

Risk perception and knowledge regarding diabetes among offspring of type 2 diabetics at a tertiary institution

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ABSTRACT

Introduction: The rapid increase in Type 2 Diabetes Mellitus (T2DM) among the younger age groups is a growing concern worldwide. Thus, assessing the perception of risk and knowledge among those at risk may provide an opportunity for early intervention, delay or even prevent the onset.

Objective: The aim of this study was to determine the perceived risk of developing T2DM and its knowledge among the offspring of diabetic patients.

Methods: A cross sectional study using a self-administered questionnaire was conducted among university students whose parents had type 2 diabetes to determine their perceived risk and knowledge on T2DM.

Results: A total of 336 university students participated in this study and 56.5% of them correctly identified themselves at risk of developing T2DM. About half of them (52.7%) had higher knowledge of T2DM. Male students appeared to have better risk perception ($p=0.024$) compared to females while those with mothers affected by T2DM appear to have higher knowledge regarding diabetes ($p=0.007$). Most of their information regarding T2DM was obtained from the internet (87.5%) and other family members (77.9%).

Conclusion: The students whose mothers had T2DM appear to have better knowledge and information regarding T2DM and this was mostly obtained from the internet and family members. Awareness regarding diabetes and healthy lifestyles advice through primary patients may be beneficial for their offspring.

KEYWORDS:

Risk perception, knowledge, type 2 diabetes mellitus, offspring

INTRODUCTION

The incidence of Type 2 Diabetes Mellitus (T2DM) worldwide is increasing at an alarming rate with Malaysia having 36.9% of the world's population of diabetes.¹ The prevalence of diabetes among young people, has doubled and this suggests an urgent need to create awareness regarding the disease and screening people at an earlier age.^{2,3}

Family history is a major risk factor for developing diabetes. The Framingham Offspring Study showed that the odds of offspring developing T2DM is 3.4 to 3.5 when one parent has diabetes and doubles to 6.1 when both the parents are affected suggesting a strong genetic predisposition for developing T2DM.⁴ A study in China also showed a significant association between family history of T2DM with prevalence and early onset.⁵

Perception of risk to develop T2DM among offspring with diabetic parents varies globally. A study in London found that only 33% of those at risk, perceived themselves to be at risk and 49% recognised family history as a risk factor for developing diabetes.⁶ In Asia, only 9.9% of offspring were aware of their risk for developing diabetes when one or both parents are affected by diabetes.⁷ However, diabetic risk awareness is higher among Japanese population with about 74% offspring of diabetic parents correctly identifying themselves to be at risk.⁸

A recent study on self-reported knowledge on diabetes and its related factors among college students in China showed low level knowledge (less than 50%).⁹ Dorman et al. found that knowledge on diabetes was higher when participants had personal experience with a relative or close friend suffering from a chronic disease.¹⁰ A qualitative study by Gordon et al. on knowledge about diabetes in adult offspring of patients showed that the participants had poor knowledge.¹¹

The aim of this study was to determine the perceived risk of developing diabetes and the knowledge among offspring of diabetic patients. This information would be valuable for physicians to plan screening, intervention, health promotion and care for the offspring.

MATERIALS AND METHODS

A cross sectional study was conducted among both undergraduate and postgraduate students at the Universiti Kebangsaan Malaysia between June and November 2018. Participants from various non-science faculties were selected using cluster sampling. Malaysian nationals aged 18 years and above with at least one parent with T2DM were invited to participate. Students from the science faculties, those diagnosed with T2DM, those who were unsure of the diabetes

This article was accepted: 31 August 2020

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status of parents and those who did not understand Bahasa Malaysia or English were excluded. Sample size was calculated, using Open Epi program using knowledge level of 49% with 95% confidence level.⁶ Another 20% was added for any incomplete response and the final sample size was 333. The questionnaire was constructed in English and translated to Bahasa Malaysia using forward and backward translation by two linguists.

Five classes were randomly selected from each faculty based on their lecture schedules. A brief introduction about the study was made to the students by the researcher before the questionnaire was distributed and it was collected upon completion at the end of the session.

