



Diabetes Mellitus, Lifestyle and Nutrition in Urban Women: Need for Baseline Knowledge, Attitudes and Practices Guided Programs

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ABSTRACT

Introduction: Fundamental to the success of preventive measures in diabetes mellitus, is disease-related knowledge, attitudes, and practices (KAP). We aimed to assess KAP regarding type 2 diabetes mellitus (T2DM), nutrition and lifestyle in a community-based population of newly diagnosed dysglycemic and normoglycemic women, unaware of their glycemic status at the time of data collection. **Methods:** Women (2800) aged 30-45 years were screened for dysglycemia using cluster sampling from the Colombo Municipal Council area. All 272 dysglycemics detected through screening and 345 normoglycemics randomly selected from the same screened sample were enrolled. All women were unaware of their glycemic status. The sampling strategy aimed to include adequate numbers of women with altered glycemic status who were unaware of their status at the time of the study. A validated and pretested interviewer-administered questionnaire was used and analyzed using Chi-square test and student's t-test. **Results:** KAP on T2DM, nutrition and a healthy lifestyle were poor, particularly knowledge on prediabetes. Some aspects of lifestyle modification were known. Women with a family history compared to those without, had better knowledge ($p < 0.001$) and attitudes ($p < 0.05$), but lower practice scores ($p < 0.05$). Majority of women who found it difficult to resist foods high in fat and sugar, ate while watching television, and a higher proportion of them had a family history ($p < 0.001$). **Conclusion:** Poor food-related practices observed among those with a family history, despite better knowledge and attitudes indicate a need for targeted intervention. The specific KAP related aspects identified here, can direct future intervention strategies.

Keywords: Knowledge, Attitudes, Practices, Diabetes, Prediabetes, Dysglycemia

Abbreviations: KAP: Knowledge, Attitudes, and Practices; T2DM: Type 2 Diabetes Mellitus; BMI: Body Mass Index

INTRODUCTION

South Asia currently faces a rising prevalence of type 2 diabetes mellitus (T2DM), Sri Lanka being no exception [1-3]. Recent data suggests a greater increase in T2DM and prediabetes among women compared to men [4]. Unsatisfactory knowledge, attitudes, and practices (KAP) regarding T2DM have been documented in many studies with population-specific variation [5,6]. Although most studies are on individuals with T2DM from clinics, knowledge levels have been below expectation, with low knowledge on risk factors, correct monitoring, complications, and correct food choices [6]. Some negative attitudes reported maybe shaped upon inadequate knowledge levels and point to inadequate input from health care services [5,7].

Poor dietary habits and sedentary behaviour are two areas of concern [6]. Television (TV) viewing has been shown to be associated with higher Body mass index (BMI), and increased consumption of high energy foods [8]. Although the positive association between TV viewing and health risk is now established and recommendations are to promote

the reduction of viewing times together with increased physical activity, studies which examine behaviors in the community including individuals with risk of T2DM, are needed for more effective intervention strategies [9,10].

The limited data from community studies, which include diseased as well as healthy individuals, indicate a lack of awareness on prevention [11]. There is currently no data on KAP related to prediabetes [5-7]. Current evidence highlights the need for data in directing interventions since the KAP of a population is fundamental to the success of programs. Globally, unsatisfactory KAP related to T2DM remains an issue, despite ongoing interventions through general awareness campaigns, targeted education and behavior change programs [5-7]. Although many intervention programs do address KAP, it is not often that baseline KAP informs program design, compromising success. The aim of this study was to assess KAP regarding T2DM, nutrition and lifestyle in normoglycemic and dysglycemic women from a community, currently unaware of their glycaemic status.

MATERIALS AND METHODS

Study Population and Methodology

A cross-sectional study design using a cluster sampling method was used to recruit a community sample of women (n=2800) aged 30-45 years, identified from all (n=55) Grama Niladhari divisions, the smallest administrative unit (cluster) within the Colombo Municipal Council area. From each cluster, 51 women (aged 30-45 years) were randomly selected. All dysglycemics detected in the entire sample following the screening procedure (n=272) who were previously unaware of their glycaemic status and a further 345 normoglycaemic women randomly selected from the same screened sample were enrolled. The screened sample ensured representation from all Grama Niladhari areas. The sampling strategy was aimed at including adequate numbers of women with altered glycaemic status but who were not aware of this fact at the time of completion of the questionnaire to enable a fair comparison of individuals from the same community with altered glycaemic status with those with normal glycaemic status. All recruited subjects were previously unaware of their glycaemic status and hence it was expected that glycaemic status would not have altered their lifestyle prior to data collection. The sampling procedure, HbA1c assessment, and cut off used have been published previously [12-14]. Women who were pregnant or breastfeeding, with acute infection, on long term steroids or reporting significant weight loss within the last 3 months were excluded.

