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Editorial

This issue of the Malaysian Journal of Pharmacy, the official journal for the Malaysian Pharmaceutical Society contains several research articles that were submitted to the editor in the past few years since the last issue of the journal in 2006. The issue also publishes the proceeding of the Malaysian Pharmaceutical Society Scientific Conference 2006.

The shortage of contribution from the researchers to the locally published journals has contributed to the delay or even discontinuation of most local journals. Higher reward given by the research institutions or universities to the researchers who published their finding in high impact factor journals has contributed to this scenario. The researchers are willing to wait for the long list to publish their research finding in more prestigious journals with highest impact factor. Local journals are left to published research finding that do not meet the merit of prestigious journals.

The editor of the Malaysian Journal of Pharmacy is inviting all authors to publish their article in this journal. Contribution could be in the form of original article, review article, continuous pharmacy development (CPD), short communication, letter to editor and other type of manuscripts. The editor also welcome contribution in the from of important news related to pharmacy such as news on adverse drug reaction, list of drug discontinued from the market, new list of registered drugs, and other related information. Malaysian Pharmaceutical Society Area Committees are also invited to publish the report of their activities in the Malaysian Journal of Pharmacy.

Mohd Baidi Bahari

Adherence To Antihypertensives Among Haemodialysis Patients At Five Non-Governmental Organisation Centres In Malaysia

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Abstract

Background: Uncontrolled hypertension is associated with increased cardiovascular mortality among haemodialysis (HD) patients. Poor adherence to antihypertensive regimens was found to contribute to inadequate control of blood pressure. The study is aimed to investigate the adherence to antihypertensives and factors affecting adherence among HD patients at non-governmental organisation (NGO) dialysis centres at the vicinity around Kuala Lumpur

Methods: Cross-sectional surveys using questionnaires were conducted in five NGO dialysis centres and Statistical Package for the Social Sciences (SPSS) was employed to conduct all statistical analyses. Patients who took at least 80% of the prescribed antihypertensives were considered as adherent.

Results: Two hundred and thirty-one respondents were interviewed; of which, 68% of patients were adherent. Patients' socio-demographic characteristics did not show any correlation to their adherence ($p>0.05$). On the other hand, the setting of dialysis centres did influence drug adherence significantly ($p=0.033$). Medication cost influenced adherence in a way that those who received medication for free and who had no difficulty paying for their medications were more adherent when compared to their counterparts ($p=0.004$ and $p=0.016$, respectively). The number of prescribed medications also showed significant relationship with adherence ($p=0.032$). Furthermore, patients who did not experience major side effects from antihypertensives revealed better adherence ($p=0.019$). *Conclusions:* Adherence to antihypertensives was suboptimal among HD patients at the NGO dialysis centres studied. Thus, all potential barriers to adherence should be taken into consideration in the treatment of hypertension among these patients.

***Keywords*: haemodialysis; drug adherence; antihypertensives**

Introduction

Cardiovascular disease is the main cause of death in haemodialysis (HD) patients. In Malaysia, it accounted for 26% of death in dialysis population in year 2004 [1]. Hypertension is one of the risk factors to increased cardiovascular mortality [2,3] while antihypertensive therapy was found to decrease the risk [3].

Prevalence of hypertension in HD patients is very high and in the United States it was found to be 86% [4]. Tozawa and colleagues [5] reported that antihypertensives were the second most commonly prescribed group of drugs in HD patients with 71% of patients were prescribed at least one antihypertensive agent.

Despite advanced development of effective antihypertensive drugs and treatment guidelines, pharmacological treatment of hypertension in HD patients continue to be a great challenge to healthcare providers partly because HD patients are known to be poor compliers to their medications [5-7]. Drug adherence is now recognised globally as the foundation to the success of medical therapy, because patients will only obtain the full benefit of the medications provided they follow the prescribed regimens reasonably closely. More than one studies found that poor adherence to antihypertensives was one of the major factors to uncontrolled hypertension [8,9].

Very few studies, if any, regarding drug adherence among HD patients have been carried out in Malaysia. In view of the importance of adherence to antihypertensives on blood pressure (BP) control, the need for a research to study adherence to antihypertensives and factors affecting adherence among HD patients in Malaysia either as a whole population or in subgroups of population is clear and warranted. Non-governmental organisation (NGO) dialysis centres became the focus of this study because over the years, the NGOs have been playing an increasing role in dialysis provision in this country. A recent report showed that 34% of dialysis patients in Malaysia were receiving their HD treatment in NGO dialysis centres in year 2004 [1]. These centres are mostly non-profit, charitable organisations which provide subsidized treatment to patients from low-income groups.

The aims of this study are to assess the degree of adherence to antihypertensive regimens among HD patients at various NGO dialysis centres, to examine adherence according to socio-demographic characteristic and to identify various

factors affecting adherence to antihypertensive(s).

Methods

Study population

NGO dialysis centres located in the vicinity of the University of Malaya were identified. Subsequently, ethical approval to interview consenting patients and to review their medical records was obtained from the respective authorities. All adult HD patients who were prescribed at least one antihypertensive agent were eligible to participate in this study. Subjects were recruited by convenience sampling.

Patients who had received haemodialysis therapy for less than three months were excluded from the study because their clinical conditions and their drug regimens were yet to be stabilised [10]. Patients who could not be interviewed because they were too ill, had difficulties with communication or had severe physical or mental disabilities were excluded. Those who could not recall their drug regimens were also excluded.

Data collection

A pilot study was conducted to check the clarity and reliability of the questionnaire. Amendments were made to the questionnaire before the actual study was carried out. Interviews were conducted from October, 2005 to February, 2006. Patients were interviewed using structured questionnaires while they were receiving their dialysis treatment. The questionnaire included questions on socio-demographic characteristics, the patient's renal disease and drug treatment. Information obtained was corroborated with their medical records. Four questions used to assess adherence to antihypertensives were adopted from the Brief Medication Questionnaire developed by Svarstad and colleagues [11]. These questions focused in the past one week to minimise recall bias.

Percentage of adherence in the past seven days was calculated as follows:

$$\text{Percentage of adherence} = \frac{\text{Total number of antihypertensive pills consumed by the patient in the past week}}{\text{Total number of antihypertensive pills that was to be consumed in the past week}} \text{ X } 100\%$$

Data analysis

For the purpose of statistical analysis, adherence was defined as taking at least 80% of the prescribed antihypertensives dose within the past seven days [12,13]. All statistical analyses were performed using Statistical Package for the Social Sciences (SPSS Inc., Chicago IL, USA.). Chi-square tests were used to analyse the relationships between adherence to antihypertensive(s) and (i) patients' socio-demographic characteristics and (ii) patients' clinical characteristics. The variables were considered to be significantly related to adherence to antihypertensives if p values were less than 0.05.

Results

Patient characteristics

Of 252 eligible patients approached by the investigators, 21 refused to participate (response rate of 92%), resulting in a total of 231 patients from five NGO dialysis centres participated in this study. These five centres were labelled as Centre A, B, C, D and E for the purpose of confidentiality. The age of HD patients in this study population ranged from 26 to 82 years (mean = 52.82 years; SD = 12.54 years). Male patients accounted for 57.6% and 42.4% female. More than half of the patients were Chinese (61%), 21.4% of Malay, 17% of Indian and one Portuguese. These patients had been dialysed from a minimum of 3 months up to a maximum of 15 years (mean = 3.49; SD = 3.00). The number of concurrent diseases (other than end stage renal failure) ranged from one to five (mean = 2.36; SD = 0.91); whereas the number of prescribed medications taken by them ranged from three to eleven (mean = 6.44; SD = 2.06).

Degree of adherence

There were 57% of patients admitted 100% adherence to their antihypertensives, 11% achieved adherence rate at least 80% (but not to 100%) and 32 % showed an adherence rate less than 80%.

Patient socio-demographic characteristics and non-adherence

As seen in Table 1, socio-demographic characteristics did not show significant relationships with adherence to antihypertensive(s).

Clinical characteristics of non-adherent patients

Table 2 summarises the correlations between adherence to antihypertensives and patient clinical characteristics. A few significant relationships were observed between patients' clinical characteristics and non-adherence to antihypertensives.

Table 1: Socio-demographic characteristics and non-adherence to antihypertensive(s)

Characteristics	Number of patients interviewed	Number of non-adherent patients (%)	(p)
Total	231	74	
Gender			(0.495)
Male	133	45 (33.8)	
Female	98	29 (29.6)	
Age (in years)			(0.735)
26-45	65	22 (33.8)	
46-65	136	41 (30.1)	
66-85	30	11 (36.7)	
Race			(0.301)
Chinese	144	43 (29.9)	
Indian	46	14 (30.4)	
Malay	40	16 (40.0)	
Portuguese	1	1	
Marital status			(0.608)
Married	171	52 (30.4)	
Never married	42	14 (33.3)	
Divorced/ separated	10	5 (50.0)	
Spouse deceased	8	3 (37.5)	
Education			(0.666)
Illiterate	27	9 (33.3)	
Primary school	79	29 (36.7)	
Secondary school	105	31 (29.5)	
Tertiary education	20	5 (25.0)	
Employment			(0.496)
Unemployed	184	57 (31.0)	
Employed/self-employed	47	17 (36.2)	

Table 2: Clinical characteristics and non-adherence to antihypertensives

Characteristics	Number of patients interviewed	Number of non-adherent patients (%)	p value
Total	231	74	
Dialysis centres			(0.033*)
Centre A	96	25 (26.0%)	
Centre B	70	32 (45.7%)	
Centre C	35	9 (25.7%)	
Centre D	21	4 (19.0%)	
Centre E	9	4 (44.4%)	
Length of time on dialysis			(0.781)
≤ 2 years	109	33 (30.3%)	
> 2-5 years	74	26 (35.1%)	
> 5 years	48	15 (31.3%)	
Cause of renal failure			(0.812)
Diabetes	109	37 (33.9%)	
Hypertension	35	10 (28.6%)	
Others	87	27 (31.0%)	
Number of co-morbidities			(0.992)
1	40	13 (32.5%)	
2	96	31 (32.3%)	
≥ 3	95	30 (31.6%)	
Number of prescribed medications			(0.032*)
3-5	79	32 (40.5%)	
6-8	110	26 (23.6%)	
9-11	42	16 (38.1%)	
Number of antihypertensives			(0.618)
1	106	35 (33.0%)	
2	79	27 (34.2%)	
3-5	46	12 (26.1%)	
Monthly medication expenses			(0.021*)
Free (Government subsidized)	122	29 (23.8%)	
RM 1-RM 50	27	13 (48.1%)	

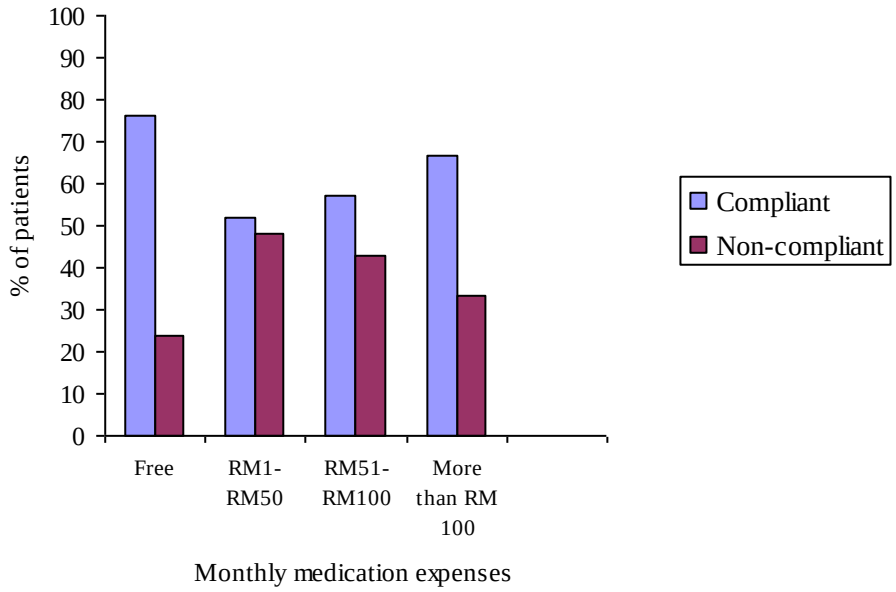
RM 51-RM 100	49	21 (42.9%)	
> RM 100	33	11 (33.3%)	
Difficulty paying for medications			(0.016*)
Had difficulty	58	26 (44.8%)	
No difficulty	173	48 (27.7%)	
Side effects			(0.019*)
Experienced side effects	27	14 (51.9%)	
No side effect	204	60 (29.4%)	

* Significant difference

The locations of dialysis centres influenced adherence to antihypertensives significantly (p = 0.033). Patients from Centre B were more likely to be nonadherent compared to those from Centre A (p=0.008), C (p=0.048) and D (p = 0.028). No significant difference was found among Centre A, C and D. Centre E was not included in the comparison because its sample size was too small. The number of prescribed medications, rather than the number of prescribed antihypertensives was found to influence non-adherence to antihypertensives. Those patients who took six to eight medications daily were significantly more adherent than those taking three to five medications (p = 0.013). In general, patients whose medications were fully subsidised showed significantly better adherence than those paying for their medications (p = 0.004).

Contradictorily, when a medicine with a higher cost was prescribed, the adherence rate was also higher (Figure 1). Finally, patients who had difficulty paying for their medications and those who experienced side effects from their antihypertensives were significantly less adherent than their counterparts

Figure 1: Comparison of adherence to antihypertensives according to monthly medication expenses



Discussion

As has been found in previous research, an adherence rate of at least 80% is required to achieve a desired reduction in BP [12,13]. With this cut-off point, 68% of patients were found to have adequately complied with their antihypertensive regimens. The degree of adherence to antihypertensive medications in this study was found to be higher compared to a study by Curtin and colleagues [14], where only 52% to 57% of patients acquired at least 80% of adherence. This difference could be due to the variation in methods that were employed in carrying out the research [15]. In their study, Medication Event Monitoring System (MEMS^{TM}) was used to monitor patients' adherence over a period of six weeks. Furthermore, interview method is known to overestimate adherence rate because patients tend to underreport their non-adherent behaviour and some may be unwilling to disclose this medically unacceptable behaviour [11].

Socio-demographic characteristics were not found to be associated with adherence to antihypertensives. Multiple studies have been conducted to study the relationship between drug adherence and demographic characteristics. So far the results are inconclusive [6,14,16]. This study was unable to assess the relationship between household income and adherence to

antihypertensives as about 10% of patients did not know or were unwilling to disclose their household income and some admitted underreporting their household income. Enrolment for most NGO dialysis centres in Malaysia gives priority to those from a lower income group. Hence, it is understandable why patients refused to disclose their actual household income.

The setting of dialysis centres was found to significantly influence patients' adherence to antihypertensives. This observation is probably closely related to the nature of healthcare provider-patient relationship. Centre A is the only centre in this study which has an in-house nephrologist and doctors. Medical consultation is readily accessible whenever patients experience any doubt or problems regarding their antihypertensive regimens. Constant availability of doctors to patients provides a sense of security and nurtures a trusting doctor-patient relationship and subsequently promotes patient adherence [17,18]. On the other hand, the other dialysis centres are affiliated to nearby hospitals and patients are followed-up by visiting doctors. In these centres, the ratio of staff nurse to patients seemed to influence patient adherence. The ratio of staff nurse to patients in Centre B, C and D were 1:10, 1:5 to 7 and 1:5, respectively. It is evident that the lower the ratio of staff nurse to patients, the higher the adherence rate was observed. This could be due to a better quality and quantity of time spent between nurses and patients facilitating drug adherence.

The impact of healthcare provider-patient interaction on patient care is always a topic of interest among researchers [19-21]. In the management of patients with chronic diseases, in this case, HD patients, a multidisciplinary involvement of healthcare team is essential (Joy et al. 2005). Pharmacists in Malaysia do not yet have rapport with HD patients as compared to rapport of doctors and nurses to HD patients. Pharmacists can provide counselling to HD patients regarding their medications and benefits of being adherent to prescribed regimens. They can also help in addressing patients' feedbacks about their medications. Throughout the years, many studies have successfully proven the positive impact of pharmacist's involvement in the care of HD patients [22-25].

A linear relationship between the number of prescribed medications and adherence to antihypertensives was not found. The exact reason behind this observation is unclear. Nevertheless, it is worth noting that the use of pillbox was found to be beneficial in facilitating drug adherence especially for patients with polypharmacy.

High medication cost adversely affects drug adherence [26,27]. Drug affordability is always a concern among HD patients because other than monthly medication expenses, they have to pay for their HD treatment and other medications such as erythropoietin and calcitriol. In this study, it was found that patients received their subsidized medication were more likely to be adherent to antihypertensives than those who have to pay the full cost for their medications. This could mean that if HD patients received their medications partially subsidized, their adherence may be improved.

Patients who admitted having difficulty paying for their medications appeared to be less adherent than their counterparts. This was possible that financial tension forced them to adopt strategies such as reducing or skipping doses of their anytihypertensives in order to make the medications last longer [26]. There were patients in this study who admitted being unable to refill their prescriptions in time due to financial constraint.

Piette and colleagues [28] concluded in their study that problems associated with cost of medication are rather complex. Patients can react to cost of medication differently. Some would continue taking their medication despite the cost, but some would forgo treatment even though they could afford it. In order to have a better view about the effect of medication cost on individual patients, Heisler and colleagues [29] suggested that healthcare providers should discuss about this issue with their patients as part of the assessment of drug adherence. Identifying patients with financial difficulty and subsequently appropriate actions such as recruiting financial aid from welfare bodies or prescribing less expensive alternatives would probably be helpful in promoting drug adherence.

Side effects associated with antihypertensives such as dizziness, general weakness, a 'weak heart' and a slow heart rate were identified by patients. In this study, less than half of the patients told their doctors about their drug problems. This phenomenon agreed with the finding by Kjellgren and colleagues [17] that patients are usually reluctant to tell their doctors about the side effects they experienced if these side effects can be alleviated by altering the dosage themselves. Furthermore, patients did not have ready access to doctors in most dialysis centres in this study. Failure of patients to tell their doctors about the side effects of drugs they experienced may actually endanger their wellbeing especially if these side effects occur frequently [18]. In view of this, healthcare providers have the responsibility to constantly seek feedbacks from patients on whether they experience

any side effects from their current therapy [17]. These feedbacks help reveal their non-adherent behaviour.

As reported by Horne and Weinman [30], there were patients who did not experience side effects from the current antihypertensive regimens, yet due to previous hypotensive episodes, they pre-empted by intentionally reduce the doses of their medications. In the present study, many patients withheld their antihypertensive doses on own accord before dialysis due to the concern of intradialytic hypotension. This action has been identified in previous studies as one of the major factors contributing to inadequate control of blood pressure among HD patients [8,9]. It was suggested that re-evaluation of blood pressure profiles and antihypertensive regimens of these patients is warranted.

The interpretation of results in the present study should take into account the limitations. This study was conducted in only 5 out of 93 NGO dialysis centres in Malaysia [1]. In addition, the degree of adherence to antihypertensives might be overestimated because patients who were at risk of non-adherence, for example those who were confused with their drug regimens, cognitively impaired, unable to recall their drug regimens and those who were too sick to be interviewed, were excluded from this study.

Conclusion

Adherence to antihypertensives among HD patients at NGO dialysis centres appeared to be suboptimal. Socio-demographic characteristics did not predict adherence. Other factors such as healthcare provider-patient relationship, medication cost, drug affordability and side effects of medications seemed to be the stronger determinants of adherence.

The understanding regarding drug adherence among HD patients in Malaysia is still lacking. It is hope

that this study will serve as a stimulus to further studies in drug adherence among HD patients. By understanding the factors that predispose to non-adherence, specific interventions can be developed to enable patients to gain optimal benefits from their medications.

The inherent limitation of interview method to accurately measure drug adherence can be overcome by assessing the laboratory test results and examining the clinical features of the patients.

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The Study of Alfuzosin and Finasteride in the Treatment of Benign Prostatic Hyperplasia

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Abstract

Benign Prostatic Hyperplasia (BPH) is a hyperplasia process where there are an increased number of cells from the transition zone of the gland. The goals of the study were: (1) to compare the effectiveness of finasteride 5mg (Proscar) versus alfuzosin 10mg (Xatral XL) for the treatment of BPH; (2) to compare the treatment costs of both drug; (3) to compare the side-effect profile of both drug. All patients who have been diagnosed with BPH and have been receiving the treatment in SOPD Hospital Tuanku Ja'afar were reviewed. The inclusion criteria were: (1) male more than 45 year old; (2) patients who are not suffering from recurrent or rebound BPH. Subjects were evaluated using the International Prostate Symptom Score (IPSS) questionnaire The score and side effects occurrence were analysis by SPSS. Only 66 men were analyzed in the study as 6 men (8.3%) were excluded. 36 of them (55%) are taking Finasteride 5mg once daily whereas the other 30 men (45%) are taking the extended released form of Alfuzosin 10mg once daily. The distribution of subject's age is even. Subjects with Finasteride 5mg have higher score (mean = 22.18) than Alfuzosin 10mg (mean = 18.87) ($p<0.05$). However, the total side effect score of both drug showed no significant different ($p>0.05$). Finasteride group (mean = 0.52 case) has experienced a slightly more side effect than the Alfuzosin group (mean = 0.50 case). This study concluded that both Alfuzosin and Finasteride provide symptomatic relief to BPH patients. Alfuzosin with its faster onset of action could be very useful for patients who were diagnosed with BPH and carry moderate IPSS scores.

Keyword: Benign Prostate Hyperplasia, Alfuzosin, outcome

Introduction

Benign Prostatic Hyperplasia (BPH) is a hyperplasia process where there are an increased number of cells from the transition zone of the prostate gland. The prevalence of this condition increases with age and requires the presence of testicular androgens. About half of men's population will develop BPH by the average of 50 years old, due to the complex stromal-epithelial interactions[1]. The disease can be progressive, showing symptoms which can be classified into two categories: irritative (frequency, nocturia, burning, urgency or urge incontinence) and obstructive (hesitancy, weak stream, dribbling, incomplete voiding or retention). Besides these bothersome lower urinary tract symptoms (LUTS), there could also be associated anatomic enlargement of the prostate leading to the compression of the urethra, resulting in compromised urinary flow and bladder outlet obstruction (BOD).

BPH symptoms manifested could interfere with patient's daily living activities, causing significant impairment in the quality of life and in some cases compromised sexual functioning. Serious cases could also subsequently lead to secondary changes of the bladder anatomy and function, urinary tract infections, formation of bladder stones, and eventually causing the deterioration of the upper urinary tract accompanied with renal failure.

Patients manifesting with different symptoms should be treated using different approaches. Most patients are first assessed by a quantitative symptom score, such as the International Prostate Symptom Score (IPSS) which was further applied in the present study. According to a study[2], an estimated 35 percent of elderly males need either surgical or medical intervention or both for BPH in their lifetime. However, surgical intervention was rather radical from most of the patient' perspective and many of them were reluctant to undergo surgery and prefer a less invasive treatment. Patients are aware of the availability of effective pharmacotherapy and also have the awareness of the complications of surgery which can include significant morbidity such as irreversible incontinence and loss of sexual function. It is therefore not astounding that besides surgery and watchful waiting, medical management is generally the first recommendation for patients showing bothersome symptoms, although many do make it better without any intervention.

