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## Original Research Article

## Investigating knowledge deficit in diabetes mellitus type 2 amongst young Australian adolescents, aged 18-25-A cross-sectional study

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## ABSTRACT

**Background:** Type 2 Diabetes mellitus (DM) is a largely preventable, chronic, and progressive medical condition. However, this preliminary study has been carried out to investigate the knowledge deficit of type 2 DM in Australia, amongst young adults.

**Aim:** To investigate knowledge deficit of type 2 DM amongst Australian adolescents.

**Materials and Methods:** A cross-sectional survey was conducted amongst 18–25-year-olds. Using a random sampling method, 108 young Australian adults were questioned from the local Rotary club via an online survey. A combination of close-ended questions and a multiple-choice self-completed questionnaire were utilised to collate the data through the online survey. Questions were formulated by assuming that participants did not have any medical background. Questions were focused on general knowledge, knowledge of risk factors, knowledge of symptoms, knowledge on complications and knowledge about lifestyle modifications.

**Results:** A total of 108 Australian adolescents completed the survey, of which 64.8% was female & 35.2% was male. The study found that there is a statistically significant difference in the knowledge about diabetes factors between the sexes. None of them had Aboriginal or Torres Strait Islander background.

**Conclusion:** Analyses of data from this population indicates that there is a deficit in knowledge amongst Australian adolescents about type 2 DM. Enhanced effort by clinicians to employ early intervention, especially at the adolescent stage by advocating for healthy lifestyle choices would help lower the burden of this disease.

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## 1. Introduction

The purpose of this preliminary study is to identify a deficit in knowledge amongst Australian adolescents about type 2 DM.

Australian institute of health & welfare<sup>1</sup> states, among young people, the risk of type 2 DM rose from an average annual rate of new cases of 16 per 100,000 for those aged 20–24. Given this prevalence among young adults, the study focused on type 2 DM knowledge deficit among young

Australian adults aged between 18 to 25 in Australia.

This age group are likely to engage in unhealthy lifestyle behaviors, such as consuming excessive alcohol, increased sugar intake and consuming processed foods and being physically inactive, which can increase their risk of developing type 2 DM. This is largely due to the legal drinking age being 18 and these adolescents moving out of their homes for the first time. These circumstances make this target population more exposed to diabetic risk factors.

Additionally, the adolescents are likely to fail to recognise the early warning signs of type 2 DM, such as fatigue, increased thirst, and blurred vision. By promoting type 2 DM awareness among young Australian adults,

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we can empower them to make informed decisions about their health and improve their quality of life.<sup>2</sup> Early detection is critical as it helps prevent or delay the onset of complications associated with type 2 DM, such as heart disease, nephropathy, neuropathy, and retinopathy.

An existing study carried out in Kuwait, on this subject, found that the knowledge of type 2 DM amongst 15 to 20 years olds were at average.<sup>3</sup> Despite this previous study, a gap exists in the literature regarding the deficit of knowledge regarding type 2 DM among young adults aged 18 to 25 in Australia. This preliminary study aims to fill the existing gap in the literature regarding the knowledge deficit of type 2 DM in young Australian adults.

The words adolescents and young adults were used interchangeably in this study.

### 1.1. Hypothesis

The underlying proposition of the study posits that young adults in Australia exhibit insufficient knowledge about type 2DM.

### 1.2. Definition and guidelines

There are three main types of DM: type 1, type 2, and gestational DM. Royal Australian College of General Practitioners handbook<sup>4</sup> define type 2 DM is a largely preventable, chronic, and progressive medical condition that results from two major metabolic dysfunctions: insulin resistance and then pancreatic islet cell dysfunction causing a relative insulin deficiency.

World health organisation<sup>5</sup> states lifestyle should be the best way to prevent or delay the onset of type 2 DM and recommends that individuals should, maintain a healthy body weight, stay physically active with at least 30 minutes of moderate exercise each day, eat a healthy diet, and avoid sugar and saturated fat not smoke tobacco.

## 2. Aims and Objectives

The aim of the study is to investigate the level of knowledge that young adults in Australia have about type 2 DM. The study aims to identify areas where there is a knowledge deficit among this demographic, such as understanding risk factors, prevention, management, and complications of type 2 DM. The objective is to use the findings of this study to develop possible targeted interventions to improve knowledge and awareness of type 2 DM among young adults in Australia.

## 3. Materials and Methods

The study employed a cross-sectional study to investigate the knowledge deficit among young Australian adults aged 18-25 regarding Type 2 DM to inform efforts to mitigate potential future health implications. The study

was conducted in the suburbs of Sydney, Australia, with a sample size of 108 participants.

