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Multilevel Analysis of Information Motivation Behavioral Skill Models and Its Effect on Tertiary Preventive Behavior in Elderly with Type II Diabetes Mellitus

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ABSTRACT

Background: Diabetes Mellitus (DM) is an important health condition for the elderly population, about a quarter of people over the age of 65 suffer from diabetes. Complications of type 2 diabetes increase the risk of death for sufferers. Complications and death from type 2 diabetes can be prevented by implementing tertiary preventive behavior. This study aimed to determine the influence of Integrated services post and other factors on tertiary preventive behavior for type 2 diabetes, using information motivation behavioral skill models theory.
Subjects and Method: A cross-sectional study was conducted at 25 Integrated services post in Sukoharjo Regency, Central Java from October to November 2023. A total of 200 elderly patients with type II DM were selected by the stratified random sampling. The dependent variable is tertiary preventive behavior. The independent variables used are information, motivation, behavioral skills, age and gender. Data collection was carried out by interviews and questionnaires. Data analysis uses multilevel multiple linear regression analysis.
Results: Tertiary preventive behavior is positively related to motivation (b= 0.31; 95% CI= 0.01 to 0.61; p= 0.037), behavioral skills (b= 0.74; 95% CI= 0.43 to 1.05; p= 0.001). Tertiary preventive behavior was positively related to information but was not statistically significant (b= 0.01; 95% CI= -0.30 to 0.32; p= 0.945). Tertiary preventive behavior was negatively related to age but was not statistically significant (b= -0.04; 95% CI= -0.11 to 0.01; p= 0.168) and gender (b= -0.07; 95% CI= -0.98 to 0.83; p= 0.878). Integrated services post has a contextual influence on tertiary preventive behavior in elderly patients with type-II DM (ICC= 35.99%).
Conclusion: Tertiary preventive behavior in elderly patients with type 2 DM increases with good information, strong motivation and good behavioral skills. Integrated services post has a contextual effect on tertiary preventive behavior in type 2 DM patients.

Keywords: tertiary prevention behavior, information motivation behavioral skill models, type 2 diabetes mellitus, elderly.

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BACKGROUND

The prevalence of type II diabetes mellitus in subjects aged ≥ 65 years increased from 18.4% to 24.6%. The prevalence of diabetes is estimated to increase as the population ages to 19.9% or 111.2 million people aged 65 to 79 years. This figure is predicted to continue to increase until it reaches 578 million in 2030 and 700 million in 2045 (Indonesian Ministry of Health, 2020). The IDF diabetes atlas study shows that individuals over 65 years of age show the highest prevalence of type II diabetes mellitus among all age groups, while diabetes cases in this age group worldwide are expected to increase from 122.8 million in 2017 to 253.4 million in 2045 (Cho et al., 2018).

The 2018 Basic Health Research (RISKESDAS) report by the Ministry of Health stated that there had been an increase in the prevalence of diabetes mellitus cases to 8.5%. The data above shows that the number of diabetes mellitus sufferers in Indonesia is very large. Diabetes mellitus can also have a significant impact on the quality of human resources and increase health costs for the country (Soelistijo et al., 2019). Then data on the prevalence of diabetes in Central Java in 2013 was 1.9% and in 2018 it increased by 2.1% (RISKESDAS, 2018).

Based on data from the 2020 Sukoharjo District Health Profile report, there were 15,653 cases of diabetes mellitus and this has increased in 2021 with diabetes mellitus cases becoming 17,349 cases. Several studies that have been conducted previously have shown that diet regulation, physical activity, medication compliance and insulin therapy can provide benefits in normalizing blood glucose levels (Susanto, 2021). Another factor, namely the emotional support provided by the family to elderly patients with diabetes mellitus, will enable the elderly to undergo regular self-care behavior, this is because the support provided is used as a driving force for the sufferer to carry out a therapy program and be able to carry out self-care well (Heriyanti et al., 2020).

Tertiary prevention is carried out by helping people who have chronic diseases to manage long-term health problems and injuries in order to maximize their ability to function and improve their quality of life (Institute for Work and Health, 2015). Information Motivation Behavior Skill Models is a health behavior model that can be used to prevent disease and health behavior. In the research of Liu et al. (2018) who tested the IMB model in adults with type II diabetes mellitus stated that there was a direct relationship between Information Motivation Behavior Skill Models related to behavior and skills and self-care behavior. This study aimed to determine the influence of Integrated services post and other factors on the tertiary preventive behavior of elderly patients with type 2 diabetes, using information motivation behavioral skill models theory.

