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Comparative Effectiveness of Audiovisual and Print Media in Type II Diabetes Mellitus Prevention

Memah P. Herlina[1], Kolompoy A. Jane[2], Semuel Tambuwun[3], Stefani Weno[4], Tansala S. Maya[5]

[1,2,3,4,5]Health Promotion Study Program, Poltekkes Ministry of Health Manado
*Corresponding Author: herlinamemah18@gmail.com

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Abstract

Type II Diabetes Mellitus (DM) is a chronic disease with an increasing prevalence and is strongly influenced by preventive health behaviors. This study aimed to analyze the relationship between the effectiveness of health promotion media, including digital posters, educational videos, and leaflets, and preventive behaviors toward Type II DM in the working area of Minanga Public Health Center. This study used a quantitative analytic design with a cross-sectional approach involving 100 respondents selected through purposive sampling. Data were collected using structured questionnaires and analyzed using univariate and bivariate tests with the Chi-Square method. The results showed that most respondents were aged 51–60 years, male, and had a senior high school education. Digital posters were rated as good by 66% of respondents, educational videos by 45%, and leaflets by 42%. Preventive behavior was categorized as very good in 55% of respondents. The Chi-Square test indicated a significant relationship between educational videos and preventive behavior (p=0.000), while digital posters and leaflets showed no significant relationship. It is concluded that educational videos are more effective in improving preventive behaviors toward Type II DM. Health centers are recommended to prioritize informative and relevant educational video media.

Keywords: *Health Promotion Media, Educational Video, Digital Poster, Leaflet, Preventive Behavior, Type II Diabetes Mellitus.*

Abstract (Indonesian)

Diabetes Mellitus (DM) tipe II merupakan penyakit kronis dengan prevalensi yang terus meningkat dan dipengaruhi oleh perilaku pencegahan masyarakat. Penelitian ini bertujuan menganalisis hubungan efektivitas media promosi kesehatan berupa poster digital, video edukasi, dan leaflet terhadap perilaku pencegahan DM tipe II di wilayah kerja Puskesmas Minanga. Penelitian menggunakan desain kuantitatif analitik dengan pendekatan cross-sectional terhadap 100 responden yang dipilih secara purposive sampling. Data dikumpulkan melalui kuesioner terstruktur dan dianalisis menggunakan uji univariat serta bivariat dengan Chi-Square. Hasil menunjukkan mayoritas responden berusia 51–60 tahun, berjenis kelamin laki-laki, dan berpendidikan SMA/SMK. Media poster dinilai baik oleh 66% responden, video edukasi 45%, dan leaflet 42%. Perilaku pencegahan tergolong sangat baik pada 55% responden. Uji Chi-Square menunjukkan hubungan signifikan antara video edukasi dan perilaku pencegahan (p=0,000), sedangkan poster dan leaflet tidak signifikan. Disimpulkan bahwa video edukasi lebih efektif dalam meningkatkan perilaku pencegahan DM tipe II. Puskesmas disarankan memprioritaskan penggunaan media video edukasi yang informatif dan relevan.

Kata kunci: Media Promosi Kesehatan, Video Edukasi, Poster Digital, Leaflet, Perilaku Pencegahan, Diabetes Mellitus Tipe II.

INTRODUCTION

Diabetes Mellitus is known as a long-term condition that causes an increase in glucose levels in the blood due to the body's inability to produce or utilize insulin properly. The disease can affect entire parts of the body, causing a variety of different health problems. Early symptoms of diabetes mellitus can include increased frequency of urination, excessive thirst, significant weight changes, and prolonged fatigue[1].

The increase in the number of diabetes cases is inseparable from the low level of effective preventive behavior. According to the central statistics agency (BPS)[2], only 30% of people have a sufficient understanding of diabetes prevention measures. Lack of physical activity, unhealthy diet, and low utilization of health education media are the main causes of low preventive behavior. According to Setiawan and Pratama, 65% of people with diabetes mellitus do not have the habit of doing routine health check-ups, which leads to delays in early detection and an increased risk of complications[3]. According to a report from the World Health Organization (WHO) in June 2023, more than 500 million people worldwide have Diabetes Mellitus. It is estimated that this number will increase to 1.3 billion by 2050[4].

