Prevention Of Type 2 Diabetes Mellitus Among Adolescents In Ternate City, Indonesia

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ABSTRACT

Complication of diabetes mellitus cause death. The death rate due to complication of diabetes mellitus was the third highest in Indonesia. Meanwhile, based on the data in 2009, people with type 2 diabetes mellitus (T2DM) in Kota Ternate was the third highest across Indonesia. In order to prevent an increase in T2DM sufferers, several strategies are needed, including prevention from an early age including in adolescents. The research aims to evaluate T2DM-related Knowledge, Attitudes, and Practices (KAP) of the adolescents in Ternate city, in order to obtain data as an illustration that can be utilized in the management of T2DM. The research design was a cross sectional study. The study population was 22,653 adolescents aged 15-19 years, with a sample of 394 adolescents. Data were obtained using a questionnaire to measure the level of KAP about diabetes mellitus, risk factors and diabetes mellitus prevention. Statistical data analysis using descriptive analysis. The conclusion obtained by the analysis of the answers to each KPA question. The results showed the majority of respondents were 15 years of age (32.5%), the dominant gender is female (59.9%), education is being taken is Senior High School (53.6%). The highest respondent's knowledge level was in good category (53.8%), the attitude of the most respondents was in good category (72.6%), while the prevention practice of T2DM was also in good category (76.4%). Even though KAP shows good results, there was still many questions and statements that were answered incorrectly by respondents. Therefore, it is suggested that more in-depth educational programs in order to be propagated, especially for adolescents, since education is one of the five pillars of containment procedures T2DM.

Keywords : adolescent, knowledge-attitude-practices, prevention, type 2 diabetes mellitus.

INTRODUCTION

Prevalence of type 2 diabetes mellitus (T2DM) has increased over the last few years. WHO states that around 422 million of the world's population suffer from T2DM and most of them live in low-and-middle income countries (Mansour, 2020). The number of deaths also reached 1.6 million per year. The prevalence of T2DM was estimated to increase with increasing age of the population to 19.9% or 111.2 million people aged 65-79 years. This figure is predicted to continue increasing to reach 578 million in 2030 and 700 million in 2045 (Saeedi et al., 2019; Xu et al., 2020). Meanwhile, Indonesia was ranked seventh among the ten countries with the highest number of patients in the amount of 10.7 million. By 2030, it is estimated there will be people with T2DM in

reached 21.3 million and occupy the fourth position in the word (Kementerian Kesehatan RI, 2020).

The Basic Health Research by the Ministry of Health in 2018, T2DM sufferers have increased the national average from the previous 1.5% to 2.0%. This increase was accompanied by an increase in the incidence of diabetes at the age of 25-34 years with 0.2% or 153,316 people. Patients aged 25-34 years are patients where this age should be of productive age.Maluku Utara province including reportedly increased the number of patients with T2DM from the previous 1.2% to 1.5% (Kemenkes RI, 2019). The key to reducing and controlling T2DM is to take early precautions. Adolescent health behavior today will affect the level of their health during adulthood and old age.

Adolescence is a period of preparation for adulthood which will pass several important stages in life, such as physical and sexual maturity, mindset, identity development, development of social and economic independence, and nutritional improvement (Sarwono, 2012). The description of the lifestyle of adolescents today tends to be at risk of suffering from T2DM later in live. As many as 87% of adolescents like to eat fast food and junk food (Silalahi, 2019), eating snack that are low in fiber, and also coupled with irregular physical activity (Irdianty, Sudargo, & Hakimi, 2016).Some studies reported that the risk factors for T2DM in adolescents include being overweight, obesity, inadequate and irregular physical activity, poor nutrition, and a history of diabetes in the family (Zappas and Granger, 2017; Akseer et al., 2020; Temneanu, Trandafir, & Purcarea, 2016).

A good health status prepared since adolescents and healthy behaviors when youth will greatly help prevent the onset of non-communicable diseases from an early, including T2DM. Conversely, unhealthy behaviors that began in adolescence can cause problems both physical and psychological health in later live (Kim, 2018). Many studies report a connection between healthy behaviors with T2DM incidence. Healthy behaviors in controlling and preventing of T2DM, among others, is to avoid sedentary life style, overeating, insufficient physical activity (Luo et al., 2018). A healthy behavior should also be based on the knowledge, attitude, and practice (KAP) that underlie a person in an attempt to prevent the disease. KAP of a person tends to generate awareness for healthy behaviors. KAP is important to establish a behavior in the prevention of T2DM.Health behaviors that are based on good knowledge, awareness and positive attitudes will be lasting compare to behaviors that are not based on knowledge (Notoatmodjo, 2012).