SUBJECTS AND METHOD

1. Study Design

This research is a cross sectional study conducted at 25 integrated services post in the Grogol District and Tawangsari District, Sukoharjo Regency, Central Java from October to November 2023.

2. Population and Sample

The target population in this study was elderly patients (aged > 60 years) with type 2 diabetes. The sample was 200 elderly patients with type 2 DM using stratified random sampling.

3. Study Variables

The dependent variable in this study was The dependent variable is tertiary preventive behavior for DM type 2. The inde-

pendent variables at level 1 are information, motivation, behavioral skills, age and gender. The independent variable at level 2 is integrated services post.

4. Operational Definition of Variables

Type 2 diabetes tertiary prevention behavior is an effort to improve or maintain health carried out to prevent complications, prevent disability and death in type 2 diabetes patients. The measuring instrument used is a questionnaire. The continuous data scale was modified to be dichotomous.

Information on individual exposure through education, mass media, electronic media related to diabetes mellitus prevention information read or heard by respondents. The measuring instrument used is a questionnaire. The continuous data scale was modified to be dichotomous.

Motivation is a personal, social attitude and belief that an individual accepts to do something an action, whether originating from within or outside. The measuring instrument used is a questionnaire. The continuous data scale was modified to be dichotomous.

Behavioral skills are a group of abilities that a person has that influence the way they act and behave. These abilities direct aspects of individual behavior, such as emotional responses, actions taken and reactions. The measuring instrument used is a questionnaire. The continuous data scale was modified to be dichotomous.

Age is a measure of time or period in the life of a person or living creature from birth to the present. The measurement scale is continuous, then changed to dichotomy. The measuring instrument used is a questionnaire. Continuous data scale.

Gender are differences in form, nature and biological function between men and women. The measurement scale is continous. The continuous data scale was modified to be dichotomous.

Integrated services post is a place for health care carried out by, by and for the community, guided by related officers.

5. Data analysis

Univariate analysis is used to describe each dependent and independent variable, that is, data is classified according to data type. Bivariate analysis was carried out to determine variable correlation, the average difference of variables, tested using the t-test. Multivariate analysis was carried out using linear regression through a multilevel analysis approach.

6. Research Ethics

Research ethics include informed consent, anonymity, confidentiality and ethical feasibility. Ethical feasibility in this research comes from the Health Research Ethics Committee at RSUD Dr. Moewardi number: 1.849/X/HREC/2023.

RESULTS

1. Sample Characteristics

Table 1 showed the characteristics of using continuous data. Meanwhile, table 2 characteristics uses categorical data. 91 respondents (45.50%) had ≥ high school education, 16 respondents (8.00%) worked, 141 respondents (70.50%) had good information, 130 (65.00%) had high motivation, 160 (80.00%) had good behavioral skills, 115 (57.50%) have good tertiary preventive behavior.

Table 1. Sample characteristics (continous data).

Variables	n	Mean	SD	Min	Max
Age	200	65.58	5.65	60	80
Information	200	5.72	1.46	2	7
Motivation	200	7.26	1.26	4	10
Behavioral skills	200	4.41	1.35	1	6
Tertiary preventive behavior	200	10.90	3.03	4	16

Table 2. Sample characteristics (categorical data).

Characteristics	Category	Frequency (n)	Percentage (%)
Education	<Senior High School	109	54.50
	≥Senior High School	91	45.50
Occupation	Not working	184	92.00
	Working	16	8.00
Information	Poor	59	29.50
	Good	141	70.50
Motivation	Poor	70	35.00
	Good	130	65.00
Behavioral skill	Poor	40	20.00
	Good	160	80.00
Preventive behavior	Poor	85	42.50
	Good	115	57.50

2. Bivariate analysis

Bivariate analysis is used to test the influence between independent variables (information, motivation, behavioral skills) and dependent variables (tertiary preventive behavior). Table 3 showed that elderly patients with type II DM with good information (Mean= 11.32) have better tertiary prevention behavior than patients with poor information (Mean = 9.89), and this is statistically significant (p= 0.002).

Elderly patients with type II DM with high motivation (Mean = 11.08) had better tertiary prevention behavior than patients with low motivation (mean = 10.57) but this was not statistically significant (p= 0.254).