When treating BPH, drug therapy could always be an option to control symptoms and delay the need for surgical intervention. To decide the most appropriate medication to treat moderate to severe BPH, it is often

crucial that the choice of drug depends on the actual or patient-perceived effectiveness of therapy, onset of action, adverse effects, dosing regimen, potential drug-drug interaction and cost. The goals of drug therapy are to provide symptomatic relief and to prevent any further complications. Drug therapy for BPH normally begins with a single therapeutic agent, usually an alpha-adrenergic antagonist. BPH medication treatment is always indicated for long period. Therefore, patient should always be advised that symptoms improvement could be observed only when treatment is continued and good adherence is observed.

Drug therapy for BPH can be classified into 2 different categories: agents that act directly on the prostatic smooth muscles and those that interfere with the stimulatory effects of testosterone on prostate enlargement. Of the agents, α_1 adrenergic antagonists such as alfuzosin, doxazosin, terazosin relax prostatic smooth muscles, whereas 5-α reductase inhibitors such as finastride, selectively inhibit the conversion of testosterone to dihydrotestosterone. Both these agents are accepted for treatment of BPH. However, the difference in their mechanisms of action has rendered these agents in treating different clinical symptoms. Finasteride was found to work best with patients who have a significant prostate enlargement of more than 40g in size. On the other hand, $\alpha_1$adrenergic antagonists are more effective in treating patients who manifest with BPH symptoms caused by excessive adrenergic tone in the prostatic stroma. Therefore, these antagonists are often commonly being considered to be an appropriate treatment for all patients regardless of prostate size.

FDA has currently approved four α adrenergic antagonists (doxazosin, terazosin, tamsulosin and alfuzosin) for lower urinary tract symptoms associated with BPH. These agents however showed equal benefits and all provide modest symptoms relief. The first generation of α blockers such as doxazosin, terazosin and prazosin are associated with significant vasodilatory actions. These α blockers are always associated with certain degrees of vasodilatory side-effects such as dizziness and postural hypotension and subsequently cause poor compliance to treatment.

Newer generations of α blockers, namely alfuzosin and tamsulosin, bind more prominently to the lower urinary tract tissues compared to vascular tissues. Reflecting this differential pattern of tissue binding, these agents have been found to be associated with a lower risk of significant vascular side-effects compared with the non-uroselective α inhibitors, despite having a significant effect in reducing BPH

symptoms[3]. However, literature has revealed that tamsulosin appears to have a lower probability of causing postural hypotension, but higher chances of ejaculatory dysfunction than other α blockers.

The extended release (ER) form of alfuzosin (10mg once a day) has been used and approved by the United States Food and Drug Administration in 2003 for treating signs and symptoms of BPH based on clinical improvements of the irritative and obstructive urinary symptoms of the disease. A study mentioned in the literature[3] had discussed a meta-analysis of 3 clinical trials studying the vasodilatory effects of the ER alfuzosin compared to placebo. In these studies, results had shown that the effects were similar to placebo and no significant changes in blood pressure were observed.

On the other hand, finasteride, a selective 5-α reductase inhibitor, acts throgh a different mechanism compared to α-blockers. It decreases the conversion of testosterone to dihydrotestosterone, a hormone primarily found in the prostate gland, testes, hair follicles and adrenal glands. Dihydrotestosterone is the primary contributing factor in the development or exacerbation of BPH and prostate cancer. Therefore, finasteride, by selectively inhibiting type II 5-α reductase, could progressively delay the development of BPH. Many studies have shown that finasteride, when compared to placebo, has effectively reduced the volume of the prostate and enlarged prostate glands in men [4,5].

Methodology

We conducted a study to compare two BPH drugs with different mechanisms of action. The aims of the study were: (1) to compare the effectiveness of finasteride 5mg (Proscar) versus alfuzosin 10mg (Xatral XL) for the treatment of BPH; (2) to compare the treatment costs of both drug; (3) to compare the side-effect profile of both drug
Subjects were patients who have been diagnosed with BPH and have been receiving the treatment in SOPD Hospital Tuanku Ja'afar. The inclusion criteria were: (1) male more than 45 year old; (2) patients who are not suffering from recurrent or rebound BPH. On the other hand, the exclusion criteria include: (1) patient who has multi-disease prior to the study; (2) patient who has undergone surgical intervention prior to the study; (3) patient who was taking any other traditional or complementary medicines.

Subjects were evaluated using the International Prostate Symptom Score (IPSS) questionnaire (Appendix I). This instrument evaluates the lower urinary tract symptoms for the past one month. Subjects were asked seven questions associated with the following symptoms: (1) incomplete emptying

of bladder during urination; (2) frequency of urine in less than 2 hours; (3) intermittency that stopped and started again when urinated; (4) urgency (difficulty to postpone urination); (5) weak stream; (6) straining which push to begin urination; and (7) nocturia (the number of times the subject has to get up from bed to urinate at night). The rating ranged from 0 to 5 which represent the frequency of the above symptoms in the past one month. The total score of IPSS is calculated by sum up the individual scores. Based on the total score of IPSS, 0-7 means mildly symptoms; 8-19 means moderately symptoms and 20-35 means severely symptomatic.

Subjects were also asked about side-effects of the drugs based on the established side-effects profiles of the drugs. This was to help the researcher to evaluate the patient's acceptance of the drug therapy. There was a total score of 10 for this question.

The data were analyzed using SPSS. The two treatment groups were compared using Student's *t*-test. *P*-value less than 0.05 was considered statistically significant.

Results

A total of 72 men diagnosed with BPH were involved in the study. However, only 66 men were included in the analysis. Of the 72 patients, three were taking the combination treatment of finasteride 5mg and alfuzosin 10mg, 2 other patients had just started the treatment for less than 1 week, whereas 1 patient was known to have underlying disease (stroke). Therefore, 8.3% of the total patients were excluded from this study as they did not meet the inclusion criteria.

36 of the subjects (55%) received finasteride 5mg once daily, whereas the rest took the ER alfuzosin 10mg once daily. The distribution of patients included was fairly equal to help minimize any bias in patient selections. This is the true distribution of patients encountered by our hospital out-patient department as the stock movements of our integrated store were found to be collaborated with our patient numbers.

Table 1 column 2 presents the distribution of the subjects by age group. Twenty men (30%) were from 50 to 59 years, 18 men (27%) were from 60-69 years, and 22 men (34%) were from 70-79 years. Only a small proportion of the study population (9%) was more than 80 years old.

Table 1 Age distribution of patients who received two different therapies for BPH

Age Group	N (%)	Name of Drugs	
		Finasteride 5mg	**Alfuzosin 10mg**
50-59	20 (30)	2 (5.56%)	18 (60%)
60-69	18 (27)	12 (33.3%)	6 (20%)
70-79	22 (34)	20 (55.6%)	2 (6.67%)
80-89	4 (6)	2 (5.56%)	2 (6.67%)
90-99	2 (3)	0 (0%)	2 (6.67%)

Table 1 Columns 2 and 3 shows the distribution of patients who received two different therapies for BPH, by age categories. In the finasteride group, about 33% of the patients were in the range of 60-69 years old, and more than half of the patients were aged 70-79 years. Conversely, in the alfuzosin group, the majority of the patients (80%) were between 50-69 years old. This shows the trend of drug prescribing in our hospital, where the younger patients were most probably prescribed with alfuzosin and the older patients were treated with finasteride.

Subjects who received finasteride 5mg had a significantly higher IPSS than those who received alfuzosin 10mg (mean IPSS of 22.18±8.06 vs.18.87±7.34, respectively; p=0.001). This indicates that patients who were treated with finasteride were severely symptomatic whereas those who received alfuzosin were moderately symptomatic (Table 2).

Table 2 Statistical results of mean IPSS score for patients on Alfuzosin and Finasteride

Drugs	N	Mean	Std. Deviation	P value
Finasteride 5mg	598	22.18	8.060	0.001
Alfuzosin 10mg	448	18.87	7.337	

Table 3 Mean IPSS scores for patients in different age groups

Age group	Mean Total IPSS Score	
	Finasteride 5mg	**Alfuzosin 10mg**
50-59	27	16
60-69	21	25
70-79	19	3
80-89	32	4
90-99	n/a	22

This study compared the mean IPSS of different age groups in the two treatment arms. Student's *t*-test shows that there was no significant difference in IPSS between the two treatment arms across all age groups. Most of the groups obtained a mean IPSS of 20 and above, which indicates severely symptomatic patients (refer to Table 3).

The distribution of mean score based on duration of treatment of both drug is shown in the Table 4. The mean score of finasteride 5mg for less than half a year was 25; half a year to one year was 11; one year to 1.5 years was 30; and more than 1.5 years was 20. On the other hand, the mean score of alfuzosin 10mg for less than half a year was 20; half a year to one year was 21; one year to 1.5 years was 7; and more than 1.5 years was 10.

Table 4 Mean IPSS scores for patients according to duration of drug therapy

	Mean Total IPSS Scores				**P values**
	< 1/2 yr	**0.5 yr to 1 yr**	**1yr to 1.5 yr**	**> 1.5 yr**	
Finasteride 5mg	25	11	30	20	>0.05
Alfuzosin 10mg	20	21	7	10	

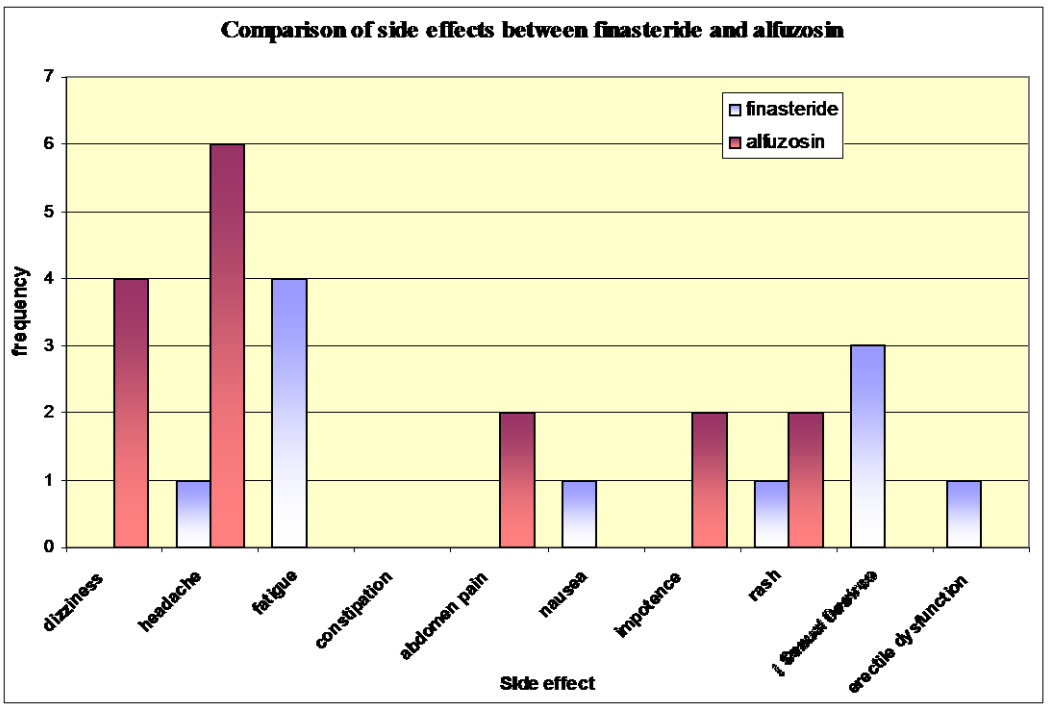
Table 5: Mean score for the number of adverse events occurred among patients

	Incidence of Side-effects			
Drugs	N	Mean	Std. Deviation	p
Finasteride 5mg	598	0.52	0.738	0.639
Alfuzosin 10mg	448	0.50	0.745	

Table 5 shows no significant difference in the total side-effects scores between the two intervention groups (p=0.693). Overall, the finasteride group had experienced a slightly higher incidence of side-effects than the alfuzosin group (mean = 0.52 cases vs. 0.50 cases, respectively)

Figure 1 presents the frequencies of individual side-effects among the treatment groups. about 16.7% subjects on finasteride complained of fatigue and decreased sexual desires 5.6% experienced problems related to erectile dysfunction. Headache and dizziness contributed to 33.3%of side effects experienced by Alfuzosin arm.

Figure 1: Side effects experienced by patients on finasteride and alfuzosin group



In comparison of treatment costs between the two treatments, finasteride 5mg tablet (Proscar) was RM 123.00 per pack of 30's while alfuzosin 10mg tablet (Xatral XL) was RM 41.31 per pack of 30's. Treatment of BPH is often life long and effect will only be seen when the treatment is continued. Therefore, to consider a one-month treatment, alfuzosin can reduce cost by RM81.969 per month, contributing to RM980.28 every year.

Discussion

The most important finding of this study is that patients taking ER alfuzosin 10mg had a significantly lower International Prostate Symptom Score (IPSS) when compared to patients taking finasteride 5mg. BPH and its consequent bothersome lower urinary tract symptoms can severely affect quality of life in older men. On the basis of this study, we could deduce from the mean IPSS that alfuzosin provided a better improvement in the quality of life of these patients.

The study did not collect patients' baseline values of the IPSS, therefore it is impossible for us to compare the effect before and after treatment. However, the finding showed that patients with higher IPSS scores (more severe) were normally prescribed finasteride 5mg. This observation could be seen as rational, since BPH is a progressive illness and significant prostate enlargement of more than 40g is normally a manifestation of the later stages of BPH. Progressive growth of the prostate would eventually overcome the reduction in prostatic urethral obstruction achieved by the relaxation of prostatic smooth muscle tone caused by alpha blockers even in patients on therapy[5].

One study which compared finastride with placebo showed symptomatic improvements in men with prostatic enlargement and moderate to severe symptoms[4]. Therefore, it would be logical to prescribe finasteride to patients who do not respond well with to alfuzosin and to minimize the need of surgical intervention as it is always an attribution to severe enlargement of prostate size. Patients treated with finasteride can eventually have a four-year risk reduction for surgical intervention and acute urinary retention[4]. The benefit of finasteride is slow, which can only be observed conservatively at about 4 months after initiation of therapy. Conversely, the effects of alfuzosin can be seen within first few days of treatment. The promptness of action of alfuzosin provides benefits of quick evaluation without delay and minimizes the costly long-term treatment where patients can only be re-evaluated after few months of inappropriate treatment.

The overall side effects between alfuzosin and finasteride shows no significant difference, with $p>0.05$. Patients from both arms shows different side-effects profiles, about 16.7% of patients treated with finastride had experienced fatigue and decreased sexual desires. 5.6% of them had encountered problems related to erectile dysfunction. These side-effects were mostly observed in patients receiving finastride for less than 1 year. On the other hand the most prominent side-effects experienced by patients taking alfuzosin were dizziness and headache. However, alfuzosin is generally reported to have only little effect on blood pressure when compared to other α blockers. Meta analyses of placebo and randomized controlled trials have demonstrated an extra 5%-20% of dizziness incidences reported by normotensive patients who underwent treatment with terazosin or doxazosin. However, with alfuzosin, the event of dizziness reported was approximately 5%[6]. In addition, one randomized controlled study found that the occurrence of postural hypotension with alfuzosin was at placebo level (estimated at 1%)[7]. This phenomenon is seen as alfuzosin is more selective to prostatic smooth muscle than vascular smooth muscles.

Another study estimated that about 30-50% of BPH patients would develop essential hypertension[8]. Patients who are originally on α-blocker as anti-hypertensive medications are more likely to experience cardiovascular adverse effects. Therefore, the second generation α-blockers such as alfuzosin are more suitable to this group of patients as they are more selective and could minimize the occurrence of cardiovascular side effects.

Conclusion:

From the study, it is clear that both alfuzosin and finasteride provide symptomatic relief to BPH patients. However, the differences in mechanisms of actions of the two drugs made them useful to patients with different underlying problems. Alfuzosin with its faster onset of action could be very useful for patients who are diagnosed with BPH and carry moderate IPSS scores. Further studies need to be conducted in order to obtain a clearer picture of the efficacy and tolerability of both drugs.

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Appendix I

International prostate symptom score (IPSS)

Name: Date:

	Not at all	Less than 1 time in 5	Less than half the	About half the time	More than half the	Almost always	**Your score**
Incomplete emptying Over the past month, how often have you had a sensation of not emptying your bladder completely after you finish urinating?	0	1	2	3	4	5	

Frequency Over the past month, how often have you had to urinate again less than two hours after you finished urinating?	0	1	2	3	4	5	
Intermittency Over the past month, how often have you found you stopped and started again several times when you urinated?	0	1	2	3	4	5	
Urgency Over the last month, how difficult have you found it to postpone urination?	0	1	2	3	4	5	
Weak stream Over the past month, how often have you had a weak urinary stream?	0	1	2	3	4	5	
Straining Over the past month, how often have you had to push or strain to begin urination?	0	1	2	3	4	5	

	None	1 time	2 times	3 times	4 times	5 times or more	**Your score**
Nocturia Over the past month, many times did you most typically get up to urinate from the time you went to bed until the time you got up in the morning?	0	1	2	3	4	5	

Total IPSS score	

Quality of life due to urinary symptoms	Delighted	Pleased	Mostly satisfied	Mixed – about equally	Mostly dissatisfied	Unhappy	Terrible
If you were to spend the rest of your life with your urinary condition the way it is now, how would you feel about that?	0	1	2	3	4	5	6

Total score: 0-7 Mildly symptomatic; 8-19 moderately symptomatic; 20-35 severely symptomatic.

Serum Trace Elements and Immunoglobulin Profile in Lung Cancer Patients

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Abstract

The aim of this study was to determine the serum concentrations of trace elements (Zn, Cu, Mn, Pb) and immunoglobulins (IgG, IgA & IgM) in lung cancer patients. The study was conducted among 45 lung cancer patients and 50 age and gender-matched healthy volunteers. Flame atomic absorption spectroscopy method was employed to analyze the serum trace element concentrations, and turbidimetry method using immunoglobulin kit was used for the estimation of serum immunoglobulin levels. Results showed that the majority of the patients were literate and older married patients were smokers. Compared to the control volunteers, they had significantly ($P<0.05$) lower BMI. Serum concentrations of trace elements and IgG were found to be significantly ($p<0.05$) lower in the lung cancer patients. In the cancer patients, the concentration of zinc, copper, manganese and lead were 0.028±0.007 mg/L, 0.029±0.027 mg/L, 0.011±0.15 mg/L and 0.053±0.049 mg/L respectively, while these were 1.14±0.27 mg/L, 1.15±1.09 mg/L, 0.44±0.59 mg/L and 2.209±1.885 mg/L, respectively in the healthy controls. IgG concentration was found to be 14.96±3.92 g/L in lung cancer patients and 20.56±8.02 g/L in healthy volunteers. The concentrations of serum IgA and IgM were found to be unchanged. Correlative analysis suggested that serum lead value had a significant correlation

with age in the lung cancer patient ($r = -0.369$, $p = 0.013$). The decreased concentration of trace elements and IgG may have a prognostic significance for the detection of lung cancer.

Key words: lung cancer, trace elements, immunoglobulin

Introduction

Lung cancer is the most common malignancy in the world. Its overall 5-year survival rate is only 14% (1), and it has not changed substantially over the past two decades (2) The global incidence of lung cancer is increasing with time. When advanced, these tumors are difficult to treat, and existing therapies often do not offer long-term disease control. The poor prognosis is largely due to lack of sufficient screening and early diagnostic tools to physicians. Currently the screening and early diagnosis of lung cancer relies mainly on chest X-ray, low-dose computed tomography, bronchoscopy, sputum cytology, and tumor markers including carcinoembryonic antigen (CEA), cytokeratin-19 fragments (Cyfra21-1), carbohydrate antigen 19-9 (CA19-9), squamous cell carcinoma antigen (SCCAg) and neuron-specific enolase (NSE), etc. (3). All these methods, however, lack adequate sensitivity and/or specificity (4-7). Thus, there is an urgent need to search for more specific methods that would provide more specific information for screening and early diagnosis of lung cancer. Because of the marked heterogeneity of lung cancer (7), a panel of biomarkers for screening and diagnosis would be most appropriate. Kinetic turbidimetric method for the immunochemical quantification of immunoglobulins, an innovative turbidimetry

technology introduced by Skoug JW & Pardue HL in 1988 (8) has a new way to overcome many of the limitations of the above procedures (9-10).

Since it is recognized that patients with lung cancer have defective immune responses (11-12), different factors may contribute for the development of lung cancer. However, three-dimensional active conformation of some proteins namely thymidylate synthetase, dihydrofolate reductase, p53, p16, K-ras etc. are very important. Some metal ions act as a vital role to form the three dimensional protein structure (13). So conversion of active to inactive or inactive to active conformation of proteins may depend on some particular trace elements. Trace elements at optimum levels are required for numerous metabolic and physiological processes in the

human body (14). They play a part in the synthesis and structural stabilization of both proteins and nucleic acids. Therefore, imbalances in the optimum levels of these trace elements may adversely affect biological processes, and are associated with many diseases, such as cancer (15). Lacking or imbalance of these trace elements may cause lung cancer. In view of these above investigations, the present study was designed to investigate the application of serum immunoglobulin profiling to distinguish lung cancer patients from a healthy population, and to determine the relationship of trace elements and immunoglobulins levels in lung cancer patients with their nutritional status and socio-economic factors.

Materials and methods

Study subjects

Forty-five lung cancer patients comprising 25 males and 20 females were randomly recruited from Ahsania Mission Cancer Hospital, Dhaka Medical College Hospital, Holy Family Red Cresent Hospital and Bangabandu Sheikh Mujib Medical University, Dhaka. Fifty healthy volunteers comprising 25 males and 25 females were recruited purposively as control. Regarding patients, both small cell lung cancer (SCLC) and non-small cell lung cancer patients were identified as lung cancer patients. The study subjects were briefed about the purpose of the study and written consent was taken from each of them. Ethical approval was obtained from the Bangladesh Medical Research Council (BMRC).

Socio-economic and smoking information were collected in a questionnaire. A routine physical check up such as organ activity, weight, nutritional condition, blood pressure was given to all of the patients by an oncologist. Socio-economic information was recorded at the time of admission into the hospital. Anthropometric data (height and weight) and information on smoking habit were collected during hospitalization under the direct supervision of a lung cancer specialist.

Blood analysis

A 5ml venous blood sample was collected from the antecubital vein of each of the lung cancer patients and healthy volunteers in a sterile tube. The blood was then allowed to clot and centrifuged for 15 min at 3000 rpm to extract the serum. The serum was aliquoted into eppendorf tubes and stored at −80° C for analysis of trace elements and immunoglobulins.

Analysis of trace elements

The trace elements (Zn, Cu, Mn, Pb) levels in both patients and controls were determined by using flame

atomic absorption spectrometry (Varian SpectraAA 220) according to the method of Falchuk Kh *et. al.* 1990 (16). Samples were diluted by deionized water by a factor of 40.

