Barriers to and Reasons for Glycemic Control among adults with T2DM:
Perspectives from Health Care Professionals

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Abstract

Introduction: Type 2 diabetes mellitus is a global epidemic. It is a leading cause of morbidity and mortality among adults in Sri Lanka. It has a significant impact on the individual, their families as well as the economy and the health care system of the country. There is a limited data available on health care professionals' perspectives regarding glycemic control among adults with type 2 diabetes mellitus in Sri Lanka.

Objective: To explore the perception towards glycemic control among adults with T2DM as perceived by health care personnel.

Design & Methods: A qualitative design was used. Focus group discussions with nurses (n=30), and in-depth interviews with doctors (n=16) were conducted until data saturation. Matrix analysis was used to analyze data.

Results: Findings from qualitative data revealed three themes: 1) barriers to glycemic control, 2) reasons for adequate glycemic control, and 3) suggestions to improve glycemic control. Participants broadly agreed in identifying barriers to effective glycemic control.

Conclusions: Nurses and doctors perceived that doing diet control, regular exercise and taking medication properly on a long-term basis are challenging behaviors for adults with T2DM. Furthermore, health care professionals encountered many barriers when attempting to provide quality diabetic care. Further, the findings revealed some suggestions for effective diabetic care.

Keywords*: *Type 2 diabetes mellitus, Glycemic control, glycemic control behaviors, Qualitative research

I. Introduction

Type 2 Diabetes mellitus (T2DM), is a major health concern of healthcare systems and health policy makers worldwide. It places a considerable economic burden to a country due to its serious complications. Prevention and control of such chronic illness based on the situation of the country is challenging for a health team. The national prevalence of DM is 10.3% in Sri Lanka [1]. The highest prevalence of 18.9% of T2DM is reported from the Western Province of Sri Lanka [2]. However, most previous studies have assessed the prevalence of diabetes, complications of diabetes and poor glycemic control among people with diabetes Sri Lanka by relying on the biomedical perspectives[1]. The biomedical point of view is too narrow in scope to handle the complex nature of a chronic disease like diabetes [3]. In Sri Lanka, there is limited data available on how adults with T2DM control their glycemic levels as perceived by health care professionals. Therefore, this study explored the perspectives among nurses and doctors regarding glycemic control among adults with T2DM.

Nurses are the main caregivers and monitors of adults with T2DM in the hospital wards and diabetic clinics in Sri Lanka. Therefore findings from this study can improve the body of nursing knowledge to provide appropriate diabetic care for adults with T2DM in Sri Lanka

II. Aim & Design

A. Aim

This study aimed to explore the perspectives regarding glycemic control among adults with T2DM as perceived by health care professionals.

B. Design

A qualitative design was adopted. The study was conducted in the Colombo South Teaching Hospital (CSTH), a tertiary care hospital and a family practice center (FPC), a primary care unit in the Colombo district. Inclusion criteria for health care professionals were: provided care for adults with T2DM for more than one year in medical/surgical wards or the DM clinic at CSTH/FPC. Doctors were endocrinologists, surgeons, physicians and family practitioners currently working at CSTH and FPC at the time of the study. Nurses were registered nurses and diabetic educator nurses. More than one year of experience was required for when recruiting health care professionals for the study because they needed experience in caring for adults with T2DM in order to understand their behavior. There were 30 nurses and 16

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doctors participating in this study. The required information was obtained by two types of interview guidelines. Firstly, guidelines were developed to conduct focus group discussions among nurses. Focus group discussions consisted of open ended questions such as "How do some adults with T2DM control their glycemic levels? Please explain. The second interview guidelines were formulated to conduct in-depth interviews with doctors. The In-depth interviews had open ended questions such as "could you please tell me your ideas and experiences of glycemic control in adults with T2DM?