Elderly patients with type II DM with good behavioral skills (Mean= 11.60) had better tertiary prevention behavior than patients with poor behavioral skills (Mean = 8.12), and this was statistically significant (p= 0.001).

Table 3. Bivariate analysis, differences in tertiary preventive behavior based on information, motivation and behavioral skills.

Variables	Category	n	Mean	SD	p
Information	Poor	59	9.89	3.34	0.002
	Good	141	11.32	2.79	
Motivation	Low	70	10.57	3.39	0.254
	High	130	11.08	2.81	
Behavioral skill	Poor	40	8.12	2.63	0.001
	Good	160	11.60	2.71	

3. Multivariate Analysis

Table 4 showed the results of multilevel mulpiple linear regression analysis regarding tertiary preventive behavior. There is a positive but statistically insignificant relationship between information and tertiary preventive behavior. Every 1 unit increase in information score will be followed by an increase in tertiary preventive behavior of 0.01 units (b= 0.01; 95% CI= -0.30 to 0.32; p= 0.945).

There is a relationship between motivation and tertiary preventive behavior. Every 1 unit increase in motivation score will be followed by an increase in tertiary preventive behavior of 0.31 units (b= 0.31; 95% CI= 0.01 to 0.61; p= 0.037).

There is a relationship between behavioral skills and tertiary preventive behavior. Every 1 unit increase in behavioral skills score will be followed by an increase in tertiary preventive behavior of 0.74 units (b= 0.74; 95% CI = 0.43 to 1.05; p = 0.001).

There is a negative relationship but this relationship is not statistically significant. Every 1 unit increase in age score will be followed by a decrease in tertiary preventive behavior of 0.04 units (b= -0.04; 95% CI= -0.11 to 0.01; p= 0.168).

There is a difference in tertiary preventive behavior scores between male and female elderly patients, but it is not statistically significant. Female elderly patients on average had a tertiary preventive behavior score 0.07 units lower than males (b= -0.07; 95% CI= -0.98 to 0.83; p= 0.878).

In the multilevel multiple linear regression analysis model, ICC = 35.99%. This means that 35.99% of the variation in tertiary preventive behavior is determined by contextual factors at the elderly integrated services post level. The influence of contextual factors is quite large because it is greater than 8-10% as the minimum threshold value for the influence of contextual factors.

Table 4. Multilevel multiple linear regression analysis of tertiary preventive behavior with IMB skill models

Independent Variable	Regression coefficient (b)	95% CI		p
		Lower Limit	Upper Limit	
Fixed effect				
Information (score)	0.01	-0.30	0.32	0.945
Motivation (score)	0.31	0.01	0.61	0.037
Behavioral skills (score)	0.74	0.43	1.05	0.001
Age (years)	-0.04	-0.11	0.01	0.168
Female gender)	-0.07	-0.98	0.83	0.878
Random effect				
Integrated Healthcare Center				
Var (constant)	2.82	1.30	6.12	
N observation = 200				
N group = 25				
Average of group= 8,				
min = 8, max = 8				
Log likelihood = -466.58				
p<0.001				
ICC= 35.99%				

DISCUSSION

1. The relationship between information and tertiary preventive behavior

The research results show that there is a positive but statistically insignificant relationship between information and tertiary preventive behavior. Every 1 unit increase in information score will be followed by an increase in tertiary preventive behavior of 0.01 units (b= 0.01; 95% CI = -0.30 to 0.32; p = 0.945).

Individuals getting appropriate and relevant information can play an important role in stimulating individuals to adopt tertiary preventive behavior. The results of research by Ho et al. (2018) who have adequate health information or knowledge are more likely to engage in preventive behavior that can improve health. The results of this research are in line with the research results of Artborirak et al. (2023) which explains that an individual's ability to access diabetes health information is related to self-care behavior which influences blood sugar control in elderly patients with type II DM. The results show that health information as well as diabetes-related knowledge among elderly patients can motivate and encourage them to achieve the desired results.

Seangpraw et al. (2023) explained that the group that received intervention regarding information or knowledge related to diabetes resulted in a significant increase in diabetes mellitus prevention behavior. The results of this study are not statistically significant, this could be because the ability to obtain health information for each individual, especially elderly patients, will encounter several limitations. This is in accordance with the results of research by Farida (2018) explaining that each individual will have different health literacy strengths and limitations that can influence involvement in accessing health information.