Immunoglobulin profiling

The serum immunoglobulin (IgG, IgA and IgM) levels in both patients and controls were determined by turbidimetry method using immunoglobulin kit (Chronolab, Switzerland). In this method anti-human antibodies were mixed with samples containing IgG, IgA and IgM that formed insoluble antigen-antibody complexes. These complexes caused an absorbance change depending upon the immunoglobulin concentration that was quantified by a calibrator. The serum was diluted with saline (1:4), and 10 µl of the diluted serum was pipetted into microtitre plate. Separate microtitre plate was used for each of the immunoglobulins (IgG, IgM and IgA). Five (5) µl, 10 µl, 25 µl, 50 µl and 75 µl calibrator protein were pipetted into marked wells of each of the microtitre plate for calibration. 230 µl of tris-buffer was then added into each serum-containing well of the three plates. Ten (10) µl of tris-buffer was added to calibrator containing wells to make total volume 240 µl. The plate content was mixed well with the help of a vortex mixer. The diluted respective anti-human IgG, IgM and IgA (1:1 diluted with saline) were added to the wells of respective microtitre plates. The plates were incubated for 2 minutes (as specified in the kit procedure) to allow complete reaction of anti-human immunoglobulin with the test serum and calibrator protein. After proper mixing, absorbance was taken at 550 nm for IgG and IgA and at 405 nm for IgM.

Statistical Analysis

SPSS software package (Version 11.5, SPSS Inc. Chicago, USA) was used to analyze the data. Descriptive statistics were used for all variables. Values were expressed as percentage, mean and standard deviation. Comparison of trace elements and immunoglobulins of lung cancer patients and controls were performed by cross-table variables and independent sample t-test. Correlative analysis was performed to find correlation of BMI and socio-economic factors on the serum trace element and immunoglobulin concentrations.

Results

Table 1 shows the socio-economic information of the lung cancer patients and control subjects. It was shown that the majority of lung cancer patients were literate (56%) with various professions having monthly income 109.53±70.44 US$, average age 52.33±12.03 years and 78% were found to be married. The mean BMI of patients was 19.79±2.58, which was significantly ($p<0.05$) lower than that of the

control subjects (25.53±4.54). The vast majority (84%) of the patients were smokers.

Table 1: Socio-demographic status and chronic energy deficiency data (CED) of Lung cancer controls (n=50) and patients (n=45)

	Patients			Controls		
Parameter	**n**	**%**	**Mean±SD**	**n**	**%**	**Mean±SD**
Education						
Illiterate	20	44.44		18	36	
Secondary (vi-x class)	12	26.67		9	18	
Higher secondary	8	17.78		15	30	
Graduate and above	5	11.11		8	16	
Occupation						
Service	15	33.33		16	32	
Small business	18	40		22	44	
House wife	12	26.67		12	24	
Monthly income in US $						
0-50	14	31.11		12	24	
51-100	16	35.56		14	28	
101-150	6	13.33	109.53±70.44	9	18	97.53±60.62
151-200	6	13.33		8	16	
201-300	3	6.67		7	14	
Age in years						
25-40	13	28.89		15	30	
41-50	12	26.67	52.33±12.03	12	24	52.86±13.21
51-60	14	31.11		15	30	
61-80	6	13.33		8	16	
Smoking Behavior						
Non Smoker	5	11.11		8	16	
Partial Smoker	22	48.89		24	48	
Habituate	18	40		18	36	
Marital status						
Married	35	77.78		35	70	
Unmarried	10	22.22		15	30	
BMI						
15.5-18.4 (CED)	13	28.89		4	8	
18.5-25.0 (Normal)	30	66.67	19.79±2.58	19	38	25.53±4.54
> 25.0 (Obese)	2	4.44		27	54	

Serum trace element levels are presented in the table 2. It was shown that compared to the control subjects, serum concentrations of trace elements were found to be significantly ($p<0.05$) lower in the lung cancer patients. The concentration of zinc, copper, manganese and lead were 0.028±0.007 mg/L, 0.029±0.027 mg/L, 0.011±0.15 mg/L and 0.053±0.049 mg/L in the lung cancer patients respectively, while these values were 1.14±0.27 mg/L, 1.15±1.09 mg/L, 0.44±0.59 mg/L and 2.209±1.885 mg/L, respectively in the healthy controls. Serum IgG, IgA and IgM concentrations of lung cancer patients were 14.96±3.92 g/L, 5.06±1.88 g/L and 5.33±2.24 g/L, which were 20.56±8.02 g/L, 4.50±1.40 g/L and 4.49±2.44 g/L in control subjects respectively (table 3). It was indicated that there was a general trend of lowering of serum immunoglobulin IgG level in lung cancer patients. Serum IgG concentration was decreased significantly ($p=0.021$) in lung cancer patients. The concentration of IgA and IgM were not changed significantly ($P>0.05$).

Table 2: Serum trace elements levels of lung cancer patients (n=45) and healthy controls (n=50).

Trace elements (mg/L)		Patients			Controls			p- value
		n	%	Mean ±SD	n	%	Mean ±SD	
Zn	<0.03 0.03-1 > 1	32 13	71 29	0.028±0.007	18 32	36 64	1.14±0.27	P= 0.000
Cu	<0.03 l 0.03-1 > 1	27 18	60 40	0.029±0.027	13 11 26	26 22 52	1.15±1.09	P= 0.000
Mn	<0.03 0.03-1 > 1	39 6	86.67 13.33	0.011±0.15	24 13 13	48 26 26	0.44±0.59	P= 0.000
Pb	< 0.1 0.1-3 > 3	42 3	93.33 6.67	0.053±0.049	10 23 17	20 46 34	2.209±1.885	P= 0.000

Table 3: Serum immunoglobulins levels of lung cancer patients (n=45) and healthy controls (n=50).

Immunoglobulins (g/L)		Patients			Controls			p-value
		n	%	Mean ±SD	n	%	Mean ±SD	
IgG	<15	8	18	14.96±3.92	11	22	20.56±8.02	P= 0.021
	16-20	17	38		18	36		
	> 20	20	44		21	42		
IgA	2-4	6	13	5.06±1.88	8	16	4.50±1.40	P= 0.265
	5-6	30	67		31	62		
	>6	9	20		11	22		
IgM	<3	14	31	5.33±2.24	19	38	4.49±2.44	P= 0.762
	3-5	23	51		22	44		
	> 5	8	18		9	18		

Correlation of serum trace elements and immunoglobulins in lung cancer patients with their socio-economic factors are presented in table 4. Only serum lead concentration of the patients was found to be influenced with the age of patients; in fact concentration of lead is negatively correlated with the age of cancer patients. There was no correlation between other parameters.

Table 4. Correlation between different parameters in lung cancer patients (n = 45).

		Pb	Zn	Mn	Cu	IgG	IgM	IgA
BMI (kg/m^2)	r	0.013	0.019	0.048	0.106	0.024	0.055	-0.032
	p	0.931	0.900	.752	0.490	0.877	0.720	0.836
Income	r	0.021	-0.009	-0.023	-0.156	-0.073	-0.247	-0.082
	p	0.892	0.955	0.881	0.308	0.635	0.102	0.594
Age	r	-0.369	0.134	0.203	-0.166	0.261	0.192	0.045
	p	0.013	0.380	0.181	0.275	0.083	0.207	0.767

r= Pearson Correlation
p= Significance (2-tailed)

Discussion

Serum trace elements level is used as diagnostic tool in cancer (17). Analysis of serum trace elements indicated a significant decrease in concentration of zinc, copper, manganese and lead. Previous reports also found a decreased serum Zn level in lung cancer patients compared to controls, which is consistent with our present findings but some other reports also suggested a significant increase in serum Cu level in lung cancer patients which is contradictory with our findings. (18-20). Trace elements play an important role in maintaining three dimensional structure of some proteins such as thymidylate synthetase, dihydrofolate reductase, p53, p16, K-ras etc. (13). So it may be suggested that the decreased trace elements in the cancer patients may be because of the deformed protein structure. It is further noted that the deficiency of trace elements like zinc, selenium might be risk factors for the development of some cancers (21).

Circulating immune complexes are detectable in the patients with carcinomas of the head and neck, stomach, rectum, external genitals, lungs, with Hodgkin's disease, and melanomas (22). Immunoglobulin levels are abnormal in all the aforementioned conditions. In pulmonary carcinoma, cancer of the head and neck, and Hodgkin's disease the concentrations of immune complexes and IgG correlate (22). Serum immunoglobulin analysis indicated that the concentration of IgG was decreased significantly in the lung cancer patients. Viramontes L, *et. al.* 1989 (23) found decreased IgA concentration in lung cancer patients, which is contradictory with our findings. Previous study also suggested defective immune activity in cancer patients (11-12). Some investigators reported a positive correlation between the extent of metastatic breast cancer and the serum level of various immunoglobulins (24), particularly IgA.

Conclusion.

From socio-demographic data it was found that the mean BMI of lung cancer patients was significantly ($p<0.000$) lower than that of the control subjects, which is well predicted. Correlative analysis suggested a significant correlation between serum lead value and age of the patients.

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Influences of Patient-Related Factors in Diabetes Management Among Non-Insulin-Treated Type 2 Diabetics

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Abstract

Study was conducted to investigate the influences of patient-related factors in diabetic management among non-insulin-treated type 2 diabetics in Outpatient Department, Hospital Kemaman. Convenience interview has been conducted, followed by further review of outpatient cards. Data collected from 29 subjects was analyzed by using SPSS Version 11. The inclusive criteria were patients diagnosed with diabetes for at least one year and on oral hypoglycemic agent. Patients on insulin treatment were excluded. The efficacy parameter was the fasting blood glucose level. 86.2% of study population were non-smokers. 41.4% consumed alternative medicines concurrently with antidiabetic medications. Majority of the subjects practiced lifestyle modifications, 62.1% in the form of routine exercise and 79.3% dietary modifications. 24.1% and 20.7% received counseling before being put on diabetic medications and on lifestyle modifications respectively. Many diabetics have poor understanding on their medications. Only 27.6% have their fasting blood glucose level ≤ 7mmol/L during the study duration. 72.4% patients claimed to have good compliance to the medications prescribed. Study revealed that patients had better glycaemic control if they had better understanding/knowledge about the medications, had better compliance, practice lifestyle modifications and had been counseled before. Other variables (age, smoking and concurrent use of alternative medicines) failed to demonstrate significant effect on glycaemic control. This study revealed problems such as non-optimal glycaemic control, insufficient patients' knowledge about the disease and medications, and inadequate compliance in diabetic population. Pharmacists can help the community to manage diabetes better. This information is expected to be useful for pharmacists in improving their roles.

Key Words: Type 2 diabetes, blood glucose level, lifestyle modifications, counseling, compliance

Introduction

Diabetes is a worldwide common chronic disorder. In ASEAN region, it is estimated that 7 million people are affected by diabetes mellitus (1). In Malaysia, diabetes is one of the most prevalent chronic illnesses which contribute to ill health and premature mortality. The prevalence is about 8% (2). Diabetes occurs when the pancreas fails to produce adequate insulin or when the body cannot utilize the insulin effectively (insulin resistance). It is a syndrome characterized by hyperglycaemia together with other metabolic abnormalities (e.g. disturbance in lipid and protein metabolism).

Essentially, diabetes mellitus is categorized into 2 groups: type 1 diabetes and type 2 diabetes. According to American Diabetes Association (ADA), 90-95% of patients diagnosed with diabetes are type 2 (3).

Type 2 Diabetes Mellitus

Type 2 diabetes is also known as adult-onset diabetes due to its relatively late onset compare with type 1 diabetes. The disorder occurs as a result of impaired insulin secretion; tissue resistance to insulin or due to increase hepatic glucose output. The long-term consequences of diabetes account for the majority of morbidity and mortality. Chronic sequelaes of diabetes always link with poor diabetes control. Glucose toxicity as a result of uncontrolled hyperglycemia appears to contribute to the development and progression of microvascular complications (retinopathy, nephropathy and neuropathy). Diabetes is also the risk factor for macrovascular implications (e.g. cardiovascular, cerebral vascular and peripheral vascular systems). (4)

Currently there is no known cure for diabetes but the disease can be controlled enabling the patient to lead a healthy and productive life. The primary goal of diabetes management is to bring the glucose level as close to normal value as possible. There are five major components in the management of diabetes mellitus: diet, exercise, education, oral hypoglycemic agents and insulin. In addition, monitoring of glycaemic control and management of complications should also be emphasized. Good glycaemic control prevents/delays short term as well as the long term diabetic complications.

Objectives

General objectives

- To investigate the influence of patient-related factors in diabetes

management in non-insulin-treated type 2 diabetics (in outpatient department of the Hospital Kemaman).
- To analyze and determine factors which might affect the glycaemic control.

Specific objectives

- To determine patients' understanding/ knowledge towards oral hypoglycaemic agents in non-insulin treated type 2 diabetics.
- To investigate the patients' compliance to the diabetes control.
- To analyze the roles of lifestyle modifications on diabetes management.
- To investigate the roles of counseling on diabetes management.
- To identify the barriers towards effective glycaemic control and steps to overcome the barriers.
- To recognize pharmacists roles in improving glucose management in diabetic patients.

Definitions

a) Diabetes mellitus

In practice, diagnosis of diabetes mellitus must be confirmed by the measurement of venous plasma glucose. Malaysian Clinical Practice Guidelines stated that the diagnosis value of diabetes is as follow:

Fasting Plasma Venous Glucose	Random Plasma Venous Glucose
≥ 7.0 mmol/L	≥ 11.1 mmol/L

In asymptomatic patient, 2 abnormal glucose values are required to confirm the diagnosis of diabetes whereas for patient presents with symptom(s), only one abnormal glucose value is diagnostic.[5]

b) Efficacy Parameter of Glycaemic Control

Many quality indicators have been proposed to measure different aspects of diabetes management. In this study, the efficacy parameter used is the fasting blood glucose level.

Efficacy Parameter	Indicators
Target Glycaemic Control	
Fasting	4.4 – 6.1 mmol/L

****The glycaemic control is considered not achieved if the fasting plasma glucose is > 7.0 mmol/L.***

c) Understanding / Knowledge of Medications Taken

Patients' knowledge of the medications taken (oral hypoglycemic agents, OHA) is expected to be one of the factors affecting glycaemic control. In this study, several questions regarding medications taken had been forwarded to the patients to assess their understanding about the oral hypoglycaemic agents consumed.

Below are some of the questions asked:

Understanding / Knowledge of Medication Name	• Do you know the name (Brand Name / Generic Name) of the medications taken? • How do you recognize your medications?
Understanding / Knowledge of Medication Indications	• What this particular medication is indicated for? • How this OHA agent acts on the blood glucose level?
Understanding / Knowledge of Medication Dosage & Administration	• How is the medication(s) taken? Dose & frequency • Pre or post prandial? • What do you do when you miss a dose?
Understanding / Knowledge of Medications Storage	• Where do you keep your medicines? • What storage condition do you think might affect the medication's efficacy?

Each section counted for 1 mark:

Level of understanding/ knowledge	*Marks*
Poor	0-1
Moderate	2-3
Good	4

d) Compliance

Type 2 diabetic patients usually were on oral hypoglycaemic agent(s) either on mono- or poly- therapy. Patients have to take their medication(s) in multiple daily dosing in order to achieve good glycaemic control. Compliance to medications, therefore, plays an essential role to ensure blood glucose level is well-controlled. In this study, 6 following questions were asked to evaluate the compliance. Each question counted for 1 mark.

- How are the medications taken?

- Have you ever forgotten to take your medications? How often?
- How frequent are you delayed in taking daily medications?
- What do you do when you miss a dose?
- When do you come for follow up / refill?
- Do you share the medications with some one else?

The interviewer would then categorize patients into poor, moderate or good compliance based on the patient's score.

Level of compliance	*Marks*
Poor	0-2
Moderate	3-4
Good	5-6

Methodology

A descriptive study has been carried out between Jan – March 2007. Sample was selected via convenience sampling among patients who were on oral hypoglycemic agent(s). The data collection was performed in two stages. In the first stage, patients were interviewed and data were recorded in a data collection form specially designed for this study (Appendix). Subsequently, outpatient cards of the same patients were reviewed to complete information.

The data was subsequently analyzed by using SPSS Version 11. Descriptive data were presented in percentage and Pearson Correlation test was used to evaluate the relationship between the fasting plasma glucose and patient's factors.

Inclusion criteria

- Patient is on at least one type of oral hypoglycemic agent.

Exclusion criteria

- Patient newly diagnosed with diabetes mellitus (less than 1 year).
- Patient on insulin treatment

Result and discussion

In this study, an overall of 29 patients with type 2 diabetes in outpatient department had been approached to assess the effect of several patient-related factors (which are expected to affect the body glycaemic control) on body blood glucose level. The study population consists of 27 (93.1%) Malays and 2 (6.9%) Chinese with 8 (27.6%) of the population were male and 21 (72.4%) were female. The population has the mean age of

54.93 ±10 and the mean of 7.38 years diagnosed with diabetes mellitus. [Table 1]

Table 1. Patient Demographics Data

Parameters	**N**
Number of patients	29
Number of OHA prescribed per patient	
Mean	1.85
Years diagnosed with diabetes mellitus	
Mean	7.38
Sex	
Male (%)	8 (27.6%)
Female (%)	21 (72.4%)
Age, (years)	
Mean (SD)	54.93 (±10.392)
Median (range)	53 (31-75)
Race	
Malay (%)	27 (93.1%)
Chinese (%)	2 (6.9%)

Most of the patients were non-smokers (86.2%). 41.4% of the population consumed alternative medications concurrently with antidiabetic medications. Lifestyle modifications, as part of diabetes management, practiced by majority of the population, with 62.1% patients claimed exercise routinely and 79.3% patients controlled their daily dietary intake.

Approximately one quarter of the population received counseling on diabetes prior to the study (24.1% and 20.7% patients received counseling before being put on diabetic medications and lifestyle modifications respectively). There are many patients out there who still do not completely understand about the medications prescribed to them. Good glycaemic control is the primary goal in diabetes management. The results, nevertheless, demonstrated a non-optimal control of blood glucose level. Only 27.6% have their fasting blood glucose level ≤7mmol/L during the study duration. More than 70% (72.4%) patients claimed to have good compliance to the medications prescribed. Some patients acknowledge moderate-poor

compliance due to personal disability, old age, multiple drug regimen and other problems. Table 2 listed the variables that might affect the glycaemic control.

Table 2 : Variables Which Might Affect Glycaemic Control

Variables	**N (%)**
Smoking	
Not smoking (%)	25 (86.2%)
Smoking (%)	4 (13.8%)
Alternative medications	
Not take alternative medications (%)	17 (58.6%)
Take alternative medications (%)	12 (41.4%)
Lifestyle modifications	
No routine exercise (%)	11 (37.9%)
Routine exercise (%)	18 (62.1%)
No dietary control (%)	6 (20.7%)
Dietary control (%)	23 (79.3%)
Counseling on medications	
No counseling given before (%)	22 (75.9%)
Counseling given before (%)	7 (24.1%)
Counseling on lifestyle modifications	
No counseling given before (%)	23 (79.3%)
Counseling given before (%)	6 (20.7%)
Understanding / Knowledge of the medications taken	
Understanding / Knowledge of medications name	
No (%)	18 (62.1%)
Yes (%)	11 (37.9%)
Understanding / Knowledge of medications indications	
No (%)	4 (13.8%)
Yes (%)	25 (86.2%)
Understanding / Knowledge of medications dosage & administration	
No (%)	7 (24.1%)
Yes (%)	22 (75.9%)
Understanding / Knowledge of medications storage	
No (%)	9 (31.0%)
Yes (%)	20 (69.0%)

Compliance	
Poor (%)	3 (10.3%)
Moderate (%)	5 (17.2%)
Good (%)	21 (72.4%)
Glycaemic control -Fasting blood glucose level	
Not-controlled (FBG > 7mmol/L) (%)	21 (72.4%)
Well-controlled (FBG ≤ 7mmol/L) (%)	8 (27.6%)

Patient-related factors have always been identified as the determining factors towards good glycaemic control. Gycaemic control, therefore, is expected to be improved if these determining factors are improved. It is expected that blood glucose level might achieve well-controlled level if the following criteria are met:

- younger age (expected to be more aware of the importance of self-care and have better understanding about the medications taken)
- non-smoker
- has better understanding about the medications taken
- has good compliance to the medications taken
- counseling on medications and lifestyle modifications given before being put on diabetic medication(s)
- practices lifestyle modifications, involving dietary control and routine involvement in physical exercise

Concurrent use of alternative medicine is also expected to influence the diabetic control.

Table 3 showed the correlation between the patient's factors and the fasting plasma glucose. The results revealed that fasting blood glucose level had no significant correlation with patients' age. Positive correlations found to be established between fasting blood glucose level and patients' understanding / knowledge towards oral hypoglycaemic agents. Patients had their blood glucose level better controlled when they had higher knowledge of the indications, dosage & administration and storage of the medications. Patients' knowledge about the name of the medications, however, did not improve the glycaemic control significantly.

Table 3. Correlation Between Fasting Blood Glucose & Patient's Factors

	Correlation coefficient	***P-value***
Age	0.323	NS
Understanding / Knowledge of medications name	-0.005	NS
Understanding / Knowledge of medications indications	0.023	<0.05
Understanding / Knowledge of medications dosage & administration	0.348	<0.05
Understanding / Knowledge of medications storage	0.247	<0.05
Compliance	0.223	<0.05
Counseling on medication before	0.193	<0.05
Counseling on lifestyle modification before	0.066	<0.05
Exercise	0.050	<0.05
Dietary Control	0.125	<0.05
Smoking	-0.247	NS
Alternative medications	-0.049	NS

P<0.05 – Significant
NS – Non-significant

Study also showed that better medication compliance produced better glycaemic control. This result was parallel with the findings from *Duff EM; O'Connor A and friends* stating that there was an inverse relationship between self-care scores and HbA1c% (6). In *Duff's* study, self-care practices included weight control, exercise and medication compliance.

Lifestyle modifications including routine exercise and dietary control appeared to influence the fasting blood glucose level positively. Patients who practiced lifestyle modifications were found to have better glycaemic control. The parallel results was demonstrated by *Sone H ; Katagiri A and friends* who concluded that lifestyle modification had a small but significant improving effect on glycaemic control (7).

In addition, this study found that the relationship between counseling given before and the extent of glycaemic control. It was found that patients who had been counseled before whether on lifestyle modifications or medications or both presented with better blood glucose

control. This finding was corresponded to the finding by *Kirk A and friends*.(8) The researchers concluded that physical activity counseling was effective in promoting physical activity in people with Type 2 diabetes. The counseling improved glycaemic control in these patients. One of the problems highlighted here is that only a minority of the population has been counseled before and has sufficient knowledge about the disease and medications taken. Counseling will help patients understand the management of diabetes better and therefore, improve the compliance and glycemic control.