C. *Data collection & Data Analysis*

The principal investigator collected the data. Focus group discussions were conducted with 30 nurses working in different settings (e.g. medical wards, surgical wards, DM clinic). Four focus group discussions (FGDs) were arranged to gain their perspectives regarding, the reasons for glycemic control, barriers to attain glycemic control and suggestions to improve glycemic control among adults with T2DM. All FGDs were conducted in one room at CSTH. Each session consisted of seven to ten nurses, lasted 60 - 90 minutes, were moderated by the principal investigator and supported by a trained note taker. A debrief discussion was conducted after each FGDs session. In-depth interviews with 16 doctors were conducted to obtain their perspectives. The interviews were done at the FPC and CSTH in a quiet room. Each interview lasted approximately 60 minutes. During each FGDs and interviews permission was obtained for tape-recording and photography.

Ethical approval was obtained by the Research Ethics Review Committees of the Faculty of Nursing, Chiang Mai University, Thailand; Faculty of Medical Sciences, University of Sri Jayewardenepura, and Colombo South Teaching Hospital, Sri Lanka.

Participants' characteristics were analyzed in SPSS 16.0 for descriptive statistics. Matrix analysis was used in qualitative data analysis. Qualitative data were verified, transcribed verbatim, and the transcripts were coded. Underlying key words and phrases were put in to matrixes and analyzed.

III. RESULTS

Demographic characteristics of health care professionals are presented in Table 1. There were 30 nurses comprising diabetic educator nurses (n=4) and nurses from medical and surgical wards (n=26). There were 16 doctors comprising family physicians (n=6), an endocrinologist (n=1), a general surgeon (n=1), a visiting physician (n=1), and registrars (n=7). Most health care personnel were female and more than half were in the 30-39 year old age group. More than half of the nurses (76.7%) and doctors (68.8%) had 1-10 years of experience in caring for adults with T2DM. However, although the majority of the nurses had many years of experience in caring for adults with T2DM, only four (13.3%) had special training in diabetic care. Majority of the doctors (87.5%) had special training in diabetic care.

Table 1
Demographic characteristics of health care professional

Demographic characteristics	Number (%)	
	Doctors (n=16)	Nurses (n=30)
Gender		
Female	9(56.3)	27(90.0%)
Male	7(43.7)	3(10%)
Age (years)		
20-29		7(23.3%)
30-39	7(43.7)	16(53.3%)
40-49	5(31.3)	6(20.0%)
≥ 50	4(25.0)	1(3.3%)
Ethnicity		
Sinhala	15(93.8)	30(100%)
Tamil	1(6.2)	
Experience with care for type 2 diabetics (years)		
1-10	11(68.8)	23(76.7%)
11-20	1(6.3)	6(20.0%)
21-30	3(18.7)	1(3.3%)
>31	1(6.2)	
With Special training for diabetes care		
Yes	14(87.5)	4(13.3%)
No	2(12.5)	26(86.7%)

Qualitative findings are presented as three themes: barriers to control glycemic levels; reasons for adequate glycemic control; and suggestions to improve glycemic control. Relevant categories and subcategories are also presented.

Barriers to control glycemic levels

Health care professionals identified several barriers to control glycemic levels. As perceived by these professionals; insufficient knowledge about the illness, low socioeconomic status, lack of family support and poor compliance to heath advice were the main barriers. Furthermore, health care professionals perceived that insufficient diabetic care was another barrier to provide diabetes care for adults with T2DM. Each of these categories are discussed as below:

Insufficient knowledge about the illness

Many health care professionals indicated that adults with T2DM have insufficient knowledge about the nature of the illness, blood glucose control and the consequences of poor diet control, and lack of exercise. Most commonly, the link between these behaviors and glycemic levels were highlighted. Most adults with T2DM did not know it is a progressive metabolic disease which cannot be cured and needs a lifetime of blood glucose control. Especially, the severity of the level of blood glucose does not have the impact on patients' well-being and it was most commonly highlighted, for example as follows:

