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THE EFFECT OF HEALTH EDUCATION IN THE MANAGEMENT OF TYPE 2 DIABETES AND THE SRI LANKAN PERSPECTIVE: A REVIEW

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ABSTRACT

A high prevalence of diabetes and its microvascular and macrovascular complications constitute a significant burden on healthcare systems. Self-management through patient education contributes to reduce the burden of uncontrolled diabetes. Although there are a number of proven strategies in providing diabetes care education, there is insufficient evidence to recommend a specific type of education for our population. The aim of this article is to critically review published studies on Type 2 diabetes health literacy to establish a culturally adapted, structured education program on glycemic control for the Sri Lankans.

The review was limited to journal articles published in PubMed, Google Scholar and Google databases. Article search was done using the search headings of “patient education, type 2 diabetes and Sri Lankan studies”. All the articles found in Sri Lankan journals and other important international articles on the topic during the last decade were also reviewed.

Poor health literacy is one of the major barriers that has limited access to healthcare facilities and reduce health outcomes. Although recent research has focused on health literacy as an intervention in the treatment of diabetes, none of the Sri Lankan studies have measured its effect on glycemic control in type 2 diabetes. This review has raised the need for measuring the impact of health education on management of type 2 diabetes. This could be adopted to develop targeted interventions on patient education to be implemented in glycemic control of Type 2 diabetes in Sri Lanka.

INTRODUCTION

The occurrence of diabetes shows substantial inconsistencies across the socioeconomic quintiles and is different, for different stages of life (1). This has become a major problem in low and middle socioeconomic countries where it has a significant influence on productivity and the overall economic output that leads to a considerable burden on health care and welfare systems (2).

Type 2 diabetes mellitus (T2DM) is the commonest type of diabetes, occurring as a heterogeneous disorder that affects the young, middle-aged and elderly. This metabolic disorder usually encompasses dyslipidemia, high blood pressure, and central obesity, reflecting

the heterogeneity of different phenotypes (3).

Sri Lanka is amongst the countries with the highest diabetes prevalence rates in the world. As stated in an International Federation of Diabetes Atlas, 1.1 million cases of all types of diabetes were recorded in Sri Lanka in 2014 and the majority of them were suffering from T2DM. It has also revealed that there are a substantial number of pre-diabetics who were not included in these statistics (4). The high prevalence of diabetes and the associated microvascular and macrovascular complications can have major socioeconomic consequences that negatively affect the individual, their family and the society (5). In order to reduce the burden on health-

-care systems, control of diabetes has become one of the priority components of healthcare management.

It is a well-recognized fact that the level of understanding on self-management determines the outcome of a chronic disease. Similarly, considering the nature of the disease, the degree of self-awareness on diabetes and its management determine the level of control and overall outcome of the disease. Understanding the important role of self-management of diabetes improve the adherence to therapy including both medications and lifestyle ensure better outcome via the influence on patient behavior, knowledge and attitudes (6-8). There is ample evidence to suggest that health education and awareness programs have improved the



overall outcome of these patients (8-11) and therefore, it has been incorporated as an integral part of diabetes management (12-14). With the recent research, it has been widely accepted that the major component of treatment success is achieved by the education and improving the self-management skills of these patients (10, 11). It is well known that the presence of diabetes prolongs the hospital stay of patients. A study conducted in 2015 by Medagama et al. has confirmed this finding even in our clinical setup. It also highlights the fact that one-quarter of all diabetes-related admissions are for optimization of glucose control that could be easily achieved in the community with proper patient education (15) and shows the positive effect that could be brought about on hospital overcrowding. Two other recent studies conducted by Jayasuriya et al., 2015 and Amarasekara et al., 2015 demonstrated that the majority of our adults with T2DM did not achieve desired glycemic control, which highlights the failure of current diabetes care practices (9, 16).

There are many published studies on diabetes education and the benefit on the overall outcome of these patients. However, there was limited research carried in this area of diabetes describing the impact of health education on glycemic control among T2DM patients in Sri Lanka. The aim of this exercise was to review the literature on health literacy among patients with T2DM and to introduce a culturally adapted, structured, pharmacist-delivered education program on glycaemic control. This paper constitutes part of a current study, which is investigating the potential role of pharmacists in improving patient health literacy and effective self-management of their T2DM in Sri Lanka.

METHOD

A review of the literature was performed to identify studies that evaluated the effect of diabetes education on T2DM patient self-management and diabetes

control, both globally and specific to Sri Lanka. The electronic databases used for this study were PubMed, Science Direct, Google Scholar and Google search engine. The search was limited to articles published in the English language (which includes all known Sri Lankan medical journals) and conducted in humans. The search used the following headings: Patient education, type 2 diabetes, T2DM and Sri Lankan diabetes studies. A cross reference search was conducted to include articles of T2DM studies published in other Sri Lankan journals that were not included in indexed databases through google search engine. In order to increase the number of articles included in the review, an additional search was made based on keywords glycated hemoglobin test, HbA_{1c}, and fasting blood glucose level. The articles that were mainly focusing on gestational diabetes and type 1 diabetes were excluded.