It was found that no significant correlation between smoking and fasting blood glucose levels. In other words, there was no significant difference in glycaemic control between smoker and non-smoker. However the expectation that non-smokers would have better blood glucose control, can not be confirmed in this study due to the limitation in sample size. Only 4 out of 29 in the study population were smokers.

The study also failed to demonstrate any correlation between the consumption of alternative medications and the fasting blood glucose level. About half of the study populations (41.4%) were taking alternative medicines concurrently with oral hypoglycaemic agents with the beliefs that the alternative approaches will aid in their glycaemic control. Akar kayu, pegaga and traditional medicines were among those taken by these patients. The beliefs that the consumption of alternative medication helps in the management of glycaemic control, however, was not confirmed in this study. The role of alternative medicines in diabetes control is still under investigation. Not much established clinical data is available for alternative medicines use. Larger-scale and more comprehensive study on the use of alternative medicines in diabetes management should be carried out in the future.

This study managed to demonstrate some significant results but the correlations were not that impressive (correlation coefficient values were small). Diabetes is a progressive condition in which β-cell function deteriorates with increasing duration of diabetes. Stepwise therapy with multiple pharmacological therapies, therefore, is often needed over time to maintain target glucose control. Intermittent uncontrolled blood glucose level is not a definite indicator for poor diabetic control. It might just reflect a further progression of the disease and a more aggressive treatment is needed. Improving patients' factors, of course, will slow down the disease progression but persistent good glycaemic control requires a

combination of many factors. In this study, the analysis only involved the correlation between each single variable with blood glucose level.

Limitation of the study

The study has several limitations such as small sample size (N=29) and the finding does not reflect the overall situation in the diabetes population. Secondly, most of the data were gathered though verbal communications with patients (compliance, alternative medications, understanding about medications given, previous counseling history and complications). This technique is prone to possibility of incomplete or bias data. Thirdly, the study uses an average of 2 readings of fasting blood glucose that were taken within 3 months. Few readings within short period of time-frame might influence the average of blood glucose value. Finally the study does not use HbA1c level although HbA1c is a better indicator of glycaemic control. HbA1c is not routinely done at the studied hospital.

Recommendation

Education and counseling on medications and lifestyle modifications should be initiated at diagnosis stage and reinforced regularly. Group counseling can be conducted from time to time and patients are highly encouraged to participate in group counseling. Through group counseling, patients can share their problems in daily diabetes management, understand more about the disease and be able to manage the disease better.

Further study using larger population can be conducted to survey the effect of a combination of multiple factors in diabetic control. Future study is recommended to use HbA1c level as efficacy parameter for a more reliable result.

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SUPPLEMENT

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Oral Presentation OPP1 (000004)

Community Pharmacy & Clinical Governance: A Snapshot From The UK

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Clinical governance has been described as a 'means of delivering high quality services to patients'. Although a relatively new term, the processes which are described under the umbrella of clinical governance are generally well-established. Clinical governance is often depicted as comprising of seven 'pillars': risk management, clinical audit, staffing and staff management, clinical effectiveness, patient and public involvement, use of information and continuing education and training. Community pharmacists must be fully versed with the concept of clinical governance since The Royal Pharmaceutical Society of Great Britain now expects all pharmacists to engage in clinical governance when providing any professional service. Furthermore, UK community pharmacies, which hold a contract with the National Health Service (NHS) to dispense prescriptions have, since April 2005, been contractually required to meet minimum clinical governance standards. NHS organisations will visit pharmacies on an annual basis to monitor all aspects of this new Community Pharmacy contract, including clinical governance. Local Health Boards, which are the NHS bodies responsible for local health administration in Wales, have been proactive in supporting community pharmacists in this area. To date, 4 Local Health Boards have commenced using a new clinical governance toolkit, the Maturity Matrix^{TM} Pharmacy, to help evaluate clinical governance within the community pharmacy setting. A further 10 LHBs are committed to using this tool. The establishment of appropriate clinical governance systems will help community pharmacists build a good working environment for their staff, whilst simultaneously facilitating the provision of high quality services that will benefit their patients and contribute to business growth.

Oral Presentation OPP2 (000019)

Public Knowledge And Opinion Of The Role Of Pharmacist And Source Of Drug Information

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This study was carried out to study public's preference sources of medication information, their awareness of the importance of medical information with regards to medical safety and their perception on the role of pharmacists. An interviewer-administered structured questionnaire was used to interview 459 members of the public (45.3% male, 54.7% female). 79.7% of the respondents indicated that health care professional was the main source of medical information, followed by internet (32.0%). People aged 40 and below was more likely to obtain information from internet (P=0.013). The public relies more on doctors than pharmacists in getting information about medicines in prescriptions, alternative drugs and counseling on drug administration. In contrast, pharmacist was an important source of information about drug prices and herbal products. The public is concerned with the indication of medicine (95.4%), how (94.1%) and when (92.2%) to take the medicine. The main barrier in getting medicine information was due to the lack of awareness of one's right in doing so. Majority of the respondents (55.6%) visited a pharmacy less than once a month with the purpose to buy toiletries, cosmetics and supplements (58.4%). Generally, pharmacist is a profession that is highly recognised but underutilised by the public. Although the respondents are aware of the role of pharmacists as a drug expert, they tend to go to doctors to seek medication advice. The public has vague perception on the extended role of pharmacist and distinction between pharmacist and pharmacist assistant. This highlighted the need of public education on pharmacy profession.

Oral Presentation OPP3 (000043)

The Effects Of Length Of Practice And Job Position On Ethical Compliance Among Community Pharmacists In Malaysia

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Being both a professional and a businessperson simultaneously may place community pharmacists in a difficult situation as the priority between professionalism and business profit need to be delicately balanced. This study aims to compare the level of ethical compliance in community pharmacists possessing different lengths of practice and job positions. A specific pharmacoethics instrument was sent to all 1,493 registered community pharmacists in Malaysia. The ethical dimensions investigated include: *Business Practice*, *Ethical Practice*, *Professional Practice* and *Personal Attitude*. Data was analysed using SPSS whereby one-way ANOVA with post-hoc comparisons was employed. A total of 210 respondents completed the instrument (majority age-range = 31-40 years; male = 86; length of practice: 1-5years = 76, 6-10years = 67, 11-15years = 46, 16-20years = 12, >20years = 9; positions held: ***Pharmacist Only*** = 53, ***Pharmacist-cum-Manager*** = 29, ***Pharmacist-cum-Owner*** = 128). In terms of length-of-practice, no significant difference was demonstrated in all the pharmacoethics dimensions ($p>0.05$). However, ***Pharmacist-cum-Owner*** exhibited significantly lower mean scores for *Ethical Practice* ($p=0.040$) and *Personal Attitude* ($p=0.023$) compared to ***Pharmacist-cum-Manager***. In all dimensions, ***Pharmacist-cum-Owner*** consistently showed the lowest mean scores compared to the rest. These findings seemed to suggest that job positions do affect pharmacists' ethical compliance particularly in their *Ethical Practice* and *Personal Attitude* aspects. Consequently, future compulsory and structured ethical reinforcement trainings/programmes must be introduced especially for pharmacists involved in their own pharmacy management. This serves to improve the level of ethical compliance and to ensure that professionalism is never compromised in place of business priorities.

Oral Presentation OPP4 (000063)

A Cross-Sectional Survey Of Herbal Medicines Use By Residents Of Puchong, Selangor

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Despite substantial growth in the use of traditional medicine which includes herbal medicines (HM) in Malaysia, there is still limited data on its use. This study aimed to examine the prevalence and types of HM used and the reasons for their use. Face-to-face interview of convenient sample of 400 residents in Puchong, Selangor using a structured questionnaire was conducted. The questionnaire identified whether respondents had taken HM during the previous year, the identity of the products taken if any, their reasons for taking HM, their opinions on the safety and quality of HM and general demographic information. Approximately 20% of respondents reported taking a HM of some kind within the previous year. Chinese HM was the most frequently reported HM used at 36%, followed by Malay HM at 30%. The most frequently reported reason for HM intake was for general health, followed by hypertension, diabetes and arthritis. Most respondents (70%) who used HM did not inform their doctors about their HM use and about 40% of the users obtained their information on HM from traditional practitioners. HM users were significantly more likely than non-users to agree that HM were adequately tested for safety ($\chi^2 = 8.65$, $p = 0.003$) and quality ($\chi^2 = 11.89$, $p = 0.001$). In conclusion, this survey provides insight into the nature of HM usage in an urban Malaysian population. As this study revealed high prevalence of HM usage, healthcare providers should consider this issue in discussions with patients.

Oral Presentation OPP5 (000064)

Fluoxetine Versus Tricyclic Antidepressants For Depressive Disorders: A Systematic Review

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The selective serotonin reuptake inhibitors (SSRI) antidepressants have been reported to be better tolerated than the older tricyclic antidepressants. This review compares the efficacy of fluoxetine with tricyclic antidepressant namely imipramine and amitriptyline. The search strategy included a search of (a) Electronic bibliographic databases (MEDLINE, EMBASE); (b) reference lists of related reviews (c) reference lists of all located studies (d) the Cochrane Group register of controlled trials. Randomised controlled trials comparing fluoxetine with either imipramine or amitriptyline in the treatment of patients with depressive disorders were selected. The outcome measure assessed was improvement in Hamilton Depression Rating scores. Effect size from seven trials which compared fluoxetine with amitriptyline was extracted and pooled. Similarly, effect size was pooled from nine trials which compared fluoxetine with imipramine. Since there was evidence of heterogeneity of treatment effects, random effects model was used for data pooling. The pooled effect size was 0.141 (95% CI -0.119 to 0.401) for studies comparing fluoxetine with amitriptyline and 0.068 (95% CI -0.224 to 0.361) for studies comparing fluoxetine with imipramine. There was no significant difference in effectiveness between fluoxetine and amitriptyline or between fluoxetine and imipramine. As such, treatment decisions on these agents need to be based on considerations of their cost and relative patient acceptability.

Oral Presentation OPP6 (000070)

Public's Perception On The Implementation Of Dispensing Separation In Malaysia

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The main beneficiary in the implementation of dispensing separation in Malaysia should be the general public. Therefore, the study was conducted to assess the general public's perception of dispensing separation in Malaysia. A descriptive cross sectional study was conducted via personal interview using a structured questionnaire in the Klang Valley and in Sibu. The general public's perception of dispensing separation was assessed using 10 items with a 5-point Likert scale and this was validated in two pilot studies. The Cronbach alpha values improved from 0.592 to 0.943 between the first and second pilot studies. Of the 525 respondents in the Klang Valley, 43% felt that dispensing separation would be a good practice in Malaysia while 32.6% disagreed and 24.4% were not sure. Similarly, of the 400 respondents in Sibu, 43.3% were supportive, 41.5% disagreed and 15.2% were not sure. The median scores obtained in the Klang Valley and in Sibu were 31 and 30, respectively. This implies that generally the respondents were neutral towards dispensing separation. Respondents felt that since two professionals would be involved, less mistakes would occur and doctors would be more careful as the pharmacist would be checking the medicines given. However, the main concerns were difficulty in finding a pharmacist at night and inconvenience. Respondents with higher education, professional jobs, higher household incomes and greater familiarity with the work of community pharmacists, were more likely to favour dispensing separation. More exposure of the general public to the roles of community pharmacists and the consequences of dispensing separation would better prepare Malaysians for its implementation.

Oral Presentation OPP7 (000073)

Prescribing Errors Detected In The Inpatient Pharmacy Of A Teaching Hospital

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Prescribing errors are the most common type of medication errors and cause of preventable adverse drug events. A prospective direct observational study was conducted to determine the extent and types of prescribing errors detected in an inpatient pharmacy. The study was conducted over 20 consecutive weekdays and the types of prescribing errors, interventions to resolve the problematic prescriptions and outcome of the interventions were documented in a data collection form. Convenience sampling was used to select prescriptions received by the pharmacy during the study period. From a total of 2086 prescriptions sampled, 1723 prescribing errors (83 errors per 100 prescriptions) were recorded. These included 1396 (81.0%) errors of omission and 327 (19.0%) errors of commission. The most common errors were absence of date on the prescription (51.1%), double prescriptions (10.2%) and missing patient data (8.0%). Drugs commonly associated with prescribing errors were ciprofloxacin, pantoprazole and ranitidine. Most of the errors detected were classified as probably clinically insignificant (70.3%) while 0.2% was considered as potentially life-threatening. A total of 26.6 hours were spent to resolve 499 prescriptions (23.9%) with problems. The main outcome of the interventions was the prescription was clarified, dispensed or not dispensed. The results of this study demonstrate that prescribing errors are common and although a small proportion may be of clinical significance, these are preventable and hence, measures should be taken to prevent the occurrence of such errors.

Oral Presentation OPP8 (000076)

A Preliminary Report On Public Quit Smoking Clinic In Malaysia

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According to the statistics from the Malaysia Health Ministry for the year 2000, 54.6% of adult men and 5% of adult women were smokers. A few of these smokers had tried or were willing to quit smoking. Since 1998, the smoking cessation program (SCP) was initiated at more than 200 Quit Smoking Clinics (QSC) throughout the country. The aim of this study was to examine the activities and facilities in these clinics. The study was carried out in two phases. In the first phase, a natural observational study was conducted at the Respiratory Medical Institute Kuala Lumpur. In the second phase, a brief cross sectional telephone survey was conducted using convenience sampling with one representative of QSC from every district in Malaysia. Out of the 294 QSC identified, 173 was still actively practicing SCP while 106 was no longer practicing SCP. Another 15 SCP was not contactable. Out of 173 active QSC, 78 was chosen for the telephone survey. A total of 200 counselors were identified in these QSC and the majority of these counselors were Medical Officers. Only two were pharmacists. The majority (90%) of these QSC were supplying their clients' nicotine replacement therapy. Further work will be carried out to evaluate the success of the smoking cessation program.

Oral Presentation OPP9 (000022)

Malaysian Pharmacists' Attitude Towards Dispensing Separation (SPD)

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This descriptive study was conducted by sending self-administered questionnaires to pharmacists from all states in Malaysia which were selected randomly. The survey aims to assess the level of support from pharmacists on SPD, and to find out and compare the community pharmacies' preparation for SPD. 85% of the respondents supported or strongly supported the implementation of SPD in Malaysia, compared with only 2% who opposed. 75% of those who opposed gave the reason that there are not enough pharmacists. The pharmacists felt that the main advantage of SPD was that patients would get more information about their medicines but the main problem would be opposition by medical doctors. 58% of the respondents felt that dispensing fees should be charged. The majority of the respondents (44%) thought that it would required 2 to 5 years of preparation before SPD can be implemented in Malaysia. The level of individual-owned pharmacies' and chain pharmacies' preparation for SPD were evaluated in 5 aspects. The community pharmacies were well prepared in terms of pharmacists' confidence. However, the level of preparation in the other 4 aspects which include basic facilities for dispensing, changes in pharmacy practice, quality of services and the estimated time needed by community pharmacies to get prepared before implementation of SPD, were not satisfactory. Individual-owned pharmacies were better prepared for SPD than chain pharmacies. Overall, pharmacists support the implementation of SPD in this country but the level of preparation of community pharmacies were not satisfactory for the implementation of SPD in the near future.

Oral Presentation OPP10 (000023)

The Opinion And Knowledge Of Malaysian Public Towards Dispensing Separation

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A national workshop was held in Kuala Lumpur in October 2001 to discuss the future National Medicines Policy, where a consensus on including separation of prescribing and dispensing in the National Medicine Policy was taken. The main objective of this questionnaire-survey was to find out the level of knowledge and opinion of the Malaysian public towards dispensing separation, and how their knowledge may affect their attitude toward this new healthcare policy. A side-assisted questionnaire survey of 410 members of the general public (age $\geq$16 years old) at various places in Kuala Lumpur was conducted. The results show that overall 78 respondents (19%) strongly agree, 256 respondents (62.4%) agree, 68 respondents (16.6%) disagree and 8 respondents (2%) very disagree that our country should implement the policy of dispensing separation. From the correlation analysis, significant correlation was found ($p<0.01$) between the knowledge score and the agreement score of the general public towards dispensing separation, but the R value was low ($R^2=0.059$), signifying a weak correlation. The majority thought that medicine safety was the main factor and confidence in pharmacists as the second factor that drove them to support this policy. Convenience was the main concern for those respondents. Most of them suggested relocating the pharmacy, to make it more accessible by the patients especially for those who are very sick, handicapped or elderly. As a conclusion, the level of public's knowledge was one of the factors that affects their agreement. Public education like campaigns and seminars are essential to increase the public awareness on this issue.

Oral Presentation OPP11 (000078)

Consultation Of Community Pharmacists On Minor Health Problems

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Community pharmacists play a major role in providing primary healthcare. Their roles in providing consultations on minor ailments were assessed in this study. The study was conducted at 20 randomly selected pharmacies in the Klang Valley. Of the 813 customers who visited a pharmacy, 44% (358 customers) of the visits were for the purpose of buying some non-prescription medications or seeking the advice of the pharmacist on minor health problems. These 358 respondents were interviewed using a structured questionnaire. Respiratory tract ailments (31.0%), CNS ailments (21.3%) and skin problems (14.7%) were the most common minor ailments presented. The most common type of medication purchased was non-steroidal anti-inflammatory drugs (17.9%), followed by products with antihistamines (15.2%) and cough preparations (7.8%). The cost of treatment ranged from RM1.80 to RM79.00 with a median at RM9.90 but a majority of the respondents (81.8%) spent less than RM20.00. More than half of the respondents (59.5%) said that they did not receive any advice on the medication(s) purchased but 83.6% of them claimed they already knew how to use the medications. However, 11.5% rated the pharmacy service as excellent while another 41.9% rated it as good. In addition, 93% of the respondents said that they would seek the advice of the pharmacist again if they had the same minor ailment. The main reasons for choosing to see a pharmacist for health problems was convenience and accessibility. This study demonstrates that the general public is gradually accepting community pharmacists as consultants for minor health problems but pharmacists should play a more active role in providing adequate counselling.

Oral Presentation OPP12 (000069)

Evaluation Of The Total Parenteral Nutrition Services At Universiti Sains Malaysia Hospital

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Total Parenteral Nutrition (TPN) has been used in Universiti Sains Malaysia Hospital (USMH), Malaysia since 1986. Unfortunately there is no published data on the cost, complications and outcome of patient receiving TPN in USMH. The study was carried out to evaluate the cost, complications and outcome of TPN. The data were obtained from patient medical records and was analyzed using SPSS version 11. 215 TPN cases from 2003 to 2005 were evaluated. The demographic of the TPN cases were neonates 22.8%, pediatric 11.0%, adult 64.6%, male 52.6%, female 46.1%. Malay comprises of 87.4%, Chinese 6.0% and Indian 1.9%. The average cost for TPN in neonate is RM 98 ± 46, pediatric RM 210 ± 121 and adult RM 398 ± 103. The TPN associated complications were electrolyte complication (56.5%), metabolic complication (5.5%), renal complication (14.5%), liver complication (12.4%), hyperglycemia (9%), hyperlipidemia (0.7%), hypoglycemia (0.7%). 71.2% cases tolerated oral nutrition after TPN was stopped, however 1.8% of the patients in the study expired. The study showed a significant difference in the cost of TPN in each group of patients. The TPN services in Universiti Sains Malaysia hospital were associated with high TPN related complications and has acceptable outcome.

Oral Presentation OPP13 (000034)

Vulnerability To Corruption At Critical Decision Points Of The Pharmaceutical System In Malaysia

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Pharmaceutical system involves many different steps such as registration of drugs, selection of essential drugs, procurement, distribution, and control of drug promotion. Studies show that certain characteristics in the system make the systems' vulnerable to corruption. The aim of the study was to identify points in the systems that were vulnerable to corruption and to evaluate perception of vulnerability to corruption. Face-to-face interview was conducted among both public and private sector pharmacists. Information collected was based on 56 indicators from diagnostic tools framework of Cohen (2002) in Costa Rica (revised version). A convenient sample of six pharmacists from each of the public and private sectors were selected. The indicators were rated according to specified criteria. An average rating was calculated for each of the questions addressing a given decision point. Average rating had a possible range from zero to one. Sum of all the ratings of one was divided by the number of questions in a given decision point to obtain the percentage indicators. The resulting percentage was converted to a zero-to-ten scale by multiplying the resulting percentage by ten. System with an overall rating of 6.3 suggests that it is only marginally vulnerable to corruption. The findings showed that there were differences in perceptions between respondents from the public and private sector, 7.29 and 5.81 respectively towards vulnerability to corruption. Selection and drug promotion were moderately vulnerable to corruption, with a relatively low rating of about 4.23 for both sectors. The registration and procurement processes received 8.11 (public) and 8.53 (private), indicating that they were minimally vulnerable to corruption.

Oral Presentation OCP1 (000013)

Review Of The Use Or Misuse Of Drug Therapy In Paediatric Patients Prior To Admission For Acute Gastroenteritis To University Malaya Medical Centre

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Acute gastroenteritis (AGE) is a common illness among children and accounts for a significant number of paediatric outpatient visits as well as hospitalisation. As such, appropriate treatment received prior to hospital admission is of utmost importance. This study was to determine the commonly used classes of drugs to treat AGE prior to hospital admission, to correlate the pre-admission treatment received with the length of stay in hospital, and to demonstrate the influence of demographic factors on pre-admission treatment. This retrospective observational study reviewed 222 AGE patients admitted to the paediatric infectious diseases ward, P4 in University Malaya Medical Centre for a period of one year. One hundred and fifty four patients received medications prior to admission of which 143 (92.9%) patients received known classes of medications. Antipyretic agents were the most commonly prescribed drugs in 69.2% of the cases; followed by antibiotics (38.5%), antiemetics (35.7%), oral rehydration salts (29.4%) and antidiarrhoeals (28.0%). The mean duration of stay in hospital was slightly shorter in patients who received prior medications than those who did not (2.22 versus 2.32 days respectively). Sex and age had no influence on the type of pre-admission treatment. This study disclosed that 70% of children admitted for AGE were treated suboptimally prior to hospital admission. Oral rehydration salts was largely under-utilised despite their proven efficacy and safety and the practice of inappropriate drug therapy remained rampant in the studied subjects. Greater effort should be made to educate the general public in the appropriate treatment of AGE.

Oral Presentation OCP2 (000014)

Attainment Of Target LDL-C Levels By Patients Receiving HMG Co-A Reductase Inhibitors

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Elevated low density lipoprotein cholesterol (LDL-C) level is one of the key risk factor for coronary heart disease (CHD). Despite the proven benefits of low LDL-C levels, studies have shown that many patients were treated sub-optimally. The objectives of this study are to determine the percentage of treated patients attaining the LDL-C target levels and the factors which might influence the attainment at a tertiary hospital. A cohort of 383 patients, with CHD or CHD risk equivalent, receiving subsidised statins was enrolled. The LDL-C target was determined following the Malaysian Clinical Practice Guidelines on Management of Dyslipidaemia 2002. Data acquired were patient characteristics, lipid profiles, and the type and dosage of statins used. Analyses were carried out using SPSS v12.0 and *p* values of < 0.05 were considered statistically significant. Eight subjects without documented post-treatment LDL-C levels were excluded. Of the 375 subjects analysed, only 36% attained the target LDL-C of < 2.6 mmol/L. Indication of statin use has a strong influence on the attainment, while sex did not. In the secondary prevention group, patients of 65 years of age or above, or Chinese race were more likely to attain the target LDL-C levels. We found that the use of statins in reducing LDL-C was not optimised in UMMC. Factors such as geneticity and compliance are worth to be assessed in future research. Full implementation of the guidelines and the development of an integrated CHD prevention strategy, involving all healthcare professionals may be considered to improve the management of hypercholesterolemia.