A study conducted in Hail Region, Saudi Arabia by Aljofan, Altebainawi, & Alrashidi, 2019)with KAP variables regarding diabetes and risk factor as well as the management of diabetes found that KAP was significantly related to treatment outputs.The result also consistent with a study conducted by Larasati, Andayani, and Kristina, 2019 who reported that there was influences patients' knowledged in two health centers in Yogyakarta to the assessment of the patient's clinical

condition.Other KAP study also conducted on Students University in Saudi Arabia by (Gazzaz, 2020). A total of 23.4% of citizens of Saudi Arabia suffer from T2DM so that researcher mention that early awareness is needed to prevent an increase in the prevalence of T2DM. In addition, the prevalence of obesity in children and adolescents is also high in Saudi Arabia, so it is necessary to conduct a research on adolescents to measure the level of KAP-related T2DM.

A study on evaluation of the diabetes-related KAP in Pakistan population has been conducted by Gillani et al., 2018). The result showed that respondents' knowledge was still low on risk factors and management of diabetes mellitus. It required the intervention in the form of educational programs that focused on adolescents to increase their information about diabetes mellitus. In general, the knowledge about prevention, treatment and management of diabetes mellitus remains low in developing countries (Gillani et al., 2018; Larasati, Andayani, dan Kristina, 2019). Identify the level of KAP related diabetes mellitus in the community is important as a strategy to prevent an increase in the prevalence of T2DM (Herath et al., 2017).The KAP study conducted by Herath et al. (2017) found that the level of knowledge about diabetes mellitus in Galle District in Southern Sri Lanka was quite good, but there was a gap between attitudes and practices towards diabetes mellitus prevention, which the level of attitudes and practices was still low. The way to prevent T2DM are to limit sugar intake, regular physical activity, and check blood sugar regularly.The research data was used a baseline for diabetes mellitus prevention through educational campaigns for diabetes mellitus awareness (Herath et al., 2017).

To the best of our knowledge until recently, very few studies have been conducted in Indonesiaabout KAP in order to prevention of T2DM.Likewise, especially in the City of Ternate there has been no research on which to evaluate the level of KAP on adolescents. Therefore, this study aimed to evaluate KAP among adolescent's population towards prevention of T2DM. The results of this study contribute to the utilization of research data as a baseline in developing the management of T2DM especially on adolescents inorder to assess their needs for further educational interventions or strategies in preventing T2DM.

METHODS

The study was designed using a cross sectional study and it conducted in adolescents community during Juli to November 2020. The population size were 22,653 adolescents aged 15-19 years who live in the city of Ternate based on data from the Central Bureau of Statistics of Ternate city in 2018 (Badan Pusat Statistik Kota Ternate, 2019). The number of samples as respondents was calculated using the Slovin formula and the respondents obtained were 394 people. Furthermore, the respondents were selected by purposive sampling. Face-to-face interviews were conducted on respondents who were met at crowded places visited by adolescents, such as malls, cafes, schools, and universities. Because the study was conducted during the pandemic covid-19, respondents were

also asked to fill out a questionnaire to those who were willing to fill out the questionnaire online though the website that prepared previously.

The questionnaire used in this study was develop to evaluate the KAP on adolesents. The questionnaire consist of four sections, the first section contain demographic data, including age, gender, and current education. The second section contain five questions about knowledge in T2DM prevention. Furthermore, the third section contain six statements about attitudes towards T2DM prevention, and lastly the fourth section contain six statements about practice in the prevention of T2DM.

The univariate descriptive statistics include data on the frequency were applied to demographic data and the score of KAP respondents were used in data processing. The Statistical Package for Social Sciences (SPSS) and Microsoft excel spreatsheet were used to analyze the data.

