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THE RISK PERCEPTION OF TUBERCULOSIS INFECTED DIABETES MELLITUS PATIENTS

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ABSTRACT

Introduction: The number of people with Diabetes Mellitus (DM) increases from year to year. Indonesia is in the sixth highest rank globally for the number of people with DM. Moreover, the level of risk of DM suffering TB is higher. The consequences can be prolonged if not treated immediately. However, the dangers of DM should be the concern of everyone. A non-healthy lifestyle such as high consumption of fast food and a sedentary lifestyle has a negative impact. DM will be worsened and can even lead to various diseases, including blindness, heart disease, kidney failure, stroke, or even amputation. **Methods:** This research was conducted in East Java and assessed the correlation between behavior, perception, perceived behavior control, and social support so that people can be motivated to seek information about the risk of TB in DM patients. This comprehensive community-based research combines quantitative and qualitative using a cross-sectional method on people who had been diagnosed with diabetes mellitus for at least one year. Information gathered concerning things to know for prevention and the desire to do the prevention. **Result:** The result of this research is the establishment of a brief video animation explaining the risk of TB in DM patients. Based upon data processing, DM patients diagnosed under five years are more active in seeking information about diabetes mellitus and its complications, including tuberculosis, as seen in table 3. **Conclusion:** The information is at their most plentiful access from social media (Facebook, Instagram), followed by radio, newspapers, television, and WhatsApp/ Line. Even more surprising, from the result of this research, it was found that the role of doctors or nurses was in the bottom two in providing information related to the risk of DM and TB. Similarly, health facilities (public health services, hospitals, clinics) are the third bottom after doctors and nurses. Of course, this is very unfortunate because the transfer of information from the primary source, in this case, health workers, did not occur properly.

Keywords: Diabetes Mellitus; Tuberculosis; Perception; Risk of TB in DM Patients

INTRODUCTION

Infection control practice, including TB infections, is one of the development goals, which requires many strategies and steps. In 2010, the world experienced an increasing number of patients diagnosed with TB by 50%, until the World Health Organization (WHO) declared TB infection as a "global health emergency" (Erkens et al., 2010; Welin, 2011; WHO & World Health Organization, 2011; Zahr et al., 2016). Therefore in 2014, the WHO declared to end the global TB epidemic by 2035 (Falzon et al., 2016). The increasing number of TB patients is in line with the increasing number of patients at risk of developing TB, such as immuno-compromised patients dealing with HIV, diabetes mellitus (DM), cancer, and autoimmune disease (Stevenson et al., 2007; Zahr et al., 2016).

Diabetes mellitus patients have a threefold increased risk of being infected

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with tuberculosis, and the risk of failure therapy increases up to two times (6–8). International Diabetes Federation estimated more than 9 million people in Indonesia living with diabetes mellitus, but only around 30% have been diagnosed and received treatment to control blood glucose levels (Asia et al., 2013; Ministry of Health, 2015).

Diabetes mellitus is one of the noncommunicable diseases (NCD) that leads to high mortality due to its complication (Sørensen et al., 2012; Van Crevel & Dockrell, 2014). On the other hand, TB as a chronic infection is also one of the NCDs that may also lead high mortality rate. Therefore, in this research, the concern was in the risk of DM patients getting infected by Mycobacterium tuberculosis (Niazi & Kalra, 2012; Van Crevel & Dockrell, 2014). Since both DM and TB are double threats of NCD, it is necessary to address this situation meaningfully by providing high-quality health care services. Efforts will need to be sustained, flexible, yet carefully designed in local contexts to overcome the many barriers to care (Nicholson et al., 2017).

In 2016, there were 21.606 new TB cases diagnosed in East Java (Didik Budijanto et al., 2016), and it is estimated that 1,8% were DM patients infected with TB with a conversion rate of BTA ± 60% (East Java Provincial Health Office 2013, 2012). TB cases in East Java are the second-highest in Indonesia(Didik Budijanto et al., 2016; Dinas Kesehatan Provinsi Jawa Timur 2013, 2012). Even though the number of DM and TB were relatively high in this province, there remains no health program for screening and information services for DM patients against TB infection, both from government and non-government organizations, reflected by the separated data for DM patients and TB patients Provincial Health Office of East Jawa and Ministry of Health of Republic of Indonesia's report (Health Research and Development Agency, 2013; Didik Budijanto et al., 2016; East Java Provincial Health Office 2013, 2012; Ministry of Health, 2017).