2. The relationship between motivation and tertiary preventive behavior

The research results show that there is a relationship between motivation and tertiary preventive behavior. Every 1 unit increase in motivation score will be followed by an increase in tertiary preventive behavior of 0.31 units (b= 0.31; 95% CI= 0.01 to 0.61; p= 0.037).

Type II DM patients who receive motivation in the form of social support is one solution for implementing tertiary preventive behavior. According to Ramkisson et al. (2017) showed that social support is very important in helping diabetes patients overcome their disease and increase adherence to treatment and implement preventive behavior.

Kosim et al. (2017) shows that patients who receive strong family support are more likely to comply with exercise, while patients who do not receive optimal family support will be more relaxed or even disobey preventive behaviors such as exercising. This is supported by the results of Firdausi's research (2016). Patients who receive good family support will be more likely to comply with diabetes prevention behaviors such as physical exercise, whereas DM patients who receive poor family support will not comply with their treatment regimen, one of which is physical exercise. The results of this study are in line with the research results of Rambe et al. (2023) which states that there is an influence between family support and preventive behavior in diabetes mellitus patients. The condition of DM patients is vulnerable to complications, one of which is diabetic foot, at that time family support is very necessary to help DM sufferers in motivating their lives so that sufferers can make

independent efforts in fulfilling daily activities including tertiary prevention behavior.

3. Relationship between behavioral skills and tertiary preventive behavior

The research results show that there is a relationship between behavioral skills and tertiary preventive behavior. Every 1 unit increase in behavioral skills score will be followed by an increase in tertiary preventive behavior of 0.74 units (b= 0.74; 95% CI= 0.43 to 1.05; p= 0.001). Behavioral skills are needed to support good tertiary preventive behavior. By having good behavioral skills, DM sufferers can be more effective in implementing and adapting actions that can reduce or prevent the risk of disease complications.

This is in line with the research results of Eva et al. (2018) who stated that commitment to positive self-care exercises in diabetes patients requires personal abilities such as skills in nutritional management practices, physical activity, appropriate medication and the ability to regularly monitor blood glucose by patients to improve good clinical outcomes. Seangpraw et al. (2023) explained that a group of elderly DM patients who received self-care behavior skills intervention such as exercise and physical activity had an impact on significantly increasing preventive behavior.

4. The relationship between age and tertiary preventive behavior

The research results show that there is a negative relationship, but this relationship is not statistically significant. Every 1 year increase in age will be followed by a decrease in tertiary preventive behavior of 0.04 units (b= -0.04; 95% CI= -0.11 to 0.01; p= 0.168). Older people may have the view that the risk of complications is part of life and difficult to avoid and face certain physical limitations that influence the way they carry out tertiary preventive behavior. This is in line with the research results of Rogon et al. (2017) 54% of women aged up to 65 years do not accept the disease they suffer from. As many as 88% of women over the age of 65 do not accept their disease. Low acceptance results in a lack of attention to controllable risk factors such as preventive behavior in diet, independence and treatment.

Some patients may experience feelings of hopelessness or lack of motivation to undertake tertiary preventive measures because they feel that their health condition will not improve. However, this does not apply to all patients because there are patients who remain active in prevention efforts even though they are getting older. The results of this research are in line with the research of Putri et al. (2020) that age is not related to DM prevention behavior because this behavior is a person's habit that has been instilled previously. The age factor also makes no difference regarding each person's behavior.

5. The relationship between gender and tertiary preventive behavior

The results showed that there was a difference in tertiary preventive behavior scores between male and female elderly patients, but it was not statistically significant. Female elderly patients on average had a tertiary preventive behavior score 0.07 units lower than males (b= -0.07; 95% CI= -0.98 to 0.83; p= 0.878).

Elderly women have poorer preventive behavior compared to men. This is in line with the research results of Boonsatean et al. (2018) that men in this study showed higher confidence in the effectiveness of treatment than women. This may be related to their higher level of education so that men are better at preventive behavior.

Women have greater difficulties in dealing with DM, which makes them less likely to be able to deal with this disease well, resulting in poor tertiary preventive behavior. This is in line with the research results of Siddiqui et al. (2013) who explained that male diabetics were observed to live more effectively with diabetes, with less depression and anxiety. Men with diabetes were more satisfied with their disease management and experienced fewer social worries.