Data collection involved the distribution of a self-completed questionnaire through Rotary members. The questionnaire consisted of a combination of closed-ended questions and multiple-choice questions, administered via an online survey. Questions were focused on general knowledge, knowledge of risk factors, knowledge of symptoms, knowledge on complications and knowledge about lifestyle modifications.

The questionnaire consisted of 15 questions, of which 10 had yes or no options. Of the responses if the participants had gotten 8 or more questions correct out of 10, then they were deemed to have a good knowledge of DM and I gave them a score of 1. Otherwise, they got a score of zero.

## 4. Statistical Analysis and Results

A total of 108 participants, 38 men and 70 women, aged between 18 -25 were questioned in the study. The skew towards female participants in the sample was due to the random nature of the selective process. To overcome any bias the analysis was done on the basis of percentages- percentage of males who were knowledgeable and females who were knowledgeable.

Table 1 the comparison of male and female knowledge about type 2DM in which it was observed that 46 (65.7%) of female study participants stated that type 2 DM is a genetic disease, p- value was 0.28. In Table 1 it was noted that the comparison of male and female knowledge about type 2DM in which, 57 (81.4%) of female study participants stated that high blood pressure is a risk factor for DM as compared to the male participants 28 (73.7%). P-value was found to be insignificant.

Table 2, demonstrates the comparison of male and female knowledge about type 2DM in which it was observed that the percentage of female study participants 50 (71.4%) was higher who thought that the type 2 DM can be prevented or managed through lifestyle changes such as healthy eating patterns and exercise as compared to the percentage of male participants 17 (44.7%) and the p-value show a significant result. Whilst Table 1, showed the comparison of male and female knowledge about type 2DM in which the percentage of female study participants 62(88.6%) was higher, who thought that the untreated type 2 DM led to increased sugar in the blood as compared to the percentage of male participants 29 (76.3%) and the p-value shows an insignificant result.

Table 3 indicate the comparison of male and female knowledge about type 2DM, in which it was observed that the percentage of female study participants 63(90%) was higher who thought that the obesity led to type 2 DM as compared to the percentage of male participants 35(92.1%) and the p-value shows an insignificant result. Table number 6displays the comparison of male and female

Table 1: Diabetes Questionnaire

Table Number	Question	Gender	I don't know	No	Yes	P-value	Observations
One	Is type 2 DM genetic? (i.e., if your parents have type 2 DM, are you likely to develop type 2DM)	Female	6 (8.6%)	18 (25.7%)	46 (65.7%)	0.248	46 (65.7%) of female study participants believe type 2 DM is a genetic disease.
Two	Is high blood pressure a risk factor for DM?	Male	6 (15.8%)	13 (34.2%)	19 (50%)		
		Female	3 (4.3%)	10 (14.3%)	57 (81.4%)	0.426	57 (81.4%) of female study participants believe high blood pressure is a risk factor for DM, but the p-value was insignificant.
		Male	4 (10.5%)	6 (15.8%)	28 (73.7%)		
Three	Which type of DM can be prevented or managed through lifestyle changes such as healthy eating and exercise?	Female	4 (5.7%)	16 (22.9%)	50 (71.4%)	0.019	Female study participants were more likely to believe that type 2 DM can be prevented or managed through lifestyle changes. The p-value was significant.
Four	Can untreated type 2 DM lead to increased sugar in the blood?	Male	6 (15.8%)	15 (39.5%)	17 (44.7%)		
		Female	2 (2.9%)	6 (8.6%)	62 (88.6%)	0.229	Female participants were more likely to believe that untreated type 2 DM caused increased sugar in the blood than male participants, but the p-value was insignificant.
Five	Can obesity lead to type 2 DM?	Male	3 (7.9%)	6 (15.8%)	29 (76.3%)		
		Female	3 (4.3%)	4 (5.7%)	63 (90%)	0.402	Female participants were more likely to believe that obesity caused type 2 DM than male participants, but the p-value was insignificant.
Six	Is there is more than one type of DM?	Male	0 (0.0%)	3 (7.9%)	35 (92.1%)		
		Female	1 (1.4%)	7 (10%)	62 (88.6%)	0.213	Female study participants were more likely to think there is more than one type of DM, but the p-value was insignificant.
Seven	Are smoking and alcohol risk factors for type 2 DM?	Male	2 (5.3%)	7 (18.4%)	29 (76.3%)		
		Female	5 (7.1%)	11 (15.7%)	54 (77.1%)	0.045	Female study participants were more likely to know that smoking and alcohol were risk factors for type 2 DM. The p-value was significant.
		Male	2 (5.3%)	14 (36.8%)	22 (57.9%)		
Eight	Which ethnicity is at the highest risk for type 2 DM in Australia?	Aboriginal and Torres Strait Islander	4				
		African	7				
		Asian	19				
		I don't know	6				
		Indian	3				
		Middle Eastern	12				
		White/Caucasian	108				
		Total					
			Frequencies			Percentages	
			57			52.8%	
						3.7%	
						6.5%	
						17.6%	
						5.6%	
						2.8%	
						11.1%	
						100.0%	

**Table 2:**

Your assistance with this survey would make a big difference in the future management of diabetes. It takes about 3 minutes to complete this anonymous survey.