The Indonesian Health Survey (SKI,) shows that the incidence of Diabetes Mellitus has increased significantly. In general, the prevalence of Diabetes Mellitus in the population of all ages based on the doctor's diagnosis is 1.7%. The age group ≥ 15 years based on the doctor's diagnosis the prevalence is 2.2%. And based on blood sugar checks, the prevalence reached 11.7% (SKI,). Compared with previous data from the results of Basic Health Research (Riskesdas) in 2018, the prevalence of Diabetes Mellitus in the population of all ages based on a doctor's diagnosis is 1.5%, and for the age of ≥ 15 years based on a doctor's diagnosis, the prevalence of Diabetes Mellitus is 2.0%, based on the blood sugar examination prevalence is 10.9%, this shows an increase in prevalence from 10.9% in 2018 to 11.7% in 2023. Diabetes Mellitus is the 1st highest in DKI Jakarta Province with a prevalence of 3.9%. North Sulawesi is the 4th highest out of 38 provinces with a prevalence of 2.7%. (SKI, 2023)[5]. The increase in the number of cases is inseparable from the lack of effective preventive behaviors. According to data from the Central Statistics Agency of North Sulawesi (BPS, 2023), only 30% of people have a sufficient understanding of diabetes prevention measures. Factors such as lack of physical activity, unhealthy diet, and lack of use of health education media are the main causes of low preventive behavior. 65% of people with diabetes mellitus do not have the habit of having regular health check-ups, which leads to delays in early detection and an increased risk of complications[6]. The latest data from the Minanga Health Center shows an increase in cases of type II Diabetes Mellitus (DM) in several villages in the Puskesmas' work area. Based on reports of DM patient visits from 2022 to 2024, there has been an increase in the number of sufferers, especially in Malalayang 1 West Village, which shows a significant increase. In 2022, health center information shows that the number of visits to DM patients from the 4 work areas in Malalayang 1 Barat was recorded at 96 cases. This figure decreased slightly in 2023 to 85 cases, but then increased significantly again in 2024 to 103 cases. From the results of interviews conducted with 2 respondents of the Minanga Malalayang 1 West health center, it indicates that there is still a low awareness and preventive behavior from the public about the risk of diabetes. Therefore, more effective health promotion efforts, such as the use of posters, educational videos, and leaflets, are needed to increase public understanding of diabetes mellitus prevention in the region.

In an effort to improve the prevention behavior of type II Diabetes Mellitus in the work area of the Minanga Health Center, this study uses three types of health promotion media, namely posters, educational videos, and leaflets. Each media is chosen based on its unique characteristics in delivering health information to the public. Posters are used as an effective visual medium to grab people's attention through eye-catching designs, contrasting colors, and relevant illustrations. The poster conveys a message in a concise and concise manner in simple language, making it easy for all groups, including those with low literacy levels. However, the limited space on the poster makes it less effective for conveying in-depth information, educational videos were chosen for their ability to combine visual and audio elements, so that they can improve public understanding in a more interactive way. This video is able to demonstrate live healthy living practices, such as proper exercise and healthy eating, which are difficult to convey with print media alone.

In the work area of the Minanga Health Center, health promotion activities are one of the important strategies in efforts to prevent non-communicable diseases, including Type II Diabetes Mellitus. Puskesmas utilize various types of health promotion media, such as digital posters, educational videos, and leaflets. Digital posters are usually installed in waiting rooms or service areas to attract the attention of visitors, while educational videos are played on television or health center monitor screens so that patients and families can obtain health information audio-visually. Meanwhile, leaflets are distributed to the public as a print media that can be taken home and read again at any time. Each type of media has its own advantages and limitations. Digital posters tend to be visually appealing, but the information conveyed is limited.

Educational videos are able to convey a more complete message with a combination of images, sounds, and text, but require full attention from the audience. Leaflets provide written information that can be relearned, but their effectiveness depends heavily on the reader's literacy level[7]. Until now, it is not known exactly which media is more effective in improving Type II Diabetes Mellitus prevention behavior in the community.

