THE INFLUENCE OF HEALTH EDUCATION USING WORD SQUARE MEDIA ON THE KNOWLEDGE AND ATTITUDES OF ADOLESCENTS REGARDING THE RISK FACTORS OF DIABETES MELLITUS AT SMK NEGERI 1 SAMARINDA

Sri Hazanah[1], Nino Adib Chifdillah[2], Aqila Eka Rahmadhanai[3]
[1,2,3]*East Kalimantan Ministry of Health Polytechnic, Ministry of Health of the Republic of Indonesia, Indonesia*
***Corresponding Author: srihazanah@gmail.com**

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ABSTRACT:
Diabetes Mellitus is a condition in which the body, especially the pancreas, has difficulty in utilizing and producing sufficient insulin. The mortality rate of Diabetes Mellitus is caused by one of the behaviors in youth with an unhealthy lifestyle. Diabetes Mellitus does not only occur in adulthood, but can also occur in adolescence. The purpose of this study was to determine the effect of health education through Word Square media on the knowledge and attitudes of adolescents about the risk factors for Diabetes Mellitus at SMK Negeri 1 Samarinda. This study is a quantitative study using one group pretest-posttest design. The population in this study was class X with a total of 438 students. The sample used came from an affordable population, namely the Tourism Service Business Department with a total of 73 students using the Total Sampling technique. Data analysis used in both variables was the Wilcoxon test. The results of the univariate analysis showed the results of identifying students' knowledge who had a good knowledge category during the Pre-test as many as 38 students (52.1%), then during the Post-test, 61 students (83.6&) had a good knowledge category. The results of the attitude identification obtained students who had a good attitude category at the time of the Pre-test were 17 students (23.3%), then at the time of the Post-test were 54 students (74.0%). The results of the bivariate analysis showed that there was an influence before and after being given health education using word square media on the knowledge and attitudes of respondents with a knowledge ρ-value of 0.000 and an attitude ρ-value of 0.000. There is an influence of health education with word square media on the knowledge and attitudes of adolescents about the risk factors for Diabetes Mellitus at SMK Negeri 1 Samarinda.

INTRODUCTION

In 2019, Indonesia was ranked seventh highest (after China, India, the United States, Pakistan, Brazil and Mexico) in terms of the highest number of diabetes sufferers in the world. The World Health Organization (WHO) states that deaths from non-communicable diseases are expected to continue to increase throughout the world. WHO (2020) reports that 70% of deaths in the world are caused by the non-communicable disease DM (Qifti et al., 2020).

DM does not only occur in adulthood but can also occur in adolescents. WHO noted, In 2017 there were 9 million children aged <20 years suffering from type 1 diabetes and the majority of them lived in high-income countries. The number of cases and prevalence of diabetes continues to increase every year due to diabetes and there are 1.6 million deaths directly linked to diabetes itself (Fajriati&Indarwati, 2021). These deaths are associated with conditions and behavior in youth with unhealthy lifestyles (Qifti et al., 2020).

The International Diabetes Federation (IDF) organization recorded that at least 463 million people aged 20-79 years in the world suffered from diabetes in 2019 or equivalent to a prevalence rate of 9.3% of the total population of the same age (International Diabetes Federation, 2019) . Then, the prevalence of type 1 diabetes cases increases every year due to increasing incidence in many countries 7 and increasing mortality rates. In total, 1,211,900 children and adolescents under 20 years of age are estimated to have type 1 diabetes globally. It is estimated that approximately 108,200 children and adolescents under 15 years of age are diagnosed each year. This number increases to 149,500 when the age range includes those over 20 years old (Webber, 2021).

National Diabetes Statistik Report In 2017, it was reported that the prevalence of Type 2 DM in children and adolescents was increasing in several countries, although not as much as in adults and the elderly. In Brazil, the prevalence of prediabetes and type 2 DM is respectively 22.% and 3.3% of the population in Brazil where around 213,830 adolescents live with type 2 DM and 1.46 million adolescents with prediabetes (Telo et al., 2019 in Riskawaty, 2022).