Only fill this out if you:

- are between the age of 18 and 25
- are currently living in Australia

Questions	Instructions	Pre-determined response options			
1. Gender	Mark only one oval.	(=) Male	(=) Female	(=) Prefer not to say	
2. Aboriginal or Torres Strait Islander	Tick all that apply.	(=) Yes	(=) No		
3. Educational Level	Mark only one oval.	(=) High school	(=) Under graduate	(=) Diploma	
4. Are smoking and alcohol risk factors for type 2 diabetes?	Mark only one oval.	(=) Post graduate	(=) None of the above	(=) I don't know	
5. What age group is most affected by diabetes?	Mark only one oval.	(=) Yes	(=) No	(=) I don't know	
6. Is there is more than one type of diabetes?	Mark only one oval.	(=) under 25	(=) 25-45 years of age	(=) 45-65 years of age	
7. Can obesity lead to type 2 diabetes?	Mark only one oval.	(=) 65 years and older	(=) I don't know		
8. Can untreated type 2 diabetes lead to increased sugar in the blood?	Mark only one oval.	(=) Yes	(=) No	(=) I don't know	
9. Which ethnicity is at the highest risk for type 2 diabetes in Australia?	Mark only one oval.	(=) Yes	(=) No	(=) I don't know	
10. How much aerobic exercise (aka cardio) can reduce diabetes?	Mark only one oval.	(=) White/Caucasian	(=) Aboriginal and Torres Strait islander	(=) Asian	(=) Middle Eastern
11. Which type of diabetes can be prevented or managed through lifestyle changes such as healthy eating and exercise?	Mark only one oval.	(=) African	(=) Indian	(=) I don't know	
12. Is high blood pressure a risk factor for diabetes?	Mark only one oval.	(=) at least 2.5 hours a day	(=) at least 2.5 hours a week	(=) at least 7 hours a week	(=) I don't know
13. Is type 2 diabetes genetic? (ie. If your parents have type 2 diabetes, you are likely to develop type 2 diabetes)	Mark only one oval.	(=) Type 1 Diabetes	(=) Type 1 Diabetes	(=) I don't know	
14. Can diabetes cause complications such as delayed wound healing, brittle bones, kidney failure and nerve problems?	Mark only one oval.	(=) Yes	(=) No	(=) I don't know	
15. Can diabetes cause heart attack and stroke?	Mark only one oval.	(=) Yes	(=) No	(=) I don't know	
16. Can stress can increase a person's blood glucose levels?	Mark only one oval.	(=) Yes	(=) No	(=) I don't know	
17. Are excessive thirst, extreme hunger, urinating a lot, blurred vision and weight loss some of the symptoms of diabetes?	Mark only one oval.	(=) Yes	(=) No	(=) I don't know	

Table 3:

Type	Are smoking and alcohol risk factors for type 2 diabetes?	Is there is more than one type of diabetes?	Can obesity lead to type 2 diabetes?	Can untreated type 2 diabetes lead to increased sugar in the blood?	Is high blood pressure a risk factor for diabetes?	Is type 2 diabetes genetic? (I.e. If your parents have type 2 diabetes, you are likely to develop type 2 diabetes)	Can diabetes cause complications such as delayed wound healing, brittle bones, kidney failure and nerve problems?	Can diabetes cause heart attack and stroke?	Can stress can increase a person's blood glucose levels?	Are excessive thirst, extreme hunger, urinating a lot, blurred vision and weight loss some of the symptoms of diabetes?
Male Yes	22	29	35	29	28	19	24	28	23	30
Female Yes	54	62	63	62	57	46	55	55	50	60
Total Yes	76	91	98	91	85	65	79	83	73	90
Male NO	16	9	3	9	10	19	14	10	15	8
Female NO	16	8	7	8	13	24	15	15	20	10
Total NO	32	17	10	17	23	43	29	25	35	18
Male YES %	58%	76%	92%	76%	74%	50%	63%	74%	61%	79%
Female YES %	77%	89%	90%	89%	81%	66%	79%	79%	71%	86%
Total YES %	70%	84%	91%	84%	79%	60%	73%	77%	68%	83%

108 High School students were asked about their knowledge on factors that cause diabetes. This population included 38 males & 70 females.

knowledge about type 2DM in which it was observed that the percentage of female study participants 62 (88.6%) was higher who thought that there is more than one type of DM as compared to the percentage of male participants 29(76.3%) and the p-value shows an insignificant result.