METHODS

Design, place and time

This study is a quantitative research with *a cross sectional* approach. The *cross sectional* approach is a research method that is carried out by collecting data at a certain point in time to describe a phenomenon or relationship between variables in a population. The research was carried out in the Working Area of the Minanga Health Center. The implementation research time is January – July 2025.

Number and method of taking subjects

The number of quantitative respondents was taken using *purposive sampling* With a sample in this study, the entire total population amounted to 100 respondents.

Types and Methods of Data Collection

Primary data is obtained when the source of data is obtained directly from the respondent using a questionnaire containing the same question and given to the respondent. Secondary data is supporting data obtained indirectly such as documents at the health center and supporting references.

Data processing and analysis

Quantitative data management is carried out with *editing, coding, processing and cleaning stages.* At the stage *of data editing* , it is collected using a questionnaire, then *coding* data in the form of letters is changed into numbers, then *data processing* is tested using SPSS, then *cleaning* to re-confirm the data that has been inputted. Quantitative data analysis uses univariate and bivariate analysis where univariate analysis is a test that explains the characteristics of each research variable. In general, this analysis only results in the distribution of the frequency of each research variable, namely age, gender and knowledge value, attitude and behavior and bivariate tests using normality tests on health promotion media score data (posters, videos, leaflets) and preventive behaviors.

RESULTS AND DISCUSSION

A. RESULTS

I. Univariate Analysis

1. Education

Diagram. 1 Distribution of Respondents' Education Frequency

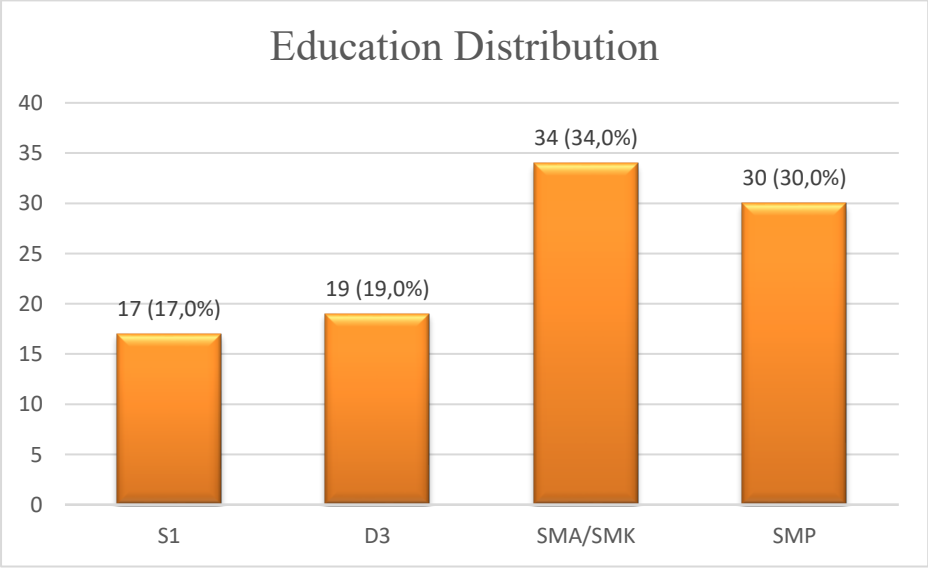


Diagram 1 shows the distribution of the frequency of education of the most respondents, namely high school/vocational school with 34 (34.0%), and the least is S1 with 17 (17.0%).