Oral Presentation OCP3 (000037)

Use Of Surgical Antimicrobial Prophylaxis In A Tertiary Care Hospital

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Surgical antimicrobial prophylaxis (SAP) has been shown to be effective in reducing postoperative surgical site infections (SSIs). Despite well-established principles of SAP, many studies have reported inappropriate utilization of antimicrobials prior to surgery. The objectives of this study were (i) to assess the practice of SAP and its adherence to University Malaya Medical Centre (UMMC) guidelines, (ii) to assess the rates of SSIs among these patients. A retrospective review of randomly selected patients who underwent elective surgeries (orthopaedic, general and ENT) from January to June 2005 was conducted. Data extracted from medical records included patient demographics, co-morbidities, type of surgery and data on prophylactic antibiotic administration. The main outcomes (measured in proportions) were correct indications for SAP, correct choice and dose of antibiotic, appropriate timing, dosing interval and duration of SAP. These parameters were assessed based on hospital guideline recommendations. Rates of SSIs were assessed based on the CDC's National Nosocomial Infections Surveillance system. Of the 304 medical records assessed, SAP was indicated in 199 (65.5%) however only 52.8% of this received prophylaxis. Adherence to parameters of antibiotic choice, dose, timing, dosing interval and duration of prophylaxis were 29.5%, 95.2%, 80.2%, 76.5% and 44.1% respectively. The overall adherence rate to hospital guidelines was 32.2%. Postoperative SSIs were documented in 8.0% of patients who underwent procedures where prophylaxis was indicated. This study revealed that there is still considerable room for improvement in the overall delivery of SAP in UMMC. Efforts should be focused on streamlining the selection of antimicrobials and limiting the duration of prophylaxis postoperatively.

Oral Presentation OCP4 (000038)

A Case Report On A Patient with Disseminated Intravascular Coagulation And Profused Bleeding Following Septic Abortion

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Disseminated Intravascular Coagulation (DIC) is characterized by the widespread activation of coagulation, which results in the intravascular formation of fibrin and ultimately thrombotic occlusion of small and midsize vessels. DIC lead to micro vascular and macrovascular thrombosis while consuming platelets by trapping them in the clot. DIC may induce severe bleeding. The objective of this presentation is to discuss a case of DIC following septic abortion. A 20-year-old Indonesian female of 5-month gestation was admitted to a general hospital following septic abortion. Subsequently she developed DIC, septicemic shock, acute renal failure, hypoxemia and metabolic acidosis. During her hospitalization, she was given antibiotics such as IV Tazocin , IV amikacin, IV vancomycin, IV fluconazole and IV metronidazole. Other medications administered included IV hydrocortisone, IV ranitidine and IV human albumin. She also had fever, unstable blood pressure and heart rate and profused bleeding from various sites. Her hematologic profile included INR of 1.1, APTT 29.5 seconds and platelets $79X10^9$ per L. Her bleeding could not be controlled by conventional management and her condition deteriorated. The cornerstone in treating DIC is based on the etiology. A meta-analysis study has found that antithrombin III would stop thrombosis, improve platelet counts and multiorgan functions in DIC patients. Hence antithrombin III can be recommended to this patient to stop her bleeding and prevent multiple organ failure.

Oral Presentation OCP5 (000057)

Acute Paracetamol Overdose In Hospital Kulim: Presentation, Management And Outcome

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This is a two-year retrospective study designed to evaluate the clinical presentations, management and outcome of treatment in acute paracetamol (PCM) overdose patients admitted to Hospital Kulim using 47 bed head tickets from Jan 2004 to Dec 2005 where 11 were excluded. The result showed out of these 36 subjects, 10 subjects (27.8%) developed potential hepatotoxicity according to the Rumack & Matthew nomogram. This potential toxic group had reported significantly earlier symptoms (vomiting p=0.007, abdominal pain and giddiness p=NS) with a mean peak paracetamol level of 128.42±34.51 ($p<0.005$). The peak serum total bilirubin(µmol/L), AST(IU/L), ALT(IU/L) and PT(seconds) were significantly higher in the toxic group compared to the non-toxic group (19.17±12.17 vs 11.01±4.12, p=0.03; 105.67±111.08 vs 23.5±5.43**,** p=0.04; 112.7±93.40 vs 24.31±6.80, p=0.05; 18.00±7.10 vs 12.38±1.98, p=0.02). Patients were given N-acetylcysteine (NAC) treatment based mostly on the Therapeutic Drug Monitoring result (74%), followed by amount of ingestion (16%), and severity of presenting symptoms (10%). Time to NAC treatment for the toxic group was 9.40 hours after acute PCM ingestion. The liver function profile, including total bilirubin (µmol/L), AST (IU/L), ALT (IU/L) and PT (seconds) improved significantly ($p<0.05$) after NAC treatment in the toxic group (19.17 vs 11.66; 105.67 vs 28.58; 112.75 vs 32; 18 vs 11.44). However, the limitations of this study are small sample size and no definite time range of liver function test (LFT) after NAC treatment. Improvement of LFT values was assumed to be due to NAC treatment. In conclusion, NAC gives a hepato-protective effect, as NAC effectively improves the liver function profile of PCM poisoning patients.

Oral Presentation OCP6 (000058)

Therapeutic INR Control Of Patients On Warfarin In Kulim Hospital

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The aim of this research was to evaluate the control of warfarin therapy of patients in Kulim Hospital. Control of warfarin therapy was measured by the percentage of time within the therapeutic range, the proportion of tests in range, the mean dose and also the mean INR. 33 patients were included in this retrospective study. The INR and the corresponding dose of warfarin of these patients were recorded and analysed. A simple survey was also performed. 2 patients were excluded because these patients were on therapy for less than 6 months. The average percentage of time spent within the therapeutic range (INR 2-3), of all patients, was 52.4% (95% confidence interval [CI], 46.5-58.4%). The percentage of time spent below and above the therapeutic range was 33.1% (95% CI, 27.1-39%) and 14.5% (95% CI, 10.2-18.8%) respectively. The average dose was 3.81 mg (95% CI, 3.22-4.41 mg) and the mean INR was 2.38 (95% CI, 2.27-2.49). The proportion of tests within range is 0.51 (95% CI, 0.45-0.57). From the survey, no correlation was found between the way of administration and alcohol use with INR level. It was also found that most of the patients (n=29) on warfarin did not know that taking over-the-counter (OTC) medication can affect their INR level. Therefore the benefit that patients would get from medication counseling is evident and all patients on warfarin should be counseled on the use of warfarin.

Oral Presentation OCP7 (000060)

Assessment On Effect Of Hypoalbuminemia On Phenytoin Serum Concentration In Intensive Care And Medical Patients Of Penang General Hospital

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Introduction: Hypoalbuminemia commonly occurs in hospitalized patients, especially those critically ill and is the most common clinical condition to cause alteration in phenytoin protein binding. The objective of this study is to assess the effect of hypoalbuminemia on phenytoin serum concentration in critically ill and medical patients in Penang General Hospital, Malaysia. **Method:** Phenytoin serum levels and albumin levels were obtained retrospectively from the TDM Pharmacy and Record Office. Purposive sampling was used to obtain the samples. Samples were divided into two groups according to albumin level. Corrected phenytoin serum concentration was calculated for group of samples with albumin level lower than 30g/dL using Winter-Tozer Equation. Exact Fisher's test was used to find the association between phenytoin serum concentration and albumin level. **Results:** 17 pairs of samples were obtained. There was no significant association between hypoalbuminemia and measured phenytoin serum level. Concurrent medications that were known to influence the protein-binding of phenytoin were also not found to be significantly affecting the phenytoin concentration. **Conclusion:** Although a significant association between serum albumin level or concurrent drugs and phenytoin serum concentration could not be found in this study, the samples with higher phenytoin level from the albumin <30g/dL group outnumbered the others.

Oral Presentation OCP8 (000065)

Patients' Knowledge On Warfarin Therapy At The Warfarin Clinic, Hospital Teluk Intan

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The aim of this study was to determine the various factors contributing to patients' knowledge of warfarin therapy including demographic and socioeconomic factors. The correlations between patientis' knowledge of warfarin therapy and the awareness and compliance towards their medication were also accessed. A retrospective and cross-sectional study was held at the warfarin clinic, Hospital Teluk Intan. Randomized sampling with questionnaires was used and patients' medical records were reviewed. A total of 52 patients were enrolled, of which 25 were males (48.1%) and 27 were females (51.9%). The age range was from 36 – 77 years old with a mean of 58.73 ± 9.55 and mode of 52-years-old. A large number of respondents (63.5%) received primary schooling and 71.2% had a low income (< RM 500/ month). 69.2% of the respondents were literate with 53.8% able to understand Malay. About 94.2% received verbal education from either the medical officers or staff nurses, and 98.1% through a warfarin book. The awareness of patients towards their medications was low (44.2%). Compliance to medication was fairly good at 76.1%. The study showed that patients' age, socioeconomic level, education level and literacy had a significant relationship on patients' knowledge on warfarin therapy ($p < 0.05$). There was a significant correlation between patients' knowledge on warfarin therapy and the awareness towards their medications ($p = 0.002$). In conclusion, patient education plays an important role in the success of warfarin therapy and ultimately reducing disease complications, potential toxicity and drug interactions. Thus, pharmacists should provide adequate counseling along with the use of conventional warfarin books.

Oral Presentation OCP9 (000098)

A Comparison Between Beta-Blockers Only & Beta-Blockers + Diuretics As First-Line Antihypertensives In Hospital Alor Star

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Beta-blockers have been used to treat primary hypertension for more than 30 years with an impressive safety record. However, the effectiveness of using only beta-blockers as initial therapy for primary hypertension has not been clearly documented. Studies have suggested that using diuretics instead (either alone or in combination with beta-blockers) may be more effective in reducing blood pressure. This study compares the effectiveness of using either beta-blockers alone or in combination with diuretics in reducing blood pressure. In this retrospective study, medical cards of hypertensive patients were screened and 60 cards of patients who were started on either beta-blockers alone (either metoprolol, atenolol or bisoprolol) (Group 1) or on beta-blockers (as mentioned above) + diuretics (either chlorothiazide, frusemide or modiuretic) (Group 2) as initial therapy were selected. Both groups consist of 30 patients each, with ages ranging from 40-82 years old. Group 1 consists of 20 males and 10 females, while Group 2 consists of 22 males and 8 females. Blood pressure measurements before (on the day of appointment before being prescribed the antihypertensives) and after starting medications (on the following medical appointment in 1-3 months time) were recorded. Systolic blood pressure reductions were 7.09% (Group 1) compared to 11.05% (Group 2) ($p<0.05$).Diastolic blood pressure reductions were 6.21% (Group 1) and 6.31% (Group 2) respectively, $p>0.05$. Meanwhile, targeted blood pressure achievement of 140/90mmHg was found to be 60% (Group 2) vs 53% (Group 1) ($p<0.05$). In conclusion, using beta-blockers in combination with diuretics may be more effective than using it alone in reducing blood pressure and consequently reducing cardiovascular-related morbidity and mortality.

Oral Presentation OCP10 (000101)

Review And Assessment Of Therapeutic Drug Monitoring Of Digoxin Among Inpatients In Hospital Melaka

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Digoxin has a narrow therapeutic index and therapeutic drug monitoring (TDM) is used to target the dose given to be within the desired therapeutic range, while minimising the risk of toxicity. The objectives of the study are i) to review all cases of digoxin in-patients, ii) to assess the appropriateness of TDM requests, and iii) to determine the common drug-drug interactions during digoxin treatment. The study design was a retrospective, descriptive study. All forms registered in the TDM record book from January 2004 till March 2006 was included. Relevant data was recovered from the Medical Records Unit to retrieve patients biodata, drug administered in the ward, laboratory results and doctor's notes. Results were analysed using Microsoft Excel version 2002 and characterised by descriptive statistics. Fifty-nine patients with 64 requests for serum digoxin concentrations were enrolled. Sampling time was appropriate in 37.5% of the cases whereas 31.3% were inappropriate. 38 patients (64%) were new patients on digoxin, of which 23 of them were given loading doses. 50 % of the requests were within therapeutic range, 42.2% sub-therapeutic and 7.8 % in the toxic range. The common drug-drug interactions identified were beta-blockers, diuretics, and amiodarone and 10 cases (17%) had dose alterations due to suspected toxicity. Inadequacies in the TDM must be addressed for patients to achieve optimal benefits of these services.

Oral Presentation OCP11 (000100)

Once-Daily Dosing Of Aminoglycosides: Review And Recommendations For Clinical Practice

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The use of aminoglycosides such as amikacin and gentamicin has seen an increase in trend in recent years. Many of these antibiotics are used in the treatment of Gram-negative infections, peritonitis, intra-abdominal infections and pneumonia. Today, we are concerned over the advantages and disadvantages of once-daily dosing regimens as compared to the conventional multi-dosing regimens. With the help of therapeutic drug monitoring (TDM), we can ascertain the clinical efficacy and risk of toxicity of the drug when administered as either a once-daily or multiple dosing regimens. This study is a retrospective study, which involved the use of data gathered from 164 aminoglycosides TDM records for the year 2005. From our study, 35.7% (N=71) were male subjects and 34.3%(N=37) were females. In the whole year of 2005, there were a total of 108 cases of amikacin and 56 cases of gentamicin TDM. For amikacin, 26.9% (N=29) cases for once-daily administration and 73.2% (N=79) cases for multiple dosing administration. For gentamicin, 39.3% (N=22) cases for once-daily administration and 60.7%(N=34) cases for multiple dosing administration. Amikacin levels that fell within therapeutic range was 32.4% (N=35) while the remaining 67.6% (N=73) were out of range. For gentamicin, 41.1% (N=23) gentamicin levels were found to be within therapeutic range while 58.9% (N=33) gentamicin levels were out of range. Due to the limitations of this study, we found no significant correlation between the type of administration and the therapeutic levels obtained for both amikacin and gentamicin. However, many literatures have quoted the advantage of a once-daily administration over multiple-daily dosing regimens. Based on some studies done in Australia and USA, it appears that once-daily administration regimen is found to be clinically effective, reduces the incidence of nephrotoxicity and provides a cost-effective method for administration of aminoglycosides by reducing ancillary service time and serum aminoglycoside determinations.

Oral Presentation OPG1 (000030)

A Bioavailability And Pharmacokinetic Study Of Two Oral Formulations Of Ciprofloxacin 250 MG Tablets In Healthy Male Volunteers

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A bioavailability and pharmacokinetic study of a local and a generic ciprofloxacin 250 mg film coated tablets was carried out in 24 healthy human volunteers. The products were administered orally after overnight fasting, using a two-way crossover design. Serial blood samples were collected for a period of 12 hours and were analyzed using a HPLC with ultraviolet detection. Various pharmacokinetic parameters, including AUC_{0-t}, $AUC_{0-,\infty}$ C_{max}, t_{max}, $t_{1/2}$, k_{el}, $AUMC_{0-12,}$ $AUMC_{0-\infty,}$ and MRT were determined. The mean C_{max} values of the generic and the local product were found to be 1.46 ± 0.032 μg/ml and 1.49 ± 0.0845 μg/ml and the mean AUC_{0-12} was found to be 5.79 ± 0.67 μg-h/ml and 5.82 ± 0.38 μg-h/ml respectively. The mean $AUC_{0-\infty}$ values of the generic and the local product were found to be 6.92 ± 0.92 μg-h/ml and 6.858 ± 0.932 μg-h/ml respectively. Both the generic and the local products produced a same mean t_{max} value (1.2 ± 0.273 h); while the mean $t_{1/2}$ values were 4.52 ± 0.66 h and 4.961 ± 1.19 h respectively. The mean k_{el} values of the generic and the local products were found to be 0.156 ± 0.022 h^{-1} and 0.147 ± 0.033 h^{-1} and the mean MRT values were found to be 6.378 ± 0.79 h and 6.878 ± 1.53 h respectively. The relative bioavailability of the local drug was 100.55% at 12 hours and 99.08% at infinity. All the differences in pharmacokinetic parameters between the two products were within acceptable range ($p > 0.1$). Therefore, it can be concluded that the local product tested is unequivocally bioequivalent to the generic product.

Oral Presentation OPG2 (000052)

Effect Of Losartan On Renal Haemodynamics Of Rats With Hypertension

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Losartan, an orally active selective non-peptide blocker of the angiotensin subtype 1 receptor is an established drug in hypertension. This study explored the role of renin-angiotensin (RAS) and sympathetic nervous (SNS) systems in the control of renal haemodynamics in hypertension. To achieve this, we compared non-treated (SHR) and losartan-treated spontaneously hypentensive rats (LSHR). Losartan (10 mg/kg) was given orally for 7 days prior to the acute study. The animals were anesthetized and their mean arterial pressure (MAP) and renal blood flow (RBF) were measured using a pressure transducer and electromagnetic flowmeter respectively. Reductions in RBF when subjected to renal nerve electrical stimulation and intrarenal noradrenaline (NA), phenylephrine (PE), methoxamine (ME) and angiotensin II (Ang II) were determined. Data, expressed as mean ± s.e.m, were recorded using a computerized data acquisition system and were compared by 2-way ANOVA followed by Bonferronni post-hoc test with a significance level at 5%. A significant decrease ($p<0.05$) in percentage drop of RBF was observed in LSHR as compared to SHR when subjected to RNS, NA, PE and ME. There was a significant drop ($p<0.05$) of RBF after administration of Ang II in LSHR. These showed that presynaptic NA release was enhanced by binding of Ang II to presynaptic AT_1 receptors. Furthermore, the functions of the postsynaptic α_1-adrenoceptor subtypes were influenced by binding of Ang II to postsynaptic AT_1 receptors, the predominant type in mediating vasoconstriction. Hence, the interaction between RAS and SNS gives a big impact in modulating the renal haemodynamic in hypertension.

Oral Presentation OPG3 (000053)

Effect Of Losartan On Renal Haemodynamics Of Spontaneously Hypertensive Rats With Nephrotoxic Renal Failure

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This study was designed to explore the role of losartan in modulating the renal haemodynamics in hypertension with nephrotoxic renal failure. Normal spontaneously hypertensive rats (SHR) and cisplatin-induced hypertensive rats (RFSHR) were treated with losartan orally for 7 days. The animals were anesthetized and their mean arterial pressure (MAP) and renal blood flow (RBF) were measured using a pressure transducer and electromagnetic flowmeter respectively. Reductions in RBF when subjected to renal nerve electrical stimulation and intrarenal noradrenaline (NA), phenylephrine (PE), methoxamine (ME) and angiotensin II (Ang II) were determined. Data, expressed as mean ± s.e.m, were recorded using a computerized data acquisition system and were compared by 2-way ANOVA followed by Bonferronni post-hoc test with a significance level at 5%. The responses to RNS, showed a significant decrease in percentage drop of RBF ($p<0.05$) in RFSHR as compared to SHR. However RFSHR showed a significant increase ($p<0.05$) in percentage drop of RBF when subjected to NA, PE and Ang II. Administration of ME gave no significant ($p>0.05$) change in percentage drop of RBF. The results suggested that, in renal failure state, the postsynaptic AT_1 receptors are upregulated and the presynaptic AT_1 receptors are downregulated. Occurrence of increase of sensitivity of the renal vasculature to α_1-adrenoceptor-mediated activation is seen with minimal contribution of α_{1A} and α_{1D}-adrenoceptors.

Oral Presentation OPG4 (000055)

Effect Of High Salt Load In The Normotensive WKY Rats

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The present study investigated the effect of high salt load in normotensive WKY rats. Adult WKY rats were fed with 0.9% isotonic saline (150mmol) and normal rat chow for six weeks. Metabolic data were collected every week, which included the bodyweight (BW) water intake (WI), urine output (UO) and conscious recording of BP by using the tail cuff method. Urine and plasma were collected for electrolyte assay. All data were expressed as mean ± s.e.m and analyzed using one way ANOVA followed by bonferoni post hoc test with the significance level of 5%. The metabolic data collected were compared before and after the salt load. WI, UO, and urinary sodium showed significant ($p<0.05$) increase, while no significant ($P>0.05$) change was observed in the BP, BW, and plasma sodium level. The result showed the body's physiological response to high salt loads, such that, in normal conditions, the body rapidly adapts to diets high in salt content with enhanced thirst; increased natriuretic and diuretic responses. Diuresis and natriuresis serve a critical role to maintain sodium balance. The natriuretic and antinatriuretic mechanism work over a period of time to oppose the expression of diuresis and natriuresis if the intake of sodium is less and allow diuresis and natriuresis to be detected with high sodium intake without affecting the BP.

Oral Presentation OPE1 (000026)

The Attitude Of Malaysian Pharmacists Towards Continuing Professional Development (CPD)

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The aim of the study was to investigate pharmacists' attitudes and approaches to continuing professional development (CPD) in Malaysia. Survey forms developed based on study objectives were posted to 480 pharmacists in Malaysia and also uploaded in i-bulletin of Malaysian Pharmaceutical Society. 337 respondents from hospital, industry, community pharmacy and academic participated in this study. It was found that in the year 2005, the majority of pharmacists (85.2%) were involved in formal CPD activities such as seminars, workshops, conferences or postgraduate courses. A third of these respondents was female and employed in the hospital. They had completed more than 30 hours of CPD activities. Other informal activities of CPD undertaken included reading professional journals (86.1%), reading manufacturer literatures (84.6%), internet-based learning (73%) and professional discussion with colleagues (68.2%) However, only 11% of the respondents had undertaken postgraduate courses. The main barrier given for the non-participation in CPD activities was lack of time (60%). Almost all respondents agreed that pharmacists should be engaged in CPD activities to maintain their professional competency. Most pharmacists (73%) agreed that CPD should be compulsory and that 30 hours per year of CPD activities was a realistic figure. The involvement of pharmacists in CPD activities in year 2005 can be considered high.

Oral Presentation OPE2 (000029)

The Knowledge & Attitude Of UKM Pharmacy Students On Pharmacy Profession

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The study was carried out to access the knowledge and attitude of UKM pharmacy students towards pharmacy profession. Questionnaires were distributed to randomly selected pharmacy students in UKM. The results showed that 35.3% of the respondents chose pharmacy course because of its bright future after graduated whereas another 33.3% due to their interest on this course. 27.5% of the respondents got to know pharmacy profession through the mass media while 22.7% through their previous visits to pharmacies. When ask on their choice of field after graduated, 51.6% of the respondents choose hospital as the first choice while 24.8% choose community pharmacy as first choice. 16.5% of them haven't decided their fields with 29% of them in their final year. 69.7% of the respondents are willing to stay on-call on weekends or holiday. Besides, 66.8% of the respondents consider 3-year compulsory service as a chance to train themselves, 17.0% consider it as a time to contribute for patient care, while 4.3% consider it as a waste of time. When the respondents were asked about their primary objective when they serve as pharmacists, 69.2% of the respondents chose patient care as their main concern, 23.4% chose reputation and only 7.5% chose business. Based on the responses from final year students, 88.4% of them believe their intervention in patient care could bring at least 60% of changes on patient outcome. Generally, majority of the pharmacy students in UKM have gained a satisfactory attitude on pharmacy profession, though there are rooms for further improvement.

