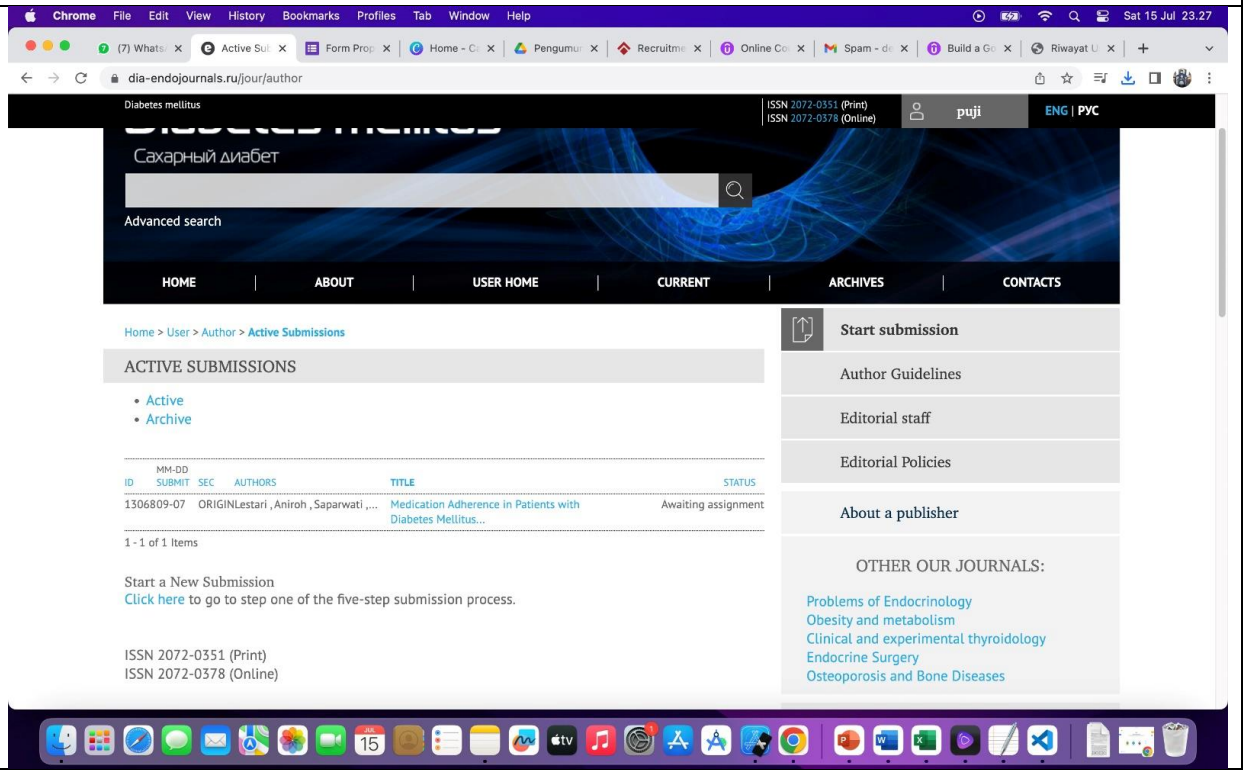
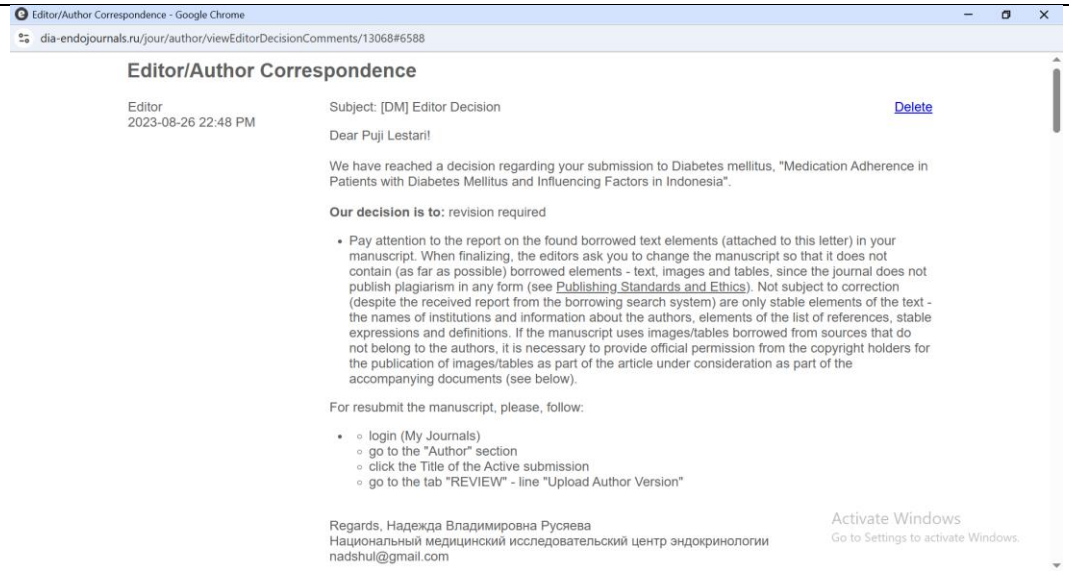
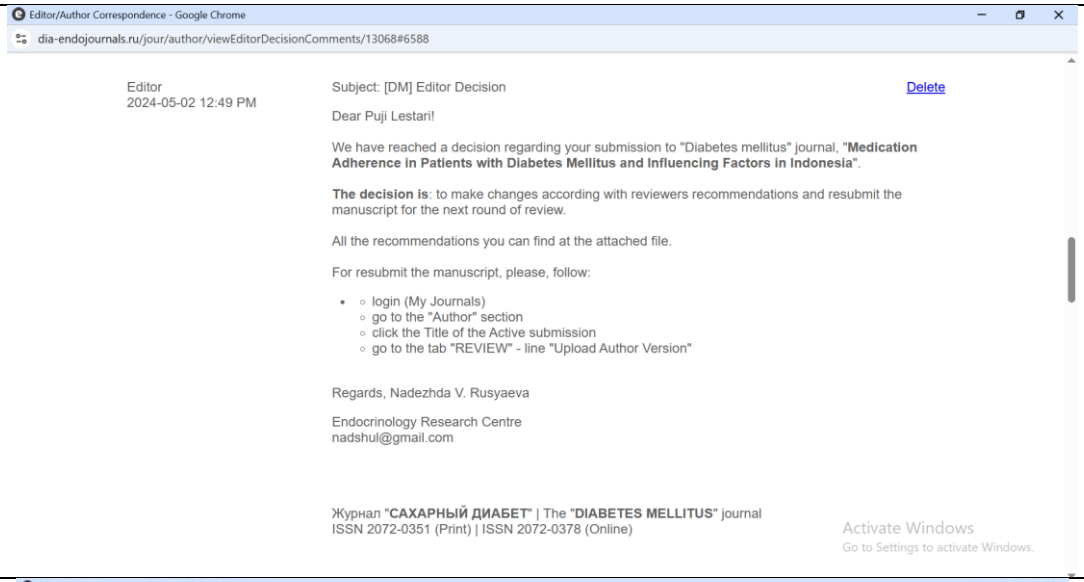
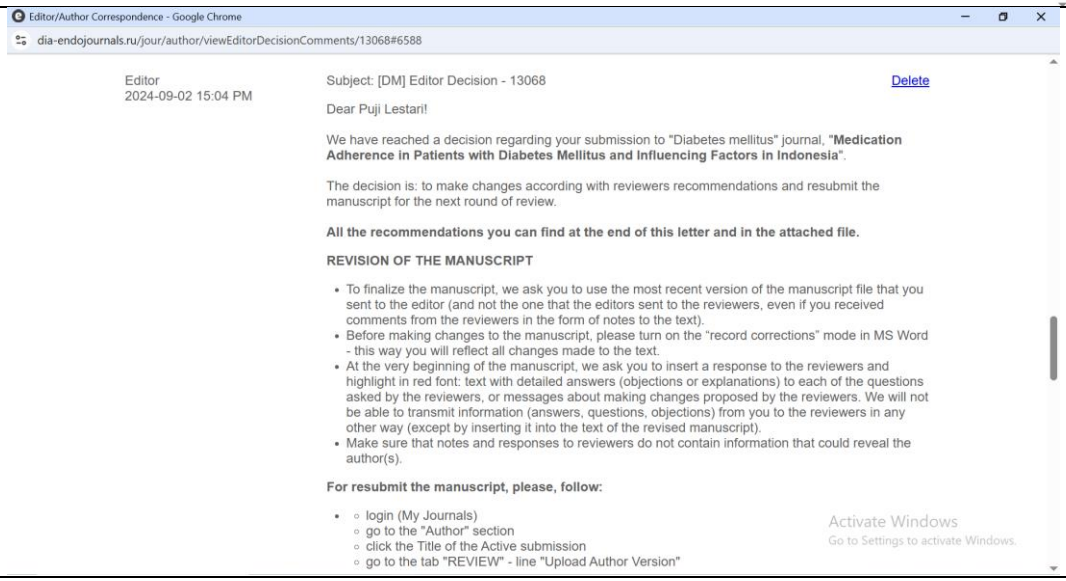
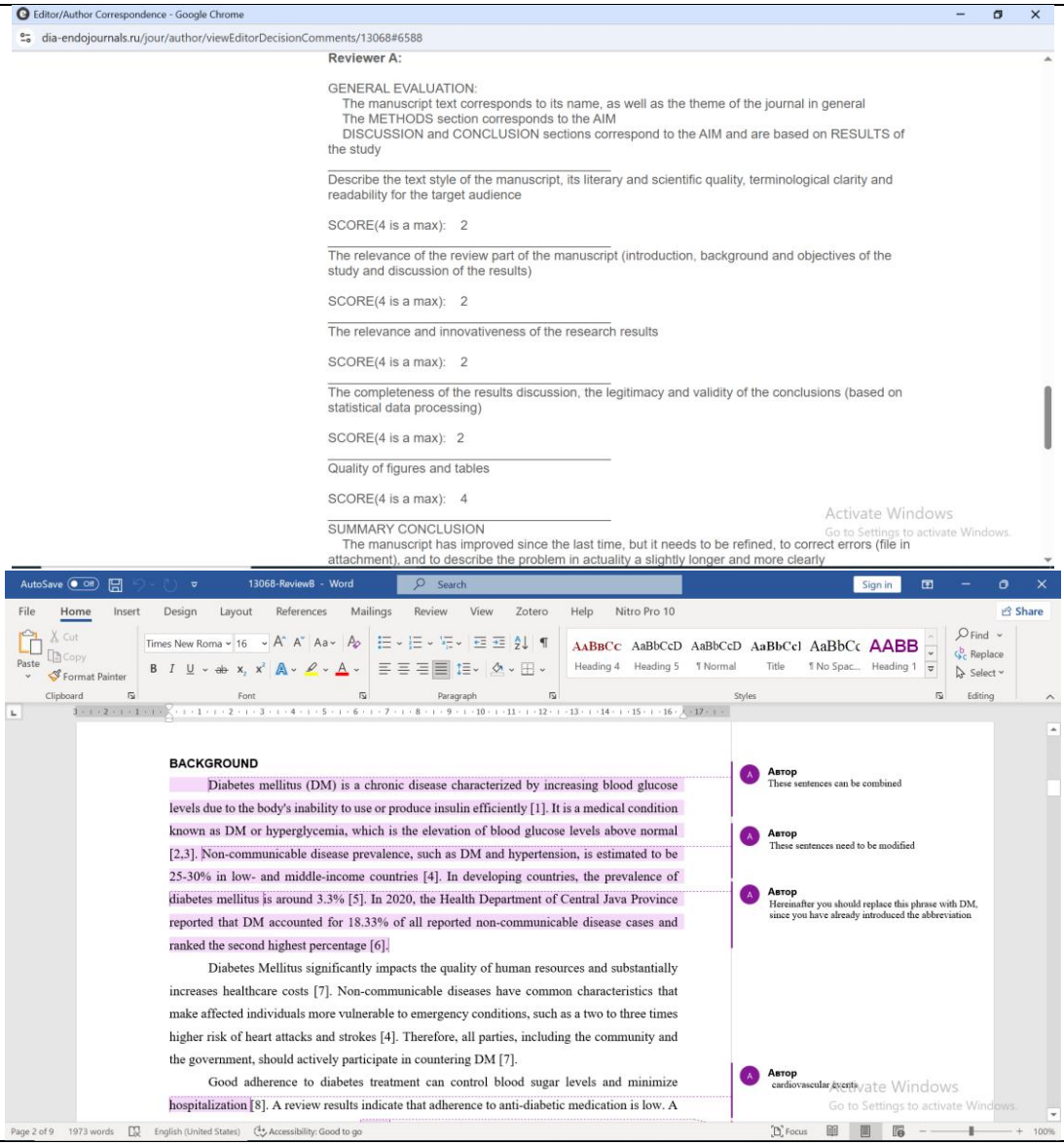
BUKTI KORESPONDENSI DENGAN HEALTHCARE IN LOW-RESOURCE SETTINGS JOURNAL