RESULTS AND DISCUSSION

Diabetes mellitus is a non-communicable disease and it is becoming a global health problem (Aljofan et al., 2019; Gillani et al., 2018). Some studies explain that the prevalence of T2DM associated with several risk factors. The risk factors are classified into socio-demographic factors, behavioral and lifestyle factors as well as clinical conditions or mental status. Socio-demographic factors include age and gender, while behavioral factors include lifestyle such as diet, smoking, drinking alcohol, and physical activity (Khan et al., 2019; Simbolon, Siregar, & Talib, 2020). Lack of good health behaviors since adolescencecan affect the level ofhealth in old age. The number of young people in Indonesia are also at great risk of suffering from disease including T2DM if the quality of health of adolescents not prepare early (Silalahi, 2019). Basic Health Research by the Ministry of Health of the Republic of Indonesia in 2013 reported that the proportion of T2DM has been detected at the age of 15 years and over (Pulungan, Afifa, & Annisa, 2018; Sugiarta & Darmita, 2020), so that the necessary precautions at an early age to prevent T2DM. With these considerations, it is necessary to conduct research on adolescents in order to obtain data as a basis for controlling problems associated with T2DM. It is intended that the data obtained is used to make diabetes prevention management policies from an early age.

Out of 394 total adolescents, 59.9% were female and 40.1% were male, most respondents age were 15 years (32.5%) and highest level of education was a Senior High School (53.6%) as shown in Table 1.

Table 1. Socio-demographic characteristics of respondents (n=394).

	Frequency	Percentage (%)
Sex		
Male	158	40.1
Female	236	59.9
Age in years		
15	128	32.5
16	68	17.3
17	81	20.6
18	65	16.5
19	52	13.2
Education level		
Junior High School	79	20.1
Senior High School	211	53.6
Student of University	96	24.4
Others	8	2.0
Access to information on diabetes mellitus prevention		
Printing media (books, newspapers, magazines, posters, billboards and others	158	40.1
Electronic media (television, radio, social media, websites)	236	59.9

The first part of the questionnaire was completed with questions to respondents how they access information about diabetes mellitus. This question was intended to determine the type of promotional media that was widely accessed by adolescents, in order to obtain information about health promotion media load on the prevention of T2DM. The results of this study indicate that adolescents in the city of Ternate access to information about T2DM prevention mostlythrough electronic media (59.9%).

T2DM control and prevention are partially influenced by the individual's Knowledge, Attitude and Practice (KAP) toward the disease (Aljofan et al., 2019; Wolde et al., 2017). Table 2 shows the results of measuring the level of knowledge, attitudes and practices in the prevention of T2DM in adolescents in Ternate City.Most of the respondents had knowledge about prevention of T2DM in the good category (53.8%), although the respondents who had less knowledge were almost as much (46.2%).

Table 2. Descriptive statistic of respondents' Knowledge, Attitudes, and Practices(n=394).

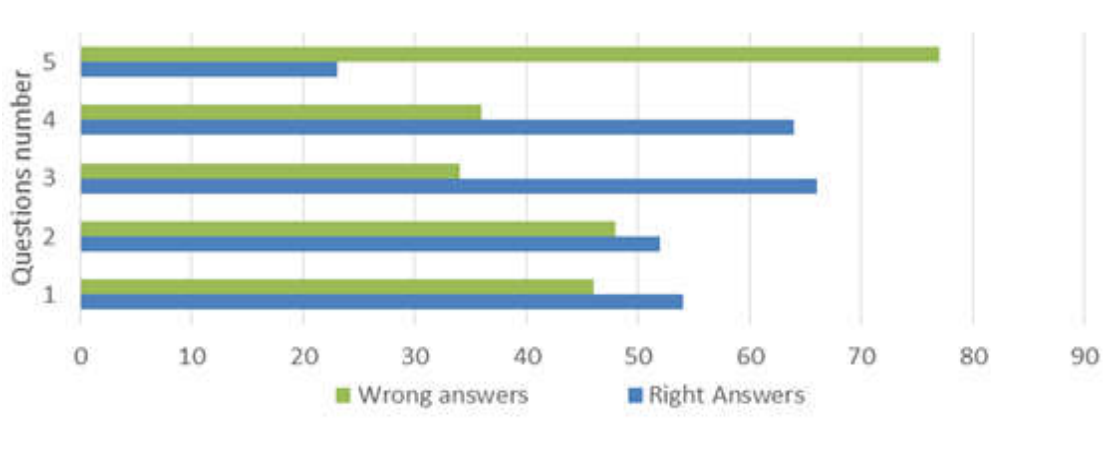| Variables	Frequency	Percentage (%)
Knowledge		
Good	212	53.8
Less	182	46.2
Attitude		
Good	286	72.6
Less	108	27.4
Practice		
Good	301	76.4
Less	93	23.6