2. Gender

Diagram 2. Frequency Distribution of Respondents' Gender

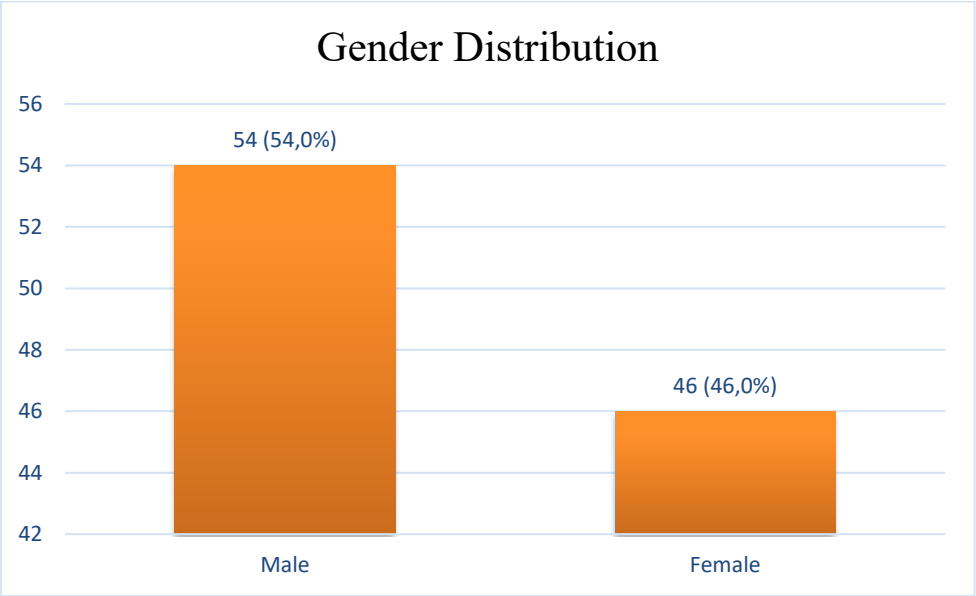
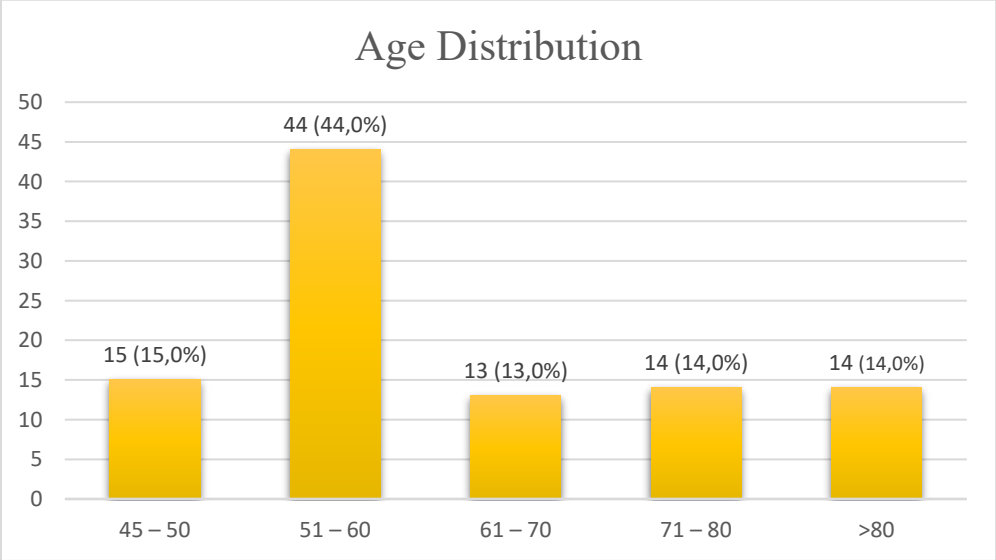


Chart 2 shows the frequency distribution of the Gender of the most respondents Male with 54 (54.0%), and the fewest is Female with 46 (46.0%).

