Original Article

Changes of some Health Indicators in Patients with Type 2 Diabetes: A Prospective Study in three Community Pharmacies in Sharjah, United Arab Emirates

Abduelkarem AR[1], Sackville MA[2]

[1]Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy and Health Sciences, AUST Network, Ajman, UAE. [2]Pharmacy Practice Department, Sunderland School of Pharmacy, University of Sunderland, Sunderland, UK

Received for publication on 15 April 2008. Accepted in revised form 3 July 2008

Key words: Diabetes, Self-care activity, Community pharmacists, Reminder packages, Patient's opinion, Quality of life.

ABSTRACT

AIM The study aimed to examine changes in some health indicators in people with type 2 diabetes mellitus, namely: reported self-care activity, health related quality of life, and patient opinion of the services provided by three community pharmacies in Sharjah, UAE. **METHOD** A group of patients was followed over 24 months. Patients under investigation received reminders packages during the first three months of the study. No reminders were sent after 3 months after the study was underway. Repeated measures ANOVA were used to test differences between means over different periods. **RESULTS** All patients included in this study were found to have poor diet and exercise behavior at baseline. Three months into the study, more than 27% of the patients had acceptable diet, exercise, foot care and self-testing behavior. However, evaluation at six months and 24-months show that mean scores had almost returned to baseline levels. There were significant differences between the mean values of initial (baseline data) and final (at the end of the study) scores for general health (5.86, $p=0.001$), vitality (5.25, $p<0.001$), and role physical scales (3.81, $p=0.02$). There was a significant ($p < 0.001$) 25% increase in the patients' perception of the ability of the pharmacist to assist in decreasing blood glucose level. **CONCLUSION** Ongoing reminder packages are needed for continued progress in self-care activities and for achieving lasting changes in the behavior. Implementation of such a strategy through community pharmacies could help to improve patients' views of the quality of services received from these pharmacies and patient's quality of life, which should improve patient's drug therapy and reduce complications of diabetes.

INTRODUCTION

Economic growth and development in the oil-exporting countries over the past three decades has been dramatic. This socio-economic development has brought benefits to many people in the region, such as improved access to health care, education, and safe drinking water. However, economic development has set the scene for the transformation of lifestyle, eating habits, and traditional societal and family structures. These changes are not all for the better. Chronic diseases, such as diabetes mellitus, which are linked both directly and indirectly to behavioral, nutritional and environmental factors, have emerged as the leading cause of morbidity and mortality in different countries [1,2].

Data on the prevalence of diabetes mellitus in the United Arab Emirate (UAE) are limited, but it appears that it is an important problem. It has been reported that deaths attributable to diabetes accounted for 2-3% of all deaths in the UAE in the last ten years, and that diabetes is set to affect half the UAE population in the next 25 years unless people change their lifestyle and become more active [3,4].

Diabetes is largely self-managed, and successful models of care must focus on strategies that promote and maintain improved

self-care behavior. Drugs are only part of the plan for managing type 2 diabetes. Other interventions, such as patient education, modification of diet and promotion of exercise remain cornerstones for management of this chronic condition [5]. Accordingly, effective diabetes self-management training has been developed and the challenge now is to package, monitor, and consistently deliver these interventions effectively in a way that is practical in terms of the time and resources required for reaching the target population [6]. Worldwide use of reminders by telephone or mail, individualised reminder charts, diaries, and engaging family members and carers to provide reminders were found to be effective in monitoring patients and promoting behavioral changes [7-10]. The Summary of Diabetes Self-Care Activities (SDSCA) measure was developed as a brief self-report instrument for measuring levels of self-management across different components of the diabetes regimen [11,12]. Also, evaluation of the quality of life, using the short-form 36-item (SF-36), has been recognised increasingly as a useful criterion for evaluating medical outcome, for understanding the physical, emotional, and social impacts of disease, and for measuring the perception of the services provided by health care professionals to target chronic diseases [13].

The general health scale is an indication of patients' perception of their health status, in general and in comparison with others. The vitality scale provides insight into how energetic patients feel. The role physical scale is a reflection of the impact of physical health on work or other daily activities. These scales are expected to show improvement of patients undergoing a programme that emphasises exercise and positive lifestyle changes.