In Indonesia, the incidence of non-communicable diseases continues to increase and one of them is DM. Data from the Indonesian Ministry of Health (2019) states that the percentage of non-communicable diseases reached 69.91. This shows that compared to the 2013 Riskesdas, the prevalence of non-communicable diseases has increased, and there has been an increase in the prevalence of DM cases in the population aged ≥ 15 years, namely 6.9% in 2013 and 8.5% in 2018 (Balitbangkes RI, 2018).

Based on the doctor's diagnosis, there were 159,014 DM sufferers aged 15-24 in 2017 (Ministry of Health of the Republic of Indonesia, 2018). The latest data from the Indonesian Pediatrician Association (IDAI) states that the prevalence of DM in children in Indonesia continues to increase, dominated by teenagers aged 10-12 years and children aged 5-6 years. DM cases in children reached 2 per 100,000 people as of January 2023. In children, the most common cases of diabetes are type 1. Meanwhile, type 2 diabetes in children accounts for 5-10 percent of all cases of childhood diabetes.

East Kalimantan is in third place with the highest prevalence of DM based on doctor's diagnosis in residents aged >15 years in Indonesia, with the number of cases in 2013 being 2.4% and an increase in 2018 to 3.1% (Riskesdas Team, 2018) . Then, Data on Non-Communicable or Degenerative Diseases for East Kalimantan Province for 2019-2022 recorded an increase in DM among residents aged >15 years, with the number of cases in 2019 amounting to 26,347 cases and increasing in 2022 to 8,4653 cases.

Based on doctors' diagnoses among residents of all ages in the Regency/City of East Kalimantan Province, Riskesdas 2018 recorded that the prevalence of DM in Samarinda was 4,116 cases. In 2020, there were 4811 cases of DM without complications and 4652 cases of DM with complications in Samarinda City. And according to data from the 10 Most Diagnoses in 2022, Abdul Wahab Sjahranie Hospital, Samarinda, there are 2,031 DM patients in outpatients and 643 inpatients and this continues to increase until now.

Segiri Community Health Center recorded 616 cases of DM without complications in 2018, 1,908 sufferers in 2019, 1,591 sufferers in 2020, 937 sufferers in 2021, 982 sufferers in 2022, and the latest data is 2023 from January -September there were 71 sufferers. Even though DM cases are decreasing and no DM cases were found at SMK Negeri 1 Samarinda recorded by the Segiri Community Health Center, prevention must still be carried out, especially in teenagers, to avoid an increase in Diabetes mellitus cases in the next period.

Diabetes that attacks teenagers is generally type 1 diabetes. However, type 2 diabetes can also attack teenagers because teenagers are in the consumerist age group so they tend to consume various types of culinary delights without following a healthy lifestyle. So obesity is also included in the risk factors for developing DM in adolescents (Andini &Awwalia, 2018).

According to the results of a preliminary study conducted on October 19 2024, information was obtained that 30 students had never been given intervention regarding DM in adolescents by the Community Health Center, and had never had blood sugar checks carried out on residents of SMK Negeri 1 Samarinda. And according to the results of a preliminary study conducted, it was found that 5 students at SMK Negeri 1 Samarinda had a good knowledge category, 17 students had a good knowledge category, and 8 students had a poor knowledge category. Then, 19 students had an attitude in the medium category, and 11 students in the good category. And of the 30 students, 5 students were found to have a history of diabetes suffered by their grandmother, father and uncle. Therefore, researchers chose SMK Negeri 1 Samarinda as the research field.

One effort to prevent DM is to increase the knowledge and attitudes of high school students through model learning media *word square*. This media can easily divert students' thoughts, feelings,

attention, attitudes and willingness to learn and can stimulate students to think effectively, cognitively and think more maturely and test students' knowledge. (Qifti et al., 2020).

Model *Word Square* is a development of the lecture method andincluding one of the innovative learning models that can provideinnovation in the learning process (Maini, 2017). According to Kurniasih and Berlin (2016) the advantages of learning models *Word Square* is that it can foster student activity by being trained to think carefully and critically in finding the wording in the problem *Word Square*.