3. Age

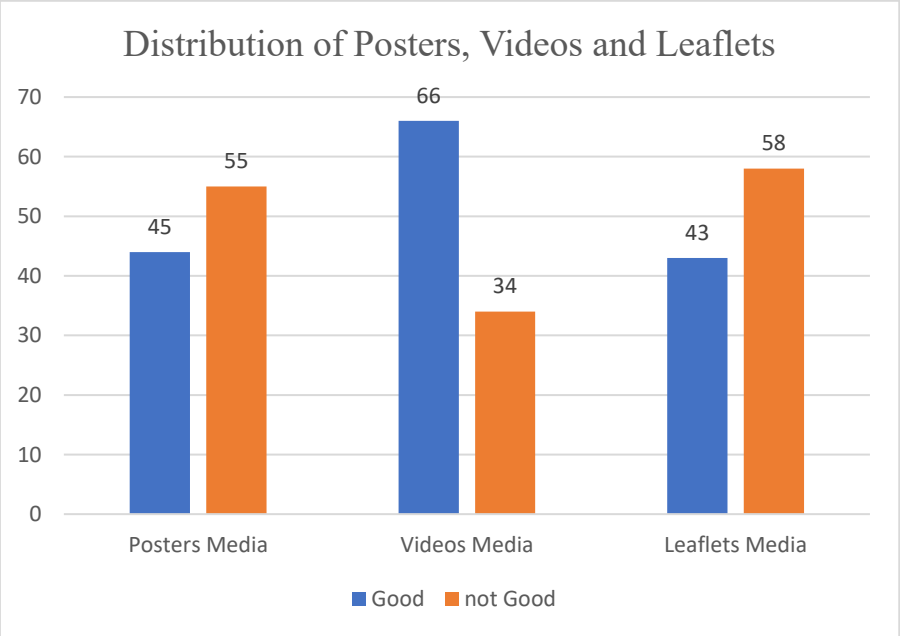
Diagram 3. Frequency Distribution of Respondents' Age



This diagram 3 shows the frequency distribution of the most respondents aged 51 – 60 with a total of 44 (44.0%), and the least is 61 - 70 with a number of 13 (13.0%).

4. Distribution of poster, video, and leaflet media images

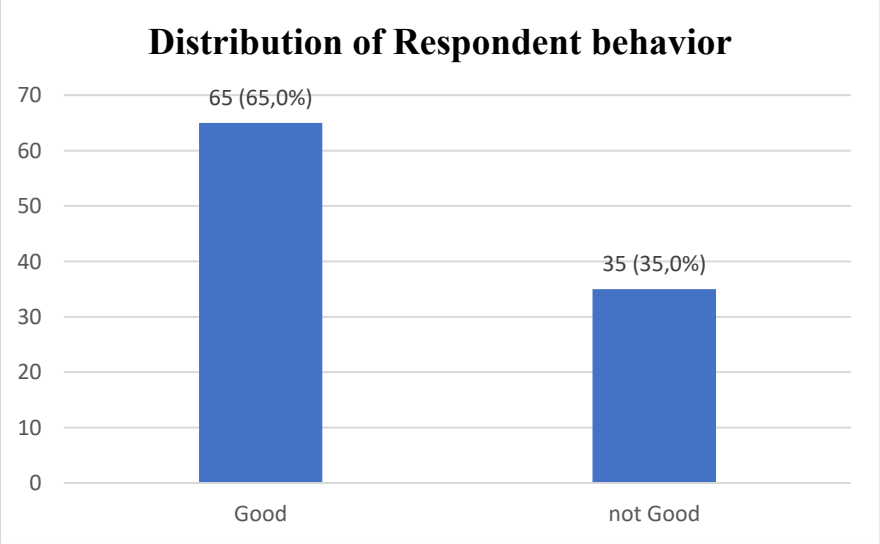
Diagram 4. Distribution of media images of posters, videos, and leaflets of respondents



The frequency of Poster Media was the most respondents in the good category with 45 (45.0%), and the most were not good with 55 (55.0%), the frequency of the most respondent Video Media in the category was not good with 66 (66.0%), and the least was good with 34 (34.0%), the frequency of the most respondent leaflet media in the category was not good with 58 (58.0%), and the least is good with 42 (42.0%).

5. Distribution of Respondent Preventive Behaviors

Diagram 7. Distribution of Respondent Preventive Behaviors



This diagram 7 shows the frequency distribution of the most respondents' behavior in the good category with a sum of 65 (65.0%), and the least is a poor with a sum of 35 (35%).