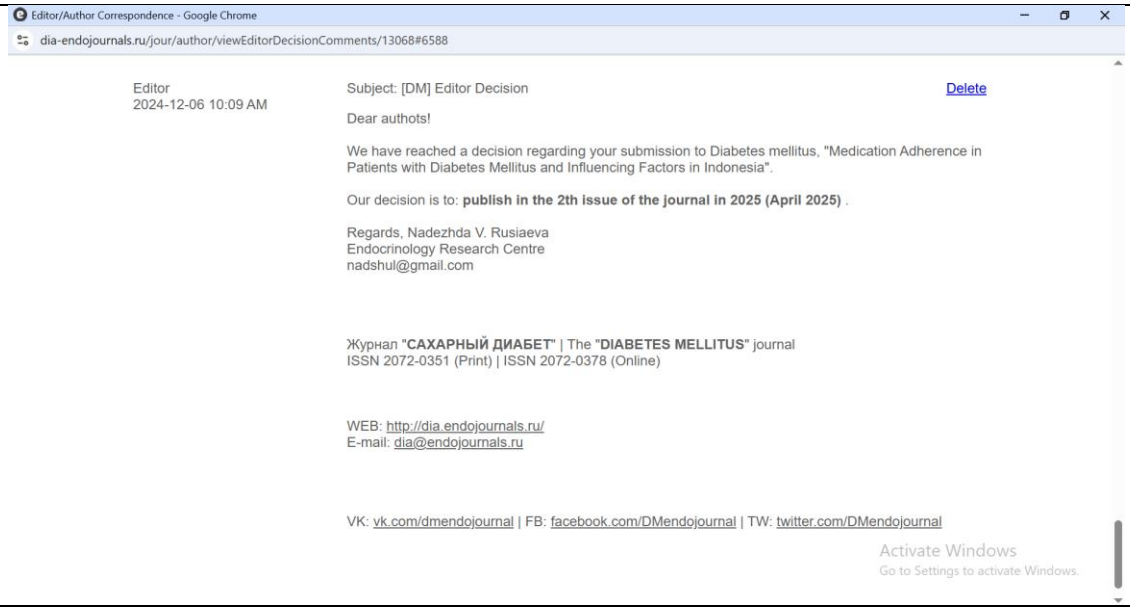
Judul: Medication Adherence in Patients with Diabetes Mellitus and Influencing Factors in Indonesia

No	Aktivitas	Tanggal	Bukti Aktivitas
1.	Submit ke sistim online jurnal Nama Jurnal: **Diabetes Mellitus** Submission link: https://www.dia-endojournals.ru/jour	15 Juli 2023	

2.	Hasil Review tahap 1: Revision required	26 Agustus 2023	
3.	Author menanyakan progress setelah revisi.	22 Desember 2023	

4.	Jawaban dari Editor atas pertanyaan author sebelumnya	2 Mei 2024	
5.	Hasil review tahap 2: Need revision	2 September 2024	


Editor/Author Correspondence - Google Chrome
dia-endojournals.ru/jour/author/viewEditorDecisionComments/13068#6588
Reviewer A:
GENERAL EVALUATION:
The manuscript text corresponds to its name, as well as the theme of the journal in general
The METHODS section corresponds to the AIM
DISCUSSION and CONCLUSION sections correspond to the AIM and are based on RESULTS of the study
Describe the text style of the manuscript, its literary and scientific quality, terminological clarity and readability for the target audience
SCORE(4 is a max): 2
The relevance of the review part of the manuscript (introduction, background and objectives of the study and discussion of the results)
SCORE(4 is a max): 2
The relevance and innovativeness of the research results
SCORE(4 is a max): 2
The completeness of the results discussion, the legitimacy and validity of the conclusions (based on statistical data processing)
SCORE(4 is a max): 2
Quality of figures and tables
SCORE(4 is a max): 4
SUMMARY CONCLUSION
The manuscript has improved since the last time, but it needs to be refined, to correct errors (file in attachment), and to describe the problem in actuality a slightly longer and more clearly
Activate Windows
Go to Settings to activate Windows.
AutoSave
13068-ReviewB - Word
Search
Sign in
File Home Insert Design Layout References Mailings Review View Zotero Help Nitro Pro 10
Share
Paste
Cut
Copy
Format Painter
Times New Roma
16
Clipboard
Font
Paragraph
Styles
Editing
Find
Replace
Select
BACKGROUND
Diabetes mellitus (DM) is a chronic disease characterized by increasing blood glucose levels due to the body's inability to use or produce insulin efficiently [1]. It is a medical condition known as DM or hyperglycemia, which is the elevation of blood glucose levels above normal [2,3]. Non-communicable disease prevalence, such as DM and hypertension, is estimated to be 25-30% in low- and middle-income countries [4]. In developing countries, the prevalence of diabetes mellitus is around 3.3% [5]. In 2020, the Health Department of Central Java Province reported that DM accounted for 18.33% of all reported non-communicable disease cases and ranked the second highest percentage [6].
Diabetes Mellitus significantly impacts the quality of human resources and substantially increases healthcare costs [7]. Non-communicable diseases have common characteristics that make affected individuals more vulnerable to emergency conditions, such as a two to three times higher risk of heart attacks and strokes [4]. Therefore, all parties, including the community and the government, should actively participate in countering DM [7].
Good adherence to diabetes treatment can control blood sugar levels and minimize hospitalization [8]. A review results indicate that adherence to anti-diabetic medication is low. A
Автор
These sentences can be combined
Автор
These sentences need to be modified
Автор
Hereinafter you should replace this phrase with DM, since you have already introduced the abbreviation
Автор
cardiovascular events
Activate Windows
Go to Settings to activate Windows.
Page 2 of 9
1973 words
English (United States)
Accessibility: Good to go
Focus
100%

6.	Accepted	6 Desember 2024	

Medication Adherence in Patients with Diabetes Mellitus and Influencing Factors in Indonesia

--удалено редактором для рецензирования--

ABSTRACT

BACKGROUND: Diabetes Mellitus significantly impacts the quality of human resources and substantially increases healthcare costs. Good adherence to diabetes treatment can control blood sugar levels and minimize hospitalization.