> *Most of the patients know that they have diabetes but not the gravity of the disease. Most of the people know when their blood sugar is high that it is diabetes. They don't know that diabetes is a metabolic disease which affects all organs in the body; that knowledge is not there. Some people think if they don't have symptoms their diabetes is cured. (Doctor)*

> *When we ask, Why you didn't take your drugs as recommended? They said, last time my blood sugar became normal, so I stopped taking medicine. I thought my diabetes got cured. (Nurse)*

In terms of blood glucose control and consequences, health care professionals perceived that most adults with T2DM did not know how to control their blood glucose levels and the consequences; especially the effects of high and low blood glucose levels:

> *Our diabetic patients don't know much about the disease. They don't know how to control it, why they have to control blood sugar levels and what they have to do to control their blood sugar level, what are the complications of uncontrolled blood sugar levels. (Doctor)*

> *We have a lot of recurrent admissions from diabetic patients. The reason is our diabetic patients don't know how to do diet control and why they have to do it. (Nurse)*

Some health care professionals informed that patients' insufficient knowledge about how blood glucose control can be improved by teaching them diet control, specifically portion size, meal planning, and meal timing. Lack of regular physical exercise acts as a barrier to control glycemic levels. Some of them shared their ideas as follows:

> *We don't know what they do as diet control in their home setting. When we ask from them, patients say' Yes, we are taking red rice for our meals, and don't put sugar into our tea, don't eat sweets like that'. Actually it is not diet control. It should be the correct portion size, and meal planning according to their body weight. (Doctor)*

> *Once we tell our patients to walk or do some exercise they said that they have enough household work. No need to do additional exercise like that (Nurse)*

Low socioeconomic status

Low socioeconomic status acted as a barrier to attain glycemic control. The most recognized barrier was inadequate income to buy medicine and recommended food; and to spend money to attend clinics for regular follow up. Some of them expressed their ideas as follows:

> *Many patients have financial problems. It affects their blood sugar control. If they don't have money, they don't buy medicine nor do they come to the hospital clinic. (Nurse)*

> *Patients say, they cannot buy insulin because it is expensive. sometimes it is not available at the indoor pharmacy of the hospital for 3-5 months. When patients have to spend money to buy insulin by themselves, the cost is often too high and they don't buy it. (Doctor)*

Health care professionals observed that patients' educational level was also important to understand health advice and practice the recommended behavior, for example:

> *Most patients are not rich, are not highly educated, often they cannot understand what we tell them, its complications, how to control and the need to and so on, that is the major problem we have. (Nurse)*

> *Our patients have an average educational level so we can educate them in a simpler way; but some of them might not take the disease seriously depending on their educational levels as well. Convincing our patients to control diabetes is also difficult and may be due to their educational level. (Doctor)*

Lack of family support

Besides these barriers health care professionals noted that without having a family care giver, it is rather difficult to control glycemic levels. Commonly patients needed family support for insulin injections and to attend clinics for follow up visits. As most adults with T2DM are middle aged they have poor vision due to the illness or their age. Once these patients need insulin injections, they need a supportive person to inject it for them. Therefore health care professionals ask a family member to come to the hospital to teach them how to give insulin injections, but rarely family members come to learn it. Their ideas are as follows:

> *These patients often don't have family support. Some patients on insulin are elderly. Due to poor vision they cannot draw and inject the insulin by themselves. So we*

always ask somebody to come and learn it, but family members don't come. (Nurse)

When we ask a family member to come to teach how to give the insulin injection, nobody comes. So sometimes we convert insulin to oral drugs and discharge. Then the patient doesn't get glycemic control. (Doctor)

Additionally health care professionals mentioned that adults with T2DM do not have family support to attend follow up clinics. Often patients are old and they cannot attend the follow up clinics alone. The children of these patients are unaware of the importance of follow up clinics. Some of them expressed their ideas as follows:

Sometimes children do not know that their mother has diabetes. She needs to go attend the clinic, take medicine regularly etc. Once their mother gets sick or until the wound gets maggots they do not know it. Once their mother is very sick and needs to be admitted to hospital only then they know it. (Nurse)