II. Bivariate Analysis

1. The relationship between digital poster media and type II diabetes mellitus prevention behavior, using *the Chi-Square* statistical test can be seen in the table below:

Table 1. Chi-Square Health Promotion Media Test Results With Preventive Behaviors of Type II DM

Variable	df	Asymptotic Significance (2-sided)
Posters Media	1	0,199
Videos Media	1	0,000
Leaflets Media	1	0.116

Based on table 1 showing the results of the correlation test of health promotion media with type II DM prevention behavior, it shows the frequency of digital poster media with type II diabetes mellitus prevention behavior (Type II DM) with the result of Asimp.Sig = 0.199 where the result is greater than (0.05), then it can be concluded that there is no significant relationship between Digital Poster Media and Type II Diabetes Mellitus Prevention Behavior, The video media showed the value of Asimp.Sig = 0.000 where the result was smaller than (0.05), then it can be concluded that there is a significant relationship between the Video Media and the Preventive Behavior of Type II Diabetes Mellitus, and the leaflet shows the value of Asimp.Sig = 0.116 where the result is greater than (0.05), then it can be concluded that there is no significant relationship between the Media leaflet and the Prevention Behavior of Type II Diabetes Mellitus.

B. DISCUSSION

Characteristics of Respondents by Age and Gender

The results of the univariate analysis showed that most of the respondents were in the age group of 51–60 years (44%), followed by the age group of 45–50 years (15%), and the age group over 60 years in a smaller proportion. The age range of 51–60 years is classified as an age group at high risk for type II diabetes mellitus, because at this age the body begins to experience a significant decrease in metabolic function, as well as the accumulation of unhealthy lifestyle habits[8].

In theory, gender influences health behavior. Men tend to have lower participation in health promotion programs due to employment factors, stigma, and masculinity perceptions[9]. In contrast, women are generally more active in routine check-ups and preventive behaviors[10]. If this condition is not balanced with adequate physical activity and a healthy diet, then the risk of insulin resistance and hyperglycemia will increase sharply. In addition to physiological factors, there are also behavioral and psychological factors that affect the low level of preventive behavior in this age group[11]. Based on field findings, these factors include physical limitations such as gout and fatigue, and long-held habits such as smoking and rarely exercising[12].

Factors influencing these outcomes are likely to be related to social roles and workload. Men tend to focus on work, are less present in health activities, and prefer curative treatment when they are sick rather than prevention[13]. Based on direct interactions in the field, some respondents aged 50 and over said that they felt that prevention was "too late", and chose to focus on treatment if they were sick. This mindset is a big obstacle to the success of health promotion. To overcome this, promotional materials should highlight immediate benefits that can be felt in a short period of time, such as reduced knee pain after two weeks of light exercise, or increased stamina after reducing sugar consumption.

The results of the univariate analysis based on the gender of the respondents showed that the majority of respondents in this study were men (54%), while women amounted to 46% of the total respondents. This composition reflects a slightly higher tendency for male participation in research, but also opens up space for analysis related to differences in health behaviors by gender. Based on observations, it is difficult for men to reach health promotion activities at health centers because of work schedules. Pick-up strategies, such as workplace or community visits, can increase their participation.

Health Promotion Media

Most respondents rated the poster as a good health promotion medium, with a total of 45% of respondents giving a positive rating. Posters have advantages in terms of visualizing information in a concise and attractive manner, and can be disseminated and displayed in various strategic places such as the walls of health centers, waiting rooms, or places of worship. Posters are effective for conveying health messages quickly because they combine elements of text, color, and images that stimulate the reader's attention. In this context, the success of posters can be attributed to the visual appeal and ease of the message that does not require high literacy skills[14].

Video media was rated "good" by 66% of respondents, making it the media with high appreciation in this study. Educational videos have the advantage of conveying information dynamically, using sound, animation, and narrative that make information easier to understand and interesting. Educational videos are more effective than print media in increasing public understanding and motivation towards the prevention of non-communicable diseases. Another advantage of videos is their ability to present real-life scenarios, such as examples of healthy behaviors, patient testimonials, or illustrations of the impact of diseases[15].

Meanwhile, leaflets received a "good" rating from only 42% of respondents, making it the media with the lowest effectiveness rate among the three media used. Leaflets generally contain more complete and in-depth information, such as explanations of symptoms, risk factors, and preventive measures for Type II Diabetes Mellitus. However, delivering information in the form of long text and less interactive designs is a challenge in itself.

Leaflets are only effective if they are adjusted to the level of literacy of the community, and if the reader has the motivation to read in its entirety. Unfortunately, in populations with lower secondary education levels, the absorption of leaflets tends to be low[16].