Health literacy has gained considerable attention across the world in recent years due to optimizing it would help people improve health and well-being and reduce health inequities (Raynor, Zorn, Ratzan, & Parker, 2012). Good health literacy influences people's ability to access health information. The development of digital-based integrated health information services to educate DM patients regarding the risk of TB infection is expected to increase public awareness, especially people at risk of DM, to increase awareness, willingness, and prevention of TB infections (Falzon et al., 2016). ealth status could be improved by focusing on three main areas: supporting people with lower health literacy, improving health literacy capacity, and improving the organizational, government, policy, and system practice (Baskin, 2017).

Nowadays, Digital health, which consists of electronic health (eHealth) and mobile health (mHealth), occupies an increasingly important space in preventive and curative interventions in affluent and resource-constrained settings. Digital health is destined to play a pivotal role in the implementation of critical activities to achieve several Sustainable Development Goals (SDGs) and to end the global TB epidemic, be they old or new, or directed at patient care, surveillance, program management, advocacy, staff development or the engagement of civil society. Video consists of health information are part of digital health (Falzon et al., 2016).

In this research, an animated model was created as part of the development of an integrated digital-based health literacy module conducted to identify the level of knowledge, attitude, and behavior of DM patients and their families towards early detection of TB related DM disease, prevention of infectious disease transmission, regulation of anti-diabetic and anti-tuberculosis drugs usage through

empowering medication-taking supervisors, blood sugar levels monitoring, DM-TB complications detection, and development of adaptive coping behavior through effective stress management (Riza et al., 2016; Stevenson et al., 2007). The expected result at this period is a concept map of characteristics of knowledge, attitudes, and behavior with the aim a health literacy model can be developed regarding the risk of TB infection in DM patients to address the community's needs (Beer-Borst et al., 2018; Lauder, 2001; Okan et al., 2018; Sørensen et al., 2012), which show the patient and community intention using social media for health information. The relationship between these factors was well-explained in The Theory of Planned Behavior (Ajzen, 1991). In this theory, adoption in behavior was influenced by attitude, subjective norm, and perceived behavior control, that people could do something (Ajzen, 1991). Self-motivation might also influence a person is seeking information.

Health promotion presents a change in thinking and acting on health and its determinants, changing the meaning of health, which has traditionally been understood as the "absence of disease" (Ajzen, 1991). Self-motivation might also influence a person in seeking information.

Health promotion presents a change in thinking and acting on health and its determinants, changing the meaning of health, which has traditionally been understood as the "absence of disease" (Oliveira & Lefèvre, 2017). Health promotion is part of health literacy (Bandura, 1998; Oliveira & Lefèvre, 2017).

Health literacy needs to be related to health policy. Health actions and interventions could address social inequities in education. Disparities in education result in differentials in health literacy based on the people's ability to clearly understand the message. The engagement process in learning activities results in willingness and motivation in searching motivation. In this research, our strategy was using animation while delivering a health campaign about TB's risk in DM patients. Since social media can easily access through the internet, we also access the use of social media in delivering health information (Kurniawati, Sabila, Anand, Gupta, & Kwatra, 2020). The animated video model in this research spread information about the risk of tuberculosis among diabetes mellitus through social media. This model was considered as an easy way to make people, with various segments based on age, education, and ability to absorb information, understand (Kurniawati et al., 2020).

How patients act in adopting health information through social media in the form of animated videos needs to be looked at more deeply. Many factors influence patient behavior in seeking health information. In this research, attitude factors, perceived behavior control, social environment, health literacy, and motivation were affected in the patient's intention to seek information through social media about health information, especially about tuberculosis risk in diabetes mellitus.