Poor compliance to health advice

Poor compliance to health advice is often due to denial to accept the disease, fear about diabetic medicine, having a busy life, lack of motivation, and having stress. In terms of denial, health care professionals encountered that most adults with T2DM do not like to accept the disease. They are in a dilemma to accept or not and in turn it influences their glycemic control. Further they highlighted that causes for denial to accept the disease may be that adults with T2DM may think they cannot eat anything, and that having diabetes is a social taboo. Often they want to hide the disease from others, as they may get medically condemned at work places. This is highlighted as:

Most of them don't like to accept the disease. They take it as a social taboo, and at the first point of diagnosis they don't like to accept it. They are in a dilemma, unable to really accept it, that is the biggest problem. (Doctor)

Some patients don't like to accept, they want to hide the diagnosis of diabetes. Sometime they tell us not to tell anybody that they have diabetes, may be due to the fact they cannot eat as they wish and they cannot live as a normal person. (Nurse)

Several health care professionals observe that most adults with T2DM are afraid to take diabetic medicine due to many reasons, such as having experience of side effects, like having a bad taste in their mouth, get hypo or hyperglycemia. Some do not like to inject insulin due to needle phobia. Their ideas as follows:

Lots of patients say that they don't like to get insulin and insulin also expensive. Also they have needle phobia too and it is painful, so they don't like to get it and when we order insulin they said "doctor please give oral drugs I don't like to take insulin". It is difficult so what we can do we give the maximum dosage of oral drugs only to them but they cannot have good glycemic control and the prevalence of complications also high. (Doctor)

As perceived by health care professional, another reason to get fear about diabetes medicine is that patients believed that diabetic medicine is harmful to their body organs. Therefore, they tend to stop or reduce their drug dosage by themselves. For example:

Many diabetes patients think taking Metformin for long time is harmful for their kidneys and they stop taking it. (Nurse)

The majority of noncompliant patients believe these diabetes drugs can harm especially their kidneys. Drugs can be toxic to kidney, they believe like that, so they stop taking drugs" (Doctor)

Moreover, several health care professional suggested that diabetic health education is ineffective if the patient does not get motivated to follow them. Their ideas are as follows:

When we educate them, they don't want to follow our advice. Patients' motivation is very poor to control their blood sugar level and they don't like to change their lifestyle. (Nurse)

Most patients are not motivated to follow advice although we educate them every time. (Doctor)

Busy life styles of adults with T2DM often contributed them to poorly adhere to diet control or regular exercise behavior. Lack of time was a common barrier as expressed by the following:

Most diabetic patients are middle aged, working people, with busy lives. They don't have enough time to do diet control, and exercise. They often eat snacks or fast food and are unable give priority to diet control. (Nurse)

They don't take it as priority, most patients are busy with house work, and office work; they don't give priority to their diabetes. (Doctor)

In addition to this some health care professional reported that patients with uncontrolled glycemic levels have many kinds of stress, like job stress, family problems, and income matters in their daily life. Likewise adults with uncontrolled glycemic levels also reported that that they have high job stress which distracts them from following recommended behavior, for example:

Our country people have to struggle for their living, for diabetic patients also same. They have lot of stress due to their job, children, family matters so they don't do diet control or any other things as we tell them, so it may effect their sugar control.(Nurse)

Our patients have lot of stress for living, working. This also affects their sugar control. They eat whatever they can afford and have no time think about their diabetes. (Doctor)

Insufficient diabetes care

Besides aforementioned barriers health care professionals perceived a number of barriers to provide effective diabetes care. They were a lack of staff, unavailability of medicine, lack of relevant investigations and lack of facilities. The most commonly identified barrier was a lack of trained staff, so they were unable to provide proper health education, for example:

There are a lot of patients in our wards, not only diabetes patients, so sometimes we cannot pay enough attention to these diabetes patients due to shortage of nurses. So we cannot give proper health education for all DM patients. (Nurse)

It is very difficult to give health education to everybody in the clinic. We give very minimum health education. About 400 patients attend the DM clinic daily. We are tightly packed in a small space. Doctors don't have time to even to talk with the patients, (Doctor)

Importantly, heath care professionals indicated that a lack of specialized health professionals like diabetes educator nurses, dieticians, and community nurses are barriers to provide effective care for adults with T2DM.

