Knowledge regarding risk factors of diabetes mellitus in Zambezi region, Namibia

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Background. No study has been conducted in the Zambezi region on the level of knowledge regarding risk factors for diabetes mellitus, yet the incidence of the disease and risky behaviours are rising.
Objective. To assess the level of knowledge regarding the risk factors for diabetes mellitus among the general population of the Zambezi region in Namibia.
Methods. This was an analytical cross-sectional study on the general population aged ≥18 years in four constituencies of the Zambezi region. Information on demographics, anthropometric and biochemical measurements and known risk factors for diabetes mellitus was captured. Data analysis was done using SPSS by calculating proportions, participants' tests, analysis of variance and χ^2 tests, with the *p*-value set at 0.05.
Results. A total of 646 participants, from the general population of Zambezi's 6 constituencies, were included in the study. The mean age of participants was 11 years (range 18 - 77). Of the 646 participants who completed the questionnaire, 76.3% (493) had poor knowledge and 23.7% (153) had good knowledge of the risk factors of diabetes. Association analysis showed that among the participants, 99 out of 334 (60% of 52%) females and 66 (40%) males had good knowledge about family history as a risk factor for diabetes ($p>0.05$).
Conclusion. The study revealed poor knowledge regarding the risk factors for diabetes mellitus in the Zambezi region. Participants could not satisfactorily identify risk factors such as excessive weight, physical inactivity, poor dietary habits, alcohol consumption, tobacco smoking, advanced age or consumption of oily food and fast food.

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Diabetes mellitus is a worldwide health problem that impacts human societies at various stages of development.[1] It is a multifaceted disease whose devastation breaches all demographic categories, such as age, gender and ethnicity. It is reported that the prevalence of this disease has increased over 50% over the past 30 years, and more than 400 million people are affected worldwide, with 46% being undiagnosed.[2] Furthermore, a World Health Organization (WHO) report estimated that in 2014, 422 million people globally >18 years old had diabetes, which amounted to an incidence of 8.5% among the adult population.[1]

Moreover, the International Federation of Diabetes estimates that the prevalence of diabetes will rise by 98% in Africa during the next 20 years, with dramatic implications for public health and the national budgets of the poorest countries.[3] Diabetes creates a large economic burden on the global healthcare system and the wider global economy through direct medical costs, indirect costs associated with productivity loss, premature mortality and the negative impact of diabetes on nations' gross domestic product.[1] In fact, the global burden of diabetes had been estimated as a 13.5% increase in all-cause mortality between 1990 and 2010. In the USA, diabetes was recorded as the seventh leading cause of death in 2015, with a total direct and indirect estimated cost accorded to diagnosed diabetes of USD245 billion in 2012.[4]

Epidemiological factors and urbanisation remain major factors that increase diabetes prevalence in Africa. Another factor that raises diabetes prevalence is migration, as people continue moving into urban areas from rural environments, particularly in sub-Saharan Africa.[5] Movement of people from rural to urban areas is associated with a shift in lifestyle, from a relatively healthy traditional pattern to the urban scenario of increased food quantity and reduced quality. Furthermore, urbanisation is associated with low levels of exercise, smoking and increased alcohol availability.[5]

Objective

To assess the level of knowledge regarding the risk factors for diabetes among the general population of the Zambezi region in Namibia.

Methods

An analytical cross-sectional study was conducted on the general population in four constituencies of the Zambezi region. Data collection was done using interviewer-administered questionnaires. The researcher used a WHO STEP-wise, non-communicable-disease risk-factor surveillance (STEPS) instrument, which was adapted to suit the Namibian situation. The WHO STEP-wise approach to STEPS is a simple, standardised method for collecting, analysing and disseminating data in WHO member countries. It focuses on obtaining core data on the established risk factors that determine the major burdens of the disease. The adapted WHO STEP-wise surveillance structured questionnaire identifies demographic, socioeconomic, familial, anthropometric, knowledge-based and behavioural risk factors that are independently associated with diabetes in Zambezi region. The STEP-wise tool was implemented as a household data collection aide via trained interviewers who conducted face-to-face interviews with selected participants regarding risk factors for diabetes.