Muttakin&Ucia Mahya Dewi's research (2022), conducted at MAN 1 Aceh Besar on class X students in atomic structure material using learning media Word Square which has been carried out obtained a value of 92.59. This score is obtained by comparing the number of students who got a score ≥ 73 with the total number of students and multiplying by 100. This shows that student learning outcomes have reached the classical completion level.

According to research by Widiyanto, et al (2021), the results of the effectiveness analysis show *Word Square* on Breast Self Examination (BSE) skills in adolescents carried out in Gembol Ngawi Village, it was found that the skills before providing health education using the *Word Square* the majority lacked skills as many as 18 respondents (60%), and skills after providing model health education *Word Square* the majority of good skills were 22 respondents (73.4%). This shows that the Word Square media is effective in health education for teenagers about BSE.

According to the results of the studies above, it shows that the media *Word Square* This is suitable for adolescent targets, including high school students, because it can stimulate students to think effectively, cognitively, think more maturely and can train students' accuracy.

Based on the background explained above, researchers want to know the effect of providing health education using media *Word Square* on the knowledge and attitudes of adolescents regarding the risk factors for DM at SMK Negeri 1 Samarinda.

RESEARCH METHODS

This research is quantitative research *Pre-experiment* by using a research design *one group pretest-postest design.* The design is implemented by measuring *score* before (Pre-test) and after (Post-test), then compare the differences *score Pre-test* and *Post-test* on each knowledge and attitude variable in one group (Notoatmojo, 2018). This research was carried out at SMK Negeri 1 Samarinda, Samarinda Ulu District with the consideration that at SMK Negeri 1 Samarinda there had never been health education using media. *Word Square* about risk factors for DM in adolescents. This research was carried out in February-March 2024. The population in class X at SMK Negeri 1 Samarinda was 438 students from 6 departments. The accessible population in this study were class X students majoring in Tourism Services Business at SMK Negeri 1 Samarinda. The number of class X students majoring in Tourism Service Business at SMK Negeri 1 Samarinda in 2023 will be 73 students. The unit of analysis in this research consists of research objects, namely knowledge and attitudes, as well as research subjects, namely class X students majoring in Tourism Service Business at SMK Negeri 1 Samarinda who meet the criteria. The inclusion and exclusion criteria for the samples taken are:

1)Actively registered as a student at SMKN 1 Samarinda.
2)All class X students majoring in Tourism Services Business at SMK Negeri 1 Samarinda.
3)Physically and spiritually healthy.
4)All students who were present and willing to become respondents signed *inform consent* when collecting data.

The exclusion criteria in this study are:

1)Students who do not fill in *informationconsent*when collecting data.
2)Students who are sick and are not present at the time of the research.

The sampling technique used in this research is *nonprobability sampling*from*total sampling* where the sample size is the same as a population of 73 respondents. This means that all members of the affordable population in this study will become members of the research sample, namely 73 students. Data collection techniques in this research are questionnaires, observation, interviews, and literature study.

RESULTS

Univariate Analysis Results

Univariate analysis was carried out on each research outcome variable. This analysis was applied to answer the specific research objectives in points (a), (b) and (c). The results of the univariate analysis are as follows:

1. General Data Characteristics

General data characteristics of respondents include age, gender, BMI, and history of DM. General data characteristics of respondents are presented in the table below:

Table 1. Frequency Distribution of Respondent Characteristics (n = 73)

Characteristics	(n)	(%)
Age		
15 years	**42**	**57,5%**
16 years	31	42,5%
Gender		
Man	16	21%
Woman	**57**	**78,1%**
Body Mass Index (BMI)		
Underweight	20	27,4%
Normal	**42**	**57,5%**
Obesity	11	15,1%
History of DM in the Family		
Mother	9	12,3%
Dad	4	5,5%
Grandma	4	5,5%
There isn't any	**56**	**76,7%**

Source: Processed Primary Data, 2024

Based on table 1 above, the majority of respondents were students aged 15 years, namely 42 students (57.5%). Regarding gender characteristics, the majority of respondents were female, namely 57 students (78.1%). Based on the characteristics of Body Mass Index (BMI), the majority of students are in the normal category, namely 42 students (57.5%). Based on the history of DM in the family, the majority of respondents who did not have a history of DM in the family were 56 students (76.7%).