This hospital has only one dietitian and a lot of diabetic patients. We cannot get a dietitian's advice to these diabetic patients. We don't have enough trained people to educate them. We have only three nurses at the DM clinic for 400 patients and it is not enough. (Doctor)

Nurses don't know what happens to patients when they go home. There are no community nurses or other health care personnel to care for them when they are at home. (Nurse)

Not surprisingly, even among the nurses who participated in focus group discussions, the majority of them (87.3%) did not have specialized training on diabetic care. Thus a lack of updated knowledge about diabetes was mentioned as a barrier to provide care by most nurses in this study.

Most nurses have a general knowledge on diabetes from their basic nursing training, only a few get a chance for specialized training. We need more training about updated knowledge in diabetic care. (Nurse)

The non availability of diabetic medicine and lack of relevant investigations were barriers to providing diabetic care for adults with T2DM:

Some investigations like HbA1c, urine micro albumin are not available in the hospital and sometimes essential drugs are not available in the hospital. These things have an impact on glycemic control (Doctor)

It was stated that a lack of facilities such as long queues at the clinic, few diabetes centers in the community, other hospitals not having relevant medicine, and no proper referral system are barriers to providing effective diabetes care. For example:

Most of our patients don't like to come to the diabetic clinic, because it takes lots of time. There are long queues at the clinic and at the pharmacy. So they show the previous clinic prescription to the pharmacy and continue the treatment, without screening. (Nurse)

The specialists are burdened with minor cases. They don't have time to deal with serious cases like diabetes, and there is no referral system unlike in the west. (Doctor)

Reasons to adequate glycemic control

There were a number of reasons to control glycemic levels such as understanding about the illness, sufficient family support, adequate income and education, and motivation to control. Each of these categories are discussed as follows:

Understanding about the illness

Understanding the illness, its progression and how to control it among adults with T2DM facilitates compliance to health advice and leads to attaining adequate glycemic control, as stated for example:

The people, who have good control, know about their illness and take the medicine regularly. They know of the complications of diabetes, comply with the medicine properly and follow dietary advice. These people are very few. (Doctor)

Some patients know about diabetes better than us. They read books, newspapers and know about the disease and its control. They do diet control, exercise and take medicine regularly. Their blood sugar control is also good. (Nurse)

Sufficient family support

As mentioned earlier adequate family support is a paramount reason to have better blood sugar control among adults with T2DM. Many health care professionals noted that patients with controlled glycemic levels have sufficient family

support to follow the prescribed diet and attend regular follow up clinics.

Some children are concerned on their mother's clinic date. They take the mother to the clinic, wait with the mother, and sometime ask us what are the suitable food for their mother? When is the next clinic date? (Nurse)

If family members can provide guidance on proper food, proper timing of drugs, the compliance is very good. We have come across many patients with support. (Doctor)

Adequate income and education

It was perceived that adults with a higher level of education and higher living standards were able to control glycemic levels.

The patients with blood glucose control are the more educated people. They read more about diabetes and are better informed. Their living standards are higher. In general people who have good blood sugar control relatively have a better socio-economic status. (Doctor)

Motivation to control

Most adults with T2DM achieve adequate glycemic control due higher level of motivation. Motivation commits the adult to follow health advice, perceive risks, and avoid blaming others.

The controlled patients very motivated. Sometimes they call me and ask to know about some food. They follow our advice very well. (Nurse)

The motivated patients control their blood sugar well. They strictly follow our advice, think about the disease despite whatever other duties they have. They check their blood sugar levels monthly and maintain regular follow up. (Doctor)

Some patients were motivated to control glycemic levels after observing the perceived risks or observing a relative getting diabetic complications such as amputation.