In the UAE, the health care system is well developed and the predominantly governmental facilities offer their services to all citizens. However, outside the secondary care sector the majority of patients obtain their medication from the growing number of private community pharmacies. Although pharmacy practice in community pharmacies in the Gulf area, such as in the UAE, has shown some improvement during the last 15 years, it has not yet fully gained the trust of the public or indeed of health professionals. This seems to be due to several reasons, including the public and the health professionals' perception of pharmacists as lacking in professionalism, commercial pressure on community pharmacies, and a lack of enforcement of the regulations governing pharmacy practice within both the community and in hospitals [14]. Evolution of new roles for the community pharmacist is highly topical [15], and people with type 2 diabetes present an ideal opportunity to develop a service needed by society. The objective of this study was to examine changes in some health indicators in patients with type 2 diabetes mellitus who receive reminder packages through community pharmacists, namely, reported self-care activity, health related quality of life, and patients' opinion of the services provided by community pharmacists.

METHODS

Study Sample

Fifteen community pharmacies, chosen to be a representative cross-section across the Sharjah Health Authority, were contacted by telephone. The pharmacy names, addresses, and telephone contact numbers were collected randomly using the DOHMS, Dubai Health Directory for 2008 available at http://www.dohmsdirectory.com. Only three pharmacies agreed to participate in the study and to provide the package to patients visiting them. All of them stated that an Arabic version should be produced for those who cannot read English. Preparation of the package in Arabic involved more than simple translation. Sometimes a term in Arabic could not be found for a medical term in English. Moreover, direct translation of an English phrase might be meaningless in Arabic or even lead to misunderstanding unless it was elaborated or qualified. For this reason, a booklet containing a summary of these packages was produced in Arabic and incorporated into the final versions before use. However, to avoid the affect of such factors on the study outcomes, the English version of the package was used with all interviewed patients throughout the study period. Patients were also encouraged to consult the Arabic summary if they needed any further clarifications. Seventy-five patients with type 2 diabetes mellitus were recruited, as initially agreed with the pharmacists. The patients were identified during prescription dispensing, and those who were on oral anti-diabetic agents were invited to take part in the study. Each patient was interviewed by the researcher based in UAE for 15–30 minutes to identify patients who met the inclusion criteria, and to collect data on their understanding of diabetes and associated topics. To minimise any bias, the interview as structured and the patients were asked the same questions, in the same sequence, and in the same tone of voice. The nature of the study was explained fully to each patient, and once they fully

understood that they were required to use the same pharmacy during the study, they were asked to sign a consent form. They were assured that their responses would be treated confidentially and that their participation in the study would not affect their medical treatment. Patients were excluded from the trial for the following reasons: age over 85 years, abnormal renal or hepatic function, known pregnancy, overt cardiovascular disease, any chronic disease, psychological or physical disability, if they refused to take part in the study or to sign the consent form, or inability to speak Arabic or English. Patients were asked if they were regular patients at any cardiovascular, renal, or hepatic clinics and their doctors were identified. The doctors were approached, either directly or by telephone, in order to discuss the study details and to obtain from them permission to enrol their patients in the study.

Stages of the Trial

Stage 1: For baseline purposes, the patients were asked to complete the SDSCA measure with the researcher based in UAE (a validated survey for measuring levels of diabetes self-care activity), the SF-36 (a validated health-related quality of life instruments), and patient opinion surveys (an unvalidated series of questions prepared by the researcher). The SF-36 (generic) is a multi-item scale measuring eight health concepts, which can be summarised as follows. (1) Physical functioning is a ten-question scale that captures abilities to deal with the physical requirement of life, such as attending to personal needs, walking, and flexibility. (2) Bodily pain is a two-item scale that evaluates the perceived amount of pain experienced during the previous four weeks and the extent to which that pain interfered with normal work activities. (3) Social functioning (SF) is a two-item scale that evaluates the extent and amount of time, if any, that physical health or emotional problems interfered with family, friends, and other social interactions during the previous four weeks. (4) Role-emotional (RE) is a three-item scale that evaluates the extent, if any, to which emotional factors interfere with work or other activities. (5) Mental health is a five-item scale that evaluates feelings, principally of anxiety and depression.