The sample size was calculated using Epi Info version 7.0 (Centers for Disease Control and Prevention, USA), for a cross-sectional analytic design in which smoking was taken as a priority exposure factor, and diabetes as an outcome factor. An expected frequency of 8.7% diabetes, according to a study by Jankowich *et al*.[6] in the USA, among an unexposed (non-smokers) and exposed population in a ratio of 3:1, and a study power of 80% at 95% confidence level, produced an odds ratio of 2.0. The required sample size was 484:162, a total of 646 adult participants from the Zambezi region. Through convenience sampling, the researcher was able to select 646 participants to complete structured questionnaires. The data analysis was carried out using Statistical Package for the Social Sciences version 22 (IBM Corp., USA).

Ethical considerations

The School of Public Health Postgraduate Committee (ref. no. 17/3/3,) University of Namibia Senate Committee and Namibian Ministry of Health and Social Services approved this study.

Results

The average age of the respondents was between 34 and 35 years. The youngest participant in the study was 18 years old, and the oldest was 77 years old. Nevertheless, the age deviation from the true mean was 11 years. Participants were asked to indicate whether risk factors such as level of knowledge contribute to the onset of diabetes mellitus. These assessments were made in comparison with various demographic and socioeconomic data such as residential area, constituency, sex, educational level, marital status and employment status, to determine their influence on the level of knowledge regarding risk factors for diabetes.

Overall, of the 646 participants who completed the questionnaire, 76.3% (493) had poor knowledge and 23.7% (153) had good knowledge of the risk factors for diabetes. Segregating level of knowledge regarding risk factors for diabetes mellitus by sex revealed that 73.7% (246) of females and 79.2% (247) of males demonstrated poor knowledge. Furthermore, only 26.3% (88) of females and 20.8% (65) of males demonstrated good knowledge of the risk factors for diabetes. However, there was no significant correlation between level of knowledge and sex (2.713, df=1, p=0.060). Eighty-one percent (51) of participants in the age group between 40 and 44 years had poor knowledge of the risk factors, followed by 80% (16) in the group aged ≥60 years. Very few participants aged 25 - 29 years demonstrated good knowledge, i.e. 26.4% (39), followed by 26% (13) in the age group 50 to 54 years. There was no significant correlation between the level of knowledge and different age categories (2.191, df=9, p=0.988).

For family history, the results illustrate the number of participants who had good knowledge of family history as a causative of diabetes as: 110 (66.7%) of those from villages, 55 (33.3%) from Katima Urban, 99 (60%) females, 84 (50.9%) participants with a secondary education, 78 (47.3%) unmarried, and 63 (38.2%) employed participants. The sex of participants had a significant relationship with knowledge of family history as a risk factor, as females were more likely to be aware of it, with a p-value of 0.045. All other socioeconomic factors had a p-value >0.05. The second aspect was knowledge regarding the risk of being overweight. All variables had a p-value >0.05, which implies that there is no correlation between these factors and knowledge of the risk of being overweight.

Regarding knowledge of the risk posed by physical inactivity, an absence of correlation was observed, as none of the p-values were <0.05. The constituency variable had the highest p-value (0.923), and residential area the lowest (0.127). Comparing these socioeconomic factors with knowledge of the risk of physical inactivity, the dominant categories are fairly similar or identical to previous results. Village residence showed the highest conformity among the residential areas with 102 (72.3% of) participants, and Katima Urban with 39 (27.7%) in conformity. Seventy-five (53.2%) females agreed that physical inactivity is a risk of diabetes.