Oral Presentation OPE3 (000092)

Perceptions Of Pharmacy Students Towards Pharmaceutical Care

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Early pharmacy practice exposure in the pharmacy curriculum enables students to visualize the evolving philosophy of pharmaceutical care. The objectives of this study were to discover and describe the perceptions of pharmacy students from Universiti Teknologi MARA (UiTM) towards pharmaceutical care. A cross-sectional study was conducted among pharmacy students from Year 1 till Year 4 (n = 325). The questionnaire was designed to assess Perceptions of Pharmacy Students towards Pharmaceutical Care (13 items) based on Likert scores from 1 (strongly disagree) to 5 (strongly agree). Descriptive statistics on the sample characteristics and questionnaire items were computed. Student's t-test and a one–way analysis of variance (ANOVA) were utilized for inferential statistics. The Cronbach's alpha reliability coefficient for the survey instrument was found to be 0.874. Students were 98.4% single, Muslim Malays from Peninsular Malaysia (mean age = 20.5 ±1.46; range = 18-29).78.7% of students were female. 23.5% of students had experience working in a pharmacy. Generally, the mean scores for Perception of Pharmaceutical Care was 4.09 ± 0.49 (range = 1.46-5.00). 93% of students agreed that all pharmacists should perform pharmaceutical care. 42.8% of students, especially those from Year 3 and Year 4 ($p = 0.008$) indicated that providing pharmaceutical care takes too much time and effort. Positive perceptions towards certain items were associated with age and working experience in a pharmacy ($p < 0.05$). However, positive perceptions were not associated with gender. In conclusion, UiTM pharmacy students indicated positive perceptions on pharmaceutical care.

Oral Presentation OPT1 (000009)

Effects Of Granulating Fluids And Hardness On Diclofenac Release From Colon-Targeted Polymer Matrices

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The effects of granulating fluids and polymer matrix hardness on diclofenac release from colon-targeted polymer matrices (xanthan gum, guar gum, pectin and chitosan) were studied in phosphate buffer (pH 6.8) and in simulated colonic conditions using rat caecal contents. Each of the polymers was prepared using isopropyl alcohol as well as water as granulating fluid and then compressed into tablets at two levels of hardness. Water produced harder matrices compared to those prepared using isopropyl alcohol. Diclofenac release from chitosan and pectin matrices in phosphate buffer was not sustained beyond 5 min irrespective of type of granulating fluid used and level of matrix hardness. On the other hand, diclofenac release from xanthan gum matrices and guar gum matrices was more sustained and not affected by the level of hardness of the polymer matrix prepared using either of the granulating fluids, although release rates were generally higher from guar gum matrices. Under simulated colonic conditions, diclofenac release was slower from matrices prepared at higher levels of hardness compared to those at lower levels of hardness for all the differently granulated matrices except for pectin, from which rate of diclofenac release remained rapid.

Oral Presentation OPT2 (000047)

Optimizing Excipient Mixtures By Mathematical Modelling In Formulating A Sustained-Release Theophylline Tablet

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Pharmaceutical formulations are usually developed by trial and error. This approach is time consuming, costly and may give misleading conclusions for complex formulation without the realization of the formulator. This study explores the application of mathematical modelling for pharmaceutical formulation with the aim of expediting formulation processes and minimizing errors. The evaluation was performed on a sustained-release theophylline formulation using a simplex lattice experimental design consisting mixtures of polymers including iota-carrageenan as the gel forming agent, lambda-carrageenan as the viscosity modifier and acacia gum as the retardant. Tablets produced from these formulations were tested for drug release by dissolution in simulated gastric fluid (SGF) and simulated intestinal fluid (SIF) using spectrophotometric measurements of theophylline at 272nm. Modelling on the drug release data obtained was carried out using model dependent polynomial functions. Constraints were placed on the model independent variables to give the ideal release characteristics. The model was validated by profiling the theophylline release rate using the optimal formulation predicted by the model. The observed drug release rate of the optimal formulation was shown to be not significantly different to the release pattern predicted by the model [one-way ANOVA; ($p>0.05$)]. The dissolution profile of the optimal formula fitted into the Power Law Model indicating zero-order release kinetics. The results of this study demonstrate the suitability of the mathematical model in obtaining an optimized sustained-release theophylline formulation with a predictable drug release profile.

Oral Presentation OPT3 (000089)

Development And Evaluation Of Controlled Release Floating Dosage Forms Of Famotidine

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The purpose of this research was an attempt to develop a floating delivery system for famotidine. Several dosage forms including granules, capsules and tablets, were prepared. Different types of hydrophilic polymers and gas floating agents were tried. The floating behavior, the dissolution profiles, density, drug content, weight uniformity, and hardness test were studied. Capsules filled with mixtures of famotidine, hydroxypropylmethylcellulose (HPMC-4000), carbopol-971P, and gas producing agents (citric acids and sodium bicarbonate) and microcrystalline cellulose (MCC), exhibited floating for 24 hrs in dissolution medium, HCl buffer pH 2.2 at 37˚C rotating at 50 rpm, and provided controlled release over 7 hrs. The optimal floating and controlled release were observed from capsules containing a higher ratio of HPMC-4000 and from these containing a higher ratio of gas floating agents as 58 and 52 percent of drug releases after 7 hrs. On the other hand capsules containing different concentrations of MCC, as a filler, showed higher drug release with increasing MCC concentration. Finally, all famotidine tablets prepared by direct compression of powdered mixtures exhibited more controlled drug release compared to conventional tablets (obtained from the market) but less floating time compared to that obtained from famotidine floating capsules.

Oral Presentation OTC1 (000051)

Cytoprotective Effects Of Honey Alone Or In Combination With Aqueous And Ethanol Extracts From *Chromolaena odorata* L. In Reducing Gastric Lesions

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Cytoprotective effects are important in keeping the integrity of gastric mucosa from strong irritants which may induce gastric ulcers. *Chromolaena odorata L.* plant extracts, honey and cimetidine were used to evaluate their cytoprotective effects against gastric lesions. Aqueous and ethanol extracts of the plant were evaluated to determine which extracts are better in protecting gastric mucosa. Sprague-Dawley rats were pre-treated via oral administration with either honey alone, aqueous or ethanol extracts of *C. odorata*, or cimetidine for 30 minutes. The plant extracts and cimetidine were also administered in combination with honey. The rats were then fed with absolute ethanol combined with HCl, which served as irritants to induce gastric lesions. Thirty minutes later, the rats were sacrificed and their stomachs were removed for further gross and histological examination to evaluate gastric lesions progression. The treatment groups were compared to the ulcer control group, which were administered with absolute ethanol combined with HCl only. Data were expressed as ulcer index (mean ± S.E.M.) and inhibition percentage. The results showed that absolute ethanol combined with HCl causes necrosis, hemorrhages and edema to the gastric mucosa. All treatment groups showed a significantly ($P<0.05$) lower ulcer index and a higher inhibition percentage as compared to the ulcer control group. The data suggest that honey contains factors that promote gastric mucosa cytoprotective effects and that *C. odorata* enhances the effects of honey. However the mechanism for this enhancement is still unclear.

Oral Presentation OPG5 (000081)

Intrarenal Haemodynamic Regulation In Diabetes: Role Of Sympathetic And Renin-Angiotensin Systems

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This study was designed to investigate the interaction of the sympathetic and local renin-angiotensin systems at the level of renal haemodynamics in diabetes. Streptozotocin-induced diabetic WKY rats were anaesthetized with pentobarbitone sodium (60 mg/kg IP). The left kidney was exposed and an electromagnetic flow probe was placed on the renal artery for renal blood flow (RBF) measurement. Bipolar electrodes were used to stimulate the renal nerve. Reductions in RBF when subjected to electrical stimulation, bolus doses of phenylephrine, methoxamine and angiotensin II were determined in the presence of 5-methylurapidil, chloroethylclonidine, BMY7378, amlodipine, perindopril and losartan, and mean arterial pressure (MAP) were monitored. The renal vasoconstrictor effects were significantly attenuated by 5-methylurapidil and amlodipine in both non- and diabetic WKY, but by chloroethylclonidine and BMY 7378 in only non-diabetic WKY. The perindopril-treated group yielded significant attenuated responses to all adrenergic agonists but not Ang II in non-diabetic WKY, and in diabetic WKY only to RNS. Pressor responses by Ang II in both groups were significantly reduced by losartan. RBF remained unchanged but MAP dropped significantly in certain groups throughout the study. Collectively, these data suggest that, in diabetes, the angiotensin type 1 (AT_1) receptors and the α_{1A}-adrenergic subtype continue to predominate in vasoconstriction at the expense of α_{1B}- and α_{1D}-subtypes, which have been down-regulated and become less functional. Intrarenal interaction at the renal vasculature level is greatly influenced by hyperglycaemic conditions possibly due to activation of local renal renin-angiotensin system.

Oral Presentation OOO1 (000017)

Evaluating Medicine Prices, Availability, Affordability And Price Components In Malaysia

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Malaysia's stable healthcare system is facing challenges with increasing medicine costs. To investigate these issues a survey was carried out to evaluate medicine prices, availability, affordability and the structure of price components. The methodology developed by the World Health Organization (WHO) and Health Action International (HAI) was used. Price and availability data for 48 medicines was collected from 20 public sector facilities, 32 private sector retail pharmacies and 20 dispensing doctors in four geographical regions of West Malaysia. Medicine prices were compared with international reference prices to obtain a median price ratio. Price components' data were collected throughout the supply chain and mark-ups, taxes, and other distribution costs were identified. In private pharmacies, innovator brand prices were 16 times higher than the reference prices, while generics were 6.6 times higher. In dispensing doctor clinics, the figures were 15 times higher for innovator brands and 7.5 for generics. Dispensing doctors applied high mark-ups of 50-76% for innovator brands, and up to 316% for generics. Retail pharmacy mark-ups were also high - between 25-38% and 100-140% for innovator brands and generics, respectively. In the public sector, where medicines are free, availability was low even for medicines on the National Essential Drugs List. In conclusion, the free market by definition does not control medicine prices, necessitating price monitoring and control mechanisms. To increase access and affordability, promotion of generic medicines and improved availability of medicines in the public sector are required.

Oral Presentation OOO2 (000033)

Cost Utility Analysis Of The Ministry Of Health Dialysis Programme

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Introduction: End-stage renal disease is on the rise in Malaysia. Dialysis prevalence has grown from 138 p.m.p. in 1996 to 497 p.m.p. (12,974 patients) at the end of 2005. In tandem with this increase, the Ministry of Health (MOH) has expanded its dialysis programme, which comprised 137 dialysis centres nationwide in 2005. **Objectives**: To determine (1) the cost effectiveness of MOH dialysis program, measured as cost per quality-adjusted life year (QALY) saved. (2) utility and QALY and (3) life expectancy of dialysis patients. **Methods**: This is a multi-centre observational study for MOH dialysis patients. The quality of life instruments used was the EQ-5D and Spitzer's index QOL. Health utility was determined by time trade-off and transformed visual analogue scale methods. Costs were valued in terms of year 2004 RM from the perspective of the MOH. All costs incurred by the MOH in the provision of dialysis, including patient care and hospitalisation costs, were included in the study. **Results and Discussion**: Quality of life of continuous ambulatory peritoneal dialysis (CAPD) patients was higher among the dialysis patients (0.79 to 0.93 of perfect health equivalent) compared to haemodialysis patients (0.79 to 0.89 of perfect health equivalent). Overall life expectancy on dialysis was 10.13 years with superior life expectancy for haemodialysis (11.37 years) compared to CAPD (7.94 years). Age at commencement of dialysis, diabetic status, haemoglobin level, albumin level and dialysis modality were significant predictors of life expectancy. The cost per patient year on dialysis was RM33,958 for haemodialysis and RM33,243 for CAPD. The cost per QALY was RM43,000 for haemodialysis and RM41,000 for CAPD. **Conclusion**: Haemodialysis and CAPD were equally cost effective given the current of utilisation of EPO therapy.

Oral Presentation OOO3 (000091)

Evaluation Of The Cultivation Condition For Enhancing The Growth Of *Lactobacillus acidophilus*

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Growth is defined as the logical increase in all the chemical constituents of the cell which leads to an increase in the number of the population. The growth of *Lactobacillus acidophilus* was optimized and the parameters investigated consisted of different selective culture media (Rogosa agar, LAMVAB agar, MRS agar and edible agar media), inoculation methods (pour plate and spread plate) and cultivation conditions (aerobic and anaerobic environment). In addition, two colony quantification methods; colony counting method and counting using the McFarland standard, were compared by estimating the number of *Lactobacillus acidophilus* grown in MRS agar. The morphology and characteristics of *Lactobacillus acidophilus* were similar in MRS, Rogosa, LAMVAB and edible agar media, except that the colour of the colony was green in LAMVAB agar medium while white in the other three media. The pour plate method provided a relatively higher number of counts than the spread plate method. No significant difference was found in viable counts between aerobic and anaerobic conditions, suggesting that *Lactobacillus acidophilus* could be cultivated under both environments. The results of colonies determined using the two different counting methods were different. The McFarland standard method might be less accurate when compared with the colony counting method.

Oral Presentation OOO4 (000085)

Cost-Effectiveness Of Medications For Smoking Cessation

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Treating tobacco dependence is economically significant since it can prevent a variety of costly chronic diseases, including cancer, heart and pulmonary diseases. Studies have shown that smoking cessation treatments ranging from clinician advice to pharmacotherapy to specialist-delivered intensive programs are cost-effective relative to other commonly used disease prevention interventions and medical treatments. However, local data on cost-effectiveness of medications for smoking cessation interventions is lacking. Thus, we conducted a cost-effectiveness analysis (CEA) of medications used at a quit smoking clinic in Malaysia. **Methods**: Cost-effectiveness analysis of data from a local quit smoking clinic, involving cost of inputs (health personnel, medications in the form of nicotine gum and/or patch, disposables, printed materials, assets, space) and outcomes, i.e., quit rates (%) by types of treatment (counselling ± medications). **Results**: Data from 129 male smokers during a period of 34.5 months. Average duration of time spent per client = 15 minutes. Average cost of health personnel per client visit = RM11.25. Total cost of medications = RM15,916.10. Total cost of the program =RM38,634.66. Quit rate for nicotine gum = 24% vs. 30% for both gum and patch. No clients quit using nicotine patch. CE ratio for gum = 1067 vs. 842 for gum + patch. Average cost of cigarettes spent by each client/month = RM 131.25. **Conclusions**: Smoking cessation medications are cost-effective. The higher success rate with combined gum and patch use suggests a need of higher nicotine dosing than using gum or patch alone.

Poster Presentation PPP1 (000006)

Causes of Drug Administration Errors In Medical Wards

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Drug administration errors largely involve errors of omission where administration is omitted due to various factors such as wrong patient and lack of stock. The objective of this study is to identify the causes of drug administration errors and to reduce it. This is a prospective study conducted for a month in medical wards. From this study, it was observed that there were a number of factors that caused drug administration errors in the medical wards. These errors commonly occurred in the wards and therefore an intervention was introduced to reduce such errors. It was found that the common causes of drug administration errors were 'using other patient's medication', 'using incorrect measuring cups', 'using the after office hours' stock', 'patient's medication not in the trolley bin or in the wrong bin', 'more than one patients' medications in the same bin' and 'discharged patients' medications still in the trolley bins'. An intervention to label the trolley bin with patient's name, registration number and the existing bed number was introduced. It was found that the numbers of causes of drug administration errors was significantly higher in the pre-study than in the post-study. This demonstrates that labelling the trolley bins with patients' name and registration numbers can reduce the causes of drug administration errors.

Poster Presentation PPP2 (000007)

A Consumption Pattern Survey Of Antibiotics In A Large Teaching Hospital In Tehran

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Irrational and uncontrolled consumption of antibiotics could increase the number of resistant bacterial species, particularly in hospital infections, and cause hazardous adverse effects albeit avoidable. This study investigated the consumption pattern of antibiotics in different wards of Taleqani teaching hospital, a large and well-known medical centre in Iran, using the ATC/DDD (defined daily dose) system within the framework of DUE (drug use evaluation) retrospective studies. Among 2137 filed patient records, 57% received antibiotics, accounting for 19.42% of the overall hospitalization drug expenses. Over 68% of patients underwent surgery received antibiotics. The overall amount of antibiotics consumed was found to be 99.82 DDD/100 bed days. 79.34% of the antibiotics used were parenteral. Orthopedics and repair surgeries accounted for the greatest (23%) amount of antibiotic consumption, followed by infectious (19%), GI (17%), and gynecology and obstetrics (15%) diseases. Over 75% of the total amount of antibiotics used was due to cephalosporins (49%) and penicillins (27%). Aminoglycosides (6%), imidazole derivatives (5%), fluoroquonolones (4%) and other groups (9%) made up the rest. The consumption rate of antibiotics in Taleqani teaching hospital, and possibly throughout Iran, appears to be greatly higher than similar European studies. Furthermore, based on the present study, antibiotic prophylaxis in different categories of surgery (especially in elective surgeries) on a few days basis seems to be irrational and costly. Hence, the physicians habits in prescribing antibiotics should be revised in Iran. National drug policies, holding regular continuous educational meetings for the prescribers and preparing standard treatment guidelines by the governmental drug authorities are suggested.

Poster Presentation PPP3 (000010)

Assessment Of Undergraduate Community Pharmacy Attachment Programme

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A three-week Community Pharmacy Attachment Program for sixth semester, Bachelor of Pharmacy (Hons.) undergraduates was designed to provide students with an early exposure of technical and relevant pharmacy skills. The aim of this study was to evaluate students' overall performance in this special training. Fifty-two pharmacy outlets in Peninsular Malaysia, including one in East Malaysia, were chosen as training locations for 61 students (male = 14; female = 47; mean age = 21 years; range = 21 – 25 years). Fifteen major criteria were created by the Community Pharmacy Secretariat for students to be assessed by pharmacist in-charge in their respective locations. The responses were scored from 1 to 5 (*1 = poor, 2 = fair, 3 = good, 4 = very good, 5 = excellent*). On average, students obtained the highest score in terms of *Punctuality* (4.46 ± 0.62), while lowest scores were given for aspects of *Problem-Solving Ability* (3.64 ± 0.78) and *Creativity* (3.64 ± 0.95). The positive outcome on punctuality was most likely due to their attendance being part of the evaluation. Their relatively lower scores for *Problem-Solving Ability* and *Creativity* were due to the attachment being scheduled before their theory classes. Nevertheless, students were overall considered to be *very good* (4.00 ± 0.11) in majority of the criteria assessed. These outcomes indicated that the students need to be further polished on their problem-solving ability and creativity via future restructuring of the programme. This will serve to ensure that the desired quality and professionalism are embedded in pharmacist-to-be.

Poster Presentation PPP4 (000027)

OTC-Steroids In Community Pharmacy

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A large percentage of primary care pharmacy visits are dermatological related complaints. Individuals frequently present with skin, hair or nail problems to community pharmacists due to their ease of accessibility. Therefore, this study was carried out to determine the type and frequency of purchases of skin-related products by the pharmacy's customers. Data collected for the research project was derived from the community pharmacy's computer system called the PHARMAPOS system. Meanwhile customers were also interviewed by the research assistants to assess whether their dermatological ailments were treated by any medical practitioners prior to visiting the pharmacy. A total of 794 skin related preparations purchased were recorded from June - December 2005. This gave an average of 132 items per month and 4 items per day. Approximately 82% of the products sold were already available over-the counter (OTC). These included topical preparations for antifungal, antibacterial or anti-acne use, corticosteroids and combination preparations. Topical corticosteroids (plain/combinations) represented 75% (597/794) of the total products purchased. Among these, 25% of the buyers obtained advice/treatment from their medical practitioners at some stage. Based on the large numbers of OTC topical steroids purchased, it is obvious that community pharmacists are playing an important role in the management of dermatological related problems and should be a reliable information provider for customers seeking advice. In conclusion, ongoing continuing professional development programmes for the pharmacists related to the management of dermatological conditions are highly recommended.

Poster Presentation PPP5 (000074)

Knowledge And Perceptions of Recent Pharmacy Graduates About Generic Medicines

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The ever-rising price of prescription medicines is a phenomenon that affects nearly every developed country. An effective strategy to contain the escalating costs is to use generic medicines. Within this context, most policy makers are encouraging healthcare professionals to prescribe or substitute with generic medicines whenever possible. Whichever strategy that is adopted, that is generic prescribing or generic substitution, the main challenge is how to instil and maintain confidence of patients and carers in using generic medicines. This is where pharmacists have a pivotal role. The objectives of this study were to evaluate pharmacy pre-registrants' perceptions of and knowledge about generic medicines and generic substitution, and to explore factors influencing pharmacy pre-registrants' future generic substitution practices. A web-based survey was developed and used to gather data. The sampling frame was pharmacy graduates from Australian universities who were undertaking pre-registration training prior to being eligible to register to practise as a pharmacist. The total number of Australian pharmacy graduates reported as being enrolled in pre-registration courses at 31st January 2005 was 948. By the end of the three-month study period, 289 pre-registrants responded to the survey (response rate = 30.5%). More than 80% of the study participants thought that generic medicines are inferior, less effective and produce more side effects compared to brand name medicines. These findings highlight the need for pharmacy pre-registrants to better understand the principles and concepts of bioavailability and bioequivalence if they are to contribute appropriately to generic medicine use.

Poster Presentation PPP6 (000086)

A Retrospective Study Of Adverse Drug Reactions Attributed To The Use Of Simvastatin In A Tertiary Hospital

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Statins have been proven to be both safe and well tolerated in millions of patients but are still not free from adverse drug reactions (ADRs). Therefore, this study was conducted to determine the types of ADRs associated with the use of statins, in particular simvastatin. A retrospective study was conducted at the University of Malaya Medical Centre (UMMC). A total of 680 patients who were just started on simvastatin in 2003 were identified using the Pharmacy Information System (PIS). The medical records of these patients were reviewed for any recorded ADRs. Eight cases of ADRs (1.2% of the patients) were identified and these included 2 cases of diarrhoea, 2 cases of rashes, 1 case of muscle ache, 1 case of insomnia, 1 case of irritable mood and 1 case of elevated transaminase level more than three times the upper limit. In the same year, 8 cases of ADRs associated with the use of simvastatin were reported to the Malaysian Adverse Drug Reaction Advisory Committee (MADRAC). However, none of the cases identified in UMMC were reported to MADRAC. This study demonstrates the under-reporting of ADRs to MADRAC and hence the review of patients' medical records could be used as a mean of supplementing such a database.