AIM: To determine the medication adherence profile in patients with diabetes mellitus and the influencing factors.

MATERIALS AND METHODS: A cross-sectional study was used in Kalinyamatan Primary Health Center, involving patients with diabetes mellitus attending the Primary Health Center. Primary data was collected using pretested questionnaires. We used a total sampling technique to recruit participants. To determine the factors influencing medication adherence in patients with diabetes mellitus, we conducted a logistics regression analysis.

RESULTS: Results: The study showed that medication adherence indicated low in 22 individuals (24.4%) and high in 68 individuals (75.6%). Four factors were significantly influencing medication adherence in patients with diabetes mellitus: age (p-value 0.007), education (p-value 0.048), occupation (p-value 0.012), and family support (p-value 0.002). However, two factors, namely gender (p-value 0.259) and duration of illness (p-value 0.547), were found to have no significant impact on medication adherence.

CONCLUSION: Healthcare professionals should have to motivate patients with Diabetes Mellitus to ensure adherence to their prescribed treatment regimen.

KEYWORDS: diabetes mellitus; influencing factors; medication adherence.

BACKGROUND

Diabetes mellitus (DM) is a chronic disease characterized by increasing blood glucose levels due to the body's inability to use or produce insulin efficiently [1]. It is a medical condition known as DM or hyperglycemia, which is the elevation of blood glucose levels above normal [2,3]. Non-communicable disease prevalence, such as DM and hypertension, is estimated to be 25-30% in low- and middle-income countries [4]. In developing countries, the prevalence of diabetes mellitus is around 3.3% [5]. In 2020, the Health Department of Central Java Province reported that DM accounted for 18.33% of all reported non-communicable disease cases and ranked the second highest percentage [6].

Diabetes Mellitus significantly impacts the quality of human resources and substantially increases healthcare costs [7]. Non-communicable diseases have common characteristics that make affected individuals more vulnerable to emergency conditions, such as a two to three times higher risk of heart attacks and strokes [4]. Therefore, all parties, including the community and the government, should actively participate in countering DM [7].

Good adherence to diabetes treatment can control blood sugar levels and minimize hospitalization [8]. A review results indicate that adherence to anti-diabetic medication is low. A combined analysis of six studies on good anti-diabetic medication practice determinants showed that age and place of residence are significant determinants of adherence to anti-diabetic medication in Ethiopia [9]. Factors influencing medication adherence include gender, education, employment status, duration of illness, health insurance coverage, knowledge about the disease, accessibility to healthcare services, healthcare provider's role, motivation for treatment, and family support [2,10–14]. Therefore, the present study aimed to determine the medication adherence profile in patients with diabetes mellitus and the influencing factors.

MATERIALS AND METHODS

Place and period of the research

Place of the research. The study was conducted at --удалено редактором для рецензирования-- in October 2022, involving patients with Diabetes Mellitus who visited the health center.

Populations under study

This research involved 90 respondents. We included individuals diagnosed with type 2 DM, having the disease for more than a year, and visiting the health center, and excluded the patients with DM who did not live with their families.

Method of sampling from the studied population (or several studied populations)

This research used a total sampling technique.

Study design

This study conducted a descriptive correlational design with a cross-sectional approach. Primary data collection was from Diabetes Mellitus patients who visited --удалено редактором для рецензирования--. Respondents filled out questionnaires to gather information on gender, education, age, occupation, duration of illness, family support, and medication adherence. The Perceived Social Support-Family Questionnaire (PSS-Fa) was used to measure the variable of family support while measuring medication adherence using the Morisky Adherence Scale (MMAS-8) questionnaire.

Statistical analysis

Descriptive analysis was employed to analyze the characteristics of respondents, including gender, education, age, occupation, duration of illness, family support, and medication adherence. Identifying factors influencing medication adherence used logistic regression analysis**.**

Ethics review

This study was approved by the Ethics Committee of --удалено редактором для рецензирования-- on October 25, 2022, with approval number 103/KEP/EC/UNW/2022. Informed consent was provided to all respondents before participating in the study.

RESULTS

This study included 90 individuals with Diabetes Mellitus. Most of them were female (57.8%) females, below 60 years old (83.3%), respondents had a low level of education (83.3%), were unemployed (52.2%), had two years or more of illness duration (64.4%), received good family support (61.1%), and had high medication adherence (75,6%).

---*Table 1*----

Four factors influence medication adherence among diabetes mellitus patients, namely age (p=0.007), education (p=0.048), occupation (p=0.012), and family support (p=0.002).

----*Table 2*----

DISCUSSION

Four factors significantly influence medication adherence among diabetes mellitus patients, namely age, education, occupation, and family support. The findings of this study demonstrate that age affects medication adherence, with the highest among respondents under the age of 60. As individuals age, the risk of developing various chronic diseases increases. However, the number of coexisting chronic conditions is not related to medication non-adherence. Comorbidity can influence adherence by increasing awareness levels of a particular illness [15].

Higher levels of education enable individuals to absorb information more efficiently. Predisposing factors, one of which knowledge may influence behavior. Improved knowledge leads to better adherence behavior [12]. Individuals who work have limited time to visit healthcare facilities. Those who are unemployed tend to be more adherent to their medication than those who are employed. It may be due to individuals with jobs having more responsibilities, leaving them with less time to seek medical care.

Family support, referring to verbal information, goals, tangible assistance, or actions provided by individuals familiar with the issue, plays a role in the social environment. The interconnectedness between family and the environment is known as family support [16]. Family support can impact the health of individuals with chronic diseases, as indicated by a study conducted in Klaten. Clients are more motivated to maintain their health if they have good communication and family coping mechanisms [17]. Family support is one of the reinforcing factors that contribute to adherence behavior.

Individuals can better manage their health at home due to the family's ability to identify health issues, make decisions, offer care, maintain and improve household health, and find necessary medical facilities [18]. Generally, individuals who receive assistance from their families tend to listen to medical advice compared to those who do not. Thus, family and social support are crucial for addressing health issues [19]. Family support and medication adherence in DM patients showed a significant relationship at the Internal Medicine Polyclinic of Syamsudin Hospital, Sukabumi City, according to a study conducted in Sukabumi City [20].

LIMITATIONS OF THE RESEARCH

Researchers have been unable to control other factors that may affect medication adherence in this study, namely participation in health insurance, disease knowledge, access affordability to health services, health worker's role, and motivation to look for treatment.

DIRECTIONS FOR FURTHER RESEARCH

Further research is needed to measure the various factors that influence medication adherence.

CONCLUSION

There is still a 24.4% non-adherence rate among diabetes mellitus patients. Four factors influence medication adherence among diabetes mellitus patients, namely age, education, occupation, and family support, while gender and duration of illness have no significant impact.

OTHER INFORMATION

The source of financing

The authors' funding to carry out the research.

Conflicts of interests

No conflicts of interest.

Participation of authors

Criterion of author's contribution:

1) Significant contribution: to the concept or study design or to the obtaining, data analysis, or interpreting results;
2) Writing an article or making significant (important) changes to the manuscript;
3) Manuscript approval of the final version;
4) All aspects of the work imply proper investigation and resolution of issues related to accuracy or integrity.

Author's contribution was as follow:

--удалено редактором для рецензирования--

The authors approved the article's final version before publication. They consented to be responsible for all aspects of the work, which implies proper resolution and investigation of its accuracy and integrity issues.

Acknowledgments

The authors thank the Head and staff members --удалено редактором для рецензирования--

REFERENCES

1. American Diabetes Association. Standards of Medical Care in Diabetes-2017. *Diabetes Care*. 2017;40(Supplement_1):S1-S2. doi:10.2337/dc17-S001

2. Kemenkes RI K. *Pengelolaan Dan Pencegahan Diabetes Melitus Tipe 2 Di. Indonesia*. PERKENI; 2015.

3. Astuti S, Paratmanitya Y, Wahyuningsih W. Tingkat pengetahuan dan dukungan keluarga tidak berhubungan dengan kepatuhan menjalani terapi diet penderita diabetes mellitus tipe 2 di Puskesmas Kasihan II Bantul Yogyakarta. *Jurnal Gizi dan Dietetik Indonesia (Indonesian Journal of Nutrition and Dietetics)*. 2016;3(2):105. doi:10.21927/ijnd.2015.3(2).105-112

4. World Health Organization (WHO). Noncommunicable diseases in emergencies. Published online 2016:1-7.

5. Animaw W, Seyoum Y. Increasing prevalence of diabetes mellitus in a developing country and its related factors. *PLoS ONE*. 2017;12(11):1-11. doi:10.1371/journal.pone.0187670

6. Dinkes Jateng D. *Profil Kesehatan Provinsi Jawa Tengah Tahun 2020*. Dinkes Jateng; 2020.

7. Perkeni. Konsesus Pengolahan Dan Pencegahan Diabetes Melitus Tipe 2 Diindonesia. *Perkeni 2011*. 2011;1(69):5-24.

8. Lin LK, Sun Y, Heng BH, Kwang Chew DE, Chong PN. Medication adherence and glycemic control among newly diagnosed diabetes patients. *BMJ Open Diabetes Research and Care*. 2017;5(1):1-9. doi:10.1136/bmjdrc-2017-000429

9. Yazew KG, Walle TA, Azagew AW. Prevalence of anti-diabetic medication adherence and determinant factors in Ethiopia: A systemic review and meta-analysis, 2019. *International Journal of Africa Nursing Sciences*. 2019;11:100167. doi:10.1016/j.ijans.2019.100167

10. Mubarak. *Ilmu Keperawatan Komunitas 2*. 2nd ed. Sagung Seta.; 2017.

11. Budiman dan Herlina N. Hubungan status demografi dengan kepuasan masyarakat tentang pelayanan Jamkesmas di wilayah Puskesmas Tanjungsari Kabupaten Bogor. *Jurnal Kesehatan Kartika,*. 2018;2(3):1-13.