An interviewer-administered pre-tested questionnaire was used to obtain demographic information including family history, monthly income, level of education and employment. To ensure validity, KAP were assessed using a 3 component (domain) structured questionnaire in a face-to-face interview. The questionnaire was content validated by 4 content experts and a pilot study was conducted to pre-test it. The final questionnaire was refined using all of the above inputs.

The knowledge domain consisted of 20 questions. Participants responded using “yes”, “no” and “do not know” responses. One point was awarded for each correct response and zero for an incorrect or “do not know” response. The 2 open-ended questions were; “What is diabetes?”, and “What is prediabetes?” with answers categorized as “correct”, “incorrect” or “never heard”. The attitude component consisted of 10 questions. The response to each question was scored according to a Likert scale; 5 response categories ranging from “strongly agree” to “strongly disagree”, with 1 point assigned for a desirable attitude and zero for an undesirable response or “neither agree nor disagree” response. The component of practices consisted of 8 questions. The response to each question was scored on a Likert scale; 4 response categories ranging from “always” to “never”, with one point awarded for each good practice.

Ethics Approval and Consent to Participate

The study protocol was approved by the Ethics Review Committee of the Faculty of Medicine, University of Colombo, Sri Lanka. Procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation. All participants were informed about the study both verbally/orally and in writing, and written consent was obtained. All newly diagnosed dysglycemics were individually counseled and advised on diet and exercise and diabetics were referred to the diabetic clinic of the tertiary hospital in Colombo, managed by an endocrinologist.

Statistical Analysis

Analyses were conducted using SPSS version 18.0. Responses to individual questions were analyzed as the percentage

of women giving a correct response. For each component, the sum of the score was converted to a percentage for each participant and mean percentage scores were calculated. A score of <50% was defined as a poor score [15]. Chi-square test for categorical variables and student's t-test for continuous variables were used for between-group comparisons. The $p < 0.05$ was used to determine statistical significance.

RESULTS

General characteristics of the population are given in Table 1. KAP was significantly higher ($p < 0.001$) in women who had secondary education or above, compared to those who did not. There was no significant difference in knowledge between the women with newly diagnosed diabetes mellitus (mean percentage score 35.5%), prediabetes (mean percentage score 34.4%) and normoglycemic (mean percentage score 36.7%). However, the mean practice score was significantly ($p < 0.05$) higher in normoglycemics (51.7%) compared to both newly diagnosed prediabetics (29.7%) and diabetics (27.2%). There was no difference in the mean practices score between those with newly diagnosed prediabetes and diabetes mellitus. Knowledge and attitudes were not different between women who were overweight/obese and with normal weight, but practice scores were significantly ($p < 0.001$) poorer in the overweight/obese group compared to the normal-weight group. Women with a family history of diabetes mellitus had higher knowledge ($p < 0.001$) and better attitudes ($p = 0.022$) but had lower practice scores ($p = 0.007$) compared to women without a family history.

Table 1 General characteristics of the population of urban women (n=617)

Variable	All (n=617) Mean (SD)	Normoglycemic (n=345) Mean (SD)	Dysglycemic (n=272) Mean (SD)
Age (years)	37.5 (3.7)	37.3 (3.7)	37.9 (3.8)
Family income (Rs per month*)	36,328 (24,297)	37,121 (22,388)	35,321 (26,529)
Secondary education (%)	85.3%	87.2%	82.7%
Family history of diabetes mellitus (%)	46.2%	37.4%	57.4%
Employed (%)	78.8%	81.2%	75.7%

*1 US Dollar=172.00 LKR (Sri Lanka rupees)

The mean percentage knowledge score was 35.6 (SD 14.5%). About 40.2% of women knew that T2DM is preventable but 67.2% were unaware that diabetes is not curable. Knowledge related to dietary practices and blood sugar was unsatisfactory (Table 2). In contrast, some aspects of knowledge related to lifestyle modification and complications of T2DM were high. About 76.7% were aware that lifestyle modification is as important as medication in the treatment of diabetes mellitus. Around 71.8% were aware of the need for portion size reduction in achieving weight loss. Most (70.8%) women were aware that exercise reduces blood glucose concentration. A few misconceptions were identified; 79.7% thought that unrestricted consumption of fruits was acceptable for individuals with diabetes and 83.6% thought that fat and salt restriction was not necessary for diabetes.