2. Identify Knowledge and Attitudes

1) Knowledge Identification

The results of identifying students' knowledge about risk factors for DM during the pre-test and post-test are presented in the following table:

Table 2. Students' knowledge about risk factors for DM during the pre-test and post-test (n = 73)

Knowledge			
Test	**Indicator**		
	Good	**Enough**	**Not enough**
Pre Test	38 (52,1%)	22 (30,1%)	13 (17,8%)
Post Test	61 (83,6%)	12 (16,4%)	0 (0%)

Source: Processed Primary Data, 2024

Based on Table 2 above, it is known that the majority of respondents who had good knowledge during the pre-test were 38 students (52.1%). Apart from that, it is known that the majority of respondents who had good knowledge at the time of the post-test were 58 students (79.5%). From this, it can be concluded that the number of respondents who had good knowledge increased by 23 students after being given health education using media *Word Square*.

2)Attitude Identification

The results of identifying students' attitudes regarding risk factors for DM during the pre-test and post-test are presented in the following table:

Table 3. Students' attitudes regarding risk factors for DM during the pre-test and post-test (n = 73)

Attitude			
Test	**Indicator**		
	Good	**Enough**	**Not enough**
Pre Test	17 (23,3%)	55 (75,3%)	1 (1,4%)
Post Test	54 (74,0%)	19 (26,0%)	0 (0%)

Source: Processed Primary Data, 2024

Based on table 4.3 above, it is known that the majority of respondents who had a good attitude during the pre-test were 17 students (23.3%). Apart from that, it is known that the majority of respondents who had a good attitude during the post-test were 54 students (74.0%). From this, it can be concluded that the number of respondents who had good attitudes increased by 37 students after being given health education using Word Square media.

Bivariate Analysis Results

The test used in the bivariate analysis is Test Wilcoxon. Test Wilcoxon used to see compare and assess variations between data pre-test and post-test. If the ρ value is <0.05, then it is considered that there is an effect after the intervention is given.

1. Analysis of Knowledge Before and After Being Given Health Education About Risk Factors for DM with the Media *Word Square*

Analysis of the influence of health education on knowledge about risk factors for DM using media *Word Square* can be seen in the following table:

Table 4. Identification of Knowledge Bivariate Analysis Results (n = 73)

Knowledge				
	Indicator			**p-*value***
	Good	**Enough**	**Not enough**	

Test	38 (52,1%)	22 (30,1%)	13 (17,8%)	0,000
Test	51 (83,6%)	12 (16,4%)	0 (0%)	

Source: Processed Primary Data, 2024

Based on Table 4 above, it is known that the results of the analysis using the Wilcoxon test show a ρ-value of 0.000 (ρ<0.05). This means that there is an influence before and after being given health education using the media *Word Square* on the respondent's knowledge.

2. Attitude Analysis Before and After Being Given Health Education About Risk Factors for DM with the Media *Word Square*

Analysis of the influence of health education on attitudes about risk factors for DM using the media *Word Square* can be seen in the following table:

Table 5. Identification of Bivariate Attitude Analysis Results (n = 73)

Attitude				
	Indicator			**p-*value***
	od	**Not enough**	**ıd**	
ɛst	(23,3%)	55 (75,3%)	(1,4%)	0,000
'est	(74,0%)	19 (26,0%)	(0%)	

Source: Processed Primary Data, 2024

Based on table 5 above, it is known that the results of the analysis using tests *Wilcoxon* shows a ρ-value of 0.000 (ρ<0.05). This means that there is an influence before and after being given health education using media *Word Square* towards the respondent's attitude.