12. Notoatmodjo S. *Promosi Kesehatan Dan Perilaku Kesehatan*. Revisi 201. Rineka cipta; 2018.

13. Suprianto, Purnawan, Arna, Kuspiantiningsih K. Dukungan Sosial Keluarga dengan Kepatuhan Menjalankan Program Pengobatan Pasien Hipertensi di URJ Jantung RSU Dr. Soetomo Surabaya. *Jurnal Keperawatan*. 2019;2(2).

14. Rasajati, Raharjo dan Ningrum R dan N. Faktor-Faktor yang Berhubungan dengan Kepatuhan Pengobatan pada Penderita Hipertensi di Wilayah Kerja Puskesmas Pudakpayung, Kota Semarang. *Jurnal Kesehatan Masyarakat (e-Journal)*. 2020;8(3):352-359.

15. Cho SJ, Kim J. Factors associated with nonadherence to antihypertensive medication. *Nursing and Health Sciences*. 2014;16(4):461-467. doi:10.1111/nhs.12145

16. Setiadi. *Konsep & Proses Keperawatan Keluarga*. Graha Ilmu; 2018.

17. Arifin, Damayanti S. Hubungan Dukungan Keluarga dengan Kepatuhan Dietdiabetes Melitus Tipe 2 di Poli Penyakit Dalam RSUP DR. Soeradji Tirtonegoro Klaten. *Jurnal Keperawatan Respati*. 2015;II(September):1-18.

18. Friedman. *Buku Ajar Keperawatan Keluarga*. 5th ed. EGC; 2014.

19. Sarafino, E.P. Edward. *Health Psychology Biopsychology Interaction. Third Edition*. John Willey and Sans.; 2014.

20. Anggraeni R. Hubungan Dukungan Keluarga dengan Kepatuhan Minum Obat Pasien DM di Poli Penyakit Dalam RSUD. R. Syamsudin, S.H. Kota Sukabumi. *Journal Health Society*. 2021;11(1):133-138.

TABLES

Table 1. Distribution of Respondents Characteristics, Duration of Illness, Family Support, and Medication Adherence

Variable	n (90)	%
Gender		
Male	38	42,2
Female	52	57,8
Age		
< 60 years old	69	76,7
≥ 60 years old	21	23,3
Education		
Low level	70	77,8
High level	20	22,2
Occupation		
Employed	36	40
Unemployed	54	60
Duration of illness		
< 2 years	32	35,6
≥ 2 years	58	64,4
Family support		
Adequate	35	38,9
Good	55	61,1
Adherence		
Low	22	24,4
High	68	75,6

Table 2. The Relationship Between Medication Adherence with Some Determinant

Variable	n (90)	Medication Adherence		OR	p-value
		Low	High		
Sex					
Male	38	7	31	0,557	0,259
Female	52	15	37		
Age					
< 60 years	69	12	57	0,232	**0,007***
≥ 60 years	21	10	11		
Education					
Low level	70	21	49	8,143	**0,048***
High level	20	1	19		
Occupation					
Employed	36	14	22	3,659	**0,012***
Unemployed	54	8	46		
Duration of illness					
< 2 years	32	9	23	1,355	0,547
≥ 2 years	58	13	45		
Family support					
Adequate	35	15	20	5,143	**0,002***
Good	55	7	48		

**Significant*

AUTHOR INFORMATION

--удалено редактором для рецензирования--

Medication Adherence in Patients with Diabetes Mellitus and Influencing Factors in Indonesia

--удалено редактором для рецензирования--

ABSTRACT

BACKGROUND: Diabetes Mellitus significantly impacts the quality of human resources and substantially increases healthcare costs. Good adherence to diabetes treatment can control blood sugar levels and minimize hospitalization.

AIM: To determine the medication adherence profile in patients with diabetes mellitus and the influencing factors.

MATERIALS AND METHODS: A cross-sectional study was used in Kalinyamatan Primary Health Center, Central Java, Indonesia, involving patients with diabetes mellitus ~~attending the Primary Health Center~~. Primary data was collected using pretested questionnaires. We used a total sampling technique to recruit participants. To determine the factors influencing medication adherence in patients with diabetes mellitus, we conducted a logistics regression analysis.

RESULTS: Results: The study showed that medication adherence indicated low in 22 individuals (24.4%) and high in 68 individuals (75.6%). Four factors were significantly influencing medication adherence in patients with diabetes mellitus: age (p-value 0.007), education (p-value 0.048), occupation (p-value 0.012), and family support (p-value 0.002). However, two factors, namely gender (p-value 0.259) and duration of illness (p-value 0.547), were found to have no significant impact on medication adherence.

CONCLUSION: Healthcare professionals should have to motivate patients with Diabetes Mellitus to ensure adherence to their prescribed treatment regimen.

KEYWORDS: diabetes mellitus; influencing factors; medication adherence.

BACKGROUND

Diabetes mellitus (DM) or hyperglycemia is a chronic disease characterized by increasing blood glucose levels due to the body's inability to use or produce insulin efficiently [1], which is the elevation of blood glucose levels above normal [2,3]. Globally, ~~It is a medical condition known as DM or hyperglycemia, which is the elevation of blood glucose levels above normal [2,3]. N~~the non-communicable disease prevalence, such as DM and hypertension, is estimated to be 25-30% in low- and middle-income countries [4] and ~~. In developing countries, the prevalence of diabetes mellitus is around~~ 3.3% in developing countries [5]. Especially in Central Java, Indonesia as low- and middle-income countries, ~~In 2020, the Health Department of Central Java Province reported that~~ DM accounted for 18.33% of all reported non-communicable disease cases and ranked the second highest percentage [6].

Diabetes Mellitus significantly impacts the quality of human resources and substantially increases healthcare costs [7]. Non-communicable diseases have common characteristics that make affected individuals more vulnerable to emergency conditions, such as a two to three times higher risk of heart attacks and strokes [4]. Therefore, all parties, including the community and the government, should actively participate in countering DM [7].

Good adherence to diabetes treatment can control blood sugar levels and minimize ~~h~~cardiovascular events~~ospitalization~~ [8]. A review results indicate that adherence to anti-diabetic medication is low. A combined analysis of six studies on ~~good~~ anti-diabetic medication practice determinants showed that age and place of residence are significant determinants of adherence to anti-diabetic medication in Ethiopia [9]. Factors influencing medication adherence include gender, education, employment status, duration of illness, health insurance coverage, knowledge about the disease, accessibility to healthcare services, healthcare provider's role, motivation for treatment, and family support [2,10–14]. Therefore, the present study aimed to determine the medication adherence profile in patients with type 2 ~~d~~Diabetes mellitus~~M~~ and the influencing factors in Kalinyamatan Primary Health Center, Central Java, Indonesia.

MATERIALS AND METHODS

Place and period of the research

Place of the research. The study was conducted at --удалено редактором для рецензирования-- in October 2022, involving patients with Diabetes Mellitus who visited the health center.

Populations under study

This research involved 90 respondents in Kalinyamatan Primary Health Center, Central Java, Indonesia. We included individuals diagnosed with type 2 DM, having the disease for more than

Commented [A1]: These sentences can be combined

Commented [A2R1]: We have revised by combining the sentences as attached.

Commented [A3]: Hereinafter you should replace this phrase with DM, since you have already introduced the abbreviation

Commented [A4R3]: We have revised as suggested

Commented [A5]: These sentences need to be modified

Commented [A6R5]: We have revised by modifying the sentences as attached

Commented [A7]: cardiovascular events

Commented [A8R7]: We have revised by adding the word "cardiovascular events" as suggested

Commented [A9]: What does this mean?

Commented [A10]: Should be specified where? And also should be specified the type of DM

Commented [A11R10]: We have revised as suggested, by adding "type 2 DM "

Formatted: Default Paragraph Font, Font: 12 pt, Font color: Custom Color(RGB(14;16;26))

Formatted: Font: 12 pt

a year, and visiting the health center, and excluded the patients with DM who did not live with their families.

Method of sampling from the studied population (or several studied populations)

This research used a total sampling technique.

Study design

This study conducted a descriptive correlational design with a cross-sectional approach. Primary data collection was from Diabetes Mellitus patients who visited --удалено редактором для рецензирования--. Respondents filled out questionnaires to gather information on gender, education, age, occupation, duration of illness, family support, and medication adherence. The Perceived Social Support-Family Questionnaire (PSS-Fa) was used to measure the variable of family support while measuring medication adherence using the Morisky Adherence Scale (MMAS-8) questionnaire.

Statistical analysis

~~Descriptive analysis was employed to analyze the characteristics of respondents, including gender, education, age, occupation, duration of illness, family support, and medication adherence.~~ The collected data from the respondents underwent a thorough review for completeness of responses, scoring, and coding. Subsequently, the data were analyzed using statistical software, SPSS version 22 ~~(IBM Corporation, Armonk, NY, USA)~~. Descriptive analysis was utilized to describe the characteristics of the respondents, including gender, education, age, occupation, duration of illness, family support, and treatment adherence. Simple and multiple logistic regression analyses were employed to determine the factors influencing treatment adherence among diabetes mellitus patients.~~Identifying factors influencing medication adherence used logistic regression analysis.~~

Ethics review

This study was approved by the Ethics Committee of --удалено редактором для рецензирования-- on October 25, 2022, with approval number 103/KEP/EC/UNW/2022. Informed consent was provided to all respondents before participating in the study.