Stage 2: Clear and concise standardised information on different regimens of diabetes self-care was given as a reminder to every patient every week during the first three months. The reminders covered body weight, physical activity, dietary habit, self-testing, foot care, smoking habits, blood pressure and dyslipidaemia.

Stage 3: Three months into the trial the patient was asked to complete the SDSCA, SF-36, and patient opinion surveys. No more reminders were sent for a further three and 18-months of the study period. The SF-36 survey was used and scored according to the instructions in the SF-36 manual [16]. An unvalidated series of 10 questions prepared by the researcher based in UAE was used to gauge patient opinion of the services provided by community pharmacists. (A copy of the entire final version of SDSCA form used in this study is available from the authors).

Stage 4: Six months into the study, the SDSCA was sent together with a covering letter to each patient. The covering letter included a 'thank you' to the patient for the decision to participate in the study, and a reminder requesting that the last form be completed as objectively as possible so as to reflect actual practices. At 24 months the SDSCA was repeated with an aim to track the patients activities and level of adherence. This was done in an effort to avoid any influence of the reminder packages given during the first 3 months of study period.

Statistical Analysis

The responses to the SDSCA measure were scored according to the instructions in the handbook of diabetes self-care activities questionnaire [11,12]. Scores are calculated for each of the five regimen areas assessed by the SDSCA: general diet, specific diet, exercise, foot care, and blood sugar testing. Mean number of days (±SD) for the items was calculated, reversing the item (*On how many of the last 7 days have you eaten red meat, full fat dairy product, cake, ice cream, or "take away" food?*) in specific diet (0=7, 1=6, 2=5, 3=4, 4=3, 5=2, 6=1, 7=0). Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) for Windows Version 10.1 and S-PLUS Professional Version 6.1. Repeated measures analysis of variance (ANOVA) was used to compare patient self-care reported between baseline, three-month, six-month, and 24-month reported scores, between three-, six-, and 24-month, and between six- and 24-month (Table 1). Before analysis, the Ryan-Joiner test for normality was applied to test the appropriateness of the data (i.e. to test the differences between measurement intervals). All 15 such variables passed this test above the cut-off value of 0.10 (null hypothesis). In effect, with single group repeated measures ANOVA, the data are subjected to a series of

one-sample tests with appropriate weighting to take into account the repeated nature of the statistical testing.

Demographic characteristics were summarised using means and standard deviations or frequencies and percentages. Means and standard deviations were calculated for SF-36 and for patients' answers on the series of questions gauging patient opinion of the services provided by community pharmacists. Student's t-tests were used to estimate the level of significance of the mean difference between the initial and final scores of both surveys. Statistical significance for all analyses was defined as $p \leq 0.05$.

RESULTS

Of the 75 patients with type 2 diabetes evaluated here, 16 were excluded: four due to their belief in the drug that they use and that there was therefore no need for any further lifestyle changes. Six patients dropped out due to lack of interest, insufficient time, or an unwillingness to comply with the process. Three were excluded because they later claimed to have linguistic difficulties, not being able to speak either Arabic or English. One was excluded because of physical disability, and two because they felt that such involvement was not an appropriate role for pharmacists. The remaining 59 patients completed the study and responded to all items of the SDSCA measure. Of these, 32 (54%) were female and 25 (42%) were UAE national. The average age was 51±11.3 years (range 28-75).

Among these 59 patients, the average duration of known diabetes was 9±3.6 years (range 2-20). More than sixty percent (61%) of them reported use of at least one medication for treatment of hypertension. More than half (52%) of male diabetic patients reported that they were heavy smokers, and almost 90% of both males and females were classified as physically inactive.

The average Body Mass Index (BMI) (kg/m^2) at the beginning of the study (25.3±3.2) was significantly higher (29.2±3.8) than at 24 months ($P<0.001$). At the beginning of the study more than one quarter (26%) of male patients and half (50%) of female patients were classified as obese (BMI >30 kg/m^2). At 24 months, almost 47% of the patients had a body weight between 80 to 100 kg and 10% had body weight of more than 100 kg. However, the percentage of male and female patients classified as obese at 24-months was similar to the findings at the beginning of the study. Seventeen per cent of patients studied reported treatment of diabetic foot problems during the study. However, female patients (60%) were more than male patients (24%) in taking care of their foot and wearing comfortable shoes. Data on A1C and lipid profile were not collected because community pharmacies in the UAE do not have access to patients' laboratory data.