RESULTS

Definition of type 2 diabetes

T2DM is defined as tissues resistance to the action of insulin combined with the deficiency in insulin secretion due to the progressive lowering of insulin secretion by the β cells that are inadequate to overwhelm the resistance, leading to T2DM. This also affects fat metabolism resulting in increased free fatty acid flux, triglyceride levels and reciprocally low levels of high-density lipoprotein (HDL) with the increased risk of developing micro and macrovascular complications (17).

Cardio-metabolic risk profile of Sri Lankan patients with type 2 diabetes

A study on “*Evaluation of common Type 2 Diabetes risk variants in a South Asian population of Sri Lankan descent*” stated that most T2DM risk variants identified in Sri Lankans were comparable to those in Europeans (18). The identified modifiable risk factors were the obesity, physical inactivity, hypertension, increased amount of high-density lipo-

-protein and /or triglycerides, history of gestational diabetes or delivery of a baby weighing more than 4 kilograms (9b), history of vascular disease and polycystic ovarian syndrome (8, 19-22). One of the major risk factors associated with T2DM was the obesity, which occurs due to abnormal or excessive fat accumulation in the body, which is also associated with dyslipidemia, hypertension, other cardiovascular diseases, non-alcoholic fatty liver disease and other conditions including renal impairment (3, 23). A recent study by Katulanda et al., 2015 revealed that, even though morbid obesity is commonly accompanied by diabetes, there is an inconsistency between obesity data derived on the international categorization of obesity and the obesity related co-morbidities based on the prevalence of diabetes and cardiovascular diseases (24). Physical inactivity is another risk factor that contributed to the total risk of developing T2DM. With the economic development and technical advances, the lifestyle of the people has become more sedentary especially in the urban population of Sri Lanka as indicated by Katulanda et al. in 2008 and has been the reason for the higher prevalence of T2DM in urban population (25). Furthermore, Ranasinghe, 2014 and Siyambalapatiya et al., 2012, found that adherence to regular exercise and physical activity were poor among T2DM patients in Sri Lanka (26, 27). Those who adhered to regular exercise were commonly the males than females and therefore had fewer disease complications. Another study provided similar evidence indicating the need for the introduction of new strategies to change the attitude towards the physical activity of patients, of both genders, to achieve their individual glycemic targets (26-28).

Complications of diabetes

As a lifelong disease, T2DM requires a commitment to improve glycemic control in order to delay or diminish the onset and the progression of microvascular and macrovascular

complications (5). The direct and indirect effects of T2DM on the vascular system are responsible for the morbidity and mortality in all types of Diabetes. The microvascular complications including retinopathy, nephropathy, and neuropathy are relatively specific to diabetes and occurrence of these complications (particularly the diabetic retinopathy) has been used to develop the diagnostic criteria for diabetes. Complication of diabetes in our population has been comparable with other countries of South East Asia (18).

Monitoring of metabolic parameters

Monitoring of the metabolic parameters, such as blood pressure, body weight, lipid profile, blood glucose, and glycated hemoglobin (HbA_{1c}), is essential in the clinical management of patients with diabetes. Hypertension, obesity, and dyslipidemia are well-known risk factors for atherosclerosis and are common in T2DM patients and assist in the evaluation of treatment response of the patients (29). At the same time, chronic diseases increase the need for multiple medications associated with complex dosing and side-effects (30).

Over the last decade, the level of HbA_{1c} is considered as the gold-standard measurement of the chronic glycemic condition. Glycated hemoglobin is formed when the normal hemoglobin A reacts non-enzymatically with glucose. This is a slow, concentration-dependent reaction proportional only to the concentration of HbA and glucose. Since HbA remains in the circulation for around 3 months, the amount of HbA_{1c} present is expressed as a percentage of HbA, proportional to the glucose concentration over that time (31-33). As revealed by the UK Prospective Diabetes Study (UKPDS), it is being used as the most reliable means of gauging chronic glycemic control and has become the cornerstone for the assessment of diabetes and risk of complications (34). Thus, specific HbA_{1c} targets for diabetes care were introduced with the goal of preventing or delaying the

development of long-term complications. However, due to the unavailability of the HbA_{1c} measurements in most of the government hospital in Sri Lanka, monitoring of glycemic control in the majority of patients is still done with fasting and postprandial blood glucose measurements.

Self-management of diabetes

The WHO argues that improving self-management of chronic conditions such as diabetes may have a big impact on individual health than any improvement due to specific medical treatments. Acceptance of having the disease and self-awareness of the disease and treatment are important components of self-management of their disease, which is guided by the person's judgment of their own ability to succeed in reaching the specific goal. Thus, improving such skills helps people to develop the confidence to manage their condition effectively. Hence, diabetes self-management incorporates behavioral, personal and environmental factors into daily performance of recommended activities. The recent studies on the impact of patient narratives on self-efficacy and self-care behaviors in T2DM have shown that a valuable component of T2DM self-management programs could be achieved through specific goal-directed behavioral strategies such as 'action plan' or 'implementation plan'. This action plan would direct the patient to create their own strategies regarding when, where and how to perform specific goal-directed behaviors (33-35). This also encourages the patients to play a more active and effective role in the management of their disease.