METHODS

The research combined quantitative and qualitative community-based approaches to develop digital-based health literacy. The design of this research was cross-sectional and conducted on people who had been diagnosed with diabetes mellitus for at least 1 year and never seen any animation video about diabetes mellitus. Respondent’s age was 17-65 years.

Regarding the COVID-19 pandemic, the research was carried out using online methods. The eligible respondents in this research are people who lived in East Java and were diagnosed with diabetes mellitus, were asked to fill out questionnaires distributed by a google

form (https://forms.gle/gTa4k9vZCa4KQsSz8) which was conducted from April to June 2020.

The questionnaire in this research was developed in Indonesian to maintain equivalency between Bahasa Indonesia and English versions. The questionnaire contains such questions: the participant's living environment and epidemiology backgrounds such as sex, age, and length of being diagnostic as DM patients); education background on the part of developing model; reflection on the participant's situation and environment; communication that leads to reflection by the patient; lead the participant to a process of recognizing of DM and TB symptoms, prevention and adequate therapy; lead the participant to recognize their social relationships and support especially in seeking health information; search for an authentic and liberating the media communication for health information. This research used the Likert scale to measure whether the participant agrees or disagrees with the statements for reflection parts.

To attract people to participate in this research, we share the information through various social media. The research obtained 106 participants become our respondents by using the total sampling method.

The research protocol was approved by the Health Research Ethics Committee of Widya Mandala Catholic University Surabaya Faculty of Medicine with reference number 028/ WM12/KEPK/DOSEN/T/2019.

In building this animated video for health education of tuberculosis risk in diabetes mellitus, we designed it in three stages. In the first stage, the activity is directed at identifying the level of knowledge, attitudes, and behavior of diabetes mellitus patients through the questionnaire; 2) making a script for the health education video; 3) sharing the video through social media. In this research, Facebook, Whatsapp, Instagram, and Widya Mandala Catholic University Youtube Channel (Video Pembelajaran UKWMS) were used to spread the information and animation video. An animation video titled "Apa itu Diabetes Melitus (DM)" (6 mins 21 secs) delivered in Bahasa, explains what diabetes mellitus is, tuberculosis infection, how is tuberculosis risk in diabetes patients, and what to do to prevent unsuccessful treatment. This video remains in social media around one year. However, the impact of this animated video was not measured.

For analysis of animated video for the health education model, this research used Structural Equation Modeling (SEM). Primary data was obtained from distributing questionnaires either directly or in google form, measured by a Likert scale five scales. The hypothesis analysis techniques were used an inferential statistical approach and statistical program SPSS version 22 and Smart PLS 3.0.

RESULTS

One hundred six respondents were willing to involve in this research. The respondent's characteristics, including gender, age, and education status, are seen in Table 1.

Table 1. Respondents Characteristics at Baseline

Characteristic	Categories	Frequency	Percentage (%)
Gender	Male	42	39.6
	Female	64	60.4
	20 – 25 years	13	12.3

Characteristic	Categories	Frequency	Percentage (%)
	31 – 40 years	37	34.9
	≥41 years	56	52
Education Status	Diploma	1	.9
	Bachelor degree	41	38.7
	Master degree	6	5.6
	Doctoral degree	2	1.9
	High School	56	52.8

Of the 106 respondents, 60,4% (64) are women with the most age over 40 years. Respondent's education level was relatively good, 52% are high school, and 38,7% are bachelors. The age of the respondents, most of whom are above 40 years old under the distribution of DM patients in the community. Thus, the respondents of this research represent the existing condition (Table 1). All of the 106 respondents were from East Java. The distribution of their hometown is represented in Table 2. Moreover, 48,1% of respondents in this research came from Surabaya, 23,6% came from Gresik, 12,3% came from Sidoarjo, and the rest came from several cities in East Java, such as Malang, Jember, Kediri, Lamongan, and Mojokerto.