Table 2 The number and percentage of respondents in each answer category on selected questions on knowledge related to diabetes mellitus, nutrition, and lifestyle (n=617)

Question	Yes		No		Don't Know	
	n	%	n	%	n	%
Diabetes is not preventable	207	33.5%	248	40.2%	162	26.3%
Blood glucose is increased only by foods high in sugar	139	22.5%	216	35.0%	262	42.5%
Skipping meals helps to control blood sugar	106	17.2%	372	60.3%	139	22.5%
Diabetes is curable	202	32.7%	281	45.4%	134	21.7%
Lifestyle modification is as important as medication in the treatment of diabetes	473	76.7%	28	4.5%	116	18.8%
One way of losing weight is to reduce portion size	443	71.8%	70	11.3%	104	16.9%
Skipping meals helps to control blood sugar	106	17.2%	372	60.3%	139	22.5%
There is no restriction on the consumption of fruits in diabetes	223	36.1%	125	20.3%	269	43.6%
Fat and salt need not be restricted as they do not produce "sugar" in the body	195	31.6%	101	16.4%	321	52.0%
Vegetables are a rich source of fibre	181	29.3%	87	14.1%	349	43.4%

Exercise reduces the blood glucose concentration	437	70.8%	40	6.5%	140	22.7%
Prediabetes could progress to diabetes within a few years	76	12.3%	25	4.1%	516	83.6%
Complications occur during diabetes and not during the stage of prediabetes	34	5.5%	36	5.8%	547	88.7%
Weight reduction is the treatment for prediabetes	35	5.7%	67	10.9%	515	83.5%

The main source of knowledge was the family (51%) rather than television (28%) in those with a family history of T2DM, while in those without a family history, the main source of knowledge was television (57%). Only 7% of women were aware of prediabetes and 5.7% knew that weight reduction could reverse prediabetes (Table 2). About 46.2% of women who had a family history of diabetes mellitus were unaware of prediabetes.

The mean percentage attitude score was 35 (15%). Majority of women (67.6%) prioritized spending time with the family over-exercise. This attitude was similar in women with or without a family history of T2DM. However, 60% were of the opinion that they would want to control T2DM even if it interfered with their daily routine. A majority (83.8%) believed they had inadequate knowledge and wanted to learn more and 97.9% wished to improve their knowledge of diabetes.

Table 3 The number and percentage of respondents to each answer category on selected questions on practices related to diabetes mellitus, nutrition, and lifestyle (n=617)

Question	Always		Almost always		Rarely		Never	
	n	%	n	%	n	%	n	%
I do 30 minutes of exercise per day	101	16.4%	25	4.1%	10	1.6%	481	78.0%
I have replaced excess starch intake with vegetables	31	5.0%	29	4.7%	11	1.8%	546	88.5%
I find it difficult to resist eating foods high in fat such as deep-fried foods and pastries	201	32.6%	27	4.4%	17	2.8%	372	60.3%
I have increased my fiber intake by increasing the number of vegetables and pulses	32	5.2%	23	3.7%	11	1.8%	551	89.3%
Much of the food I eat is high in salt	98	15.9%	78	12.6%	26	4.2%	415	67.3%
I cannot resist eating foods high in sugar	192	31.1%	25	4.1%	13	2.1%	387	62.7%

The mean percentage practice score was 31.2 (SD 16.2%). Majority of women did not follow the current public health recommendations on diet and exercise (Table 3). About 37% of women reported difficulty in resisting consumption of high-fat foods and 35.2% could not resist foods high in sugar. A significantly greater proportion of women who could not resist high-fat food had a family history of T2DM ($p < 0.001$). 42.8% consumed food while watching television. Among women who could not resist high-fat foods, 70.4% regularly consumed food while watching television. Among women who could not resist sugary foods, 63.5% regularly ate while watching television.