While they feel well they don't think about medicine. Once they get a complication, they decide to immediately see a doctor or commence taking the medicine again. (Doctor)

Some patients get concerned after they get amputation or other kinds of complications. After that they are very compliant patients, but sometimes it is too late. (Nurse)

Suggestions to improve glycemic control

Participants proposed some suggestions to improve glycemic control. They are, improving knowledge about diabetes and its control, complications among type 2 diabetics and their family members, and providing better diabetic care.

Improving knowledge about diabetes

Many participants suggested that using appropriate teaching strategies such as mass media, small group discussion and individual health education will be useful. Moreover, as mentioned by the health care professionals, continuous education by repeating the advice and the importance of patient-centered diabetes education, was suggested. Educating family members about diabetes was also further highlighted.

As appropriate teaching strategies, it was suggested that including a number of photographs/videos of amputees, or blind patients as examples of complications of diabetes in mass media programs. It was to make patients become more aware of the gravity of the disease and enhance the motivation to attain glycemic control. Further, they mentioned that these media clips can be displayed in the clinic or at the outpatients departments. Some suggested on conducting small group discussions in the clinic area so that patients can discuss their problems with peers. It was widely accepted that providing individual diabetic education is essential to motivate and enhance the glycemic control:

We should make people aware of it, facts like if your diabetes is not under control it may affect your eyes, feet, kidneys. These should be told to them by electronic media, print media and repeated using all these as much as possible. This is the only way that we can give the message to our people (Doctor)

Our patients think their diabetes can be controlled by doctors not by themselves. Patients are not aware that control of diabetes or blood sugar is the responsibility of the patient. This "self-management" concept is not known, so we have to educate them on self-management. (Nurse)

It was stressed that the importance of continuous motivation about diabetes control and the need to provide patient specific heath advice rather than giving general health advice. This is because diabetes is long-term disease which needs long-term adherence. Perhaps, this kind of patient-centered education, promotes long term adherence to the health advice.

We can educate patients properly, with the help of proper audio-visual aids. It would be helpful because it will stick better in their memory on a longer time duration Patients will remember our advice today and up to may be one week and they will forget, so there is a need to repetitively educate them (Doctor)

Most people find adherence on a long-term basis difficult. Anyone can adhere on a short term basis. As it is a lifelong change they find it difficult. We have to accept that no one would like to take medicine for a lifetime and it is difficult to do. Therefore we have to observe their daily life and try to adjust it as much as possible without interfering with their daily routine. (Doctor)

Education of family members was also highlighted as a means to improve knowledge about the illness by a majority of health care personnel. Once the family member knows about diabetes, a suitable diet, and the importance of taking medicine on time, they can support the adult with T2DM. Some of them expressed their ideas as follows:

Need to educate our diabetic patient's families about the disease, its complications, diet control, exercise, clinic follow up, then they can support the patient. (Nurse)

Provide better diabetic care

Besides these suggestions most health care professionals proposed improving facilities, increasing the number of trained heath care personnel and good–doctor patient relationships to provide better diabetes care. With regard to improved facilities most stated the need for the availability of relevant medicines and investigations. There is a need for community diabetes centers and referral systems to improve diabetes care

Making available HbA1c assessment, urine micro albumin measurement, and quality medicines in the government health care centers will have huge impact on the long term outcome of patients. (Doctor)

If there is a diabetic center at the field it is easy for them, a community nurses can educate diabetic patients, and their family members more easily. (Nurse)

In terms of increasing the number of trained health care personnel more nurses trained in diabetes care were essential.