Table 2. Distribution of Respondent's City

City	Frequency	Percentage (%)
Surabaya	51	48.1
Gresik	25	23.6
Sidoarjo	13	12.3
Jember	8	7.6
Kediri	1	0.9
Lamongan	1	0.9
Malang	6	5.7
Mojokerto	1	0.9

Respondents in this research were DM patients. Therefore, the researchers' initial question was the duration of diagnosis with DM. The distribution of respondents is as in table 3. Most of the respondents in this research admitted that they were newly diagnosed with DM for about one year (49%) and less than five years (20,7%). This condition makes respondents seek information about DM and its complications, including tuberculosis infections. Based on this result, our next health education target is people diagnosed with diabetes for less than five years.

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Table 3. Duration of Diagnosed with Diabetes Mellitus

Duration	Frequency	Percentage (%)
0 – 1 year	52	49
2 – 5 years	22	20.7
6 – 10 years	13	12.3
11 – 20 years	13	12.3
> 20 years	6	5.7

Moreover, before continuing the questionnaire, participants were also asked about DM patients' tuberculosis information. Surprisingly, even though DM and TB have known as double threats (Nicholson et al., 2017), only 52,8% of respondents answered "know," and 47,2% had never received information about the risk of tuberculosis infection in DM patients. Delivering and emphasizing new scientific knowledge may dramatically change TB prevention and care. Based on this supporting data, it is concluded that this research needs to undertake.

This research also asked the personal question about whether the respondents intend to seek information for early detection and prevention of transmission of DM-TB in the future, and 100% agreed that they need to know more about this issue.

Table 4. Information Resources

Information Resources	Frequency	Percentage (%)
Public Health Center/ Clinic	7	6.6
Health Facility	6	5.6
Family/ Friends	1	0.9
Social Media (Facebook, Instagram, WhatsApp/ LINE)	16	15.1
News Media (Radio/ Newspaper/ TV)	1	0.9
All above	75	70.8

To find out the effective media for health education, this research also asked about the media that had been used by the respondent to seek out information about DM and its complication including TB. We made a list of all information resource, from social media (such as Facebook, Instagram), Radio/ Newsletter/ Television, WhatsApp/ LINE, Healthcare Facilities (Public Health Center, Hospital, Clinic), Doctor/ Nurse, and Family/ Friend (Table 4).

Less than 10% of respondents stated that they search for health information, especially about DM-TB, from the doctor and health facility information desk. This result was contradicted with the health literation's paradigm about the doctor as the leading health information resource (Cepova,

Cicvakova, Kolarcik, Markovska, & Geckova, 2018; Mccormack, Haun, Sørensen, & Valerio, 2013; Pleasant, 2014).

Surprisingly, 15.1% stated that they received information from social media, such as Facebook and Instagram, and the rest, more than 70%, was a combination of obtaining information from doctor/nurses, healthcare facilities, social media, radio/ television, WhatsApp/ Line, and family/ friends. Therefore, from this research result, it can be stated that there was no single media that would be effective for sharing health education.

Table appendix 1 finds out people living with DM's perceptions and opinions about the risk of TB infections. The question is adopted from (Baskin, 2017). According to the results in Table appendix 2, the focus of providing health education is the patient, family, and friends. The implementation of health education needs involving diabetes mellitus patients' association including friends and family members. Special attention from friends and family members increases patients' motivation to seek more information related to DM, including TB infection risk. This result supported the theory that health literacy means empowerment (Pleasant, 2014). Table Appendix 3 shows that Health literacy was measured using the Short Test of Functional Health Literacy for Adults (STOFHLA) (Baskin, 2017).

The influence of attitudes, social factors, and beliefs in motivation to seek information through social media were analyzed using SEM (Structural Equation Model) and Smart PLS 3. The measurement models were also called outer models, and structural models (structural model) was called the inner model.

The validity and reliability measurement model showed that Internal consistency (composite reliability), Convergent validity (Indicator reliability/average variance extracted), and discriminant validity all meet the requirements. Thus, this data was valid and reliable for analysis. This fitness explains how the influence of attitude, health literacy, social factors, motivation, and intention to use social media The relationship between variables and hypothesis testing is shown as follows in Table 5 and Figure 1.