Participants were also assessed on knowledge regarding the risk of poor dietary habits. The results indicate that about 15% (13) of participants who resided in the (non-suburban) location did not know whether poor dietary habit was a risk factor for diabetes. The residential area variable had a p-value of 0.086, which implies that there is no significant correlation between knowledge regarding poor dietary habits and residential area. Forty-seven participants from Sibbinda (35.3%) had knowledge of poor dietary habits as a risk factor. The p-value for the constituency variable is 0.321. The majority of females (78, 58.6%) agreed that poor dietary habits are a risk factor. The sex variable had a p-value of 0.174, which reveals an insignificant correlation between knowledge of the risk of poor dietary habits and sex. The p-value for educational level is 0.807, i.e. greater than the 5% significance level, indicating that there is no correlation between level of knowledge regarding poor dietary habits and educational level. Sixty-three (47.4%) of the 43.2% of participants who had never been married also confirmed knowledge of dietary habits as a factor. The p-value of the marital-status variable was 0.176, and the p-value of employment status was 0.909. Neither are statistically significant at the 5% significance level to indicate correlation. Furthermore, 38 unemployed participants (45.2%) indicated that they were uncertain whether poor dietary habits were a risk factor or not.

Looking at knowledge regarding the risk of alcohol consumption, interestingly, 57% of village residents demonstrated a higher level of knowledge regarding the risk of alcohol consumption than the participants from other residential areas, though 22.4% stated that they did not possess knowledge on alcohol consumption. The significance level (0.594) indicates that there is no correlation between knowledge of the risk of alcohol consumption and residential area. The constituencies of Sibbinda (44, 35%) and Katima Urban (40, 32%) had the highest number of residents with knowledge regarding the risk of alcohol consumption, compared with the number of Kabbe South residents (20, 16%) who had the least knowledge. No correlation existed between knowledge of the risk of alcohol consumption and constituency, as the *p*-value was >0.05.

Furthermore, females (72, 57%) tended to know more compared with males (55, 43%). No correlation existed between sex and knowledge of the risk of alcohol consumption. It was found that secondary-school graduates (69, 54%) had greater knowledge, while at the same time 224 (52%) had no knowledge about the risk factor of alcohol consumption. In general, people with no formal education also tended to lack knowledge regarding the risk of alcohol consumption. Participants who were married (43, 34%) or never married (53, 42%) demonstrated having knowledge of the risk of alcohol consumption, while participants who were separated demonstrated next to no knowledge of alcohol consumption as a risk factor. Participants who were otherwise employed (52, 41%), and unemployed (45, 35%), had greater knowledge, while domestic workers 5 (1.5%) scored extremely low regarding knowledge about alcohol consumption. There was a correlation between a person's marital and employment status and educational level regarding knowledge of alcohol consumption as a risk factor for diabetes.

Assessment of knowledge regarding the risk of tobacco smoking revealed that participants who lived in villages (110, 73%) demonstrated knowledge of the risk of tobacco smoking, while 58 village residents (71%) had no idea about this risk. The *p*-value (0.405) was >0.05, so we concluded that there was no correlation between residential area and knowledge of the risk of tobacco smoking. Regarding knowledge of smoking and constituency, participants from Sibbinda (46, 31%) and Katima Urban (41, 27%) demonstrated the highest levels, despite the fact that they also had the highest number who claimed to know nothing about the risk of tobacco smoking, with numbers of 128 (31%) and 126 (31%), respectively. Eighty-six (57%) females demonstrated that they had knowledge of the risk of tobacco smoking, whereas 39 (48%) male participants were uncertain regarding their knowledge of the risk of tobacco smoking. Only 8 participants (5%) with no formal education demonstrated that they had knowledge of the risk of tobacco smoking, compared with 82 (54%) with secondary education who did. Four (5%) of those with no formal education claimed that they had no knowledge of the risk of tobacco smoking, compared with 12 (15%) who had post-secondary education. Eight (4%) widows and 1 (1.2%) separated person showed the lowest numbers among those who admitted having no knowledge about the risk of tobacco smoking, while those who had never been married (70, 46%) demonstrated the highest knowledge of alcohol as a risk for diabetes. By the same token, 179 (43%) participants who had never been married were the largest group under the marital status factor who demonstrated no knowledge about the risk of tobacco smoking. Fifty-nine (39%) employed participants and 51 (34%) unemployed were among the highest scorers with regard to knowledge about the risk of tobacco smoking, while only 1 (1.2%) domestic worker claimed having no knowledge about the risk of tobacco smoking. No correlation existed between educational level, marital status and employment status regarding the knowledge of tobacco smoking as a risk factor for diabetes, since their *p*-values were >0.05.