DISCUSSION

Results of Identification of Students' Knowledge at SMK Negeri 1 Samarinda Before and After Being Given Health Education About Risk Factors for DM Disease Through the Media *Word Square*.

Notoatmodjo (2014), stated that knowledge is the result of knowing and occurs after someone senses a certain object. Sensing occurs through the five human senses, namely sight, feeling, smell, taste and touch. During the research, students were very enthusiastic about discussing and working together in finding answers that had been scrambled on word square media.

The results of identifying students' average knowledge showed that the majority of respondents had the good knowledge category at the pre-test, namely 38 students (52.1%), then at the post-test, 61 students (83.6%) had the good knowledge category). Therefore, it can be seen that as many as 23 students experienced an increase in knowledge after being given health education using *Word Square*. In line with research conducted by Febriani& Lucyana, (2019), 32 students completed their learning in the posttest, while 44 students completed their learning in the pretest, so it can be seen that as many as 12 students had an increase in learning completeness with a score above the KKM of 75 after being given treatment using media *Word Square*.

Results of Identification of Students' Attitudes at SMK Negeri 1 Samarinda Before and After Being Given Health Education About Risk Factors for DM Disease Through the Media *Word Square*.

Stephan (2007) in Budiman & Riyanto (2014) states that attitudes are judgments made about things, people or events that express a person's feelings towards an object. The results of identifying students' attitudes in this research showed that the majority of respondents had a good attitude category during the pre-test, namely 17 students (23.3%), in addition to that, it was found that respondents had a good attitude category during the post-test, namely 54 students (26, 0%) therefore it

can be seen that as many as 37 students experienced an increase in positive attitudes after being given Health Education using media *Word Square*.

According to Notoatmodjo, (2014) attitude is not an action or activity, but is a tendency to carry out actions or behavior or roles, so it can be concluded that the majority of respondents have a positive attitude tendency and hope that it can be applied into an action or behavior in life. daily.

Results of analysis of the influence of health education using Word Square media on respondents' knowledge before and after being given the intervention

Based on the results of identifying respondents' knowledge before and after the intervention, it was found that the majority of respondents had good knowledge at the pre-test, namely 38 students (52.1%). Apart from that, it is known that the majority of respondents who had good knowledge at the time of the post test were 61 students (83.6%). From this, it can be concluded that the number of respondents who had good knowledge increased by 23 students after being given health education using word square media.

Based on table 4, the results of the significant analysis before and after being given health education using word square media on respondents' knowledge using the Wilcoxon test, obtained a significance value for knowledge (0.000) where the ρ-value <0.05 means **H0** rejected. The results of statistical tests explain that health education using word square media has a significant influence on students' knowledge about risk factors for DM at SMK Negeri 1 Samarinda.

The results of this research are in line with research by Muttakin&Ucia Mahya Dewi (2022), which was carried out at MAN 1 Aceh Besar on class This score is obtained by comparing the number of students who got a score ≥ 73 with the total number of students and multiplying by 100. This shows that student learning outcomes have reached the classical completion level. Results of research conducted by El Has, Imaduddin Maulana (2023) shows a significant increase in knowledge, as seen from the p-value > 0.000, < 0.05. These results highlight the impact of health education through health education media on maternal knowledge.

According to the researchers' assumptions, the influence of health education using word square media on students' knowledge could occur because 73 respondents received exposure to specific information provided by the researchers. With the intervention carried out twice with a gap between intervention 1 and intervention 2 for two days, 73 respondents were well exposed to information. This is in accordance with the theory of Murre and Dros, (2015) in previous research, namely, retention is formed through the process of storing stimulus information received from the environment. These memories are passed to the nervous system and become short-term memories, which have a small capacity because they only last for 30 seconds. However, providing information that is continuously repeated will enter the long-term memory system to be stored longer. Therefore, based on this theory, the average increase in the knowledge score of the visual media group is higher than that of the audiovisual media group (Adib Chifdillah et al., 2021).