This is in line with the results of research by McLaughlin et al. (2016) who explained that the group of elderly women aged 65 years and over who suffer from diabetes have less active physical activity patterns than men, which has an impact on poor preventive behavior. Siddiqui et al. (2013) also explained that women experience conditions such as the burden of household work which can make it difficult for them to take medication, exercise, care for their feet, and check blood sugar and eating schedules which can influence diabetes self-care behavior.

However, the results of this study were not statistically significant. This is because women also have a social role in caring for their families, which can make them more aware of the importance of tertiary preventive behavior to avoid further complications. This is supported by the research results of Caruso et al. (2020) explains that women have the same or better self-care performance than men. In this study, women reported higher levels of diabetes prevention behavior, health promotion behavior and symptom recognition. This is reinforced by men who are active workers so it is associated with maintaining preventive behavior and inadequate self-care. This finding is in line with the research results of Arnetz et al. (2014) which shows that men are more likely to have poor preventive behavior due to smoking, drinking alcohol, and monitoring blood sugar levels less when compared to women.

6. Integrated services post contextual effects

The research results showed ICC = 35.99%. This means that 35.99% of the variation in tertiary preventive behavior is determined by contextual factors at the elderly integrated services post level. The influence of contextual factors is quite large because it is greater than 8-10% as the minimum threshold value for the influence of contextual factors.

The research results of Zhou et al. (2023) shows that respondents have utilized preventive care communities. This study explains that community social capital and individual social activity participation are related to preventive behavior in elderly patients. The intra-class correlation coefficient (ICC= 13%) shows that respondents' preventive behavior is distributed in the community where they live.

AUTHOR CONTRIBUTION

Alimah Ulfah Khairiyyah was the principal researcher who developed the conceptual framework, collected data, analyzed the data and wrote the manuscript. Bhisma Murti helps develop the conceptual framework, guides data analysis and interprets the results of data analysis. Didik Gunawan Tamtomo guided contextually in the discussion.

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CONFLICT OF INTEREST

There is no conflict of interest in this study.

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REFERENCES

Artborirak PO, Seangpraw K, Boonyathee S, Auttama N, Winaiprasert P (2023) Health literacy, self-efficacy, self-care behaviors, and glycemic control among older adults with type 2 diabetes mellitus: a cross-sectional study in Thai communities. BMC Geriatr. 23(1): 297. Doi: 10.1186/s12877-023-04010-0.

Arnetz L, Ekberg NR, Alvarsson M (2014). Sex differences in type 2 diabetes: focus on disease course and outcomes. Diabetes Metab Syndr Obes.7:409-20. Doi: 10.2147/DMSO.S51301.

Boonsatean W, Carlsson A, Dychawy Rosner I, Ostman M (2018). Sex-related illness perception and self-management of a thai type 2 diabetes population: a cross-sectional descriptive design. BMC Endocr Disord. 18(1):5. Doi:10.1186/s12902-017-0229-8. PMID:29382309; PMCID: PMC5791169.

Caruso R, Rebora P, Luciani M, Dimauro S, Ausili D (2020). Sex-related differences in self-care behaviors of adults with type 2 diabetes mellitus. Endocrine. 67(2): 354-362. Doi: 10.1007/-s12020-020-02189-5.

Cho NH, Shaw JE, Karuranga S, Huang Y, Da Rocha Ferndanes JD, Ohlrogge AW, Maldana B (2018). IDF diabetes atlas: global estimates of diabetes prevalence for 2017 dan projections for 2045. Diabetes Res. Clin. Pract. 138: 271–281. Doi: 10.1016/j.diabres.-2018.02.023.

Eva JJ, Kassab YW, Neoh CF, Ming LC, Wong YY, Abdul Hameed M, Hong YH, Sarker MMR (2018). Self-Care and self-management among adolescent t2dm patients: A Review. Front Endocrinol (Lausanne). 18;9:489. Doi: 10.3389/fendo.2018.00489.

