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Original research

Effects of the pharmacist's input on glycaemic control and cardiovascular risks in Muslim diabetes☆

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ABSTRACT

Aims: To determine whether an extended pharmacy service would improve glycaemic control and cardiovascular risks in diabetic Muslims.
Methods: Ambulatory literate adult diabetic Muslims with A1C >7% were randomly assigned to either a study group (usual care plus added pharmacist input, $N = 63$) or a control group (usual care only, $N = 67$). On four consecutive visits, at 2-month intervals, the study group met a pharmacist who educated and discussed with each patient regarding medication uses and diabetic treatment. This was accompanied by providing a diabetic pamphlet. Changes in A1C (mg/dL), lipid parameters (mg/dL), medication adherence (% pill count) and diabetic knowledge scores were measured.
Results: There was no difference in A1C reduction between the study and the control groups (−0.8 vs. −0.6, $p = 0.56$). Total cholesterol and LDL-C improvements were greater in the study group than in the control group (−31.6 vs. −1.2, $p = 0.000$; −15.0 vs. +9.1, $p = 0.002$, respectively). The percent pill count (+6.8 vs. −2.8, $p = 0.004$) and diabetic knowledge scores (+2.1 vs. +0.6, $p = 0.002$) were increased in the study group but not in the control group.
Conclusion: The pharmacist' s one-on-one education on diabetes accompanied by its pamphlet, in Muslim patients with diabetes did not affect glycaemic outcome but reduction in cardiovascular risks through lowering total cholesterol and LDL-C was found. The strategies may also improve diabetic knowledge and medication adherence.

1. Introduction

It is projected that the prevalence of people living with diabetes worldwide will reach 366 million by 2030, which is more than double the figure for the year 2000. Indeed, six of the top 10 countries with diabetic patients are found in Asia [1]. This is in line with the results of a long term follow up in a healthy cohort that showed Asians had a significantly

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higher risk of diabetes than did Caucasians [2]. The WHO estimates for the prevalence of diabetes in the South-East Asia region shows that Thailand would rank fourth among the ten countries in the region by the year 2030 [3]. This, however, may be an underestimation compared to that of the InterASIA study that quoted the Thai national diabetic prevalence as 9.6% (2.4 million) in the year 2000 [4], which corresponded with the 2.6–15.1% reported in South-East Asia and Western Pacific [5]. Since 2003, a chronic disease surveillance policy in Thailand has begun [6], thus a more accurate and traceable diabetes database can be expected as well as better planning and provision for diabetes care. In Thailand, Muslims reside primarily in three deep southern provinces, constituting 79% of population in the provinces compared to the national figure of 5% [7]. In Krabi Province located in mid south where the study took place, about one-third of the population is Islamic [8]. From its 2001–2005 provincial health statistics, Diabetes mellitus was among top five diseases affecting population attending outpatient clinics [8]. Although there is no specific data on the prevalence of diabetes for Muslims, the figure reported elsewhere is 11–14% [9,10]. Diabetes mellitus is related to genetics but individual lifestyle behaviours can have a substantial impact on its occurrence [11] and subsequent cardiovascular risks. Abstaining from alcohol consumption and smoking may be considered a favourable lifestyle behaviour among Muslims towards cardiovascular risk reduction. Special dietary requirements may also play an important role. From a current electronic literature review, seldom has a study evaluating clinical outcomes of health care service been carried out in this specific diabetes population. The current study is to determine the effects of extra pharmacist's activity added on to the usual care for Muslim diabetes. It was hypothesized that patients receiving the extra care from a pharmacist will have an improvement in both glycaemic control and cardiovascular risks, compared to those who do not.

2. Methods

This study was a randomized controlled trial (RCT) taking place at a 30-bed community hospital in Krabi Province in mid-south of Thailand, between August 2005 and May 2006. The study was approved by the Faculty of Pharmacy Ethic Committee. Among 463 diabetic outpatients, 202 (43.6%) were Muslim. There were three primary care physicians providing service in rotation for the patients, on Thursdays and Fridays. There were four pharmacists, two of whom were in charge of dispensing medications. One pharmacist was responsible for the administrative duties while the other was for public health service. There were, however, no routine pharmaceutical care services specific to a group of patients or to a particular disease.

2.1. *Eligibility criteria*

Inclusion criteria were Muslim diabetic patients; literate in Thai; ≥18 years of age; and had A1C >7% 3 months prior to the study.

2.2. *Sample size calculation*

Based on a study by Choe et al. [12], in the pharmacist care group type 2 diabetes had their A1C lowered 2.1 ± 2.5% compared to a 0.9 ± 2.0% reduction in the control group. The number of patients needed, to detect a difference in the A1C reduction at a test power of 80% and with a two tailed 95% confidence level, should be fifty-six patients for each group but taking into account the number of patients who could be lost to follow up (~15%) it was calculated that 65 patients would be required for each group.

2.3. *Control group vs. study group*

Of the 137 eligible patients, 135 consented to participate in the study. They were selected randomly by drawing numbers from a container that included "1" for the study group ($N = 67$) and "2" for the control group ($N = 68$). All the patients were asked to bring in their own medications at every visit. Diabetic medication adherence predicted by percent pill count was assessed at the baseline (first visit) and at each subsequent visit. The percent pill count was calculated by: [(the number of tablets previously received) minus (the number of tablet currently remaining)] multiplied by 100, then divided by the number of tablet previously received. At both the baseline and at the end of the study a diabetic knowledge test questionnaire was also administered by the pharmacy technician. Lipid panels were also measured at the same time points. With patients whose triglyceride level was <400 mg/dL their LDL-C level was calculated from the Friedwald formula [LDL-C = total cholesterol – HDL-C – Triglyceride/5]. Non-HDL-C, which was a secondary target in those with triglyceride ≥200 mg/dL [13], was also estimated selectively.

The control group received their usual scheduled care by a primary care physician every 4–8 weeks. At each visit, fasting blood glucose was checked by the laboratory. Blood pressure and weight were recorded by a qualified nurse. A research pharmacist checked the pill count. Each patient then met a physician who assessed the patient and issued a repeat or modified prescription which the dispensing pharmacist filled and they also gave general advice on the medication uses. This was done over the dispensary counter on a routine basis.

In addition to the usual care, each patient of the study group had a scheduled meeting with the research pharmacist for four consecutive visits at 2-month intervals. Each visit was on the same date as the physician's appointment and in addition, to avoid a missed appointment, a health personnel coordinator attached to the primary health care centre in the area, where a patient was living, reminded the patients of the scheduled visit 3 days prior to each visit date. At each visit, the research pharmacist refilled prescriptions, discussed the uses of medication and checked the pill count. Education on diabetes which included appropriate lifestyles and correct diet was also provided apart from a companion diabetic pamphlet which covered the diabetic complications, the targets of treating diabetes, lifestyle change, and antidiabetic medications. During the study, five (four in the study group, one in the control group) were excluded, thus 63 and 67 patients remained in the study and control groups, respectively. The study design is outlined in Fig. 1.