A self-administered questionnaire was developed from literature review and adapting questionnaires from earlier studies.^{6,9,12} Further input and review of the questionnaire was done by an expert panel consisting of a family physician, an endocrinologist and a family medicine trainee. The final questionnaire consisted of 42 items in three sections. Section I, consisted of socio demographic details (5 items). Section II (2 items), assessed perceived risk of developing diabetes among participants, using a single question, "How likely do you think that you will get diabetes?" This statement was followed by 5 answer options in Likert scale, namely: extremely unlikely, unlikely, neutral, likely, and extremely likely.⁶ Participants were requested to select only one option. Those who selected options likely and extremely likely were considered to have correct risk perception while those who selected extremely unlikely, unlikely or neutral, as having wrong risk perception. The second question in this section assessed the sources of information regarding diabetes of the participants. Section III, (35 items) assessed participant's knowledge on T2DM in 5 domains.^{9,12}

- A. *General knowledge regarding diabetes (Items 1 to 4)*
- B. *Knowledge of risk factors of diabetes (Items 5 to 9)*
- C. *Knowledge of symptoms of diabetes (Items 10 to 19)*
- D. *Knowledge of prevention of diabetes (Items 20 to 26)*
- E. *Knowledge of complications of diabetes (Items 27 to 35)*

Each item was followed by 3 options, "Yes", "No", or "Don't know". Participants were instructed to select one. Each domain consisted of a mixture of correct and incorrect items. Items 1, 4, 9, 13, 16, 17, 18, 20, 21, 25, 26, 27, 33 (37% of the total items) were incorrect and were reversed scored. Median score was used as the cut-off point between higher and lower knowledge. The questionnaire was subjected to face validity followed by pre-test and retest for reliability (cronbach's α coefficient 0.62).

Data was analysed using SPSS version 22. Descriptive statistics, Mann-Whitney, and Chi square tests were used in the analysis. Categorical data was described as frequency and percentage while numerical data was described as mean and standard deviation (SD). Mann-Whitney test was used to analyse the association between age with risk perception and knowledge. Other associations were analysed using Chi square test. This study was approved by the Ethics and Industry Research Committee of University Kebangsaan Malaysia.

RESULTS

A total of 336 university students who have parents with T2DM participated in this study. The mean age of participants was 22 years (SD \pm 3.96) and most of them were undergraduate students (86.3%, n=290). Most participants were females (73.2%, n=246) and were Malays (88.1%, n=296). Majority (92.3%, n=310) had one parent affected by T2DM with fathers being more frequently affected (53.6%, n=180) compared to mothers (38.7%, n=130). Only a small percentage (7.7%, n=26) had both parents with T2DM (Table I).

Slightly more than half (56.5%, n=190) of the participants correctly perceived themselves of being at risk of developing T2DM. More male participants had correct risk perception that they are at risk of developing T2DM compared to female participants. The minimum, maximum, and median scores for the overall knowledge on diabetes were 0, 35, and 22 respectively. Median score was used as a cut-off point between higher and lower knowledge levels. Hence participants with an overall score of 22 and more were considered to have higher knowledge of diabetes. Higher knowledge in each domain was defined in a similar manner i.e. based on the median score of the respective domains. About half (52.7%, n=177) had higher knowledge regarding diabetes (median score of \geq 22). There was no association between knowledge regarding diabetes and demographic characteristics except for family history of T2DM. Participants who have mothers with T2DM appeared to have higher knowledge (p=0.007) regarding the disease compared to those whose fathers or both parents affected (Table II).

Highest score was noted in the "General knowledge of diabetes" domain while lowest score was noted in "Knowledge of risk factors of diabetes" domain (Table III).

There was also no association between knowledge of the disease with risk perception of developing T2DM (Table IV).

Most participants obtained information regarding diabetes from the internet followed by family and television (Table V).

DISCUSSION

According to the National Health and Morbidity Survey the prevalence of undiagnosed T2DM in Malaysia is about 9.2%.³ Creating awareness, early identification among people at risk and implementation of lifestyle modifications could help delay and perhaps reduce the number of people affected by T2DM.