RESULTS

Formatted: Text_05

Commented [A12]: Needs to be specified in which program the statistical analysis was made. It is also necessary to detail all methods and parameters used

Commented [A13R12]: We have revised as suggested

Commented [A14]: Poor results' description

Commented [A15R14]: We have completed the description of the results section

This study included 90 individuals with type 2 DMiabetes Mellitus. Most of them were female (57.8%) females, below 60 years old (83.3%), respondents had a low level of education (83.3%), were unemployed (52.2%), had two years or more of illness duration (64.4%), received good family support (61.1%), and had high medication adherence (75,6%).

Commented [A16]: ??

---*Table 1. Distribution of Respondents Characteristics, Duration of Illness, Family Support, and Medication Adherence* ----

Formatted: Font: Not Bold, Italic

Based on Table 1, the majority of the respondents were female (57.8%), below 60 years old (83.3%), had a low level of education (83.3%), were unemployed (52.2%), had a duration of illness of two years or more (64.4%), received good family support (61.1%), and demonstrated high medication adherence (75.6%). However, there was still a 24.4% non-adherence rate among DM patients.Based on Table 1, most of the respondents were female (57.8%), below 60 years old (83.3%), had a low level of education (83.3%), were unemployed (52.2%), had two years or more of illness duration (64.4%), received good family support (61.1%), and had high medication adherence (75.6%).

Four factors influence medication adherence among diabetes mellitus patients, namely age (p=0.007), education (p=0.048), occupation (p=0.012), and family support (p=0.002).

Formatted: Indent: First line: 1,25 cm

----*Table 2. The Relationship Between Medication Adherence with Some Determinant* ----

Formatted: Font: Not Bold, Italic

Formatted: Font: Italic

Table 2 shows that simple logistic regression analysis revealed four factors significantly influenced medication adherence (p<0.05) among DM patients: age (p=0.007, OR= 0.232, 95% CI= 0.80-0.67), education (p=0.048, OR= 8.143, 95% CI= 1.02-64.84), occupation (p=0.012, OR= 3.659, 95% CI= 1.30-10.01), and family support (p=0.002, OR= 5.143, 95% CI= 1.82-14.52). Gender and duration of illness had no significant impact in this study.

----*Table 3. Multiple Regression Medication Adherence with Some Determinant* ---

Formatted: Font: Not Bold, Italic

Factors that significantly influenced medication adherence were proceeded with multiple logistic regression analyses to identify the most impacted factor on medication adherence. Table 3 shows that occupation was the most influential factor in medication adherence (p= 0.015 and 95% CI= 1.39-20.56).

Formatted: Font: 12 pt

DISCUSSION

The research results indicate that 24.4% of respondents have low adherence, 41.1% of diabetes mellitus patients have forgotten to take their medication at some point, 33.3% did not take their medication in the last two weeks, and 37.8% forgot to bring their medication when traveling. These findings align with other studies [15], ~~such as Bekalu et al. (2022),~~ which reported that nearly half of the respondents (44.9%) were non-adherent to their prescribed medication. Additionally, 22.5% had poor ~~treatment~~ medication adherence, while the remainder fell into moderate and high adherence categories [16]~~(Abhilash et al., 2023)~~.

Four factors significantly influence medication adherence among diabetes mellitus patients, namely age, education, occupation, and family support, whereas gender and duration of illness do~~were~~ not.~~.~~ Multiple logistic regression analysis identified occupation as a significant factor influencing medication adherence, with a p-value of 0.015 (95% CI 1.39-20.56). Age and education level were found to be associated with adherence, which is consistent with the previous findings~~ of Bekalu et al . (2022)~~[15]. However, this contrasts with another study that ~~Abhilash et al. (2023), who~~ found no association between age, education level, and medication adherence in diabetes mellitus patients [16]. Among respondents aged over 60 years, 11 (52%) were classified as having high adherence. H~~Huber et al. (2016) reported that h~~igher adherence rates increase with age [17]. As individuals age, the risk of developing various chronic diseases increases. Comorbidity can influence adherence by increasing awareness ~~levels~~ of a particular illness [18].

Additionally, 19 (95%) of respondents with higher education levels had high adherence, indicating that higher education correlates with better information absorption and behavior. Behavior is influenced by predisposing factors such as knowledge; better knowledge leads to better behavior [12]. The occupation was associated with adherence, corroborating previous findings that reported a statistically significant relationship between socioeconomic class and adherence

~~Additionally, 19 (95%) of respondents with higher education levels had high adherence, indicating that higher education correlates with better information absorption and behavior. Behavior is influenced by predisposing factors such as knowledge; better knowledge leads to better behavior~~ ~~The findings of this study demonstrate that age affects medication adherence,~~

Commented [A17]: the discussion should describe in more detail the obtained results and a comparison of them with other studies, possibly giving some data in numbers.

Commented [A18R17]: We have revised as attached.

Formatted: Not Highlight

Commented [A19]: I think this statement cannot be made, since you did not ask about chronic conditions in your survey

Commented [A20R19]: We have removed this sentence "However, the number of coexisting chronic conditions is not related to medication non-adherence" and replaced with another sentences.

~~with the highest among respondents under the age of 60. As individuals age, the risk of developing various chronic diseases increases. However, the number of coexisting chronic conditions is not related to medication non-adherence. Comorbidity can influence adherence by increasing awareness levels of a particular illness [15].~~

~~Higher levels of education enable individuals to absorb information more efficiently. Predisposing factors, one of which knowledge may influence behavior. Improved knowledge leads to better adherence behavior (12).~~

~~The study also found that occupation was associated with adherence, corroborating the previous findings of Aravindakshan et al. (2021), who reported a statistically significant relationship between socioeconomic class and adherence~~ [19]. However, this is contrary to the findings [16,20] ~~of Sefah et al. (2018) and Abhilash (2023), who~~ that found no association between occupation and adherence levels. Employed individuals tend to have less time to visit healthcare facilities, while unemployed individuals are generally more adherent due to having more time for healthcare visits. ~~However, this is contrary to the findings of Sefah et al. (2018) and Abhilash (2023), who found no association between occupation and adherence levels. Employed individuals tend to have less time to visit healthcare facilities, while unemployed individuals are generally more adherent due to having more time for healthcare visits.~~

~~Individuals who work have limited time to visit healthcare facilities. Those who are unemployed tend to be more adherent to their medication than those who are employed. It may be due to individuals with jobs having more responsibilities, leaving them with less time to seek medical care.~~

Family support, referring to verbal information, goals, tangible assistance, or actions provided by individuals familiar with the issue, plays a role in the social environment. The interconnectedness between family and the environment is known as family support [21]. Family support can impact the health of individuals with chronic diseases, as indicated by a study conducted in Klaten, Indonesia. Patients~~Clients~~ are more motivated to maintain their health if they have good communication and family coping mechanisms [22]. Family support is one of the reinforcing factors that contribute to adherence behavior.

~~Individuals can better manage their health at home due to the family's ability to identify health issues, make decisions, offer care, maintain and improve household health, and find necessary medical facilities [18]. Generally, individuals who receive assistance from their families tend to listen to medical advice compared to those who do not. Thus, family and social support are crucial for addressing health issues [19]. Family support and medication adherence in DM patients showed a significant relationship at the Internal Medicine Polyclinic of Syamsudin Hospital, Sukabumi City, according to a study conducted in Sukabumi City~~

Commented [A21]: I think this statement cannot be made, since you did not ask about chronic conditions in your survey

Formatted: Indent: First line: 0 cm

Formatted: Highlight

Formatted: Not Highlight

Formatted: Highlight

Commented [A22]: Patients

Commented [A23R22]: We have revised as suggested

~~[20].~~Individuals can manage their health better at home due to the family's ability to identify health problems, make decisions, offer care, maintain and improve household health, and locate necessary medical facilities [23]. Those receiving family support are more likely to follow medical advice compared to those without such support. Thus, family and social support are crucial for addressing health issues [24]. A study in Sukabumi found a significant relationship between family support and medication adherence among diabetes mellitus patients at the Internal Medicine Clinic of R. Syamsudin, S.H. Hospital, with a chi-square test p-value of 0.000 [25].

LIMITATIONS OF THE RESEARCH

Researchers have been unable to control other factors that may affect medication adherence in this study, namely participation in health insurance, disease knowledge, access affordability to health services, health worker's role, and motivation to look for treatment.

DIRECTIONS FOR FURTHER RESEARCH

Further research is needed to measure the various factors that influence medication adherence.

CONCLUSION

There is still a 24.4% non-adherence rate among ~~diabetes mellitus~~DM patients in Central Java, Indonesia. Four factors may ~~–~~ influence medication adherence among diabetes mellitus patients, namely age, education, occupation, and family support, while gender and duration of illness have no significant impact in ~~our~~ this study.

OTHER INFORMATION

The source of financing

The authors' funding to carry out the research.

Conflicts of interests

No conflicts of interest.

Participation of authors

Criterion of author's contribution:

Formatted: Indent: First line: 1,25 cm

Commented [A24]: Where? Need to be specified

Commented [A25R24]: We have revised as suggested

Commented [A26]: may

Commented [A27R26]: We have added the word "may" as suggested

Formatted: Not Highlight

Formatted: Font: 12 pt

1) Significant contribution: to the concept or study design or to the obtaining, data analysis, or interpreting results;
2) Writing an article or making significant (important) changes to the manuscript;
3) Manuscript approval of the final version;
4) All aspects of the work imply proper investigation and resolution of issues related to accuracy or integrity.