These findings show that video is the media that is most appreciated by respondents, followed by video, while leaflets are rated the least effective in conveying health messages.

Diabetes Mellitus Prevention Behaviors

The results of the univariate analysis in this study showed that 65% of respondents had good preventive behavior, and 35%, still showed poor behavior. This indicates that the community has good preventive behavior.

Preventive behavior is influenced not only by knowledge, but also by individual awareness, motivation, long-established habits, and social support from the surrounding environment. Although a person knows the importance of avoiding excessive sugar consumption or physical activity, it is not necessary that they will do so consistently, especially if there is no support or trigger system from their family, community, or healthcare facility[17]. Low preventive behavior can also be influenced by internal factors such as perception of risk, such as the assumption that diabetes is not a serious threat or can be treated when symptoms have appeared. This kind of behavior is often found in middle-aged and elderly people who feel that lifestyle changes are "too late" to make or too difficult to change[18]. Long-established habits, such as regular consumption of sweet foods, lack of physical activity, and the habit of not doing regular health check-ups, are challenges in encouraging preventive behavior. Without a sustainable educational approach and supported by environmental interventions such as family, community, or health worker support, behavior change is difficult to achieve optimally[19]. Social support from partners, children, and peers plays an important role in forming a commitment to healthy behaviors, especially for people or groups at risk of type II DM. Therefore, health promotion must go beyond conveying information, but also building a social environment that supports behavior change[20].

In my opinion, the low percentage of respondents who have good preventive behavior shows that there is a gap between information exposure and the implementation of healthy behaviors in daily life. This shows that although health promotion media has been used, the content is not necessarily in accordance with the psychosocial and cultural needs of the community. It could be that the promotional material is not contextual enough, irrelevant to the respondents' daily lives, or not intensive enough to trigger a change in habits.

Analysis of the Relationship between Digital Poster Media and DM Prevention Behavior

Based on test results *Chi-Square*, obtained a significance value (p) = 0.199, which is greater than the significance limit of 0.05. This shows that there is no statistically significant relationship between digital poster media and Type II Diabetes Mellitus prevention behavior. These findings indicate that positive perceptions of posters are not automatically proportional to the application of preventive behaviors in daily life. In theory, posters are passive visual health promotion media. Posters are effective for grabbing attention and providing brief reminders because they blend elements of color, short text, and images. However, posters are not designed to convey detailed information or teach practical skills, making them less likely to produce long-term behavioral change without the support of other interventions[21]. Some previous research has suggested that posters tend to only increase early awareness (*Awareness*), but to achieve behavior change requires more interactive media, such as videos or group discussions. Posters can indeed spark curiosity, but without further explanation or strong emotional engagement, the information received is easily forgotten or ignored[22].

According to researchers, based on direct observations in the field, many respondents admitted that they had seen posters about DM prevention in health centers, waiting rooms, and posyandu. However, most only remember visual elements such as illustrations or dominant colors, without being able to decipher the content of the message in its entirety. Some respondents even said that they did not read the text on the poster because it was too small or too much writing. This shows that although posters can act as visual triggers to raise awareness, they cannot stand alone as the primary medium in health promotion strategies. Posters should be used as complementary media that support other more comprehensive media, such as educational videos or live counseling. In addition, the poster design should be simple, use language that is very easy to understand, and highlight the main message in the form of a dominant visual, such as a healthy food icon, a simple preventive measure, or a call for a blood sugar check.

Analysis of the Relationship of Educational Videos with DM Prevention Behaviors

Based on the results of the *Chi-Square* test, a significance value (p) = 0.000 was obtained, which is smaller than 0.05. This means that there is a statistically significant relationship between the use of educational video media and the prevention behavior of Type II Diabetes Mellitus. In other words, the better the respondents' assessment of video media, the more likely they are to have good preventive behavior against Type II DM.

Theoretically, audiovisual media such as video has advantages over print or static visual media. Hendriyani & Fitriani= emphasized that video is able to combine visual, audio, narrative, and illustration elements that work simultaneously in increasing understanding, building emotional engagement, and strengthening information memory. The strength of video lies in its ability to present modeling or imitation of behavior, where viewers can see firsthand preventive measures, such as how to do diabetic exercises, choose healthy foods, or check blood sugar levels independently. This is in line with Bandura's Social Learning theory, which states that individuals learn new behaviors more easily when they see real, clearly displayed examples.