The present study shows that, slightly more than half (56.5%) of the offspring of diabetic patients correctly perceived themselves at risk of developing diabetes and this was much higher compared to a study in Korea which was only 9.9%.⁷ However, the risk perception among offspring of diabetic patients in Japan is much higher, which is about 74%.⁸ This high percentage in Japan was attributed to their national project on raising awareness on diabetes and less optimistic bias among that population. In Malaysia, the Ministry of Health, has introduced numerous health campaigns over the years to increase awareness regarding diabetes and urging the residents to adopt a healthy lifestyle in order to prevent

Table I: Participants' demographic characteristic

Variables	n (%)
Age (years), Mean (\pm SD)	22.00 (\pm 3.96)
Gender	
Female	246 (73.2)
Male	90 (26.8)
Ethnicity	
Malay	296 (88.1)
Non-Malay	40 (11.9)
Education Level	
Undergraduate	290 (86.3)
Postgraduate	46 (13.7)
Family member affected with T2DM	
Mothers	130 (38.7)
Fathers	180 (53.6)
Both parents	26 (7.7)

Table II: Association between demographic characteristics of participants with perceived risk of developing T2DM and knowledge regarding diabetes

	Perceived risk		p value	Diabetes knowledge		p value
	Likely at risk (n=190) n (%)	Unlikely at risk (n=146) n (%)		Higher knowledge (n=177) n (%)	Lower knowledge (n=159) n (%)	
Age (years) Mean (SD)	22.11 (4.12)	21.86 (3.76)	0.611	22.32 (4.40)	21.64 (3.38)	0.097
Gender						
Male	60 (66.7)	30 (33.3)	0.024	49 (54.4)	41 (45.6)	0.695
Female	130 (52.8)	116 (47.2)		128 (52.0)	118 (48.0)	
Ethnicity						
Malay	170 (57.4)	126 (42.6)	0.373	157 (53.0)	139 (47.0)	0.718
Non-Malay	20 (50.0)	20 (50.0)		20 (50.0)	20 (50.0)	
Education Level						
Undergraduate	158 (54.5)	132 (45.5)	0.055	148 (51.0)	142 (49.0)	0.13
Postgraduate	32 (69.6)	14 (30.4)		29 (63.0)	17 (37.0)	
Family member affected with T2DM						
Mothers	70 (53.8)	60 (46.2)	0.684	82 (63.1)	48 (36.9)	0.007
Fathers	104 (57.8)	76 (42.2)		81 (45.0)	99 (55.0)	
Both parents	16 (61.5)	10 (38.5)		14 (53.8)	12 (46.2)	

Table III: Knowledge of diabetes in different domains.

Knowledge on diabetes domains	Maximum score	Median	Higher knowledge n (%)	Lower knowledge n (%)
General knowledge regarding diabetes	4	2	310 (92.3)	26 (7.7)
Knowledge of symptoms of diabetes	10	5	215 (64.0)	121 (36.0)
Knowledge of prevention of diabetes	6	5	195 (58.0)	141 (42.0)
Knowledge on complications of diabetes	10	6	190 (56.5)	146 (43.5)
Knowledge of risk factors of diabetes	5	4	177 (52.7)	159 (47.3)

*Higher knowledge for each domain is define when the scores are greater to or equal to the median score for each domain.

Table IV: Association between participant's knowledge with their perceived risk

	Likely at risk (n=190) n (%)	Unlikely at risk (n=146) n (%)	p value
Knowledge on diabetes			
Higher knowledge	103 (58.2)	74 (41.8)	0.521
Lower knowledge	87 (54.7)	72 (45.3)	

Table V: Sources of information regarding diabetes

Source	n (%)
Internet	294 (87.5)
Parents & siblings (1st degree relatives)	262 (77.9)
Television	237 (70.5)
Health promotion talks & brochure	205 (61.0)
Healthcare providers (doctors, nurses, or medical assistants)	174 (51.8)
Books, newspapers & magazines	171 (50.9)
Others (2nd degree relatives, school)	6 (1.7)

diabetes and other chronic diseases. However, there is a possibility that the information has not reached out fully or as widely as expected. Perhaps it is worthwhile to approach the population at risk through the affected parents i.e. the diabetics. Physicians can remind their diabetic patients to inform their children about the increased risk for developing diabetes, and by doing this would indirectly increase awareness among the younger generation.

A majority of the participants in this study received information regarding diabetes from the internet and family. It appears that family members have a big role in giving information as almost 80% of participants received the information regarding T2DM from them. This finding reinforces that the primary patients can be empowered to educate their offspring regarding T2DM and to encourage them to adopt a healthy lifestyle which will help delay and potentially prevent this condition.

Our study showed that male participants have higher perception of risk compared to females. This finding is in contrast to the findings from a study in the US, which showed that females have higher risk perception of diabetes compared to males.¹³ Our finding suggests that female participants in this study may have unrealistic optimism about their own risk of developing T2DM. This may be attributed to the optimism bias which is a cognitive bias of being less likely to experience a negative event. It is possible that there is a cross-cultural variation between the Asian and Western culture which influences optimism bias and eventually the perception of risk to acquire diseases.