Poster Presentation PPE1 (000011)

Assessment On Pre-Degree Pharmacy Students' Interest In Pharmacy

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The Pre-Degree Pharmacy programme (PI010) is the latest introduced by Universiti Teknologi MARA (UiTM). It acts as a basis to select excellent candidates with relevant academic qualification to pursue the pharmacy degree programme. Thirty-nine students registered in May 2006 for their third/last semester. This semester was uniquely brief (5 weeks) and highly-focused on pharmacy-related subjects. A survey was administered in their final week of study 1) to investigate their early interest in pharmacy as a career and 2) to evaluate the *Introduction to Bioorganic Chemistry* course (PHM032). The instrument assessed *Course*, *Student Expectations* and *Grades*, based on Likert scores 1 (strongly disagree) to 5 (strongly agree). A 100% response was received (male = 15; female = 24; mean age = 19 years; range = 18 – 21 years). Majority decided to pursue pharmacy after secondary school (n = 17; 44%), during Pre-Degree Pharmacy experience (n = 12; 31%), during secondary school (n = 9; 23%) and before secondary school (n = 1; 3%). The mean scores for PHM032 course were 3.50 ± 0.80 (*Course*), 3.63 ± 0.64 (*Grading*) and 3.72 ± 0.76 (*Student Expectations*). The findings indicated that interest towards pharmacy had already been present in many students after secondary school, probably due to the increased popularity of pharmacy programs in the current Malaysian education scenario. Students also responded positively with regard to the PHM032 course which forms an important pharmacy foundation subject. These collective outcomes are highly encouraging signals for the future of pharmaceutical education in this country.

Poster Presentation PPE2 (000018)

Basic Health Knowledge Of A Sample Of The Malaysian Urban Population

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The movement towards patient directed care could be seen with the recent emphasis on clinical pharmacy. It remains unsure whether the general public (patients) is ready for the intended pharmaceutical care. Their level of health literacy is an important factor in the success of drug therapies. With the above in mind, a questionnaire was set-up to understand the basic health knowledge of the general public during a public health campaign organized by University College Sedaya International in Sunway Pyramid, Kuala Lumpur. The questionnaire that consisted of 20 multiple-choice-questions on health knowledge were distributed to the shoppers near the site of the campaign. A total of 118 questionnaires were completed from the three-day campaign. It was found that 84% of the subjects knew that the normal blood pressure was 120/80 mm Hg and HDL was the "good" cholesterol. Only about half of the subjects were correct in naming 5 mmol/L as the normal cholesterol reading. As for the meaning of LDL to HDL ratio, 45% answered that it is an indicator of the risk of getting diabetes mellitus but the correct response should be indicator of the risk of stroke. 50% answered that another name for stroke is artherosclerosis, while only 41% knew the correct answer of "brain attack". 54% thought that urine tests were used to diagnose diabetes mellitus instead of blood tests. Various studies have concluded that insufficient health knowledge was a major barrier in educating patients. Therefore, similar studies should be done on our multicultural Malaysian population for better management of drug therapy.

Poster Presentation PPE3 (000093)

Rational Use Of Antibiotics Among Pharmacy Students

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Antibiotic resistance is a rapidly increasing phenomenon. Irrational use of antibiotics is one of the major determinants in the development of resistance. This cross-sectional study was conducted to determine the knowledge, attitude and behavior of pharmacy students of a University towards antibiotic use. A questionnaire consisting of 13 items was designed and given to all the pharmacy students in Universiti Teknologi MARA (n = 300). The mean age was 20.6 ± 1.4 (range = 18 - 29) and 74% were females. The mean antibiotic knowledge score was 9.02 ± 1.4 (total score = 12, score range = 4 - 12) with mean score for 4th year students, 9.96 ± 1.2 and 1st year students, 8.82 ± 1.42. Out of 300 students, 57.7% believed that antibiotics could be used for common cold and 78.7% agreed that antibiotics could be started with a pharmacist's advice. Self-medication with antibiotics was admitted by 15% of the students and 12.1% of the respondents used antibiotics until their symptoms disappeared. More than half of the students (66.8%) completed the antibiotic course during their last infection and 67.8% did not know the name of the antibiotics they used. These findings show that the knowledge of pharmacy students on antibiotics is moderate. It is rather surprising to know that pharmacy students approve antibiotics against common cold and most of the pharmacy students agree that antibiotics could be started with pharmacist's advice, in a country where a prescription is needed for antibiotics. Specific education regarding antibiotics for pharmacy students can improve the knowledge and rational use of antibiotics.

Poster Presentation POO1 (000068)

Asthma Care Before And After Hospitalization: Potential Role For Pharmacists Intervention

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According to the national guideline, effective asthma management encompasses the following components; assessment and monitoring, identifying and controlling of triggers, appropriate pharmacotherapy, and education for partnership in care. Evidence suggests that unscheduled clinic and emergency department (ED) visits reflect failure of long term care. Interventions by pharmacists have been shown to improve outcome of care. **Objective**: To describe the management of asthma six months before and four months after hospitalization in Selayang Hospital. **Methods**: Electronic medical records of children aged 5-14 years hospitalized for asthma were reviewed in retrospective based on the management components. **Results**: 72 (37% female) children met the inclusion criteria. Prior to index admission, three children had previous hospitalization. 83% had at least one visit of which more than half experienced multiple visits (2 to 8; median=3). Medications upon admission included combination therapy (inhaled corticosteroid (ICS) and short acting beta-2 agonist (SABA) and/or long acting beta-2 agonist (LABA)), SABA only or oral anti-asthmatics. 40% were not on any medication. It was also found that 43% of those on combination therapy were non-compliant. Inhaler technique was assessed in 15% and trigger factors were identified in 70% of the patients during hospitalization. Assessment of severity was documented in 25% of the patients and 68% were discharged with ICS. Within four months after hospitalization, 28% of the children re-attended ED, 6% were re-admitted and 25% defaulted with follow-up appointments. **Conclusion**: The management of asthma fell short of that recommended by the guideline. Pharmacists can assist in the management of asthma.

Poster Presentation PCP1 (000003)

Antimicrobial Susceptibility Pattern Of The Uncommonly Isolated *Burkholderia cepacia* Strains

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Antimicrobial susceptibility pattern of *Burkholderia cepacia* (*B. cepacia*), a rare but life-threatening pathogen causing fatal infections especially among immunocompromised or cystic fibrosis patients, was evaluated in this study. During May 2005 to March 2006, 12 strains of *B. cepacia* were isolated from various specimens of patients admitted to Milad Hospital (Tehran, Iran) and their susceptibility to antibiotics was assessed by the disk diffusion technique (NCCLS 2004). Demographic data and medical history of the patients were also gathered using a questionnaire. Of 12 cases studied, 7 (58.3%) were female and 5 (41.7%) male. Specimens from which the strains were isolated included blood (7, 58.3%), respiratory tube (2, 16.7%), urine, wound and femur bone (1 each, 8.3% each). These isolates were frequently from medical wards (66.7%) than ICU (25.0%) or surgical wards (8.3%). Blood samples were mostly (71.4%) from children particularly infants (<2 years) and other samples from adult patients especially those >55 years of age. The respiratory tube isolates were from patients on mechanical ventilation. The susceptibility pattern (% susceptible) of the isolates against the tested antimicrobials were as follows: ceftazidime, 50.0; cefotaxime, 0.0; ceftriaxone, 0.0; cefepime, 50.0; aztreonam, 0.0; imipenem, 100; piperacillin, 50.0; piperacillin-tazobactam, 50.0; ticarcillin-clavulanic acid, 50.0; ciprofloxacin, 58.3; amikacin, 58.3; gentamicin, 8.3; tobramycin, 8.3; sulfamethoxazole-trimethoprim, 83.3; tetracycline, 66.7. Our findings suggest imipenem as the sole antimicrobial agent absolutely active against this bacterium. Nevertheless, sulfamethoxazole-trimethoprim that is the historical drug of choice for treatment of infections caused by *B. cepacia* remains useful in our hospital.

Poster Presentation PCP2 (000016)

Vital To Monitor Prescribing Practices: A Case Report On Prescribing Error In A Malaysian Community Clinic

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Despite increases in the number of community pharmacies, the Malaysian society is still dependent on drug prescribing and dispensing by general practitioners (GPs). This case aims to highlight the importance of monitoring GP prescribing practices in the absence of pharmacist dispensing rights. All information was obtained from patient interview and by counter-checking with the GP's medication records. A 62-year old man with penicillin, aspirin and sulphur allergies complained of common chills and sore throat. He was also on regular KCl Tablet 600mg 3 tablets *qds* and KCl Solution 15ml *bd* for hypokalaemia. Prednisolone Tablet 5mg *bd*, Erythromycin Tablet 400mg *qds*, Cimetidine Tablet 400mg *bd* and Diphenhydramine Syrup 15ml *tds* were prescribed by the GP. Several hours post-consumption, uncontrolled hiccups appeared - his previous diagnostic hypokalaemic symptom. All medications were stopped but the hiccups failed to subside. Blood test clearly showed elevated K^+ level and decreased Na^+ level plus abnormal ECG change. Upon hospitalisation, the electrolyte imbalance was corrected via intravenous infusion of dextrose and insulin (to promote shift of K^+ into intracellular space), leading to ECG normalisation. This case illustrates the unwarranted outcomes of prescribing error which had led to classical drug interactions. Cimetidine could increase plasma erythromycin level, increasing the risk of toxicity while erythromycin can inhibit the metabolism of corticosteroids. Corticosteroids could potentially cause fluid and electrolyte disturbances, hence its administration to a hypokalaemic patient was highly questionable. In the absence of dispensing separation for pharmacists, patient-initiated spontaneous reporting system on suspicious prescribing-related adverse events should be introduced through enhanced public health education/awareness programmes.

Poster Presentation PCP3 (000041)

Evaluation Study On Patients Taking Antiretroviral Drugs: Efficacy, Side Effects And Compliance Issues

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The objective of treating Human Immunodeficiency Virus (HIV) patients with antiretroviral therapy (ART) is to improve the patients' quality of life while keeping adverse effects to a minimum. We performed this study to describe the types of combination therapy prescribed and to evaluate ART efficacy, side effects and medication compliance among HIV patients. The study was a cross-sectional survey conducted in a public hospital in December 2003. Patients were interviewed based on a structured questionnaire after their follow-up appointment in the outpatient HIV clinic. A total of 43 patients were selected in the study based on convenience sampling and their ages ranged from 25 -55 years old (mean±SD= 37.91±7.69 years). 18.6% of them were unemployed while the remaining had a monthly income of around RM1000. Interviewed patients had been on ART for an average of 2.34±1.79 years. Triple therapy was the most popular combination therapy prescribed (n=37, 86%) and as high as 55.8% had their treatment plan changed during their course of treatment. Although 58.1% (n=25) of subjects obtained positive trends in CD4 counts from the medication prescribed, medication non-compliance however was observed to be high, at 44.2 %. Financial constrains and adverse drug reactions were identified as the main problems that led to non-compliance. Medication compliance is a crucial issue that needs to be addressed in this study population. Missing even 5% of antiretroviral medications during the course of treatment may impair the HIV patients' chances of suppressing viral replication. By identifying issues related to drug treatment in HIV patients, health professionals may help them cope with their illness better.

Poster Presentation PCP4 (000044)

Is Diuretic Therapy Inappropriate In Ascites Patients With Ineffective Intravascular Volume? A Case Report

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The objective of this study is to present a case of a patient with ascites and how he was managed without diuretic therapy. A 53-year-old Indian man was admitted to the medical ward in Penang general hospital on 2/5/2006 with problems of fever, hypotension (due to ineffective intravascular volume), encephalopathy, ascites, dehydration, and leg edema leading to the inability to walk, and in an uncomfortable and confused state. He was treated with antibiotics, potassium chloride, normal saline, dextrose 5%, ranitidine, and thiamine. Some of his problems were resolved during his admission, including dehydration, hypotension, and encephalopathy. However his ascites and leg edema persisted, which contributed to him persistently feeling uncomfortable. He was discharged and had to obey fluid and sodium restrictions. Proper use of diuretics would have helped to improve his fluid distribution with minimal effects on intravascular volume and electrolytes. In conclusion, diuretic therapy (spironolactone and/or furosemide) should have been given to this patient after his BP had normalized to achieve optimum outcomes.

Poster Presentation PCP5 (000066)

Group Of Antibiotics Most Frequently Prescribed For Upper Respiratory Tract Infection In Pediatrics

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Antibiotics are commonly used for the therapy of upper respiratory tract infections (URTI) in pediatrics. The use of antibiotics for the management of URTI may vary depending on the type of infecting organism. This study was carried out to determine the pattern of antibiotic usage in pediatric URTIs in Penang Hospital. The data from January to December 2003 were collected retrospectively from the record office and transferred into study form and analyzed using SPSS version 12.01. The results were that 36 male and 46 female pediatrics were confirmed to have URTIs. 29 of them were less than 3 years old, 15 were between 3 to 6 years and 38 were more than 6 years old. The most frequent type of URTI were rhinitis and cold (13.41% each) followed by bronchitis and otitis media (12.9% respectively), viral URTI (8.53%), sinusitis (7.31%) and others. Penicillins were the most commonly prescribed antibiotics. It was also the most frequently prescribed antibiotics for bronchiolitis and sinusitis, while cephalosphorins were frequently used for otitis media and macrolides for sinusitis, bronchopneumonia and phyringotonsilitis. The data show that the selection of antibiotics was made based on the type of URTIs.

Poster Presentation PCP6 (000075)

Differential Protein Binding Of HIV Protease Inhibitors In Matched Umbilical Cord And Maternal Plasma

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The pharmacokinetics of the anti-HIV agents, Protease Inhibitors (PIs) in the fetus is not well explored. This project aims to determine whether lower umbilical cord (C) than maternal (M) binding of indinavir and saquinavir contributed to the low cord:maternal (C/M) total plasma concentration ratios reported previously. The unbound fraction (f_u) of indinavir and saquinavir was determined using equilibrium dialysis. Binding to purified human serum albumin (HSA) and α_1-acid glycoprotein (AAG) in buffer solutions was examined. Matched C and M plasma was spiked with 1.00 mg/L indinavir (n = 12) or 0.15 mg/L saquinavir (n = 20). HSA and AAG concentrations in C and M plasma were measured using radial immunodiffusion. Indinavir and saquinavir demonstrated protein concentration-dependent binding in buffer solutions of HSA and AAG. The f_u of indinavir was significantly higher ($p = 0.001$) in C (0.53 ± 0.12) compared with M (0.36 ± 0.11) plasma. The f_u of saquinavir was different ($p < 0.001$) between C (0.0090 ± 0.0046) and M (0.0066 ± 0.0039) plasma. HSA and AAG concentrations differed ($p < 0.030$) in C versus M plasma. The transplacental AAG concentration gradient contributed significantly to the binding differential of both PIs. The f_u of indinavir and saquinavir was significantly higher in C than M plasma, thus contributing to the low C/M total plasma concentration ratios observed previously for PIs. The unbound concentrations of indinavir and saquinavir are likely to be substantially lower in C than M plasma, and this is relevant for prophylaxis of perinatal transmission of HIV.

Poster Presentation PCP7 (000079)

Cost Of Adherence And Non-Adherence To Antibiotic Guideline For Surgical Antimicrobial Prophylaxis In A Tertiary Care Hospital

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Suboptimal use of surgical antimicrobial prophylaxis (SAP) has been shown to increase health care costs through extended hospitalization, treatment of infections and antibiotic resistance. This study was conducted to determine and to compare the direct costs of SAP between adherent and non-adherent use according to University of Malaya Medical Centre (UMMC) SAP guidelines in patients undergoing specific surgeries. Medical records of 130 patients who underwent elective surgeries (orthopaedic, general and ENT) from January to June 2005 were randomly selected from each category of surgery and reviewed in retrospective. Direct medical costs of SAP, from the hospital's perspective, were calculated with respect to (i) cost of adherent and non-adherent use of SAP, (ii) cost of postoperative antibiotic use (associated with prophylaxis or treatment of surgical site infections). Data on SAP administrations were obtained from the adherence study. Cost of antibiotics was calculated with reference to the Pharmacy Information System. Among the 304 cases assessed, 40.8% were given SAP. RM9236.46 was spent on SAP in 90.2% (N=122) non-adherent cases with potential savings of RM7260.45 if the SAP guidelines were followed. The average cost of postoperative antibiotic use for non-adherent cases (67.8%) was RM44.65 as compared to adherent cases (32.2%) at RM4.14 (N=304). The study suggests that non-adherence to SAP guidelines led to increased drug costs. Knowledge of the direct costs of SAP can be utilized to evaluate the impact of SAP use on the overall hospital expenditure.

Poster Presentation PCP8 (000087)

An Assessment Of Empiric Antibiotic Therapy Of Hospitalized Patients With Community-Acquired Pneumonia

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Background: Decisions on appropriate empiric antibiotic therapy for community-acquired pneumonia (CAP) is a challenge in Malaysia due to the lack of national guidelines and reliable prevalence data on microbial resistance patterns for pathogens causing CAP. The utilization of antibiotics without clear and specific guiding principles carries the risk of causing widespread microbial resistance and unnecessary treatment costs. **Objectives:** (1) To describe the pattern of empiric antibiotic therapy prescribed to hospitalized CAP patients and its adherence to international guidelines (2) To assess the extent of sequencing therapy utilized among these patients. **Method:** A prospective, observational study was conducted from 1 July-30 September 2003. Adult patients admitted to 11 government-funded hospitals in Malaysia with a working diagnosis of CAP were randomly recruited. Data on patient demographics, antibiotic utilization and treatment courses were noted. Data were analyzed using SPSS 9.0 and $p<0.05$ was considered to be significant. **Results:** There were 287 patients recruited with a mean(±SD) age of 50.8(±20.5) years. The majority were Malay (48.8%) males (57.5%). 473 courses of empiric antibiotic therapy was initiated; 39.5% monotherapy, 56.4% dual-therapy and 4.2% triple-therapy. The most common empiric regimen prescribed was the β-lactam/β-lactamase inhibitor and macrolide combination (35.2%) followed by β-lactam/β-lactamase inhibitor as monotherapy (20.9%). While choice of agent was concordant in 86.1% of cases with international guideline recommendations, only 36.4% of patients with confirmed CAP underwent sequencing therapy. Patients with sequencing therapy had a significantly shorter duration of hospital stay compared to those without. (mean 4.9 vs 7.7 days, $t(127)=4.04$, $p<0.001$). **Conclusion:** Greater efforts should be placed on programs that promote IV-to-oral switch in therapy to further improve the management of CAP.

Poster Presentation PCP9 (000059)

Factors Influencing The Quality Of Life In Kidney Failure Patients

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Kidney failure patients on maintenance haemodialysis and peritoneal dialysis experience decreased quality of life and increased mortality compared to the normal population. The purpose of this study was to investigate factors that influence the quality of life in patients with kidney failure. A total of 308 patients were studied prospectively. Twelve cases were excluded from the study due to death (3), patient absconded from the medical ward (2) and patients discharged on self risk (7). Patients with GFR of <15 ml/minute/1.73 m^2 were recruited as cases, and those with GFR>15 ml/minute/1.73m^2 were considered as controls. The SF36 (Short Form with 36 questions) for quality of life is a self administered and well documented questionnaire which contains eight domains (general health, vitality, mental health, physical functioning, role physical, bodily pain, social functioning, and role emotional). The mean age of patients was 51.17±16.76 years. The ethnic group distribution was Malays (40.5%), Chinese (45.6%), and Indians or others (13.9%). There were 50.7% male and 49.3% female patients. 37.2% of patients were on hemodialysis, 12.5% on peritoneal dialysis and 50.3% were not on any dialysis. The mean score of SF36 for quality of life measure for the eight domains was persistently higher in the kidney failure group than the control group. The Student t-tests showed significant difference (P<0.001) between the two groups in terms of their general health, vitality and mental health. Mann-Whitney test shows a significance difference (P<0.001) between the two groups in term of physical functioning, role physical, bodily pain, social functioning and role emotional. Based on the general linear model test, it was found that increased age, lower creatinine clearance, calcium/phosphorus balance agents, longer duration of chronic kidney disease (CKD), antihypertensive drugs (excluding diuretics), primary education, cardiovascular drugs (such as nitrates, digoxin, lipid lowering agents, diuretics) were found to be associated with a lower quality of life. Higher education was found to be associated with a better quality of life. Therefore, the study demonstrates that the SF36 quality of life measure can be used to determine factors that influenced the quality of life in patients with kidney failure.

Poster Presentation PCP10 (000050)

Evaluation Of Comparative Efficacy Between Generic And Innovator Products Of Simvastatin And Pravastatin

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With the availability of generic brands of simvastatin and pravastatin in Malaysia due to the patent expiry of Zocor and Pravachol, the P&T Committee of the National Heart Institute (IJN) recently decided to evaluate the possibility of substituting these agents with their generic equivalents; simvastatin 10mg and pravastatin 20mg tablets. An open label, observational study was undertaken to evaluate the efficacy of these generic substitutions by comparing the cholesterol levels of patients after switching over from the innovator products. A total of 304 patients (simvastatin-228; pravastatin-76) who met the study inclusion criteria were enrolled in the study and their cholesterol levels monitored. In the simvastatin arm, the results showed no significant difference in LDL, HDL and total cholesterol levels after the switch-over compared to when the patients were on the innovator products. The exception was for the triglycerides level with a significant drop of 7.1%. Similar results were also observed with the generic pravastatin 20mg except for LDL levels with a significant drop of 4.7%. Overall, the study shows a very positive result toward the generic equivalence of the drugs, suggesting that both innovator and generic simvastatin and pravastatin have similar efficacy in their lipid-lowering effect. In conclusion, the generic simvastatin and pravastatin is as efficacious as its innovator products, thus suggesting brand substitution as a possibility.

Poster Presentation PPC1 (000005)

Optimization Of The Dimerisation Of Stilbenes By HPLC Technique

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Sixteen different solvent systems were evaluated for the dimerisation of 3,4-dimethoxy-12-benzyloxystilbene **1**: water, acetonitrile, methanol, ethanol, acetone, 2-propanol, methyl ethyl ketone, ethyl acetate, dichloromethane, chloroform, dimethylformamide, tetrahydrofuran, xylene, toluene, hexane and diethyl ether. Starting material **1** was introduced to the above mentioned solvents with 15 equivalent of ferric chloride (FeCl3) 60% w/v for 12 hours. After removal of the ferric chloride reagent by filtration on silica, the reaction mixture was diluted to make it 1 mg/mL, with 4-acetoxystyrene added as internal standard. The 16 samples were injected into an analytical High Performance Liquid Chromatography (HPLC) column. A standard chromatogram gave the following retention time, t_R (±0.1 min); internal standard = 2.7, **1** = 4.4. Meanwhile, the dimers, **2** and **3**, were eluted in t_R (±0.1 min) = 12.5 and 19.8, respectively. The dimerisation of **1** could be significantly optimized by using dichloromethane as the solvent, where **2** and **3** arose as major products. In the case of chloroform, the formation of **2** and **3** were suppressed and two unknown products were formed. For the rest of the mentioned solvents, the HPLC chromatograms did not show significant peaks of **2** and **3** and some of them do not show any noticeable product peaks.