DISCUSSION

KAP related to T2DM, prediabetes, nutrition, and lifestyle were inadequate in both normoglycemic and dysglycemic women recruited from the community and who were previously unaware of their glycemic status. These women were also unaware of their glycemic status when filling the questionnaire. We add valuable KAP data to the limited pool of community data on KAP. Our findings highlight the importance of community studies of KAP with regard to prediabetes and diabetes, and that detailed information looking beyond total scores of KAP can give important insights that can be used from an intervention point of view. Women who had a family history of diabetes mellitus had significantly better knowledge and attitudes but demonstrated unhealthy practices when compared to those without a family history. Although other studies have demonstrated that those with a family history have better knowledge, data on the association of family history with attitudes and practices are limited [16].

Inadequate knowledge of prediabetes in this study needs special mention. About 93% were unaware of prediabetes, while even the few who were aware did not know that prediabetes was the early stage of T2DM. In our population, similarities with regard to knowledge could be seen with other Asian populations with regard to certain aspects, such as prevention, where 59.8% did not know that T2DM was preventable. Similarly, Aljoudi, et al., showed that only 37.3% were aware of the prevention of T2DM, and data from other parts of the world are also comparable [11,17]. Unlike deep-rooted behaviors which are difficult to change, awareness on prevention through early screening is more likely to have a positive impact, and it has previously been demonstrated that knowledge alone can stimulate people to seek screening [18].

Interestingly, almost two-thirds of women, including both women with or without a family history of diabetes mellitus said they would want to control blood sugar if they had diabetes despite the perception that it may interfere with their daily routine. Negative attitudes in a few participants may have been shaped by the participants' lack of knowledge on certain aspects of diabetes mellitus; some participants believed that controlling blood sugar was futile since complications would invariably occur, valuing family time over-exercise. This data indicates the importance of correctly targeted specific knowledge in changing attitudes in the community and encouraging a family approach in lifestyle change.

Despite a majority of women indicating awareness of the importance of lifestyle modification, some practices were unsatisfactory. Our study examined eating behaviors with regard to foods rich in fat and sugar and snacking while watching TV. A third of women could not resist foods high in fat such as deep-fried foods and pastries, and sugary foods, and in a significant proportion of women these foods were eaten while watching TV. These findings are in agreement with Bowman, et al., who reported that TV viewing time of >2 hours per day was associated with greater intakes of energy and high body mass index (BMI) [10]. It is of concern that amongst women who could not resist high-fat food and sugary foods, a significant number of women had a family history of diabetes mellitus. These patterns highlight that snacking and eating unhealthy foods are associated with each other in this population. Such specific information is essential when formulating behavior change strategies. Women with a family history of diabetes mellitus appear to have undesirable food behaviors, with the possibility that the whole family cluster may show negative food behaviors. It is important to observe that these women were unaware of their glycemic status and may not have considered themselves as a high-risk group despite their family history.

Our findings highlight that there is a group of individuals in the community who are unaware of their dysglycemia and are currently not empowered to make the correct decisions on behaviors that will improve their condition. Two questions arise from these findings, which need to be tested in further studies: did these negative behaviors occur because women did not realize that they were a high-risk group, or, did the same negative behaviors lead to T2DM in the other family members. In order to address the issue of what role behavior may play over genetic predisposition, future longitudinal studies need to examine behavior patterns within family groups. Although these findings are reported for an urban population, given the similarities in behavior associated with nutrition transition in many parts of the country and Asia, these common patterns can be used in designing intervention for communities in transition and also need to be studied further. We included only women within a narrow age range. Hence the findings need to be interpreted within this limitation and the findings would be generalizable only to similar populations.

CONCLUSION

Overall KAP was poor in this community and women with a family history are receptive to acquiring knowledge, have high levels of selective knowledge and better attitudes, but poor practices than individuals without a family history. Irrespective of family history women currently do not have adequate knowledge on prevention and on prediabetes and demonstrate unsatisfactory eating behaviors, although they are willing to learn.

DECLARATIONS

Authors' Contribution

The authors are solely responsible for the design and conduct of this study. IW, PL, AdeS, and SA participated in the design of the study. IW, PL, AdeS, and SA conducted the study, collected the data, and wrote the manuscript. IW, PL, AdeS, and RW contributed to the analysis. IW, PL, AdeS, SA, NS, and RW reviewed and edited the manuscript. All authors read and approved the final manuscript.

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Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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