Through playing methods using media *word square,* 73 respondents who had been divided into 10 small groups were very focused on working on the questions and collaborated well to carefully look for answers in the random arrangement of letters on the *word square*. This is in line with the explanation by Kurniasih and Berlin (2016) regarding the advantages of the Word Square learning model, namely that it can foster respondents' activeness by being trained to think carefully and critically in finding word order in Word Square questions.

Results of Analysis of the Effect of Health Education Using Word Square Media on Respondents' Attitudes Before and After Being Given the Intervention

Based on the identification results of respondents' attitudes before and after the intervention, it was found that the majority of respondents who had a good attitude category during the pre-test were 17 students (23.3%). Apart from that, it is known that the majority of respondents who had a good attitude category during the post-test were 54 students (74.0%). From this, it can be concluded that the number of respondents who had a good attitude increased by 37 respondents after being given health education using word square media.

Based on table 5, significant analysis results were obtained before and after being given health education using word square media on respondents' attitudes using the Wilcoxon test. The significance value of knowledge was obtained (0.000) where the ρ-value <0.05 means **H0** rejected. Where the results of statistical tests explain that health education using word square media has a significant influence on students' attitudes about the risk factors for DM at SMK Negeri 1 Samarinda.

This research is in line with research by Widiyanto & Pradana, (2021), showing the results of an analysis of the effectiveness of Word Square on Breast Self-Examination (BSE) skills in adolescents conducted in Gembol Ngawi Village, it was found that the skills before providing health education using the model *Word Square* the majority lacked skills as many as 18 respondents (60%), and skills after providing model health education *Word Square* the majority of good skills were 22 respondents (73.4%). This shows that the Word Square media is effective in health education for teenagers about BSE. This is supported by the results of research conducted (Hazanah, 2022), namely that a p value of 0.002 was obtained, which means > 0.05, so there is a relationship between providing sex education using media on changes in teenagers' attitudes.

According to the researchers' assumptions, the influence of health education using word square media on the attitudes of 73 respondents could occur because of students' careful attitude in searching for answers in *word square* and students' enthusiastic attitude in listening to material presented using media *PowerPoint* while discussing the answers in the game *word square*. Use of media assistance *PowerPoint* in line with research (Pramono&Hazanah, 2023), namely, the media *PowerPoint*is effectively used as media to help deliver material in socialization and education activities to improve attitudes and skills because, media *PowerPoint*is useful as a visualization tool for any material presented regarding the conscious movement of eating fruit and vegetables.

During the question and answer activity, respondents knew the dangers of DM, but had not been able to implement DM prevention and did not know the risk factors for DM. However, after being given intervention regarding information about the Definition of DM, Classification of DM, How to Prevent DM, and Risk Factors for DM, respondents have an increased positive attitude and it is hoped that this can become the basis for maintaining a healthy lifestyle and can improve it from a positive attitude to a behavior. positive for DM prevention, especially in 17 respondents (23.3%) who had a family history of DM, in order to prevent DM in the future. This is in line with research conducted by (Mokalu et al., 2023) which states that the mindset of teenagers influences the incidence of degenerative diseases in the future.

CONCLUSION

Based on age characteristics, most of the respondents were students aged 15 years, namely 42 students (57.5%), most of the respondents were female, namely 57 students (78.1%), most of the students had a Body Mass Index (BMI). There were 42 students (57.5%) in the normal category, and the majority of respondents who did not have a family history of DM were 56 students (76.7%). Most of the respondents had good knowledge at the time *pre-test* namely 38 students (52.1%), then when *post test* It was found that 61 students (83.6%) had good knowledge category. Most of the respondents had a good attitude category at the time *pre-test* that is, as many as 17 students (23.3%) apart from that, it was found that respondents had a good attitude category at the time *post-test*namely as many as 54 students (74.0%). There was a significant influence before and after being given health education using word square media on respondents' knowledge with a significance value of ρ-knowledge value of 0.000 (< 0.05). There was a significant influence before and after being given health education using word square media on respondents' attitudes with a significance value of ρ-knowledge value of 0.000 (< 0.05).

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