

EARLY DETECTION AND PREVENTION EDUCATION OF DIABETES MELLITUS IN STUDENTS OF SMA NEGERI 1 SAMUDERA, NORTH ACEH REGENCY

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ABSTRACT Diabetes mellitus is a metabolic disorder characterized by excessive eating, drinking, and urination. This disease is primarily caused by unhealthy lifestyle habits. Adolescents are particularly vulnerable to unhealthy diets and infrequent physical activity, which makes them prone to developing diabetes mellitus. The purpose of this community service activity is to identify diabetes mellitus (DM) at an early stage and to increase students' awareness about preventing the onset of DM at a young age. The target of this activity was the students of SMA Negeri 1 Samudera, North Aceh Regency, totaling 216 students. The method used in this activity was to perform blood sugar tests on students who were willing, and the test results showed that the participants' blood sugar levels were still within normal limits. Afterward, education on DM prevention was provided. The activity ran smoothly, and the students understood the material presented, as evidenced by the evaluation results, which showed that the majority of students had a good to very good level of knowledge regarding DM prevention. The expected outcome is an increase in knowledge and a shift in adolescent behavior toward a healthier lifestyle. The target output is the publication of the community service results in a SINTA-accredited journal (SINTA 1-6).

KEYWORDS: *Prevention of Diabetes Mellitus.*

1. INTRODUCTION

Diabetes Mellitus (DM) is a degenerative disease and one of the non-communicable diseases that has become one of the biggest global health emergencies in the 21st century. To this day, many countries remain unaware of the potential impact of diabetes mellitus (Dewi, et.al, 2020). This disease is one of the fastest-growing diseases in the world and ranks fourth in national research priorities, having affected more than 425 million people worldwide. Indonesia ranks fifth among the 10 countries with the highest number of adult DM sufferers in the world.

Diabetes mellitus is a non-communicable disease that poses a serious health threat both nationally and globally, with its prevalence increasing in both developed and developing countries. Non-communicable diseases are responsible for nearly 70% of deaths worldwide. In addition to causing fatalities, this disease can also lead to disabilities and long-term health conditions (Laili, et.al, 2023). Diabetes mellitus is not only suffered by young adults and the elderly, but also affects adolescents. According to the International Diabetes Federation (IDF), countries in the North Africa-Arab region and the Western Pacific region rank first and second in terms of the highest prevalence of diabetes among populations aged 20-79 years, with prevalence rates of 12.2% and 11.4%, respectively. Southeast Asia, where Indonesia is located, ranks third among countries with a prevalence of 118.4 million, 77 million, and 31 million people suffering from diabetes (Siregar, et.al, 2023).

The rapid increase in the prevalence of diabetes mellitus is also driven by several risk factors, such as a sedentary lifestyle, unhealthy eating habits, obesity, alcohol consumption, genetics, and smoking. Diabetes mellitus can be caused by two factors: modifiable and non-modifiable factors. Modifiable factors include daily habits related to diet, rest patterns, physical activity, and stress management. Non-modifiable factors include age, gender, and a family history of diabetes (2). Nowadays, the number of diabetes sufferers among children, adolescents, and young adults is also on the rise. Adolescents today tend to have irregular lifestyles, which increases the risk of developing diabetes in the future. This is linked to unhealthy eating habits, with adolescents generally preferring to consume fast food. A study in Sidoarjo by Andini and Awalia (2018) found that 58% of adolescents were diagnosed with prediabetes and 87% were fond of consuming fast food and junk food (Widyastuti, et.al, 2022).

The International Diabetes Federation (IDF) in 2017 reported that the prevalence of diabetes among children and adolescents in the United States in 2015 was estimated at 7.2% of the total child and adolescent population, with 132,000 children under 18 years old and 193,000 children under 20 years old affected (Center for Disease Control and Prevention, 2017). In Indonesia, according to the diagnosis by doctors, there were 159,014 diabetes mellitus sufferers in the age group of 15-24 years (Ministry of Health of the Republic of Indonesia, 2018).

Based on these incidence rates, it is clear that health education and awareness campaigns about diabetes are essential, especially for adolescents. Health education aims to prevent diabetes and provide positive information to adolescents so that they can maintain their health and adopt better eating habits and lifestyles (Riskawaty, 2022). Diabetes mellitus is a major burden for governments and individuals due to complications such as kidney failure, heart disease,

amputations, and blindness. Education related to blood sugar level tests, diabetes mellitus, and its complications plays a vital role in blood sugar management (Alsous, et.al, 2019).