Patient education of self-management of T2DM

Education programs on self-management are increasingly recognized not only as an essential component of chronic disease management, but also as part of secondary prevention and a means of reducing the burden of chronic illness on individuals and the community. The

experience of drug interactions, polypharmacy, social stigma, and unawareness may be responsible for the poor compliance to therapy resulting in long-term complications of diabetes. Hence, improving knowledge, skills and self-management education can motivate a person to make positive lifestyle changes and sustain it, addressing their health beliefs concerns at the same time.

Epidemiologic data has shown that the prevalence of T2DM varies with ethnicity. Therefore, culturally competent behavioral interventions should be the focus of major national initiatives when carrying out research with the aim of developing a culturally appropriate outcome. Addressing translation issues for non-English speaking populations and exploring motivating factors and strategies for diabetes self-management process need to be focused (36).

Managing diabetes through patient education interventions requires a culturally modified, structured program targeted at changing the dietary habits, physical activity, and adherence to medications, cessation of smoking and reduction of alcohol consumption. The development of such a program is desirable with the consideration of the diversity of health literacy levels, ethnicity and socioeconomic background in developing countries (37-39).

As in many other developing countries, primary care for patients in Sri Lanka is provided by Diabetes and Endocrinology clinics in the government hospitals. Overcrowding of these clinics has limited the patient consultation to 2-4 minutes that mainly focuses on medication rather than on lifestyle changes (15, 38). Despite the limitations with the resources, patient education programs are carried out by the diabetes nurse educators in certain hospitals that have not reached all the patients with diabetes. This has created a gap between the proper diabetes education and the implementation of self-management of diabetes (39, 40). However, this problem could be easily overcome with the help of other health care professionals such as diabetes educators, nurses, and pharmacists on

diabetes education. This was seen in the study “Diabetes Medication Assistance Service: The pharmacist’s role in supporting patient self-management of T2DM in Australia” (41).

Patient education is usually carried out as groups as well as a one-on-one basis. Some researchers emphasize that attending a group-based education can have better outcomes than one-on-one education, stating important opportunities to share and compare experiences, receive empathy and support, and revise negative self-concepts (42). Other studies supported the effectiveness of one-on-one patient education methods for T2DM showing that health professionals imparting personalized knowledge and insight, to trigger the specific patient new behavior leading to better control of their disease prognosis, and in the case of the T2DM may contribute to better glycemic control than group education (40-43). When considering the limitations of resources, group education would be more practical and acceptable in Sri Lankan health setup. Although we have enough practical strategies and proven methods to improve self-management skills of patients, Sri Lanka is far behind in implementing these processes for our patients in clinical practice and it is high time that we take an initiative to find our own model to suit our patients.

The impact of health literacy on diabetes management and its measurements

WHO describes health literacy as “the cognitive and social skills and knowledge which determine the motivation and ability of individuals to gain access to, understand and use information and making critical health decisions to successfully manage their own health” (44). It has been instrumental in developing a therapeutic relationship and mutual understanding between the patient and the involved health practitioner and should be focused beyond information dissemination. It requires interaction, participation and critical analysis that

lead to comprehensive understating of the health condition by improving the health literacy. Therefore, the achievements of the health education should be assessed not only through glycemic control but also through improvement in health literacy as well.

The health education impact questionnaire (heiQ™) is a tool that is used to obtain a comprehensive measurement of proximal outcomes of health education interventions. This was initiated in 2005 by Professor Richard Osborne and his colleagues of Deakin University, Australia; validated and undergone extensive psychometric testing across chronic conditions. It has the capacity to evaluate the individuals’ ability to manage their chronic condition irrespective of the type of underlying disease. This is being applied to a broad range of chronic disease conditions with different settings, by the range of users, as it is already being validated in a variety of settings with different languages. HeiQ™ is consist of separate independent questions representing eight domains including; health-directed activity; positive and active engagement in life; emotional distress; self-monitoring and insight; constructive attitudes and approaches; skill and technique acquisition; social integration and support and health service navigation. The items of heiQ™ were constructed with minimal ambiguity and colloquialisms, confirmed with people from low socioeconomic backgrounds and have the applicability to our clinical setup. However, it is not yet translated or adapted to Sri Lanka in such a way to assess the effect of health education after the delivery of one-on-one structured education program (45-47).

DISCUSSION AND CONCLUSIONS

Diabetes is one of the commonest non-communicable diseases with lots of long term complications and self-management has been instrumental in preventing most of these complications. Recent studies in developed countries revealed the need of local research that is culturally appropriate and to establish primary

care education for T2DM patients which can be used by any health professional including pharmacists that would improve patient awareness of responsibility towards their own health, in terms of self-management of disease progression, adherence to medication and lifestyle adjustments.

Compliance with Ethical Standards:

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Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

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