Figure 1 summarizesthe respondents' answer from the questions about knowledge of T2DM. As seen in figure 1, on the variable knowledge, there were five questions that include, the definition of T2DM, risk factors and prevention of T2DM, and controlling of blood sugar. The question getting the most number of correct answers was question number 3 with the number of respondents who answered correctly as many as 261 respondents (66.2%). The question number 3 was about the risk factors of T2DM. T2DM may occur due to several risk factors, among others obesity, unhealthy dietary habits, sedentary lifestyle and genetic factors are considered as important risk factors in the development of T2DM (Galaviz et al., 2018; Granger, 2017; Mansour, 2020).

Meanwhile, the question with the least number of correct answers was question number 5. Most of the respondents (77.4%) answered incorrectly for question number 5, namely whether T2DM can be prevented by controlling blood sugar properly. Only 89 respondents (22.6%) answered correctly to question number 5. T2DM is a chronic disease and requires controlling blood sugar levels through management therapy and self-care so that blood sugar levels can be stable (Larasati, Andayani, & Kristina, 2019). The level of knowledge can affect a person's behavior, including behavior in maintaining health. Knowledge is the result of knowing and this occurs after people sensing a certain object. Knowledge or cognitive is a very important domain for the

formation of one's actions (Notoatmodjo, 2012). Even though the respondent's level of knowledge were good, there must still be an emphasis on more knowledge at the age of adolescents, so that adolescents will be very aware of early detection and diagnosis of T2DM.

Measurement respondent's attitude showed a good category (72.6%), but there were still respondents with less attitudes (27.4%) as shown in table 2. Furthermore, the analysis of attitude variable which consisted of 6 statement items were summarized in table 3. The attitude statements related to risk factors and prevention of T2DM.

Table 3. Analysis of respondents' answers to attitude variable

Attitude statements	Respondents' answer							
	strongly agree	%	agree	%	disagree	%	strongly disagree	%
A1	168	42.6	92	23.4	100	25.4	34	8.6
A2	62	15.7	114	28.9	179	45.4	39	9.9
A3	188	47.7	146	37.1	47	11.9	13	3.3
A4	94	23.9	145	36.8	128	32.5	27	6.9
A5	142	36.0	81	20.0	152	38.6	19	4.8
A6	115	29.2	143	36.3	111	28.2	25	6.3

A1-A6 is a code of six attitude statements

Although in general the respondents' attitude toward the prevention of T2DM was good, there was still the wrong attitudes of respondents. For example, as many as 168 respondents (42.6%) strongly agree that T2DM is an infectious disease, so they should not eat and drink with people who suffering T2DM. T2DM is not a contagious disease but a non-communicable disease (Pulungan, Afifa, & Annisa, 2018; Arnold, 2020; Simbolon, Siregar, & Talib, 2020).Another wrong attitude was 36.8% of respondents agree that frequent consumption of sweet foods had no impact on T2DM. The fact is often eating sweet foods contribute to weight gain doubled, which can lead to obesity(Stanhope, 2016; Irdianty, Sudargo, & Hakimi, 2016)and obesity can increase the risk of T2DM (Arnold, 2020; Gillani et al., 2018; Herath et al., 2017; Tino et al., 2020).

Attitude is a response to someone who is still closed to a stimulus or object. Attitude is also defined as the tendency of a person to act in the form of a closed response to an object, so the attitude is not an act or activity, but predisposes a behavior action. A person's attitude is influenced by the stimulus of factors, such as the influence of other people, culture and environment (Notoatmodjo, 2012). Good attitude of adolescents that have been formed in the beginning is expected to be early to form awareness of them for the prevention of T2DM.