Table 3 shows the comparison of male and female knowledge about type 2DM in which it was observed that the percentage of female study participants 54(77.1%) was higher who thought that smoking and alcohol risk factors for type 2 DM as compared to the percentage of male participants 22(57.9%) and the p-value shows significant result. In Table 1 it highlights high incidence of type 2DM amongst the Aboriginal and Torres Strait Islanders.

Data analysis was done using the IBM SPSS v 23.0 and yielded a p value of 0.0244.

The study was approved by the Oceania University of Medicine Ethic Committee approval number- 20-0424VF.

## 5. Discussion

In terms of previous studies examining awareness of risk factors for type 2DM by Al Husiani & Mustafa<sup>3</sup> carried out a cross sectional study in Kuwait in the age group between 15 to 20. They discovered that the young people had good general information about diabetes except for a few areas. However, this preliminary study found that was not the case amongst Australian young adults. On the other hand, 91% of those surveyed correctly identified being overweight or obese as a risk factor for type 2DM, while 79% identified high blood pressure as a risk factor. This study also concluded that female study participants were more likely to believe that type 2 diabetes can be prevented or managed through lifestyle changes, with a significantly higher p-value than male participants, suggesting a knowledge disparity within the sexes.

Hossain et al<sup>6</sup> examined the awareness of risk factors for type 2 DM among people with pre-DM in rural Australia and found that while most participants were aware of the importance of diet and physical activity in preventing type 2DM, many were not aware of other important risk factors, such as family history, ethnicity, and age. However, this study found that 60% of participants were aware of the genetic factor but the study was not conducted in a rural setting.

In addition to smoking, excessive alcohol consumption has also been linked to the development of type 2DM. A study by Knott et al<sup>7</sup> found that heavy alcohol consumption was associated with an increased risk of type 2 DM, independent of other risk factors such as obesity and smoking. This study identified 70% of the young Australian adults identified smoking & alcohol as risk factors, this is a significant finding as the adolescents were able to relate type 2DM to these risk factors. This is supported by Meads et al.<sup>8</sup> who discovered that most Australian adults were aware of the link between smoking and type 2DM.

The outcome of this study is relevant to clinical practice, as clinicians can employ brief opportunistic interventions to encourage adolescents to improve their health behaviors. Early intervention, especially at the adolescent stage by advocating for lifestyle would help lower the burden of disease. This could be done as early as making adolescents aware of type 2DM in high schools.<sup>9,10</sup> Results of this study could also benefit the community, particularly considering the significant number of young Australian adults in an 'obesogenic' environment, which, combined with other risk factors, substantially increases the risk of diabetes and related diseases.<sup>11</sup>

An extended goal is to alleviate the burden of diabetes in Australia and reduce the healthcare costs. In 2018, the economic cost of diabetes was estimated at \$14 billion, encompassing direct healthcare costs and indirect costs such as reduced productivity, absenteeism, early retirement, and premature death, with costs being notably higher for people with diabetes complications.<sup>12</sup>

There are certain limitations associated with this study, which require careful consideration. One such limitation pertains to generalizability, for example, study only interviewed Rotarians also the sample size may be inadequate to reflect the true representation of the entire Australian youth. As such, the results are not applicable to other regions or populations with varying demographics, socioeconomic statuses, or cultural backgrounds.

Further, the age group surveyed has a wide interval between 18 to 25, the future studies should concentrate on narrowing to a specific age group.

Moreover, this study was conducted in a suburban area of Sydney, which raises questions regarding the representativeness of the sample and its applicability to other parts of Australia. It is worth noting that the prevalence of certain health conditions such as type 2DM can vary significantly across different regions and ethnic groups in Australia, with Aboriginal and Torres Strait Islander people being more than three times as likely as non-Indigenous people to have type 2DM according to the Australian Bureau of Statistics. Efforts to reduce the high prevalence of type 2DM among Indigenous Australians require a multifaceted approach that addresses both the social determinants and genetic factors that contribute to the development of type 2DM. Improved access to healthy food options, education and awareness programs, and culturally appropriate healthcare services are essential to prevent and manage type 2DM among Indigenous Australians.<sup>13</sup>

Another potential limitation to consider is that the study offered insights specific to a particular community or locality, potentially not reflecting the experiences and perspectives of youth from other parts of the country. Furthermore, the author feels that a longitudinal study would identify changes in the characteristics of the given population. It is imperative to acknowledge and address

these limitations appropriately to ensure the validity and reliability of the study's results.

## 6. Conclusion

This study suggests that there is a deficit in knowledge amongst Australian adolescents about type 2DM. Further, the study found that there is a statistically significant difference in the knowledge about diabetes factors between the sexes, female participants were found to be more knowledgeable than their male counterparts.

## 7. Source of Funding

None.

## 8. Conflict of Interest

None.

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