An important proportion of the pooled sample had no idea about the disease definition (25%), disease risk factors (23%), disease complications (33%), and disease symptoms (20%), apart from high urination frequency, which was identified by more than 95% of them. Furthermore, more than 85% of respondents considered traditional remedies and herbal medicine to be the best option for the management of diabetes. Most of them (80%) use at least one oral anti-diabetic agent and only 25% considered lifestyle modification important in diabetes management.

The mean and 95% confidence intervals for each subscale of SDSCA measure provide information for comparative purposes (higher numbers indicate better self-care on all scales). These means show considerable consistency across different measure subscales at baseline, with patients typically reporting low levels of self-care behavior regarding diet, exercise, foot care, and self-testing. At 3 months, the mean number of days per week that patients exhibited good diet behavior was 2.92±1.01 for both general and specific diet. The mean number of days per week on which patients undertook daily exercise (minimum 30 min) was 2.88±1.04. On the other hand, the mean number of days per week that patients carried out foot care and self-testing behavior were 2.93±1.10, and 2.61±1.05, respectively. All patients were considered to have poor diet behavior (i.e., on less than five days per week and poor exercise behavior (on less than three days per week) at baseline according to their responses on the scale used by the SDSCA. This percentage decreased to 71.2 for diet and exercise at the 3-month observations. At 3 months, more than 27% of patients were considered to have acceptable diet, exercise, foot care and self-testing behavior (between four and five days per week). However, results at 6 months and 24 months show that mean scores had almost returned to baseline levels. At 24 months, the mean number of days per week that patients exhibited good diet behavior was 1.66±0.90 (1.24±0.88, baseline) for general and

1.80±0.78 (1.78±0.97, baseline) for specific diet. The mean number of days per week on which patients undertook daily exercise (minimum 30 min) was 1.54±0.79 (1.17±0.75, baseline). On the other hand, the mean number of days per week that patients carried out foot care and self-testing behavior were 1.46±1.18 (baseline 1.12±0.70) and 1.71±0.71 (baseline 1.19±0.51), respectively. The mean difference (baseline to 24-months) for general diet, specific diet, exercise, foot care, and self-testing were 0.42, p=0.064; -0.02, p=0.998; -0.37, p=0.057; -0.34, p=0.312; and –0.53, p<0.001, respectively. Repeated measures ANOVA were used to test differences between means from baseline to 3 months, baseline to 6 months, baseline to 24 months, 3 month to 6 months, 3 months to 24 months; and 6 months to 24 months (Table 1).

All people under investigation completed the SF-36 survey at the baseline (initial scores) and 3-months (final scores) of the study. There were significant mean differences between the initial and final scores for general health (5.86, p=0.001), vitality (5.25, p<0.001), and role physical scales (3.81, p=0.02) (Table 2). No significant changes were detected in the remaining scales.

Table 1. Repeated measures analysis of variance (ANOVA: pairwise multiple comparison) was used to test differences between means of SDSCA measures reported between baseline, three-month, six-month, and 24-month reported scores); between three, six months, and 24-month; and between six and 24-months.