On knowledge regarding the risk of advanced age, about 104 (22.8%) village participants were aware of the risk of advanced age, while 351 (7.1%) did not know that the risk of diabetes increases with age. Furthermore, 19 (13%) participants from the informal location could confirm this knowledge, though 33 (8%) participants from the informal settlement demonstrated no knowledge that the risk of diabetes increases with age, the lowest number with no knowledge of the risk.

The present study showed that 73 participants (50%) with a secondary education understood that the risk of diabetes increases with age. The same awareness was demonstrated by 37 (25%) participants with post-secondary level education, whereas 25 (6%) participants with no formal education did not know that diabetes increases with advancing age. It was also observed that 68 people who had never been married (46%) understood that the risk of diabetes increases with age, as did 44 (30%) who were married. On the other hand, 5 (1%) of those who were separated did not understand this connection, nor did 22 participants (5%) who were cohabiting. Fifty-six (38%) employed participants and 47 (32%) unemployed agreed that the risk of diabetes increases with advanced age. Three (1%) domestic workers did not know that the risk of diabetes increases with age. A correlation did not exist between a person's area of residency, constituency, sex, level of education, marital status and employment status regarding the perception that the risk increases with advancing age, since their *p*-values were >0.05.

On the level of knowledge regarding the risk of eating oily food, despite the fact that we also need oily food as an important component in a healthy diet, some people had little or no idea that some oily food is not healthy and also contributes to the onset of diabetes. One hundred and five (69%) village residents had knowledge about the risk of oily food, compared with 13 (9%) participants who resided in suburbs. Furthermore, 37 (9%) suburb participants stated that they did not have any knowledge regarding the risk oily food, while 293 (72%) village residents also claimed that they did not have any knowledge of this risk factor contributing to diabetes. At the constituency level, residents of Katima Urban (48, 31%) and Sibbinda (46, 30%) had positive knowledge of the risk of oily food. In Kabbe South (82, 20%) and Kabbe North (84, 21%), some residents were not aware of the risk of oily food. There was a 9% variation between males (69, 45%) and females (84, 54%) among those who demonstrated knowledge regarding the risk of oily food. In the group that was found to have no knowledge of the risk of oily food, 206 (50%) were male and 203 (50%) were female.

Approximately 80 (52%) subjects with a secondary education had knowledge of the risk of oily food, while 33 (22%) with post-secondary level had that knowledge as well. Twenty-three subjects (6%) with no formal education had no idea about the risk of oily food. It was found that 64 people (41%) who had never been married had knowledge about the risk of oily food. Only 7 (5%) of the cohabiting participants had knowledge regarding oily food. Only 4 (1%) subjects among the separated couples had no idea regarding the risk of oily food, compared with 151 (37%) of those who were married. Furthermore, 60 (39%) employed participants had knowledge about the risk of oily food, as did 54 (35%) unemployed subjects. Only 5 (1%) domestic workers demonstrated that they had no idea about the risk of oily food, while 10 (2%) contract/casual workers had no knowledge about the risk. There was no correlation between residential area, constituency, gender, educational level, marital status and employment and knowledge of the risk of oily food, since their *p*-values were >0.05.

Participants were also assessed on their level of knowledge regarding the risk of fast food. The analysis revealed that 94 (77%) villagers had knowledge of the risk of fast food as a contributing factor in diabetes, while only 7 (6%) participants from the suburbs knew this. Furthermore, 41 (9%) suburb residents were found to have no knowledge of the risk factor of fast food, while 3 (4%) residents of the informal location also had no knowledge. Approximately 38 (31%) subjects from Sibbinda constituency demonstrated that they had knowledge of the risk of fast food, and 33 (27%) residents of Kabbe South also demonstrated they had this knowledge. Eighty-one (18%) participants from Kabbe South had no knowledge of the risk posed by fast food, while 15 (18%) from the same constituency admitted they did not know whether fast food was risky. It was found that 65 (53%) females knew the risk posed by fast food, compared with 57 (48%) of their male counterparts. There was no significant variation between males (217, 49%) and females (225, 51%) who did not understand that fast food is a risk factor for the onset of diabetes. Participants with secondary-school education (70, 57%) were more likely to know that fast foods are risky than any other educational category. Moreover, 24 subjects (5%) without any formal education did not know that fast food is a risk for diabetes, while 4 (5%) were uncertain whether fast food is a risk. Forty-three (35%) employed participants and 5 (4%) casual workers knew the risk of fast food. On the other hand, 180 (41%) unemployed participants did not know that fast food is risky, and 37 (45%) were not certain whether that was the case. All variables show no correlation with the existence of knowledge regarding the risk of fast food, as their *p*-values are >0.05, the marker of insignificance.