Poster Presentation PPC2 (000048)

Determination Of Ethanol At Various Fermentation Intervals Of Traditionally Fermented Glutinous Rice And Tapioca (Tapai) Using Fourier Transform Infrared Spectroscopy (FTIR)

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Tapai is a traditional fermented food available in Malaysia. The ethanol content in fermented tapai is the major concern of this study. The fermentation duration required for ethanol to be formed in both fermented tapai pulut and tapai ubi was determined. Ethanol contained in tapai was detected by using Attenuated Total Reflectance (ATR) accessory of Fourier Transform Infrared Spectroscopy (FTIR). The applicability of ATR-FTIR in detecting ethanol formation in tapai was also evaluated in this study. The prepared tapai pulut and tapai ubi were sampled at one-hour intervals during the fermentation process and analysed for the presence of ethanol. Ethanol was detected in tapai pulut that had been fermented for six hours and in tapai ubi after eight hours fermentation. As shown by the results obtained in this study, ATR-FTIR coupled with distillation is applicable in detecting the presence of ethanol in fermented tapai.

Poster Presentation PPC3 (000049)

Crystallization Kinetics Of Theobroma And A Palm Kernel Oil Blend

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Crystallization is an exothermic process that occurs when a compound goes through a phase transition from liquid to solid form. Heat is released in the process, enabling the molecules of the compound to bind together and form a solid structure. In this study, the non-isothermal crystallization kinetics of theobroma and palm kernel oil blend was investigated by using Differential Scanning Calorimetry (DSC). Samples of both substances were scanned non-isothermally with DSC. During the process, each of the samples was melted at 80°C and cooled from 80°C to 0°C at different cooling rates. The Avrami equation was used to describe the overall crystallization kinetics process that occurs in both substances. Even though the rate of scanning is different, the Avrami exponent *n* for both of the substances was approximately 2 which means that both substances undergo one dimensional crystal growth. The activation energy, *Ea* for both substances was evaluated using the Arrhenius equation. The *Ea* for theobroma oil was found to be -4046.76 kJ/mol while the *Ea* for palm kernel oil blend was found to be -399.94 kJ/mol. We can conclude that our palm kernel oil blend can form a crystal structure faster and releases less energy compared to theobroma oil.

Poster Presentation PTC1 (000046)

Cytotoxicity Of Some Plant Species In Sabah Rainforest

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The high species diversity in the rainforests of Sabah provide a rich chemodiversity and opportunities for discovery of new biologically active chemical leads. A preliminary cytotoxicity screening was carried out. Plant samples were collected and the voucher specimens were deposited at the Forest Research Center, Sabah. The dried plant materials were ground and extracted using methanol. The methanol extracts were then evaporated in vacuo and freeze dried. The extracts were dissolved in ethanol and co-cultured with the cancer cell lines, MDA and MCF-7 cells and Chang liver cells, for 72 hours at concentrations of 10, 30 and 60 μg/ml. Cell proliferation was evaluated using MTT proliferation assay. The liquid handling and washing steps in the assay were automated to expedite the process and reduce operator error. A total of 210 samples from 110 plant species representing 39 plant families were screened against the above mentioned cell lines. The results showed that 24 extracts at concentration of 60 μg/ml caused 50-75% growth inhibition to the cell lines, and another 24 extracts with inhibition rate above 75%. Overall, the extracts from the *Aglaia shawiana* (bark), *Ficus septica* (leaves), *Clausena excavate* (leaves), *Walsura pinnata* (bark) and *Dendrocnide elliptica* (bark) showed IC_{50} below 10 μg/ml against the cancer cell lines tested and have been selected for further investigation.

Poster Presentation PTC2 (000072)

Use Of Complementary And Alternative Medicine (CAM) Among Cancer Patients In The Clinical Oncology Unit Of University Of Malaya Medical Centre

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Use of CAM therapies is gaining importance worldwide especially in chronic diseases such as cancer. CAM use is of great concern since it may interfere with conventional treatments. This study was conducted to assess the pattern of CAM use among Malaysian cancer patients, the reasons that prompted their use and the disclosure rate of CAM use to the oncologists. This was a descriptive cross-sectional survey of 321 patients who were interviewed face to face. A majority of the patients were females, Chinese and aged between 41 to 64. Herbal therapies was the most common CAM used in this study sample (68.8%), followed by vitamin and mineral supplements (62.3%). Most of the patients used these two types of CAM. The most common reason cited for using CAM was to increase the body's ability to fight cancer while the most common perceived benefit was an improvement in physical well being. Of the patients interviewed, 90.3% mentioned that they were satisfied with the effects of CAM. Friends (55.5%) and family (27.4%) served as the major sources of CAM information. The monthly expenditure on CAM mainly ranged between RM100 to RM499. The disclosure of CAM use to their oncologists was rather low accounting for only 45.5% of cases. Therefore, oncologists should be well equipped with knowledge pertaining to CAM use as well as promoting disclosure of CAM use among their patients to avoid any drug-drug interactions while the patients are on chemotherapy.

Poster Presentation PTC3 (000084)

Cholesterol-Reducing Activity Of Probiotics

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In recent years, there has been considerable interest and research on the beneficial effects of probiotics on cholesterol metabolism. This is based on several studies where there appears to be a relationship between consumption of cultured dairy products and reduction of serum cholesterol levels in humans. However, the exact mechanism(s) of action of probiotic bacteria on cholesterol reduction remains unclear. The objective of this study was to determine the cholesterol-reducing ability of *Lactobacillus acidophilus* I 26 *in vitro*. The *L. acidophilus* I 26 probiotic strain was inoculated into MRS (Man Rogosa Sharpe) broth containing cholesterol (162.8 µg/ml) and was incubated at 39 °C for 20 h, after which the broth was fractionated to yield supernatant fluid and cell pellet by centrifugation. The cholesterol in the supernatant and bacterial cell pellet was extracted using the o-pthalaldehyde method. A qualitative fluorescence technique was also used to detect the presence of cholesterol in the cell pellets. *Lactobacillus acidophilus* I 26 reduced the amount of cholesterol in the supernatant by 63.37 % and a large amount of cholesterol that was removed from the growth medium was found in the cell pellet (60.66 %) of the probiotic bacteria. Results from the fluorescence analysis confirmed that the *Lactobacillus* cells were able to assimilate cholesterol as the cell pellets fluoresced yellow gold when stained with Nile Red. Furthermore, the fact that several washings did not detach the assimilated cholesterol suggests incorporation of the cholesterol within the cellular membrane.

Poster Presentation PTC4 (000094)

Acid and Bile Tolerance Of Lactic Acid Bacteria As Probiotics For Humans

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There is increasing evidence of the potential of lactic acid bacteria (LAB) as a probiotic to enhance intestinal health. However, to provide health benefits, a probiotic must be able to tolerate physical and chemical barriers such as acid and bile in the gastrointestinal tract. The small intestine and colon of humans contain relatively high concentrations of bile acids, which can inhibit growth or kill bacteria. Therefore it is essential for probiotic bacteria to be able to grow in a medium containing about 0.15 to 0.30 % of bile salt. The aim of this study was to investigate the ability of 12 LAB strains to tolerate acid and bile. The 12 LAB strains used in the present study were selected from 125 LAB strains based on their inhibitory activity against pathogens (E. coli and S. aureus). MRS broth was supplemented with bile salt for the bile tolerance test or adjusted to pH 1 to 3 with hydrochloric acid (HCl) for the acid tolerance test. Out of 125 strains studied, P2, P5, P9, and P12 were able to resist up to 0.3 % bile salt while strains P1, P3, P4, P6, P7, P8, P10, and P11 were slightly inhibited after 12 h of incubation. On the other hand, strains P1, P5, P7, P10 and P12 exhibited good acid tolerance and survived even at a low pH (pH 1). The results showed that strains P5 and P12 will be able to survive the low pH of the stomach and tolerate and grow in the high bile environment of the intestine, suggesting these strains as potential probiotic candidates.

Poster Presentation PPG1 (000082)

Antitumour Activity Of SRJ13, A New Semisynthetic Derivative Of Andrographolide In Breast Cancer Cell Lines

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SRJ13, a semisynthetic compound derived from andrographolide, has been found to have strong selectivity towards breast cancers by the National Cancer Institute (NCI) of the USA *in vitro* anticancer screen. The NCI anticancer map indicated that the mechanism of SRJ13 falls under the unknown category. This study investigated the antitumour activity of SRJ13, as single agent and in combination with tamoxifen, against MCF-7 (hormone-dependent) and MDA-MB-468 (hormone-independent) breast cancer cell lines. Cells were cultured in RPMI 1640 medium supplemented with 10% FBS and 1% penicillin-streptomycin. The breast cancer cells were then treated with SRJ13 at concentrations ranging from 0.1µM to 100µM. The cells were incubated for 96 hours after which viability of the cells was determined using MTT assay. Data generated from the microplate reader was used to determine 50% growth inhibitory concentrations (GI_{50}). Both cell lines were also treated with SRJ13 and tamoxifen, singly and in combination. GI_{50} values for SRJ13 against MCF-7 and MDA-MB-468 were 4.9µM and 2.1µM, respectively. This indicates that SRJ13 is relatively more selective against the hormone-independent breast cancer cell line. Greater inhibition of MDA-MB-468 cell growth was observed for combined treatment with SRJ13 and tamoxifen at concentrations of twice their respective GI_{50} values compared to the inhibition observed for treatment with the single agents at the same concentrations. However the combined treatment against the MCF-7 cell line showed no significant difference in the cell growth inhibition.

Poster Presentation PPG2 (000083)

Antitumor Activity Of Malaysian Endophytes

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Cancer is one of the leading causes of death worldwide, contributing to about 5 million deaths per year. Despite the sophisticated design for cancer chemotherapy, there is no cancer treatment that is 100% effective against disseminated cancer. Furthermore, acquired resistance is also becoming common. Therefore, there is a growing demand for new effective and safe anticancer drugs. Intensive research for anticancer agents from various sources has led to the exploration of natural products from unusual sources, which include endophytes. Endophytes, are microorganisms that reside within plants and represents a huge source of bioactive compounds. However, in Malaysia research into the use of endophytes in drug discovery is still in its infancy. In the present study, 350 endophytes from 25 Malaysian plants from UiTM's forest at Kuala Pilah were extracted and examined for their antitumor properties. The extracts (two fold dilution series) were treated with P388 cells (Murine Leukaemic) followed by the MTT assay. A total of 102 from the 350 endophytes showed remarkable antitumor activity against P388 cell with an IC_{50} in the range of 0.098 µg/mL to 12.50 µg/mL. Six strains [HAB 2 (R1), HAB 21 (R22), HAB 10 (R12), HAB 14 (R3), HAB 21 (R22) and HAB 21 (F7)] were found to be extremely active ($IC_{50} < 0.1$µg/mL). Further activity-monitored fractionation should be conducted to determine the potential of these six strains for the development of anticancer drugs.

Poster Presentation PPT1 (000002)

Recombinant Human Serum Albumin Dimer Has High Blood Circulation Activity And Low Vascular Permeability In Comparison With Native Human Serum Albumin

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PURPOSE: Human serum albumin (HSA) is used clinically as an important plasma expander. Albumin infusion is not recommended for critically ill patients with hypovolemia, burns, or hypoalbuminemia because of the increased leakage of albumin into the extravascular spaces, thereby worsening edema. In the present study, we attempted to overcome this problem by producing a recombinant HSA (rHSA) dimer with decreased vascular permeability and an increased half-life. METHODS: Two molecules of rHSA were genetically fused to produce a recombinant albumin dimer molecule. The pharmacokinetics and biodistribution of the recombinant proteins were evaluated in normal rats and carrageenan-induced paw edema mouse model. RESULTS: The conformational properties of this rHSA dimer were similar to those for the native HSA (the HSA monomer), as evidenced by the Western blot and spectroscopic studies. The biological half-life and area under the plasma concentration-time curve of the rHSA dimer were approximately 1.5 times greater than those of the monomer. Dimerization also caused a significant decrease in the total body clearance and distribution volume at the steady state of the native HSA. rHSA dimer accumulated to a lesser extent in the liver, skin, muscle, and fat, as compared with the native HSA. Up to 96 h, the vascular permeability of the rHSA dimer was less than that of the native HSA in paw edema mouse models. A prolonged plasma half-life of the rHSA dimer was also observed in the edema model rats. CONCLUSIONS: rHSA dimer has a higher retention rate in circulating blood and a lower vascular permeability than that of the native HSA.

Poster Presentation PPT2 (000008)

The Effect Of Citric And Tartaric Acids On The Release Performance Of A Weakly Basic Drug From Matrix Tablets

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With controlled release oral dosage forms, possible pH-dependent release often results *in vivo* variability and bioavailability problems. This is especially important for weak basic drugs, which often demonstrate a pH dependent solubility in the pH range of gastrointestinal tract. The aim of this study was to achieve a pH-independent release of propranolol HCl, a weak basic drug, from HPMC based matrices using organic acids as an approach to overcome this problem. Tablets containing propranolol HCl, HPMC K4M, dicalcium phosphate and different percentages of citric or tartaric acids were prepared by the direct compression method. The dissolution tests were performed in acid and phosphate buffer media (pH=1.2 and pH=6.8, respectively). The collected data were compared by using the mean dissolution time (MDT, n=3) and similarity factor (f2). Based on the results, the similarity factors obtained for tablets containing 5 and 10% tartaric acid (f2=89.1 and 87.6 respectively) were significantly higher compared to tablets prepared with no acid (F2=58, $P<0.05$). The MDT values calculated for the acid containing matrices in acid and buffer dissolution media were also similar. Further increasing of tartaric acid percentage in tablet formulation, resulted in a decrease in similarity factor. The results also showed that employing citric acid in matrix preparation was not as suitable as tartaric acid in providing a pH-independent release pattern (f2=51.4-60.3 for various formulations). In addition, the polymer concentration had a major impact on the obtained results. Using HPMC at percentages lower than 30%, did not show the desirable pH-independent release profiles.

Poster Presentation PPT3 (000025)

Characterization Of Sago Starch Derivatives (CMSS) For Aqueous Pharmaceutical Film Coating Application

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Aqueous coating process and natural polymers have become an active area of research nowadays. Sago starch is one of them and so far has been used as filler, binder and disintegrating agent in oral solid dosage forms but not as a coating agents. Therefore the objectives of this experiment are to synthesise sago starch into a carboxymethyl starch (CMSS) and to characterize it in order to suit the aqueous pharmaceutical film coating process. CMSS is prepared by an etherification process using sodium monochloroacetate (NaMCA) as the etherifying agent and degree of substitution value (DS) analysis is carried out to find out the amount of hydroxyl groups (O-H) being replaced by carboxymethyl groups (COOH). Solubility tests, Fourier transform infrared analysis (FTIR) and viscosity tests were used to characterize the CMSS. The etherification process at molar ratio of anhydro glucose unit (AGU) of sago starch to NaMCA, 1.5 : 1.0 will produce CMSS with DS values of 0.63 and viscosity of 212.0 cps. The CMSS dissolves completely within 15 min in water at room temperature whereas sago starch is insoluble and forms a high viscosity solution. From FTIR analysis, the O-H peak intensity of CMSS is less than the sago starch whereby new peak at 1587 cm^{-1} indicates the presence of a carboxymethyl group in the CMSS which does not appear in FTIR spectrum of sago starch. This study shows that CMSS has the potential to be use as coating solution in an aqueous pharmaceutical film coating application.

Poster Presentation PPT4 (000036)

Study Of Physicochemical Properties Of Gamma Irradiated Bacterial Cellulose

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Film forming polymers are widely used in formulation of solid dosage form. These materials are mainly used as coating substances and binder agents for granulation. The solubility, digestibility and mechanical behavior of the film formed must be adequate for the objective of the application. Mainly aqueous solutions are used for the dispersion of polymer because they are environmentally more suitable and cheaper. Bacterial cellulose produced by *Acetobacter xylinum* is one of the biopolymer that has several practical implications in biotechnology and other fields of biomedical sciences. Although the chemical nature of bacterial cellulose is similar to plant cellulose, bacterial cellulose possesses highly crystalline structure and purity precluding the use of organic solvents or processing steps necessary in the manufacturing of plant-derived cellulose. Furthermore the physiochemical properties of the membrane can be chemically modified to obtain desired functionality. Most importantly they feature biocompatibility characteristics ideally suited for encapsulation systems. Therefore the objectives of the study are to investigate and evaluate the properties of the bacterial cellulose, which has been exposed to gamma radiation as a potential aqueous coating material. In this study, 3% of bacterial cellulose aqueous dispersion was prepared and radiated with 25 kGy gamma rays. The viscosity study was conducted using viscometer run at 25ºC while morphological study was done using SEM with 50000X magnification. To determine chemical bonding present in the polymer chain, bacterial cellulose powder with particle size of 200µm was analyzed using FTIR within the range of wave number from 500 - 4000 cm^{-1}. As for the tensile strength analysis, bacterial cellulose was prepared as free film with thickness between 100-120µm and cut into size of 4mm x 20mm. From the study, the viscosity of the dispersion was found to be 289.9 ± 8.7 cp, while tensile strength of the free film was 744.356 MPa. In conclusion, this study shows that bacterial cellulose radiated with gamma rays has good rheological and tensile characteristics as a coating material for pharmaceutical applications.

Poster Presentation PPT5 (000061)

Attenuation Of The Degradation Of Gemcitabine In Plasma Via Polymeric Drug Conjugation

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The anticancer drug, gemcitabine is one of the standard regimens for non-small cell lung cancer (NSCLC). However, it can be rapidly deaminated by cytidine deaminase in plasma to the inactive metabolite 2',2'-difluorodeoxyuridine. To improve its plasma stability, we synthesized a polymeric derivative of gemcitabine (GD200401) and studied its stability in storage and in plasma. The gemcitabine derivative (GD200401) and gemcitabine were incubated with human plasma at 37˚C over 8 days respectively. Aliquots of the mixtures were removed at time intervals, ultrafiltered and analysed using reverse phase High Performance Liquid Chromatography (HPLC) to quantify gemcitabine and its degradation product. The results clearly showed GD200401 was more stable compared to gemcitabine (two-way ANOVA; $p < 0.05$), with $t_{1/2}$ >192 hours and 24 hours respectively. In summary, polymeric conjugation of gemcitabine protected the drug from degradation in plasma and improved the plasma half-life by 8 folds.

Poster Presentation PPT6 (000062)

Improved Antitumour Efficiency Of Gemcitabine Via Polymeric Drug Conjugation

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Conjugation of an anticancer drug to biocompatible polymers is an attractive approach to improve its tumour targeting properties and therapeutic index. In this study, we sought to improve the antitumour efficiency of gemcitabine by synthesizing a polymeric derivative (GD200401) and studied its *in vivo* antitumour activity. The gemcitabine derivative (GD200401) and gemcitabine in single (20 - 80 mg of gemcitabine equivalent/kg) or multiple doses (4 doses at 7 days intervals; 20 - 40 mg gemcitabine equivalent/kg), were injected via the tail vein into 9 weeks old Balb-c mice bearing 4T1 mouse breast tumour (200 mm^3). Changes in mouse tumour size were monitored for 12 days (for single dose study) and 28 days (for multiple dose study). The results were expressed as tumour size reduction (TSR) i.e. % change relative to initial tumour size (mean (n=10) ± SEM) and tumour growth delay (TGD) (mean (n=10); days), and analysed using 2-way ANOVA. In the single dose study, GD200401 showed significantly higher TSR and TGD compared to gemcitabine at all the concentrations tested (2-way ANOVA; $p < 0.05$). At 80 mg of gemcitabine equivalent/kg, GD200401 gave TSR, -51.0 ± 7.1% and TGD, 9 days whilst gemcitabine gave TSR, -18.2 ± 7.1% and TGD, 3 days. In the multiple dose study, similar trends were observed; GD200401 showed significantly higher potency compared to gemcitabine (2-way ANOVA; $p < 0.05$). At 40 mg of gemcitabine equivalent/kg, GD200401 gave TSR, -56.4 ± 4.9% and TGD, 27 days whilst gemcitabine gave TSR, -17.3 ± 7.2% and TGD, 3 days. The results clearly showed GD200401 possessed superior *in vivo* anti-tumour efficiency as compared to its parent drug, gemcitabine.

Poster Presentation PPT7 (000088)

In Vitro Evaluation Of Salbutamol Sulphate Transdermal Delivery Systems

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The transdermal delivery systems for salbutamol sulphate (SS) were designed using a hydrophilic polymer, hydroxypropyl methylcellulose (HPMC) with different concentrations of plasticizers such as polyethylene glycol (PEG), propylene glycol (PG), glycerin (GL), and Tween-80 as enhancer. The prepared transdermal films were evaluated in-vitro for drug release using phosphate buffer pH5.8 and cellophane membrane as a barrier. Transdermal films prepared with 10% PEG and 4% HPMC produced flexible and smooth films which can be easily removed from the glass mould and released the highest amount of SS (66.1%) after 6 hours. Incorporation of different concentrations of plasticizers such as PEG, PG, and GL, and Tween 80 as enhancer revealed that films containing PEG and PG exhibited an optimal controlled drug release within 6 hours where more retardation of drug release was obtained from those containing GL and Tween-80. Transdermal films containing PEG and PG of 10 and 15% w/w of polymer represented the proper controlled drug release within the period time of experiment. Further *in vitro* investigation of SS from HPMC films containing PEG of 10 and 20% w/w of polymer using rat skin as a biological membrane was evaluated where 44.76 and 69.43 percentages of SS were permeated after 6 hours respectively.

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A Preliminary Investigation On The Preparation And Physical Properties Of Chitosan Lotions

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Chitosan is a polysaccharide made up of ß-glucosamine and N-acetyl-D-glucosamine units. Due to its characteristic features, chitosan can be used to improve skin cell metabolism, repair scar tissues, and balance oil secretion. The aim of this preliminary study was to formulate and evaluate chitosan loaded lotions (o/w emulsion). The aqueous phase contained chitosan (1% w/v in 1% acetic acid) and glycerin, while the oil phase consisted of liquid paraffin and theobroma oil. Sorbitant Monopalmitate (SMP) and sodium lauryl sulfate (SLS) were selected as emulsifiers. Various types of chitosan loaded lotions were prepared, having different ratios of SMP to SLS (and combinations of SMP and SLS). The mixtures were homogenized using an Ultra Turrax Homogenizer at 11,000 rpm. The lotions were investigated in terms of physical appearance, odour and skin feel. Phase separation of the sample was observed visually while the extent of coalescence was observed using a light microscope. The rheological properties were examined using a rotational viscometer using spindle 40. Almost all the lotions were white in colour and had the smell of cocoa butter. The lotion was slightly oily when applied to the skin. The phase separation studies showed that lotions prepared with SMP were more stable than those prepared with SLS. Nevertheless, the use of combination of SMP and SLS showed greater stability than the use of individual emulsifiers. Decrease in the concentration of emulsifying agents decreased the stability of the lotion. Coalescence did not occur in all the samples evaluated. All the lotions exhibited non-Newtonian pseudoplastic flow behaviour.