Firdausi AZ, Sriyono, Asmoro CP (2016). Hubungan dukungan keluarga dengan kepatuhan melakukan latihan fisik dan terapi insulin pada pasien diabetes melitus tipe 1 di poliklinik penyakit dalam rsud dr. Abdoer Rahem Situbondo. CMSNJ. Doi: 10.20473/cmsnj.v4i2.12396

Heriyanti H, Mulyono S, Herlina L (2020). Dukungan keluarga terhadap self care pada lansia dengan diabetes melitus tipe 2 (Family support for self-care in elderly people with type 2 diabetes mellitus). J. Islamic Nutrition, 5(1): 32. Doi: 10.24252/join.v5i1.14145

Ho TG, Hosseinzadeh H, Rahman B, Sheikh M (2018). Health literacy and health-promoting behaviours among Australian-Singaporean communities living in Sydney metropolitan area. Proceedings of Singapore Healthcare. 27(2): 125-131. doi: 10.1177/201010581774-1906

Institute for Work and Health (2015). Primary, secondary and tertiary prevention.

Kementerian Kesehatan Republik Indonesia (2020). Infodatin tetap produktif, cegah, dan atasi diabetes melitus 2020 (Infodatin remains productive, prevents and treats diabetes mellitus 2020). Pusat Data dan Informasi Kementerian Kesehatan Republik Indonesia. 1–10.

Kosim MN, Damayanti S, Sucipto A (2017). Hubungan dukungan sosial keluarga dengan Kepatuhan olahraga pasien diabetes melitus tipe 2 di Kelompok

persadia RS PKU muhammadiyah Yogyakarta Medika respati jurnal ilmiah kesehatan. Doi: 10.35842/mr.-v0i0.86

Liu T, Wu D, Wang J, Li C, Yang R, Ge S, Du Y, et al. (2018). Testing the information-motivation-behavioural skills model of diabetes self-management among Chinese adults with tipe 2 diabetes: a protocol of a 3-month follow-up study. BMJ Open. 8(10). Doi: 10.12659/MSM.910827.

McLaughlin SJ, Connell CM, Janevic MR (2016). Gender differences in trajectories of physical activity among older americans with diabetes. J Aging Health. 28(3):460-80. Doi: 10.1177/-0898264315594136.

Putri, EA, Anisa R, Sulistyowati E (2020). Perbedaan tingkat pengetahuan dan pola perilaku pencegahan diabetes melitus tipe 2 setelah penyuluhan pola aktivitas fisik pada pendidik dan tenaga kependidikan perguruan tinggi di Malang. J. Islamic Health, 8(2), 56.

Rambe RI, Nyorong M, Nur'aini N. (2023). Faktor yang memengaruhi perilaku pencegahan diabetes melitus di wilayah kerja Puskesmas Pargarutan Kecamatan Angkola Timur Kabupaten Tapanuli Selatan. (JIKKI). 3 (2). Doi: 10.55606/jikki.v3i2.1647.

Ramkisson S, Pillay BJ, Sibanda W (2017). Social support and coping in adults with type 2 diabetes. Afr J Prim Health Care Fam Med. Jul 31;9(1):e1-e8. Doi: 10.4102/phcfm.v9i1.1405.

Riset Kesehatan Dasar (2018). Kementerian Kesehatan Republik Indonesia.

Rogon I, Kasprzak Z, Szczesniak L (2017). Perceived quality of life and acceptance of illness in people with type 2 diabetes mellitus. Prz Menopauzalny. 16(3):79-85. Doi: 10.5114/pm.2017.-70583.

Seangpraw K, Artborirak PO, Boonyathee S, Bootsikeaw S, Kantow S, Panta P, Winaiprasert P (2023). Effect of health literacy intervention on glycemic control and renal function among thai older adults at risk of type 2 diabetes mellitus. Clin Interv Aging. 18:1465-1476. Doi: 10.2147/CIA.S41-3456.

Siddiqui MA, Khan MF, Carline TE (2013). Gender differences in living with diabetes mellitus. Mater Sociomed. 25(2):140-2. Doi: 10.5455/msm.2013-.25.140-142.

Soelistijo SA. (2019). Pengelolaan dan pencegahan diabetes melitus tipe 2 dewasa di Indonesia (Management and prevention of adult type 2 diabetes mellitus in Indonesia). Perkeni.

Susanto D (2021). Perilaku perawatan diri lansia dengan diabetes melitus tipe 2. J. penelitian keperawatan kontemporer. 1(2): 39–51. Doi: 10.59894/-jpkk.v1i2.193

Zhou L, Ju P, Li Y, Liu B, Wang Y, Zhang X, Yin H (2023). Preventive health behaviors among the middle-aged and elderly in China: Does social capital matter?. Prev Med Rep. 35:102329. Doi: 10.1016/j.pmedr.2023.102329.