Table 5. Results of Inner Model Hypothesis Analysis (Influence Between Processing Results Variables Using Boothstraping)

Direct Effect					
Hypothesis	path	Original Sample (O)	T Statistics (|O/STDEV|)	P Values	Miscellaneous
H1	Attitude -> motivation	0,584	5,488	0,000	Significant
H2	Health Literacy -> Motivation	0,161	2,230	0,026	Significant
H3	Motivation -> Intention to Use	0,647	8,579	0,000	Significant
H4	Perceived Behaviour Control -> Motivation	-0,138	2,216	0,027	Significant
H5	Social -> Motivation	0,205	2,548	0,011	Significant
Indirect Effect					
	attitude -> Intention to Use	0,378	4,229	0,000	Significant
	Health Literacy -> Intention to Use	0,104	2,124	0,034	Significant
	Perceived Behaviour Control -> Intention to Use	-0,089	2,127	0,034	Significant
	Social -> Intention to Use	0,132	2,584	0,010	Significant

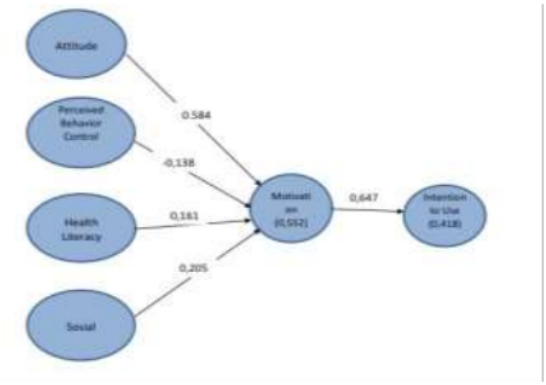

Figure 1. Model Analysis

Table 6. Perceptions and Opinions about The Risk Tuberculosis amongst People with

No.		Questions	Validity	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
		Motivation		**0,940**	**0,971**	**0,943**
1	Motivation 1	Getting information about early detection and prevention of TB transmission among DM patient is important	0,974			
2	Motivation 2	Getting information about early detection and prevention of TB transmission among DM patient is beneficial	0,968			
		Attitude		**0,329**	**0,707**	**0,572**
3	ATT1	Getting information about early detection and prevention of TB transmission among DM patient is very useful	0,953			
4	ATT2	Getting information about early detection and prevention of TB transmission among DM patient is easily	0,486			
		Perceived Behavior controll		**0,787**	**0,865**	**0,620**
5	PBC1	I could do early detection for TB infection while controlling DM condition	0,732			
6	PBC2	Early detection for TB infection while controlling DM condition is completely up to me	0,615			
7	PBC3	I can do the prevention for TB transmission	0,904			
8	PBC4	I could do the prevention of TB infection while controlling DM condition	0,867			
		Intention to Use		**1,000**	**1,000**	**1,000**
9	IU1	I am willing to seek information about early detection for TB infection while controlling DM	1			

		condition				
10	IU2	I am willing to seek information about prevention in TB infection while controlling DM condition	0,913			
		Social Support		**0,968**	**0,970**	**0,747**
1.	SOSUP1	I have got a special person who cares about how I feel when I do early detection and prevention for TB infection while controlling my DM condition	0,743			
2.	SOSUP2	I have a special person who could comfort me when I do early detection and prevention for TB infection while controlling my DM condition	0,823			
3.	SOSUP3	I get positive support from my family when I do early detection and prevention for TB infection while controlling my DM condition	0,908			
4.	SOSUP4	My family supports me in carrying out early detection and prevention for TB infection while controlling my DM condition	0,923			
5.	SOSUP5	My family help me to do early detection and prevention for TB infection while controlling my DM condition	0,868			
6.	SOSUP6	I could convey freely to my family about the problems I face when doing early detection and prevention for TB infection while controlling my DM condition	0,918			
7.	SOSUP7	My friends really support me to carry out early detection and prevention for TB infection while controlling my DM condition	0,925			
8.	SOSUP8	I could rely on my friends whenever I got problems in early detection and prevention for TB infection while controlling my DM condition	0,896			
9.	SOSUP9	I have friends to share the joys and sorrows when I do early detection and prevention for TB infection while controlling my DM condition	0,925			
10.	SOSUP10	I could share my experiences freely when doing early detection and prevention for TB infection while controlling my DM condition	0,790			
		Health Literature		**0,948**	**0,954**	**0,616**
1.	LIT2	I am aware that DM patients are at risk of TB because of impaired body defense system (immune system)	0,728			
2.	LIT3	I am aware the cause of TB is a bacterial infection/TB germ	0,802			
3.	LIT4	I am aware TB can be passed from person to person	0,841			
4.	LIT5	I am aware TB can be cured	0,777			
5.	LIT6	I am aware TB DOTS therapy can be obtained free of charge in all government health services	0,807			
6.	LIT7	I am aware smoking can cause TB	0,840			