Author's contribution was as follow:

--удалено редактором для рецензирования--

The authors approved the article's final version before publication. They consented to be responsible for all aspects of the work, which implies proper resolution and investigation of its accuracy and integrity issues.

Acknowledgments

The authors thank the Head and staff members --удалено редактором для рецензирования--

REFERENCES

Formatted: Font: (Default) Times New Roman, 12 pt

1. American Diabetes Association. Standards of Medical Care in Diabetes-2017. *Diabetes Care*. 2017;40(Supplement_1):S1-S2. doi:10.2337/dc17-S001
2. Kemenkes RI K. *Pengelolaan Dan Pencegahan Diabetes Melitus Tipe 2 Di. Indonesia*. PERKENI; 2015.
3. Astuti S, Paratmanitya Y, Wahyuningsih W. Tingkat pengetahuan dan dukungan keluarga tidak berhubungan dengan kepatuhan menjalani terapi diet penderita diabetes mellitus tipe 2 di Puskesmas Kasihan II Bantul Yogyakarta. *Jurnal Gizi dan Dietetik Indonesia (Indonesian Journal of Nutrition and Dietetics)*. 2016;3(2):105. doi:10.21927/ijnd.2015.3(2).105-112
4. World Health Organization (WHO). Noncommunicable diseases in emergencies. Published online 2016:1-7.
5. Animaw W, Seyoum Y. Increasing prevalence of diabetes mellitus in a developing country and its related factors. *PLoS ONE*. 2017;12(11):1-11. doi:10.1371/journal.pone.0187670
6. Dinkes Jateng D. *Profil Kesehatan Provinsi Jawa Tengah Tahun 2020*. Dinkes Jateng; 2020.
7. Perkeni. Konsesus Pengolahan Dan Pencegahan Diabetes Melitus Tipe 2 Diindonesia. *Perkeni 2011*. 2011;1(69):5-24.
8. Lin LK, Sun Y, Heng BH, Kwang Chew DE, Chong PN. Medication adherence and glycemic control among newly diagnosed diabetes patients. *BMJ Open Diabetes Research and Care*. 2017;5(1):1-9. doi:10.1136/bmjdrc-2017-000429
9. Yazew KG, Walle TA, Azagew AW. Prevalence of anti-diabetic medication adherence and determinant factors in Ethiopia: A systemic review and meta-analysis, 2019. *International Journal of Africa Nursing Sciences*. 2019;11:100167. doi:10.1016/j.ijans.2019.100167

10. Mubarak. *Ilmu Keperawatan Komunitas 2*. 2nd ed. Sagung Seta.; 2017.

11. Budiman dan Herlina N. Hubungan status demografi dengan kepuasan masyarakat tentang pelayanan Jamkesmas di wilayah Puskesmas Tanjungsari Kabupaten Bogor. *Jurnal Kesehatan Kartika,*. 2018;2(3):1-13.

12. Notoatmodjo S. *Promosi Kesehatan Dan Perilaku Kesehatan.* Revisi 201. Rineka cipta; 2018.

13. Suprianto, Purnawan, Arna, Kuspiantiningsih K. Dukungan Sosial Keluarga dengan Kepatuhan Menjalankan Program Pengobatan Pasien Hipertensi di URJ Jantung RSU Dr. Soetomo Surabaya. *Jurnal Keperawatan.* 2019;2(2).

14. Rasajati, Raharjo dan Ningrum R dan N. Faktor-Faktor yang Berhubungan dengan Kepatuhan Pengobatan pada Penderita Hipertensi di Wilayah Kerja Puskesmas Pudakpayung, Kota Semarang. *Jurnal Kesehatan Masyarakat (e-Journal)*. 2020;8(3):352-359.

15. Bekalu AF, Yenit MK, Tekile MT, Birarra MK. Medication-related burden and associated factors among diabetes mellitus patients at Felege Hiwot Comprehensive Specialized Hospital in northwest Ethiopia. *Front Clin Diabetes Healthc*. 2022;3:977216. doi:10.3389/fcdhc.2022.977216

16. Abhilash, Dsouza DJ, S S, et al. Factors influencing adherence towards oral hypoglycaemic agents- A cross-sectional study among patients with Type II Diabetes Mellitus. *Diabetes Epidemiology and Management*. 2023;12:100163. doi:10.1016/j.deman.2023.100163

17. Huber CA, Reich O. Medication adherence in patients with diabetes mellitus: does physician drug dispensing enhance quality of care? Evidence from a large health claims database in Switzerland. *Patient Prefer Adherence*. 2016;10:1803-1809. doi:10.2147/PPA.S115425

18. Cho SJ, Kim J. Factors associated with nonadherence to antihypertensive medication. *Nursing and Health Sciences*. 2014;16(4):461-467. doi:10.1111/nhs.12145

19. Aravindakshan R, Abraham SB, Aiyappan R. Medication Adherence to Oral Hypoglycemic Drugs among Individuals with Type 2 Diabetes Mellitus - A Community Study. *Indian J Community Med*. 2021;46(3):503-507. doi:10.4103/ijcm.IJCM_985_20

20. Alqarni AM, Alrahbeni T, Qarni AA, Qarni HMA. Adherence to diabetes medication among diabetic patients in the Bisha governorate of Saudi Arabia - a cross-sectional survey. *Patient Prefer Adherence*. 2019;13:63-71. doi:10.2147/PPA.S176355

21. Setiadi. *Konsep & Proses Keperawatan Keluarga*. Graha Ilmu; 2018.

22. Arifin, Damayanti S. Hubungan Dukungan Keluarga dengan Kepatuhan Dietdiabetes Melitus Tipe 2 di Poli Penyakit Dalam RSUP DR. Soeradji Tirtonegoro Klaten. *Jurnal Keperawatan Respati*. 2015;II(September):1-18.

23. Friedman. *Buku Ajar Keperawatan Keluarga*. 5th ed. EGC; 2014.

24. Sarafino, E.P. Edward. *Health Psychology Biopsychology Interaction. Third Edition.* John Willey and Sans.; 2014.

25. Anggraeni R. Hubungan Dukungan Keluarga dengan Kepatuhan Minum Obat Pasien DM di Poli Penyakit Dalam RSUD. R. Syamsudin, S.H. Kota Sukabumi. *Journal Health Society*. 2021;11(1):133-138.

TABLES

Table 1. Distribution of Respondents Characteristics, Duration of Illness, Family Support, and Medication Adherence

Variable	n (90)	%
Gender		
Male	38	42,2
Female	52	57,8
Age		
< 60 years old	69	76,7
≥ 60 years old	21	23,3
Education		
Low level	70	77,8
High level	20	22,2
Occupation		
Employed	36	40
Unemployed	54	60
Duration of illness		
< 2 years	32	35,6
≥ 2 years	58	64,4
Family support		
Adequate	35	38,9
Good	55	61,1
Adherence		
Low	22	24,4
High	68	75,6

Table 2. The Relationship Between Medication Adherence with Some Determinant

Variable	n (90)	Medication Adherence		OR	95% CI	p-~~value~~
		Low	High			
Sex						
Male	38	7	31	0,557	0,20-1,54	0,259
Female	52	15	37			
Age						
< 60 years	69	12	57	0,232	0,80-0,67	**0,007***
≥ 60 years	21	10	11			
Education						
Low level	70	21	49	8,143	1,02-64,84	**0,048***
High level	20	1	19			
Occupation						
Employed	36	14	22	3,659	1,30-10,01	**0,012***
Unemployed	54	8	46			
Duration of illness						
< 2 years	32	9	23	1,355	0,51-3,64	0,547
≥ 2 years	58	13	45			
Family support						
Adequate	35	15	20	5,143	1,82-14,52	**0,002***
Good	55	7	48			

**Significant*

Table 3. Multiple Regression Medication Adherence with Some Determinant

Variable	β	Adjusted OR	95% CI	p
Age	-21,582	0,000	0,00-0,01	0,998
Education	22,919	898	0,00-0,01	0,998
Occupation	1,675	5,338	1,39-20,56	**0,015***
Family support	0,880	2,410	0,66-8,81	0,184
Constant	-4,733			

**Significant*

Commented [A28]: OR need to be presented with CI

Commented [A29R28]: We have revised as suggested b

Formatted Table

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted Table

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

Formatted

AUTHOR INFORMATION

--удалено редактором для рецензирования--

Response to the reviewers:

Reviewer: The manuscript has improved since the last time, but it needs to be refined, to correct errors (file in attachment), and to describe the problem in actuality a slightly longer and more clearly.

Response: We have revised the manuscript according to the reviewer's suggestions and refined the abstract through the references section. In making these revisions, we used track changes so that the modifications can be directly viewed in the attached file.

Formatted: Normal, Line spacing: single

Medication Adherence in Patients with Diabetes Mellitus and Influencing Factors in Indonesia

--удалено редактором для рецензирования--

ABSTRACT

BACKGROUND: Diabetes Mellitus significantly impacts the quality of human resources and substantially increases healthcare costs. Good adherence to diabetes treatment can control blood sugar levels and minimize hospitalization.

AIM: To determine the medication adherence profile in patients with diabetes mellitus and the influencing factors.

MATERIALS AND METHODS: A cross-sectional study was used in Kalinyamatan Primary Health Center, Central Java, Indonesia, involving 90 patients with type 2 diabetes mellitus. Primary data was collected using pretested questionnaires. This research~~We~~ used a total sampling technique to recruit participants. To determine the factors influencing medication adherence in patients with diabetes mellitus, we conducted a logistics regression analysis.