We need more trained nurses in diabetes care. We have only two diabetes educator nurses in the clinic. Not enough for this number of patients. (Doctor)

Nurses need more training to upgrade the knowledge in diabetes care. Most of us have our general training nursing and no specialized training in diabetic care.(Nurse)

Doctors mentioned the importance of doctor-patient relationships in providing better diabetic care as follows:

Doctor-patient relationship matters on blood sugar control. Doctors need an organized clinic and mindset to teach and treat diabetic patients, and cannot blame the doctors. Doctors have to be organized in diabetic care and should maintain good-doctor patient relationships. (Doctor)

In summary, based on the above qualitative information, health care professionals perceived that doing diet control, regular exercise and taking medication properly for the long-term are challenging behaviors for adults with T2DM. Furthermore, there were many barriers encountered by health care professionals in terms of providing quality diabetes care: lack of staff, unavailability of relevant medicine and investigation, and lack of facilities. .

IV. DISCUSSION

Qualitative findings from the present study revealed that lack of knowledge about the illness, low socioeconomic status, lack of family support and poor compliance to medical advice are barriers to glycemic control among adults with T2DM. Somewhat similar findings were reported from other studies as well. Lack of knowledge about the illness, amongst diabetics is a key barrier to provide treatments as perceived by the health care personal in their study [4]. Moreover, it is reported that patients' lack of understanding about the illness is a barrier to providing care as perceived by nurses [5]. However, in contrast, other studies have determined that the knowledge of diabetes among adults with T2DM was not related to their diabetes self–care behavior or glucose levels [6]. However, a general stand point is enhanced knowledge about diabetes and its control is essential to understand the disease. In turn, improved knowledge promotes better glycemic control among adults with T2DM. This was further confirmed by the health care personnel participating in this study.

Low educational status was associated with low health literacy and acts as a barrier to understand and implement the given health advice [7]. Several studies have reported that a high level of literacy is associated with better adherence to health advice which in turn attains better glycemic control [7], [8], [9]. Further, low income was perceived as a barrier to following dietary advice and taking the prescribed medication regimen. Low income was identified as a main barrier for adults' with T2DM to buy medicine [10], [11]. However, in the present study cost of medication was not a barrier as all adults with T2DM attending the clinics are provided medication and health care free of charge by the state.

Lack of family support, was identified as a barrier to adhering to appropriate diet in the present study. This was observed in several other studies too [12]. The importance of family support has been identified for regular exercise and medication taking behavior as well [13], [14]. In contrast, non-supportive behaviors by family members were associated with fewer adherences to medication regimen among their study participants [15]. The same study concluded that interventions should target adults with T2DM with their family members to enhance the motivation, and to facilitate medication adherence behavior.

The present study revealed that health care personnel perceived a sense of denial amongst adults with T2DM to accept the disease. Lack of motivation, lack of time due to

having busy life styles, all act as barriers to be compliant with health advice. These findings are supported by a study conducted among Australian patients [16].

With regard to insufficient diabetic care as a barrier to glycemic control, most health care personnel in this study were overloaded with the massive number of patients attending the clinic. Hence they do not have time nor the facilities to provide individualized diabetic care. The results highlighted the need to regularly train health care professionals to motivate the patients with T2DM to attain optimal glycemic control [5]. In the present study, too, the need for regular intercommunication amongst the health care providers was highlighted to promote better health care delivery.

In conclusion, an educational intervention that emphasizes the importance of proper diet control, advice on locally available food with low glycemic index, adoption of a regular exercise regimen, and adherence to the regular medications prescribed is essential. The educational intervention should be targeted to consider the patients' contexts to overcome the misconceptions and false fears of these patients. The study also sheds light on the poor resources available to diagnose and treat patients with T2DM in Sri Lanka. It provides an insight to the inadequate number of staff caring for a large number of adults with T2DM attending a diabetic clinic.

Relevance to clinical practice

Health care professionals need to understand the glycemic control behaviors of their patients with T2DM, need to provide more individually appropriate health education and more organized care for adults with T2DM in order to improve their compliance to control glycemic levels. Moreover, at a broader level the total care package for patients with T2DM requires major review, government support and polices to provide appropriate and culturally relevant care in Sri Lanka.

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