		Health Literature		**0,948**	**0,954**	**0,616**
7.	LIT8	I am aware TB therapy is done for 6 months	0,815			
8.	LIT9	I am aware that coughing up phlegm for more than 2 weeks, night sweats, fever and or without weight loss are signs and symptoms of TB.	0,845			
9.	LIT10	I am aware that the acid-resistant sputum smear (BTA) is a mandatory examination to establish a TB diagnosis	0,752			
10.	LT11	I am aware TB can be prevented by not spitting everywhere	0,724			
11.	LIT12	I am aware that DM patients are three times more likely to get TB	0,768			

The magnitude of the regression coefficient showed that the relationship between attitude, health literacy, social factors, and perceived behavior control (PBC) toward motivation to use social media as a source of information about tuberculosis risk amongst people with diabetes mellitus showed positive coefficients, except PBC. This phenom indicated that increasing motivation in seeking information depends on not only his/herself but also family and community. The PBC result showed that when people feel they can do early detection for tuberculosis infection while controlling hyperglycaemia condition, they might not feel motivated to seek information through social media due to their previous experiences found false information.

Statistical analysis of all variables such as attitude, health literacy, social factors, and perceived behavior control toward motivation to use social media as a source of information about tuberculosis risk amongst people with diabetes mellitus showed all significant effects. The indirect effect coefficient also showed a significant coefficient. This means that motivation has an important influence in explaining how attitude, health literacy, social factors, and perceived behavior control could move people to start seeking information about tuberculosis risk amongst diabetes mellitus.

DISCUSSION

The Perception of Risk Associated DM Patients Infected with TB

The result in this research shows that health literacy as a community education effort about tuberculosis infection risk in diabetes mellitus patients' needs to pay attention to several points, which are: increasing patients knowledge, increasing patients' motivation to seek information related to health problems, especially about diabetes mellitus and its complications; optimizing information media in health facilities, including clinic and public health centers, and also increasing the involvement of family and friends support in seeking information and knowledge. This result is consistent with previous research related to health literacy (Lauder, 2001; Prasanti, 2018).

Treatment of active TB requires daily administration of medicines for at least 6 months and up to 2 years or more in the case of multidrug-resistant (MDR)-TB and extensively drug-resistant (XDR)-TB. Those conditions may lead to unfavorable outcomes with the continued spread of infection, acquisition of drug resistance, disease chronicity, and death. Diabetes Mellitus may lead to MDR-TB and XDR-TB three times higher (Kumar et al., 2017;

Parida et al., 2015). Prevention needs to be more actively done to decrease the risk of MDR, XDR, and mortality of DM-TB. This research focuses on developing the animation video for people to understand more about DM and TB, especially in risk, early detection, and prevention.

For many years, it stated that doctor and other health professionals, healthcare facility remains the main resource in gathering information. Surprisingly, in this research, less than 10% of our respondents seek out health information, especially about DM-TB, from the doctor and health facility information desk, while 70.8% of the 106 respondents stated that they received information from all resources (as seen in Table 4). Based on our result, there was no single media that would be effective for sharing health education. Then, the doctor, health professionals, and health facilities need to provide health information, especially in risk of TB among DM patients, and use several media to spread information. Research in various media spreading health information also yielded similar results (Widada, 2018).