RESULTS: ~~Results:~~ The study showed that medication adherence indicated low in 22 individuals (24.4%) and high in 68 individuals (75.6%). Four factors were significantly influencing medication adherence in patients with diabetes mellitus: age (p-value 0.007), education (p-value 0.048), occupation (p-value 0.012), and family support (p-value 0.002). However, two factors, namely gender (p-value 0.259) and duration of illness (p-value 0.547), were found to have no significant impact on medication adherence.

CONCLUSION: Healthcare professionals should have to motivate patients with Diabetes Mellitus to ensure adherence to their prescribed treatment regimen.

KEYWORDS: diabetes mellitus; influencing factors; medication adherence.

BACKGROUND

~~Diabetes mellitus (DM) or hyperglycemia is a chronic disease characterized by increasing blood glucose levels due to the body's inability to use or produce insulin efficiently [1], which is the elevation of blood glucose levels above normal [2,3].~~ Globally, the non-communicable disease prevalence, such as Diabetes mellitus (DM) and hypertension, is estimated to be 25-30% in low- and middle-income countries [1] and 3.3% in developing countries [2]. Indonesia as low- and middle-income country, ranks seventh globally in diabetes mellitus (DM) prevalence, with around 10 million adults affected [3]. Complications from type 2 DM are a leading cause of death in the country [4]. Especially in Central Java, Indonesia ~~as low- and middle-income countries~~, DM accounted for 18.33% of all reported non-communicable disease cases and ranked the second highest percentage [5]. Experts project that non-communicable diseases will cause economic losses amounting to 4.47 trillion US$ from 2012 to 2030, equivalent to 1.5 times Indonesia's 2012 Gross Domestic Product [6]. Furthermore, low public awareness about DM makes it challenging to manage blood glucose effectively, leading to various complications [7].

D~~iabetes Mellitus~~ M significantly impacts the quality of human resources and substantially increases healthcare costs [8]. Non-communicable diseases have common characteristics that make affected individuals more vulnerable to emergency conditions, such as a two to three times higher risk of heart attacks and strokes [1]. Therefore, all parties, including the community and the government, should actively participate in countering DM [8].

Research indicates that understanding the complexities of patient decision-making helps healthcare professionals engage better with individuals living with diabetes [7]. Good adherence to diabetes treatment can control blood sugar levels and minimize cardiovascular events [9]. For diabetic patients who are unaware of how to adhere to medication properly, unintentional factors such as irregular access to oral hypoglycemic agents and insulin can arise [10]. Patients with lower treatment adherence often exhibit poor glycemic control compared to those with higher adherence [11–13]. ~~A review results indicate that adherence to anti-diabetic medication is low. A combined analysis of six studies on anti-diabetic medication practice determinants showed that age and place of residence are significant determinants of adherence to anti-diabetic medication in Ethiopia [14].~~

Factors influencing medication adherence include gender, education, employment status, duration of illness, health insurance coverage, knowledge about the disease, accessibility to healthcare services, healthcare provider's role, motivation for treatment, and family support [14–19]. Age, disease duration, treatment adherence, diet, and physical activity can affect blood glucose levels [20,21]. A combined analysis of six studies on anti-diabetic medication practice

Formatted: Font color: Auto
Formatted: Font color: Auto
Formatted: Font: 12 pt, Font color: Auto
Formatted: Font: 12 pt, Font color: Auto
Formatted: Font color: Auto
Formatted: Font: 12 pt, Font color: Auto
Formatted: Default Paragraph Font, Font: 11 pt, English (United States)
Formatted: Font color: Auto
Formatted: Font: 12 pt, Font color: Auto
Formatted: Font: 12 pt, Font color: Auto
Formatted: English (United States)
Formatted: Font color: Auto
Formatted: Font: 12 pt, Font color: Auto
Formatted: Font: 12 pt, Font color: Auto
Formatted: Font: 12 pt, Font color: Auto

determinants showed that age and place of residence are significant determinants of adherence to anti-diabetic medication in Ethiopia [22]. Meanwhile, intentional factors like lack of perceived benefits from medication, fear of side effects, and increasing regimen complexity contribute to reduced medication adherence [23,24]. Therefore, the present study aimed to determine the medication adherence profile in patients with type 2 DM and the influencing factors in Kalinyamatan Primary Health Center, Central Java, Indonesia.

MATERIALS AND METHODS

Place and period of the research

Place of the research. The study was conducted at --удалено редактором для рецензирования-- in October 2022, involving patients with Diabetes Mellitus who visited the health center.

Populations under study

This research involved 90 respondents in Kalinyamatan Primary Health Center, Central Java, Indonesia. We included individuals diagnosed with type 2 DM, having the disease for more than a year, and visiting the health center, and excluded the patients with DM who did not live with their families.

Method of sampling from the studied population (or several studied populations)

~~This research used a total sampling technique.~~This research used a total sampling technique, meaning that all members of the population who met the inclusion criteria were included in the study, ensuring that the sample fully represents the studied population. The researcher wants to capture the characteristics of every individual within the population, leading to more comprehensive and generalizable findings.

Study design

This study conducted a descriptive correlational design with a cross-sectional approach to determine the medication adherence profile in patients with type 2 DM and the influencing factors in Kalinyamatan Primary Health Center, Central Java, Indonesia. Primary data collection was from Diabetes Mellitus patients who visited --удалено редактором для рецензирования--. Respondents filled out questionnaires to gather information on gender, education, age, occupation, duration of illness, family support, and medication adherence. The Perceived Social Support-Family Questionnaire (PSS-Fa) [25] was used to measure the variable

Formatted: Font color: Auto

Formatted: Font: 12 pt, Font color: Auto

Formatted: Font: 12 pt, Font color: Auto

Formatted: Font color: Auto

Formatted: Font: Times New Roman, 12 pt

Formatted: Font: 12 pt

Formatted: Normal, Indent: First line: 1,25 cm

Formatted: Font: 12 pt

Formatted: Font: 12 pt

of family support while measuring medication adherence using the Morisky Adherence Scale (MMAS-8) questionnaire [26].

Formatted: Font: 12 pt

Statistical analysis

The collected data from the respondents underwent a thorough review for completeness of responses, scoring, and coding. Subsequently, the data were analyzed using statistical software, SPSS version 22. Descriptive analysis was utilized to describe the characteristics of the respondents, including gender, education, age, occupation, duration of illness, family support, and treatment adherence. Simple and multiple logistic regression analyses were employed to determine the factors influencing treatment adherence among diabetes mellitus patients.

Formatted: Font: Not Bold

Ethics review

This study was approved by the Ethics Committee of --удалено редактором для рецензирования-- on October 25, 2022, with approval number 103/KEP/EC/UNW/2022. Informed consent was provided to all respondents before participating in the study.

RESULTS

This study included 90 individuals with type 2 DM. The data analyzed covered the characteristics of the respondents, including gender, education, age, occupation, duration of illness, family support, and treatment adherence. Table 1 provides a complete breakdown of these characteristics~~This study included 90 individuals with type 2 DM~~.

---*Table 1. Distribution of Respondents Characteristics, Duration of Illness, Family Support, and Medication Adherence* ----

Based on Table 1, the majority of the respondents were female (57.8%), below 60 years old (83.3%), had a low level of education (83.3%), were unemployed (52.2%), had a duration of illness of two years or more (64.4%), received good family support (61.1%), and demonstrated high medication adherence (75.6%). However, there was still a 24.4% non-adherence rate among DM patients.

----*Table 2. The Relationship Between Medication Adherence with Some Determinant* ----

Table 2 shows that the simple logistic regression analysis identified four factors significantly influencing medication adherence among DM patients ($p<0.05$). Age was a significant predictor

(p=0.007, OR=0.232, 95% CI= 0.80-0.67), indicating that younger patients were more likely to adhere to medication. Education level also played a significant role (p=0.048, OR=8.143, 95% CI= 1.02-64.84), suggesting that patients with higher education levels were more likely to adhere to their treatment. Occupation was another influential factor (p=0.012, OR=3.659, 95% CI= 1.30-10.01), with employed individuals showing higher adherence. Lastly, family support had a strong impact (p=0.002, OR=5.143, 95% CI= 1.82-14.52), where patients with better family support were significantly more likely to follow their medication regimen. ~~Table 2 shows that simple logistic regression analysis revealed four factors significantly influenced medication adherence (p<0.05) among DM patients: age (p=0.007, OR= 0.232, 95% CI= 0.80-0.67), education (p=0.048, OR= 8.143, 95% CI= 1.02-64.84), occupation (p=0.012, OR= 3.659, 95% CI= 1.30-10.01), and family support (p=0.002, OR= 5.143, 95% CI= 1.82-14.52).~~ However, gender (p=0.259) and duration of illness (p=0.547) did not show a significant impact on medication adherence in this study (p>0.05), indicating that these factors were not strong predictors of adherence in the sample population.~~Gender and duration of illness had no significant impact in this study.~~

----*Table 3. Multiple Regression Medication Adherence with Some Determinant* ---

Factors significantly influencing medication adherence were analyzed using multiple logistic regression to identify the most impactful factor. Table 3 shows that occupation emerged as the most influential factor in medication adherence (p=0.015, 95% CI= 1.39-20.56). It indicates that employed individuals were significantly more likely to adhere to their medication regimen compared to unemployed. The wide confidence interval suggests a strong effect, although there may be some variability in the estimate.~~Factors that significantly influenced medication adherence were proceeded with multiple logistic regression analyses to identify the most impacted factor on medication adherence. Table 3 shows that occupation was the most influential factor in medication adherence (p= 0.015 and 95% CI= 1.39-20.56).~~

DISCUSSION

The research results indicate that 24.4% of respondents have low adherence, 41.1% of diabetes mellitus patients have forgotten to take their medication at some point, 33.3% did not take their medication in the last two weeks, and 37.8% forgot to bring their medication when traveling. These findings align with other studies [27], which reported that nearly half of the respondents (44.9%) were non-adherent to their prescribed medication. Additionally, 22.5% had

poor medication adherence, while the remainder fell into moderate and high adherence categories [28].