Previous research by Gunawan = also supports this finding, where the use of video media has been shown to be more effective in increasing participation and intention to behave healthily, especially in communities with low levels of literacy. Video has high flexibility because it can be accessed through various platforms, ranging from local television, screenings at health centers, to distribution through social media or *WhatsApp24 groups*. According to the researchers, based on direct observation during the study, respondents showed higher focus and engagement when watching videos compared to reading leaflets or viewing posters. Many respondents were able to replay the content of the video message after watching, showing a strong level of information retention. Some even stated they were motivated to try the measures indicated, such as reducing the consumption of sugary drinks or starting light exercise.

The researcher also noted that there are challenges, such as limited video playback facilities in some areas, especially in villages that do not have adequate TV facilities or digital devices. In addition, excessively long video durations lead to a decrease in focus, especially in elderly respondents. Researchers recommend that educational videos be designed to be short, interactive, and accompanied by real illustrations that are relevant to local customs. The combination of video playback with a short discussion session with health workers is also believed to strengthen understanding and increase the likelihood of behavior change.

Analysis of the Relationship of Leaflet Media with DM Prevention Behavior

Based on the results of *the Chi-Square* test, a significance value (p) = 0.116 was obtained, which is greater than 0.05, so it can be concluded that there is no statistically significant relationship between leaflet media and Type II Diabetes Mellitus prevention behavior in respondents. This means that respondents' perception of leaflets as a health promotion medium is not strong enough to influence their preventive behavior in daily life.

According to the researchers, based on experience in the field, researchers see that leaflet distribution without proper communication strategies makes it just a passive reading material that is not always used. Some respondents when asked again did not know the contents of the leaflet, some even forgot to have received it. This shows that leaflets cannot stand alone as an effective health promotion tool, especially in communities with low literacy or minimal reading culture. Therefore, the researcher argues that leaflets should be used together with other media, for example, distributed after face-to-face counseling sessions or supported by the screening of educational videos so that the message written in them can be strengthened through two-way communication.

The team found that the design and layout of the leaflets also influenced reading interest. Leaflets with long text without attractive visual support make readers quickly lose interest. Meanwhile, overly technical content makes the message difficult to digest, especially by respondents with lower secondary education levels. Content suitability with the target literacy level is key to the success of print media [25]. With this combination, leaflets can function as a reinforcement media that can be read back at home, while the core information has been received and understood in advance through direct explanations or audiovisual media. This strategy is believed to increase the absorption of messages and reduce the risk of information being ignored by the recipient=.

CONCLUSION

The majority of respondents had a high school/vocational education level (34%), were male (54%), and were in the age group of 51–60 years (44%). These characteristics suggest that most respondents are in the age group at high risk for type II DM and have a secondary level of education, which can affect the way they receive and understand health promotion messages. In terms of assessment, digital poster media received appreciation (45% rated good), followed by educational videos (66% rated good), and leaflets (42% rated good). However, this positive assessment is not always directly proportional to changes in preventive behavior. Posters are considered visually appealing but lack in-depth understanding, educational videos are able to convey information comprehensively and interestingly, while leaflets tend to be less effective in people with low literacy. Video media was shown to have a significant association with Type II DM prevention behaviors (p = 0.000). Although only 66% of respondents rated video media as "good", it showed high effectiveness in changing behavior. This indicates that an informative

and interactive audiovisual format is very influential in increasing respondents' understanding and awareness. As many as 42% of respondents rated leaflet media as good, but the results of statistical tests showed that there was no significant relationship between leaflets and preventive behavior (p = 0.116). Although leaflets have the potential to provide more in-depth information, their effectiveness may be hampered by less attractive designs or low literacy levels of respondents.

Overall, only educational video media had a significant association with Type II Diabetes Mellitus prevention behavior. The media posters and leaflets do not show any meaningful connections. This confirms that in the context of this study, audiovisual media is more effective in conveying health messages and encouraging behavior change than static or print visual media.

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