Moreover, based on Table 4, health literacy emphasizing the risk of TB infection among DM patients was not much. Using various media for delivering health messages, such as social media, such as Facebook, Instagram, radio/ television, WhatsApp/ Line, may give better results in early detection and prevention of TB infection among DM patients.

Community Support

As seen in Table 5, respondents with DM knew and were aware that early detection and prevention for TB transmission were entirely up to them as individuals.

Furthermore, as stated in Table 6, family and friends were the most important component in supporting respondents while seeking out information in early detection and prevention for TB transmission. Community support from family/ friends may also motivate the patient in seeking health information. Nowadays, a club for diabetic patients provides by the health provider (primary health care and hospital).

This research result was related to nowadays conditions. Being around people with similar conditions may give better motivation to seek health information (Baskin, 2017). Therefore, doctors and other health professionals need to encourage more patients with diabetes, especially new cases, to join the diabetic club. Involving family and friends improves both DM and TB patients' skills in managing themselves, maintaining their blood glucose, preventing TB, and seeking health information (Kigozi, Heunis, Engelbrecht, Janse Van Rensburg, & Van Rensburg, 2017; Lauder, 2001).

The participants' education statuses were high school and above. This condition may affect health information retraining, specifically the risk of TB in DM patients, and hopefully could give better results in prevention. Research conducted by Cepova et al. stated that education status might involve a multidimensional problem of health literation (Cepova et al., 2018). The level of education may not directly relate to health literacy (Cepova et al., 2018; Riza et al., 2016). However, low health literacy may also be associated with barriers to DM patients accessing health care and engaging in health-promoting behaviors, such as seeking preventive TB infection.

There is also a need to consider appropriate selective media in presenting patient information. In the current research, the respondents passively seek information provided by medical professionals and through the information shared in the public health center, such as printed leaflets and advertisements. They also actively seek health information through social media. Therefore social media's function in providing health information such as on Facebook, Instagram, WhatsApp, and Line is

becoming more effective. The ultimate goal of health literacy is to improve the community's self-care skills (Baskin, 2017; Falzon et al., 2016; Sørensen et al., 2012).

The effective target of health literacy is patients newly diagnosed with DM or in a maximum period of 5 years, involving their family and friends. This is parallel with the government and health center's program to create diabetes mellitus associations and arrange useful activities. The animated video link in this research is https://www.youtube.com/watch?v=RhNUdRzb5NE. This video has been registered for the copyright of IPR with number 000176992.

Research Limitations and Future Research

Adequate communication might reduce conflicts, misunderstandings, achieves defined goals in this research. Moreover, direct two ways and need to respond and validate messages, both verbally and physically (proximity, posture, eye contact). However, due to the COVID-19 pandemic, this research minimized the crowd. Therefore, evaluation of the effectiveness of the animation video in delivering the message about the risk associated with DM patients infected with TB also could not be assessed.

Besides that, it is essential to assess whether a lack of motivation related to the DM patients' perceptions in searching risk of tuberculosis in hyperglycemia or lack of interest in DM patients in doing prevention against TB.

CONCLUSION

Since Diabetes Mellitus may lead to MDR-TB and XDR-TB three times higher, it is highly advised to communicate more about TB risk amongst DM patients. Theory of Planned Behavior explained the relationship between attitude, social support, perceived behavior control, health literacy, motivation, and intention to seek information in animated video form about tuberculosis risk in amongst diabetes mellitus by using social media.

Based on the patients' characteristics who were diagnosed with diabetes mellitus in East Java, it is shown that patients diagnosed with diabetes mellitus under five years are more actively seeking information about diabetes mellitus and its complications, including tuberculosis infections. The information concerning things to know for prevention and the desire to do the prevention became the first step as the result is the establishment of a brief video animation explaining diabetes mellitus and tuberculosis risk and early detection. The distribution of the animation video can be undertaken using social media (Facebook, Instagram), radio/ newsletter/ television, WhatsApp/ Line application, health facilities (public health center, hospital, clinic), doctors/ nurses, family, and friends.

Moreover, the information presented is not limited to patients and their families and friends. Actively involved in the diabetic group could also motivate DM patients in seeking health literation to achieve better health quality.

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