Based on the situation analysis, the issues faced by the students of SMA Negeri 1 Samudera include: (1) The health personnel responsible for public health services have never provided education about diabetes mellitus prevention to adolescents in high schools. (2) There has been no early detection of diabetes mellitus (DM) in high school students through regular blood sugar level checks. (3) The health personnel believe that blood sugar level checks for adolescents are not necessary because DM is more commonly found in adults and the elderly. (4) The importance of blood sugar level checks and health education about DM prevention for adolescents has not been recognized, and the school has never cooperated with health service providers to promote health on this topic.

In response to these issues, the faculty from the nursing program in North Aceh and the team from the Samudera Health Center are motivated to conduct a community service project by providing information and health education about diabetes mellitus prevention for adolescents. This educational activity is expected to increase the knowledge of students and change their attitudes, particularly in adopting healthier lifestyles, including consuming nutritious food and engaging in regular physical activity.

The key issues are as follows: (1) Students' knowledge about DM prevention at a young age is still low. (2) The development of science and technology has impacted lifestyle changes, especially in sedentary behaviors. (3) Adolescents are generally unaware of the dangers of consuming unhealthy foods/junk food and its relation to high blood sugar levels. (4) The important role of community partners in increasing adolescents' knowledge through health education to prevent DM at an early stage.

2. METHOD

The target audience for this community service activity is the students of SMA Negeri 1 Samudera, North Aceh Regency. The number of students who will receive health education on diabetes mellitus prevention is 216. This community service is conducted in collaboration with SMA Negeri 1 Samudera, North Aceh Regency, and involves early detection of diabetes mellitus (DM) through blood sugar screening and providing education on DM prevention at an early age using PowerPoint presentations and booklets as media.



Figure 1. Participants (Students of SMA Negeri I Samudera) who attended the "DM Disease Prevention Education"

The characteristics of the goal can be seen in the table below:

Here is the translated version of the table and its description:

Table 4.1 Distribution of Characteristics of Participants in Diabetes Mellitus Prevention Education

No	Participant Characteristics	Number	Percentage (%)
Gender			
1	Male	58	27
2	Female	158	73
Grade			
1	Grade 1 (X)	83	38.4
2	Grade 2 (XI)	106	49.1
3	Grade 3 (XII)	27	12.5
Total		216	100

Based on the table above, it can be seen that the majority of participants in the community service activity on early detection and prevention of diabetes mellitus at a young age are female, with 158 participants (73%), while male participants total 58 (27%). The largest group of participants in the educational activity consists of students from grade 2 (XI), with 106 students (49.1%), followed by grade 1 (X) with 83 students (38.4%), and grade 3 (XII) with 27 students

(12.5%).

3. RESULT AND DISCUSSION

3.1 Result

The community service activity (pengabmas) was carried out over two days. The health education/counseling session took place on July 17, 2024, at SMA Negeri 1 Samudera, North Aceh Regency, and the post-activity evaluation was conducted on July 20, 2024. Prior to the education session, the community service team conducted a preliminary assessment on July 9, 2024. A formal request for permission to carry out the activity at SMA Negeri 1 Samudera was submitted on July 12, 2024. The post-activity evaluation was then conducted on July 20, 2024, by distributing questionnaires to homeroom teachers, who then shared a Google Form link with the students.

The implementation of this community service activity was preceded by various preparations, including the creation of banners, development of presentation materials, preparation of booklets, and the drafting of an event rundown according to assigned team roles, as shown in the table below:

Table 3.1. Educational Activities on Diabetes Mellitus Prevention.

No.	Activity	Person in Charge	Location
1.	Early detection of DM through random blood sugar testingu	Ners. Aini Yusra, M. Kep	Aula SMA Negeri 1 Samudera
2.	Opening and delivery of an introduction to early DM prevention education and government programs as part of health transformation	Ns. Syahabuddin, S.Kep., M.A./Tim	
3.	Delivery of education on preventive efforts for DM starting from an early age (adolescence)	Ners. Aini Yusra, M. Kep	
4.	Preparation of media and materials for the community service activity	Ns. Fitriani Agustina, M.Kep., Sp.Kep.MB	

The community service activity (pengabmas) began with a preliminary assessment on July 9, 2024, to collect data on the students of SMA Negeri 1 Samudera. The next step was submitting a request for permission to carry out the activity to the school administration by meeting with the Principal of SMA Negeri 1 Samudera, Mr. Zulkiram, on July 12, 2024, to discuss the suitable time for the education/counseling session with the students.

The education/counseling session took place over one day, on July 17, 2024, starting with an opening by the school principal, accompanied by the Vice Principal. The event was attended by teaching staff, educational personnel, and students from grades 1, 2, and 3, as well as the community service team, which included the event's Chairperson, Ners. Aini Yusra, Ns. Fitriani Agustina, S.Kep., Sp.Kep.M.B, Ns. Syahabuddin, and Sulaiman, S.Ag., M.A as the event members, along with students from the D-3 Nursing Program, Aceh Utara. The activity continued with the implementation of random blood sugar testing as an initial identification of diabetes mellitus in the participants.