Scale	Mean Difference	Significance (P)	95% CI
General diet			
Baseline - 3 months	-1.68*	<0.001	-2.14 to -1.21
Baseline - 6months	-0.63*	0.001	-1.05 to -0.20
Baseline - 24 months	-0.42	0.064	-0.86 to -0.02
3–6 months	1.05*	<0.001	0.59 to 1.51
3–24 months	1.25*	<0.001	0.78 to 1.72
6 –24 months	0.20	0.75	-0.23 to 0.63
Specific diet			
Baseline - 3 months	-1.14*	<0.001	-1.62 to -0.65
Baseline - 6months	-0.12	0.976	-0.55 to 0.31
Baseline - 24 months	-0.02	0.998	-0.45 to 0.42
3–6 months	1.02*	<0.001	0.57 to 1.46
3– 24 months	1.12*	<0.001	0.67 to 1.56
6 –24 months	0.10	0.981	-0.28 to 0.49
Exercise			
Baseline - 3 months	-1.71*	<0.001	-2.16 to -1.27
Baseline - 6months	-1.08*	<0.001	-1.54 to -0.63
Baseline - 24 months	-0.37	0.057	-0.75 to -0.03
3–6 months	0.63*	0.009	0.11 to 1.14
3– 24 months	1.34*	<0.001	0.88 to 1.79
6 –24 months	0.71*	<0.001	0.25 to 1.17
Foot care			
Baseline - 3 months	-1.81*	<0.001	-2.27 to -1.36
Baseline - 6months	-1.12*	<0.001	-1.64 to -0.60
Baseline - 24 months	-0.34	0.312	-0.82 to 0.14
3–6 months	0.69*	0.014	0.19 to 1.29
3– 24 months	1.47*	<0.001	0.91 to 2.04
6 –24 months	0.78*	0.006	0.16 to 1.40
Self-testing			
Baseline - 3 months	-1.42*	<0.001	-1.83 to -1.01
Baseline - 6months	-0.44	0.075	-0.91 to -0.02
Baseline - 24 months	-0.53*	<0.001	-0.84 to -0.21
3–6 months	0.98*	<0.001	0.42 to 1.55
3– 24 months	0.90*	<0.001	0.45 to 1.35
6 –24 months	-0.08	0.998	-0.59 to 0.42

* = P≤0.05

Table 2. SF-36 survey results (n=59)

Scale	Mean ± SD		Level of significance (Student's t-test)
	Initial scores	Final scores	
Physical functioning	62.71±25.21	64.79±17.84	0.098
Role-physical	53.39±43.17	57.20±32.14	0.023
Bodily pain	60.78±23.45	62.66±20.22	0.103
General health	52.27±26.76	58.14±20.19	0.001
Vitality	43.38±10.14	48.64±08.14	< 0.001
Social functioning	46.82±14.97	48.31±12.02	0.089
Role-emotional	58.19±46.56	61.36±34.13	0.096
Mental health	51.45±18.15	53.56±17.71	0.094

The SF-36 survey was scored according to the instructions in the SF-36 manual. All scores are transformed to a scale of 0-100 points: higher scores indicate a better state of health. Student's test was used to calculate the level of significance.

Table 3 shows the respondents' opinions on the ten questions used to gauge patient opinion of the services provided by community pharmacists. Although this was an invalidated instrument, it provided some insight into changes in patients' perceptions of the services provided by community pharmacists at baseline and at the 3-months of the study. The responses at 3 months were generally better than those at baseline. When patients were asked about the idea of being able to have a diabetes test done in a pharmacy (question 1), about 42% responded "agree" or "strongly agree" at baseline. This figure rose to more than 60% at 3-months. At baseline, patients either agreed or strongly agreed by only 32% and by more than 92% with the statement in question 2 (My pharmacist can help me decrease my blood glucose level) and question 3 (My doctor can help me decrease my blood glucose level) respectively. At the 3-month stage, the perception of the ability of the pharmacist to assist in decreasing blood glucose level had increased to more than 56%. The change in the evaluation of pharmacists' abilities was significant ($p < 0.001$). Significant changes were also seen in the responses of patients to question 6 (How often do you forget to take your medication?), question 7 (How often do you forget to take your medication when you are away from home overnight?), question 8 (Do you take your medicine exactly as your doctor instructed?), and question 9 (How often do you stop taking your medication?), which covered the topic of patient behaviors and compliance.

At baseline, only 12% of the participants either agreed or strongly agreed with the statement "My diabetic medication is no benefit" (Question 4). Therefore, there seems to be little doubt that patients in general have faith in their drug therapy regimes. This view was further reinforced by the fact that only 7% of respondents either strongly agreed or agreed with the statement "I feel my medication is not working and that it is pointless to continue with it in the long term" (Question 5). However, in responding to question 10, "How often do you take more medication than your doctor prescribed?" 81% reported that they either never or very rarely took more medication than prescribed. At the 3-month stage, the changes in respondents' opinion on questions 4, 5, and 10 were non significant. Table 3 shows respondents' opinion (Mean±SD) on the ten questions used for this particular study.