Although slightly more than half of the participants in this study had correct risk perception of developing T2DM, there was no association between their knowledge and risk perception. This means that although participants knew regarding the risks of developing diabetes, they were optimistic of not being at risk themselves. This gap between knowledge and risk perception could be explained by the phenomenon of unrealistic optimism.¹⁴ Unrealistic optimism, also known as comparative optimism or optimism bias is the cognitive bias which causes an individual to believe that they are less or unlikely to experience a negative event. Such a bias could be a barrier to the implementation of preventive behaviour modification strategies. An earlier study by Dickerson et al, also showed that there was no association between perceived risk of developing diabetes and behavioural risk factors. Another study also showed that the perceived risk of developing diabetes among those who were indeed at higher risk (based on Framingham risk score or by metabolic syndrome characteristics) had no intention of modifying their lifestyles.¹⁵ Perhaps a qualitative study could help to understand the gap between knowledge and risk

perception of T2DM better. Since accurate risk perception alone may not influence risk-modifying behaviours, perhaps a more individualise approach may be required to target health promotion among the high-risk group. Even though familial risk is a non-modifiable risk factor in developing T2DM, it can be used as a tool for educating the diabetic offspring for early screening, delay and perhaps prevent it by adopting a healthy lifestyle.¹⁶

About half of the participants (52.7%) had higher knowledge regarding diabetes, best scores were in the mainly in the domain of general knowledge of T2DM. This may be due to the rigorous advertisement and awareness programmes initiated by the Malaysian government in the battle against the rising number of T2DM over the last few decades. The lowest scores in knowledge was in the risk factor domain. An earlier study by Xu Y et al. also suggests similar findings.⁹ This suggests that an urgent need to create awareness regarding risk factors especially the modifiable risk factors among the younger generation as they may be more receptive to lifestyle modifications as a crucial step to delay and prevent T2DM in the future.

This study also shows a significant association between family history and the participant's knowledge on diabetes. Participants whose mothers had T2DM appear to have higher knowledge regarding the disease. This finding is supported by a study done by Nishigaki et al., which found that mothers were two times more likely to advise their offspring regarding diabetes compared to fathers.¹⁷ This is probably because mothers are more attentive to their children's lifestyle habits compared to fathers.¹⁷ In general, men may not discuss their health issues with others to avoid exposing their vulnerability or what they perceive as weakness.¹⁸ Mothers on the other hand, may be able to communicate easily about their disease to their family members.

One of the limitations of this study is that some eligible participants may have been unintentionally excluded as they may have chosen not to declare the diabetic status their parents to avoid answering the questionnaire. Since this study was done among university students, there may have been an unintentional bias where the responses were mostly from female participants from the Malay descent, with higher level of education, knowledge and access to internet compared to those from lower social-economic or education background. Risk perception in this study was assessed using a single question which may have narrowed the probability of its association with the participant's knowledge as other factors such as cultural believes or diet may influence perception. These unintentional biases may restrict the implication of this study findings to the general population. Future research should perhaps include participants from the

lower social-economic group as the possibility of undiagnosed T2DM may be more among this group and researchers may also want to determine their access to information on this issue.

CONCLUSIONS

This study shows that about half of the offspring of diabetic patients who had established risk of developing T2DM have correct personal risk perception of developing the disease and knowledge regarding T2DM. However, there is no relationship between risk perception and knowledge suggesting a potential gap requiring a more individualized approach. The most common source of information regarding diabetes was obtained from the internet and family members. Participants with mothers affected by T2DM seem to have better knowledge regarding the disease. More robust efforts are required to create awareness, vigilance regarding T2DM and to change the mind-set of young people who are in comfort zone underestimating their risk of developing diabetes. Imparting knowledge regarding T2DM and benefits of adhering to healthy lifestyles by physicians through the primary patient or family counselling sessions may be beneficial as many young people get to know about T2DM from their parents and siblings.

ACKNOWLEDGEMENTS

The authors would like to thank Prof Clare Bradly, Xu Ying and Badariah Ahmad for granting permission to adapt their questionnaire. We would also like to thank Universiti Kebangsaan Malaysia Medical Centre for granting permission to conduct this research (FF-2017-380).

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