Figure 2. Blood Sugar Check Activities

The activity continued with the delivery of introductory material on the prevention of diabetes mellitus at an early age by Mr. Ns. Syahabuddin, S.Kep., M.A. The main topic on efforts to prevent diabetes mellitus from an early age was then presented by Ners. Ainil Yusra, M.Kep.



a. Introduction to Material by Ns. Syahabuddin, S.Kep, M.A



b. Educational Activities for the Prevention of DM by Ns. Ainil Yusra, M. Kep

During the activity, the participants responded very well. This was evident as they listened attentively to the presentation and showed great enthusiasm in asking questions. The event ran smoothly as expected.

During the initial screening activity, a total of 41 participants agreed to undergo random blood glucose testing, consisting of 32 females and 9 males. This examination was conducted as an initial step to identify prediabetes or diabetes mellitus. The results of the examination can be seen in the table below.

Tabel 4.2 Blood Sugar Level Examination Results During

No	Participant's Initials	KGDS Result	Age	Information
1	Nn. N	102	15	Female Student
2	Tn. Z	131	57	Principal
3	Nn. M	90	16	Female Student
4	Nn. C. A	92	16	Female Student
5	Nn. D	86	15	Female Student
6	Nn. N	81	16	Female Student
7	Nn. N P H	90	16	Female Student
8	Ny. A	148	37	Female Student
9	Nn. I A	89	15	Female Student
10	Nn. M R	98	15	Female Student
11	Nn. F Z	101	16	Female Student
12	Nn. M	92	16	Female Student
13	Nn. R	101	16	Female Student
14	Nn. N R	115	15	Female Student
15	Ny M	111	36	Teacher
16	Nn. E	103	15	Female Student
17	Nn. Nf	97	15	Female Student
18	Nn. N	95	16	Female Student
19	Nn. F R	121	15	Female Student
20	Ny M	91	34	Teacher
21	Nn. Z S	94	15	Female Student
22	Tn Z A	107	48	Teacher
23	Tn S	116	16	Male Student
24	Tn. W S	92	15	Male Student
25	Nn. S R	99	16	Female Student
26	Nn. C P	79	16	Female Student
27	Tn R	67	44	Teacher
28	Nn. M	129	16	Female Student
29	Ny. L	92	38	Teacher
30	Ny Y	118	35	Teacher
31	Nn. S R	81	15	Female Student
32	Nn. Z	85	16	Female Student
33	Nn. A	70	16	Female Student
34	Tn. R	80	16	Male Student

No	Participant's Initials	KGDS Result	Age	Information
35	Tn E	85	17	Male Student
36	Tn, M A	70	46	Teacher
37	Ny. A	73	32	Teacher
38	Nn. A	76	16	Female Student
39	Nn. L	93	16	Female Student
40	Tn A	85	17	Male Student
41	Nn. K	94	17	Female Student

Shows that the results of the random blood glucose tests for almost all participants were still within normal limits. Only a small number of participants had low blood glucose levels, which was due to the fact that they had not had breakfast or were in a fasting state. Based on the blood glucose examination results of all the participants who agreed to be tested, there were no signs or symptoms of prediabetes or diabetes mellitus.

The evaluation results taken three days after the health education activity showed that the community service team conducted a post-test with 72 participants who completed the questionnaire via Google Form. The results can be seen in the table below.

Tabel 4.3 Distribution of Participant Characteristics at the Post Test

No	Characteristic	Sum	Persentase (%)
Gender			
1	Male	11	15
2	Female	61	85
High School Class Levels			
1	Class I	30	41,7
2	Class II	34	47,2
3	Class III	8	11,1
Family DM History			
1	Yes	18	25
2	No	54	75
Anggota Keluarga yang menderit DM			
1	Mother	5	28
2	Father	5	28
3	GrandMother	3	17
4	Grandmother	4	22
5	Uncle/aunty	1	5
6	Sister	0	
7	Brother	0	
		18	100
Information about DM			

No	Characteristic	Sum	Persentase (%)
1	Yes	22	31
2	No	50	69

Based on the table above, we can see that the results of the evaluation of participant characteristics after receiving early education on diabetes mellitus (DM) prevention show that the majority of participants were female, totaling 61 individuals or approximately 85%, while male participants totaled 11 individuals or 15%. Most of the participants were second-year students (11th grade), totaling 34 individuals (47.2%), followed by first-year students (10th grade) with 30 individuals (41.7%), and third-year students (12th grade) with 8 individuals (11.1%).