As many as 76.4% of adolescent in Ternate City practiced prevention of T2DM in good category as shown in Table 2. Furthermore, the analysis of the practice of preventing T2DM is summarized in Figure 2.
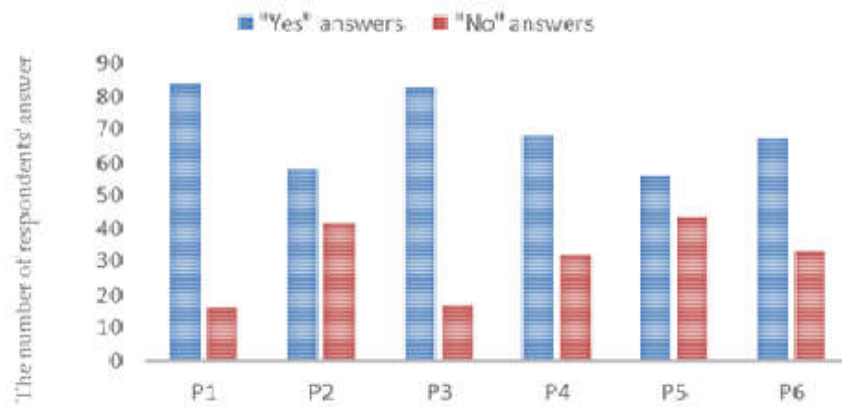
Respondents practiced preventing T2DM by exercising diligently (84.3%) and continuing to do physical activity even though they were at home (82.7%). The practice of reducing the consumption of sweet foods to prevent T2DM was only 58.1%. Diligent exercise, physical activity and reduce the consumption of sweet foods is a healthy lifestyle. Lifestyle modification, physical activity and healthy dietary consumption can delay or prevent T2DM (Galaviz et al., 2018; Gillani et al., 2018; Herath et al., 2017; Uusitupa et al., 2019). Modern lifestyle today include physical inactivity and long sedentary periods requires community-based interventions to reach individuals, families, and also adolescents through campaigns, education, social marketing and encouraging physical activity both inside and outside of schools and workplaces (Kumar & Preetha, 2012; Machado et al., 2016). Likewise, often consuming sweet foods can indirectly increase weight gain which leads to obesity, as it is known, that obesity can cause insulin resistance and increase the risk of T2DM (Stanhope, 2016; Mansour, 2020).

Preventing the occurrence of T2DM and its complications are important in the phases of life including early life and in adolescence phase(Temneanu, Trandafir, & Purcarea, 2016). For example, in adolescence when eating habits and physical activity are implemented and when the term energy balance is programmed, it can prevent weight development which is a risk factor for T2DM(Sami et al., 2017). Besides a healthy lifestyle can also improve the health status into the next life. For prevention since the beginning of the necessary knowledge, attitudes and actions that have relevance and interplay among the three in preventing the development of type 2 diabetes (Kassahun et al., 2016)included in adolescence. For prevention early on, then the necessary knowledge, attitudes and practices that have relevance and interplay among the three in preventing the development of T2DM (Sami et al., 2017). The level of knowledge can influence a person's attitude and actions in maintaining and improving the health status (Herath et al., 2017; Mamady, 2016).

In general terms, there are two risk factors for T2DM, namely non-modifiable factors and modifiable factors. Factors that cannot be modified include gender and age, while factors that can be modified include lifestyle and KAP. Old age is a risk factor for T2DM that cannot be modified, but there is an epidemic of T2DM in children and adolescents which significantly increases along

with obesity cases with also increase in them (Wu et al., 2014). For this reason, a strategy is needed to improve lifestyle of adolescents through health behavior change better. Modifiable risk factors can be done early by enforcing education since adolescence.UNICEF stated that prevention of non-communicable diseases including T2DM can be done with a human life cycle-based approach, including its intervention with adolescent population (Brumana et al., 2017) in order to prevent an increase of T2DM. Health promotion in certain environments such as schools, workplaces and homes can contribute to better health for everyone. T2DM has an impact both on the quality of the human resources and increased health care costs significantly. For this reason, all parties, both the community and the government, must participate in the prevention of T2DM, especially in prevention efforts (Soelistijo et al., 2019).

CONCLUSION

A cross-sectional study of adolescents in the city of Ternate showed that the level of Knowledge, Attitudes and Practices (KAP) for the prevention of T2DM was in good category with the percentage of 53.8%, 72.6% and 76.4% respectively. However, from the results of the analysis of the questions, it was known that most of the adolescents still shown mistakes with KAP in terms of lifestyle, including issues of physical activity and consumption of healthy foods. Given the tendency of increasing prevalence of T2DM sufferers to increase, the management of T2DM should be carried out in the early phases of human development including in the adolescent phase.

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