Table 3. Respondents' responses on the five statements and five questions used to gauge their opinion of the services provided by community pharmacists.

Statements/Questions	[Mean±SD]		Level of significance (t-test)
	Baseline scores	3-month scores	
1 I like the idea of being able to have a diabetes test done in a pharmacy.	[3.19±1.42]	[3.58±1.30]	0.112
2 My pharmacist can help me decrease my blood glucose level.	[2.80±1.11]	[3.54±1.21]	<0.001
3 My doctor can help me decrease my blood glucose level.	[4.25±0.84]	[4.34±0.80]	0.557
4 My diabetic medication is of no benefit.	[3.83±1.05]	[4.19±1.01]	0.103
5 I feel my medication is not working and that it is pointless to continue with it in the long term.	[4.07±0.87]	[4.32±0.86]	0.121
6 How often do you forget to take your medication?	[3.85±0.93]	[4.32±0.63]	0.001
7 How often do you forget to take your medication when you are away from home overnight?	[3.68±1.17]	[4.56±0.60]	<0.001
8 Do you take your medicine exactly as your doctor instructed?	[4.27±1.11]	[4.85±0.36]	<0.001
9 How often do you stop taking your medication?	[4.37±1.05]	[4.86±0.35]	0.001
10 How often do you take more medication than your doctor prescribed?	[4.46±0.79]	[4.66±0.60]	0.135

For statements 1 to 5, the respondents were asked to rate their response using the options, strongly agree, agree, somewhat agree, disagree, and strongly disagree.
For questions 6 to 10, the respondents were asked to rate their response using the options, most of the time, often, sometimes, very rarely, and never.
Scores (1 to 5) were used and reversed in statements/questions 4-7, 9 and 10 because of the negative wording of the questions; higher values now indicate positive responses.

DISCUSSION

This study was set up in community pharmacies to test the hypothesis that the provision of reminder packages by a community pharmacist would have a demonstrable effect on outcomes (reported self-care activity, health related quality of life, patient opinion of the services provided by community pharmacists) in patients with type 2 diabetes mellitus.

We found that knowledge about type 2 diabetes was inadequate, i.e. that a significant proportion had no idea about the disease definition (25%) or disease symptoms (20%). In view of this and the obesity epidemic, sedentary lifestyle and an ageing population in the region, it is not surprising that the prevalence of diabetes and its complications doubles with each generation [3,17]. Furthermore, a significant proportion of people under investigation were unaware of the diabetes-associated risk factors (23%), diabetes-associated diseases or diabetes complications (33%). This is similar to the findings of previous studies, which demonstrated that patients with type 2 diabetes had negligible knowledge about their disease [18,19]. This suggests that the image of diabetes itself overshadows knowledge of its complications, which are the major causes of morbidity and mortality.

Self-care is essential for managing diabetes, and ensuring that patients undertake such programmes is a major challenge to the healthcare team. Adoption of a healthy lifestyle will almost certainly produce better metabolic control of diabetes, which in turn will aid in the avoidance of subsequent acute and long-term complications of the disease [20]. All patients in the present study had poor diet and exercise behavior at baseline, and only 27% had acceptable diet and exercise behaviors at 3-months. This indicates that there is much scope for improvement in these areas of diabetes management. This finding might be attributed to underestimation of the importance of lifestyle modification once medical therapy is started [21].

The reported poor foot care behavior at baseline (2.93) and the finding that more than 50% of people under investigation were heavy smokers may explain the reason why 17% of patients reported treatment of diabetic foot problems during the study. With more than 50% of the patients under investigation being heavy smokers, it is likely that these smokers were unaware that smoking can affect the circulation to their feet.

Promoting change and knowing how to support it is an important skill for pharmacists [22]. The provision of information, education and physiological support that facilitates self-management is a cornerstone of diabetes care [4]. Our results show that at the 3-month stage all scales demonstrated an improvement in reported self-care activity compared with the baseline responses. However, at the end of the second three-month period and again at the 24-month period, during which no reminders were sent, mean scores regressed almost to baseline. There was a decline at 6-months in the achievements gained at 3-months but little change between 6-months and 24-months, suggesting that an ongoing reminder strategy is needed to support continued progress in self-care activities and to achieve lasting changes in the behavior of those people under investigation. However, whether such reminder-phase improvements (at 3-months) are associated with lowered glycaemia, decreased hospitalisation, and reduction of associated expenditure are not known. These longer-term issues deserve further study.