Among the 72 participants, 18 individuals (25%) were found to have a family history of diabetes mellitus (DM). The majority of these family members with a history of DM were the participants' grandfathers (22%), followed by grandmothers (17%), and uncles/aunts (5%). A total of 22 participants (31%) had previously received information about DM, while 50 participants (69%) had never received any health information about the disease.

Based on the evaluation results of the participants' knowledge/understanding levels, it was found that:

Tabel 4.4. Knowledge Distribution of SMA Negeri 1 Samudera Students After Health Education

Knowledge	Sum	Persentase (%)
Less good	3	4
Good	44	61
Excellent	25	35
Total	72	100

The data in the table above indicate that the level of knowledge among students at SMA Negeri 1 Samudera, North Aceh Regency, after receiving health education on early prevention of diabetes mellitus (DM), is quite satisfactory. The majority of students had good knowledge, totaling 41 individuals (57%), with 22 students (30.5%) having very good knowledge, and 9 students (12.5%) having less adequate knowledge.

Meanwhile, based on attitudes/behaviors, it was found that:

Tabel 4.5. Distribution of Attitudes/Behaviors of SMA Negeri 1 Samudera Students After Health Education

Knowledge	Sum	Persentase(%)
Less	1	1,4
Good	55	76,4

Excellent	16	22,2
Total	72	100

Table 4.5 shows that students' attitudes/behaviors in efforts to prevent DM disease from an early age were mostly in the good category, namely 55 people (76.4%), the very good category amounted to 16 people (22.2%) and the poor category was 1 person (1.4%).

3.2 Discussion

Based on the data on participant characteristics collected during the community service activity at SMA Negeri 1 Samudera, it was found that the majority of participants in the diabetes mellitus (DM) prevention education program were female, although some male students also participated. A total of 216 students took part in the activity, consisting of 58 males and 158 females. The number of participants was quite large, dominated by 11th-grade (class XI) students, followed by 10th-grade (class X) and 12th-grade (class XII) students. This indicates that students at SMA Negeri 1 Samudera were enthusiastic and eager to learn new and beneficial health-related knowledge.

Among all participants, 18 students (25%) reported a family history of DM. This condition could be a risk factor for developing prediabetes or diabetes if they do not adopt a healthy lifestyle early on. This is in line with research by Irwansyah and Kasim (2021), which stated that one of the unmodifiable risk factors for DM is genetics. However, genetics is no longer considered the primary risk factor; rather, an unhealthy lifestyle has become the main risk factor for developing type II diabetes (Irwansyah et al., 2021).

Further data on participant characteristics revealed that 22 students (31%) had previously received health information related to DM, while 50 students (69%) had never received such information. This shows that most students had not yet been exposed to information about diabetes. The analysis of students' knowledge levels after receiving DM prevention education showed that most students' knowledge fell into the "good" category, with 44 students (61%), while 25 students (35%) were in the "very good" category, and 3 students (4%) were in the "less adequate" category. Improved knowledge can lead to greater awareness and the formation of positive behaviors, especially in applying the information gained from health education programs (Fitriani & Kurniasari, 2022).

The analysis of students' behavior at SMA Negeri 1 Samudera after the health education program showed that the majority of students exhibited healthy behavior in the "good" category, totaling 55 students (76.4%). Those with "very good" behavior totaled 16 students (22.2%), and only 1 student (1.4%) demonstrated less healthy behavior. The success of behavior change toward a

healthy lifestyle can be achieved through comprehensive educational efforts aimed at increasing individual knowledge—especially among adolescents, who are at a critical stage for developing healthy lifestyle behaviors and improving compliance in applying such behaviors (Widijati et al., 2024).

4. CONCLUSION

After conducting the community service activity on early detection and education for the prevention of diabetes mellitus (DM) among students at SMA Negeri 1 Samudera, North Aceh Regency, it can be concluded that:

1. There was an increase in students' knowledge about the efforts that can be made to prevent DM, particularly during adolescence.
2. There was a behavioral shift toward adopting a healthy lifestyle.
3. There was an improvement in understanding the potential impacts of not implementing a healthy lifestyle.
4. Participants began to recognize the “CERDIK” program of Germas as an effort to promote the prevention of non-communicable diseases, particularly DM.

Suggestions:

1. After receiving information through education about DM prevention, it is expected that students will adopt a healthy lifestyle to prevent the onset of disease from an early age.
2. Educators are expected to motivate students and enhance the promotion of a healthy lifestyle, especially concerning healthy snacks at school, the importance of regular exercise, and the prohibition of smoking among students.

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