Another aspect of the study assessed participants' knowledge of whether spicy foods influence the onset of diabetes or not. Among villagers, 71% had poor knowledge, and 29% had good knowledge, i.e. understood that spicy food does not contribute to diabetes, and 3.2% of the participants from the informal settlement were unsure whether spicy food had an influence on the onset of diabetes. Considering constituencies, Katima Urban (29%) dominated all categories for the poor knowledge of its subjects regarding this factor. Furthermore, more females (51%) had poor knowledge than males (49%). Comparing levels of poor knowledge of this risk factor with educational levels, participants who had completed secondary school had the highest percentage, at 53%. In terms of marital status, 46% of the never married group had poor or no knowledge of this risk factor. Under the employment variable, unemployed participants dominated all categories, with 101 having good knowledge (41.4%). Surprisingly, domestic workers had the lowest knowledge about spicy foods' possible contribution to diabetes. In summation, no correlation was found between any variable and knowledge about spicy food as a causative factor for diabetes.

Discussion

This study was conducted in the four constituencies of the Zambezi region, namely Katima Urban, Sibbinda, Kabbe North and Kabbe South. Most participants in the study were from Katima Urban (319, 50.3%), while 198 (30.7%) were from Sibbinda, and the smallest number were from Kabbe North and South, collectively (129, 19%). Participants were asked to identify various risk factors using a quantitative approach. Furthermore, levels of knowledge were assessed in comparison with statistics regarding residential area, constituency, sex, educational level, marital status and employment status, to determine their influence on the level of knowledge regarding risk factors of diabetes. Levels of knowledge were identified as poor. Participants could not satisfactorily identify risk factors of diabetes such as excessive weight, physical inactivity, poor dietary habits, alcohol consumption, tobacco smoking, advanced age or consumption of oily food and fast food. The ability to identify risk factors for diabetes was not influenced by sociodemographic data (with the exception of knowledge of the risk posed by a family history of diabetes) to a statistically significant degree. Participants' level of knowledge in identifying family history as risk factor was influenced by sex. Interestingly, 99 (60%) females and 66 (40%) males had good knowledge about family history as a risk factor for diabetes. This means that women were more knowledgeable that family history is a risk factor for diabetes. It was established that level of knowledge of family history of diabetes as a risk factor is influenced by sex at a *p*-value >0.05. Producing contrasting results, a study conducted in Pakistan revealed that educational level and residential area significantly influenced level of knowledge on the risk factors for diabetes.[7] A growing body of literature indicates that the familial factor plays an important role on the onset of diabetes. There is a ~40% chance of developing diabetes when one parent has diabetes, and ~70% when both parents have diabetes.[8]

The inability to identify risk factors of diabetes reflects the participants' significant lack of knowledge about the disease itself. This situation is likely to have negative repercussions for efforts to reduce and prevent diabetes in the Zambezi region. Another significant explanation for poor knowledge regarding the risk factors was the fact that participants did not understand diabetes as a disease, or its prevention.

Conclusion

In conclusion, the general population of the Zambezi region has poor knowledge of the risk factors associated with diabetes. A family history of diabetes was the only factor that was regarded

as a risk factor for diabetes. An explanation for the poor knowledge regarding the risk factors may be the fact that participants did not understand diabetes as a disease, or its prevention. It is recommended that additional research be undertaken in other regions to shed light on the risk factors of diabetes in Namibia.

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