The improvement achieved at 3-months and the significant difference in the mean final scores of SF-36 general health ($p = 0.001$), vitality ($p < 0.001$) and role physical ($p = 0.023$) scales, in addition to the significant changes ($p < 0.001$) in patients response about pharmacists' abilities presented here demonstrate that implementation of such a strategy through community pharmacies could help in improving patients' views of the quality of services received from their community pharmacy and patients' quality of life, which will improve their drug therapy and reduce diabetes complications. The findings presented here are consistent with and support a similar study [23] reporting that clinical improvements were greatest between baseline and 3-months, with stabilization between 3-months and 6-months, and insisting on the necessity for a continuous intervention strategy to maintain this improvement.

Obesity and inactivity can increase insulin resistance, speeding up the onset of type 2 diabetes in the genetically predisposed. We found that 26% of males and 50% of females were obese, and almost 90% of them combined were physically inactive. This corroborates another study, which demonstrated that only 12.7% of men and 8.7% of women in the Gulf area practiced any kind of exercise [17]. Though our sample was small (n=59), the high prevalence of obesity and physical inactivity may illustrate the potential ill health of the surveyed population. Only 25% of the patients in this study considered lifestyle modification an important element in diabetes management. Moreover, in many African and Mediterranean communities, overweight is widely perceived as a desirable and a sign of good health and financial success [3]. We suggest that part of the remedy would be to seek a fundamental change in the way walking is popularly perceived so that it is no longer considered a strictly the low-income transport option.

In no way do we suggest that a reminder strategy by a community pharmacy can replace the relationship between the patient and the provider (physician, dietician, nurse), which is central to diabetes care, or face to face interventions to improve patients adherence and compliance. But we do suggest that pharmacists in the community have the potential to be an integral part of the primary healthcare team in delivering holistic patient care [24]. We hope that our study would contribute positively to the pharmaceutical system in the UAE by promoting a greater understanding among the health authorities of the role pharmacists can play in the community and their important input in the management of chronic diseases such as diabetes.

One limitation of this study is that it included pharmacists from only one state. Hence, the results should not be generalized to other areas in the UAE or to other regions of the Gulf area. Moreover, the before-and-after design used in this study, with patients serving as their own controls, was not optimal. Furthermore, the study has a number of shortcomings, such as (1) the responses were based on patient self-recall, and the relationship between reported and actual behavior is unknown, (2) the short period during which reminder packages were used, and (3) the scales used have not been validated in Arabic. Furthermore, considering the difference in health care systems between the different countries and the fact that an individual's level of adherence may vary over time and between different aspects of treatment, our findings may not be applicable or be achievable elsewhere. For future research the authors recommend that the SDSCA questionnaire be used in a crossover study, whereby patients are randomly allocated to 'no reminder followed by reminder' or 'reminder followed by no reminder' groups, in order to develop intervention programs that facilitate long-term changes in behavior.

CONCLUSION

Our study found that repeated reminder packages are needed to support continued progress in self-care activities and to achieve lasting changes in the behavior of those people. Such findings, in addition to the significant changes in patients' response about pharmacists' abilities, demonstrate that implementation of such a strategy through community pharmacies could help to improve patients' views of the quality of services received from their community pharmacy and also patients' quality of life, which will improve their drug therapy and reduce diabetes complications.

CORRESPONDING AUTHOR:
Abduelkarem AR, e-mail:
Karem1961@hotmail.com

REFERENCES

1. Li X. H., Li T. L. and Yong Z. A nine year prospective study on the incidence of childhood type 1 diabetes mellitus in China, Biomed Environ Sci. 2000; 13:263-70.

2. Oldroyd J., Banerijee M., Heald A. and Cruickshnak K. Diabetes and ethnic minorities. Postgrad Med J. 2005; 81:486-90.

3. Robinson D. Killing me sweetly. Arabian Business-Health. 2005; 6:48-53.

4. Adeghate E., Schattnerb P. and Dunn E. An Update on the Etiology and Epidemiology of Diabetes Mellitus. Ann. N.Y. Acad. Sci. 2006; 1084:1–29.

5. Yamaoka K. and Tango T. Efficacy of lifestyle education to prevent type 2 diabetes. Diabetes Care. 2005; 28:2780-6.

6. Edwards A., Thomas R., Williams R., Ellner A., Brown P. and Elwyn G. Presenting risk information to people with diabetes: evaluating effects and preferences for different formats by a web-based randomised controlled trial. Patient Educ Couns. 2006; 63:336-49.

7. Tilson H. H. Adherence or compliance? Change in terminology. Anna Pharmacother. 2004; 38:161-2.

8. Atreja A., Bellam N. and Levy S. Strategies to enhance patient adherence: Making it simple, Available at: http://www.medscape.com/viewarticle/498339. (Accessed 2008 February 10).

9. Sequist T., Gandhi T., Karson A., Bugbee D., Cook E., Fairchild D., et al. A randomised trial of electronic clinical reminders to improve quality of care for diabetes and coronary artery disease. J Am Med Inform Assoc. 2005; 12:431-7.

10. Thomas S. and May M. Novel Technology Shows Promise in Diabetes Management. Available at: http://www.medscape.com/viewarticle/552799. (Accessed 2007 March 10).

11. Toobert D.J. and Glasgow R.E. Assessing diabetes self-management: the summary of diabetes self-care activities questionnaire". In: Bradley C., ed. Handbook of psychology and diabetes. Switzerland: Churchill Horwood Academic. 1994; 351-75.

12. Toobert D.J., Hampson S.E. and Glasgow R.E. The summary of diabetes self-care activities measure. Diabetes Care. 2000; 23:943-50.

13. Glasgow, R.E., Barrera, M., Mckay, H.G. and Boles, S.M. Social support, self-management, and quality of life among participants in an internet-based diabetes support program. CyberPsychol and Behav. 1999; 2:271-81.

14. Bawazir, S.A. Prescribing patterns at community pharmacies in Saudi Arabia. Int Pharm J. 1992; 6:222-4.

15. Timothy M.E. Pharmaceutical care reduces risk factors in type 2 diabetes. Diabetes Care. 2005; 28:771-6.

16. Ware J.E. Measuring patients' views: the optimum outcome measure. BMJ 1993, 306:1429-30.

17. Nielsen J.V. Diabetes in the Arab world: prevalence and risk factors. Pract Diabetes Int. 1999; 16:82-6.

18. Caliskan D., Ozdemir O., Ocaktan E. and Idil A. Evaluation of awareness of diabetes mellitus and associated factors in four health center areas. Patient Educ Couns. 2006; 62:142-7.

19. Ding C.H., Teng C.L. and Koh C.N. Knowledge of diabetes mellitus among diabetic and non-diabetic patients in Klinik Kesihatan Seremban. Med J Malaysia. 2006; 61:399-404.

20. Bradley H.A. and Puoane T. Prevention of hypertension and diabetes in an urban setting in South Africa: participatory action research with community health workers. Ethn Dis 2007; 17:49-54.

21. Dushay J. and Abrahamson M.J. Insulin resistance and type 2 diabetes: A comprehensive review. Available at: http://www.medscape.com/viewprogram/3942?src=mp. (Accessed 2007 April 24).

22. Maguire T. Ways to help change behaviour. Pharm J. 2003; 271:813-5.

23. Lemon C.C., Lacey K., Lohse B., Hubacher D.O., Klawitter B. and Palta M. Outcomes monitoring of health, behaviour, and quality of life after nutrition intervention in adults with type 2 diabetes. J Am Diet Assoc. 2004; 12:1788-92.

24. Krass I., Armour C. L., Mitchell B., Brillant M., Dienaar R., Hughes, J. et al. The pharmacy diabetes care program: assessment of a community pharmacy diabetes service model in Australia. Diabetic Med. 2007; 24(6):677-83.

To cite this article Abduelkarem AR, Mike A Sackville MA. Changes of some Health Indicators in Patients with Type 2 Diabetes: A Prospective Study in three Community Pharmacies in Sharjah, United Arab Emirates. *Libyan J Med*, 2009; 4:29-38. AOP:080918.