Four factors significantly influence medication adherence among diabetes mellitus patients, namely age, education, occupation, and family support, whereas gender and duration of illness do not. Multiple logistic regression analysis identified occupation as a significant factor influencing medication adherence, with a p-value of 0.015 (95% CI 1.39-20.56). Age and education level were found to be associated with adherence, which is consistent with the previous findings [27]. However, this contrasts with another study that found no association between age, education level, and medication adherence in diabetes mellitus patients [28]. Among respondents aged over 60 years, 11 (52%) were classified as having high adherence. Higher adherence rates increase with age [29]. As individuals age, the risk of developing various chronic diseases increases. Comorbidity can influence adherence by increasing awareness of a particular illness [30].

Additionally, 19 (95%) of respondents with higher education levels had high adherence, indicating that higher education correlates with better information absorption and behavior. Behavior is influenced by predisposing factors such as knowledge; better knowledge leads to better behavior [17]. The occupation was associated with adherence, corroborating previous findings that reported a statistically significant relationship between socioeconomic class and adherence [31]. However, this is contrary to the findings [28,32] that found no association between occupation and adherence levels. Employed individuals tend to have less time to visit healthcare facilities, while unemployed individuals are generally more adherent due to having more time for healthcare visits.

Formatted: Indent: First line: 1,25 cm

Family support, referring to verbal information, goals, tangible assistance, or actions provided by individuals familiar with the issue, plays a role in the social environment. The interconnectedness between family and the environment is known as family support [33]. Family support can impact the health of individuals with chronic diseases, as indicated by a study conducted in Klaten, Indonesia. Patients are more motivated to maintain their health if they have good communication and family coping mechanisms [34]. Family support is one of the reinforcing factors that contribute to adherence behavior. Individuals can manage their health better at home due to the family's ability to identify health problems, make decisions, offer care, maintain and improve household health, and locate necessary medical facilities [35]. Those receiving family support are more likely to follow medical advice compared to those without such support. Thus, family and social support are crucial for addressing health issues [36]. A study in Sukabumi found a significant relationship between family support and medication

adherence among diabetes mellitus patients at the Internal Medicine Clinic of R. Syamsudin, S.H. Hospital, with a chi-square test p-value of 0.000 [37].

Addressing the issue of non-adherence among DM patients, healthcare providers should develop targeted educational programs, especially for older patients and those with lower education levels, emphasizing the importance of medication adherence. Involving family members in patient care is essential, as family support plays a crucial role. Workplaces should offer flexibility to help patients manage their treatment schedules. Regular monitoring and community-based interventions, such as medication reminders or visits by healthcare workers, can significantly improve adherence.

LIMITATIONS OF THE RESEARCH

Researchers have been unable to control other factors that may affect medication adherence in this study, namely participation in health insurance, disease knowledge, access affordability to health services, health worker's role, and motivation to look for treatment.

DIRECTIONS FOR FURTHER RESEARCH

Further research is needed to measure the various factors that influence medication adherence.

CONCLUSION

There is still a 24.4% non-adherence rate among DM patients in Central Java, Indonesia. Four factors may influence medication adherence among diabetes mellitus patients, namely age, education, occupation, and family support, while gender and duration of illness have no significant impact in this study.

Formatted: English (United States)

OTHER INFORMATION

The source of financing

The authors' funding to carry out the research.

Conflicts of interests

No conflicts of interest.

Participation of authors

Criterion of author’s contribution:

1) Significant contribution: to the concept or study design or to the obtaining, data analysis, or interpreting results;
2) Writing an article or making significant (important) changes to the manuscript;
3) Manuscript approval of the final version;
4) All aspects of the work imply proper investigation and resolution of issues related to accuracy or integrity.

Author's contribution was as follow:

--удалено редактором для рецензирования--

The authors approved the article's final version before publication. They consented to be responsible for all aspects of the work, which implies proper resolution and investigation of its accuracy and integrity issues.

Acknowledgments

The authors thank the Head and staff members --удалено редактором для рецензирования--

REFERENCES

1. World Health Organization (WHO). Noncommunicable diseases in emergencies. Published online 2016:1-7.
2. Animaw W, Seyoum Y. Increasing prevalence of diabetes mellitus in a developing country and its related factors. *PLoS ONE*. 2017;12(11):1-11. doi:10.1371/journal.pone.0187670
3. International Diabetes Federation. *IDF Diabetes Atlas Ninth Edition 2019*. Ninth.; 2019. Accessed September 10, 2024. https://diabetesatlas.org/upload/resources/material/20200302_133351_IDFATLAS9e-final-web.pdf
4. Badan Penelitian dan Pengembangan Kesehatan [National Institute of Health Research and Development, Ministry of Health, Republic of Indonesia]. *Laporan Nasional Riskesdas 2018 [Basic Health Research Report 2018]*. Kementerian Kesehatan Republik Indonesia; 2019. Accessed November 14, 2020. http://labdata.litbang.kemkes.go.id/images/download/laporan/RKD/2018/Laporan_Nasional_RKD2018_FINAL.pdf
5. Dinkes Jateng D. *Profil Kesehatan Provinsi Jawa Tengah Tahun 2020*. Dinkes Jateng; 2020.
6. American Diabetes Association. 2. Classification and Diagnosis of Diabetes: *Standards of Medical Care in Diabetes—2020*. *Diabetes Care*. 2020;43(Supplement_1):S14-S31. doi:10.2337/dc20-S002

Formatted: Indent: Left: 0 cm, Hanging: 0,89 cm, Space After: 0 pt, Don't add space between paragraphs of the same style, Line spacing: 1,5 lines

7. Ligita T, Wicking K, Francis K, Harvey N, Nurjannah I. How people living with diabetes in Indonesia learn about their disease: A grounded theory study. Shiyanbola OO, ed. *PLoS ONE*. 2019;14(2):e0212019. doi:10.1371/journal.pone.0212019
8. Perkeni. Konsesus Pengolahan Dan Pencegahan Diabetes Melitus Tipe 2 Diindonesia. *Perkeni 2011*. 2011;1(69):5-24.
9. Lin LK, Sun Y, Heng BH, Kwang Chew DE, Chong PN. Medication adherence and glycemic control among newly diagnosed diabetes patients. *BMJ Open Diabetes Research and Care*. 2017;5(1):1-9. doi:10.1136/bmjdrc-2017-000429
10. Basu S, Garg S, Sharma N, Singh MM, Garg S. Adherence to self-care practices, glycemic status and influencing factors in diabetes patients in a tertiary care hospital in Delhi. *WJD*. 2018;9(5):72-79. doi:10.4239/wjd.v9.i5.72
11. Adikusuma W, Qiyaam N. ADHERENCE LEVEL AND BLOOD SUGAR CONTROL OF TYPE 2 DIABETES MELLITUS PATIENTS WHO GETS COUNSELING AND SHORT MESSAGES SERVICE AS REMINDER AND MOTIVATION. *Asian J Pharm Clin Res*. 2018;11(2):219. doi:10.22159/ajpcr.2018.v11i2.22988
12. Aminde LN, Tindong M, Ngwasiri CA, et al. Adherence to antidiabetic medication and factors associated with non-adherence among patients with type-2 diabetes mellitus in two regional hospitals in Cameroon. *BMC Endocr Disord*. 2019;19(1):35. doi:10.1186/s12902-019-0360-9
13. Bagonza J, Rutebemberwa E, Bazeyo W. Adherence to anti diabetic medication among patients with diabetes in eastern Uganda; a cross sectional study. *BMC Health Serv Res*. 2015;15(1):168. doi:10.1186/s12913-015-0820-5
14. Kemenkes RI K. *Pengelolaan Dan Pencegahan Diabetes Melitus Tipe 2 Di. Indonesia*. PERKENI; 2015.
15. Mubarak. *Ilmu Keperawatan Komunitas 2*. 2nd ed. Sagung Seta.; 2017.
16. Budiman dan Herlina N. Hubungan status demografi dengan kepuasan masyarakat tentang pelayanan Jamkesmas di wilayah Puskesmas Tanjungsari Kabupaten Bogor. *Jurnal Kesehatan Kartika,*. 2018;2(3):1-13.
17. Notoatmodjo S. *Promosi Kesehatan Dan Perilaku Kesehatan.* Revisi 201. Rineka cipta; 2018.
18. Suprianto, Purnawan, Arna, Kuspiantiningsih K. Dukungan Sosial Keluarga dengan Kepatuhan Menjalankan Program Pengobatan Pasien Hipertensi di URJ Jantung RSU Dr. Soetomo Surabaya. *Jurnal Keperawatan.* 2019;2(2).
19. Rasajati, Raharjo dan Ningrum R dan N. Faktor-Faktor yang Berhubungan dengan Kepatuhan Pengobatan pada Penderita Hipertensi di Wilayah Kerja Puskesmas

Pudakpayung, Kota Semarang. *Jurnal Kesehatan Masyarakat (e-Journal)*. 2020;8(3):352-359.

20. Kalogianni A. Factors affect in patient adherence to medication regimen. 2011;5:157-158.
21. Aloudah NM, Scott NW, Aljadhey HS, Araujo-Soares V, Alrubeaan KA, Watson MC. Medication adherence among patients with Type 2 diabetes: A mixed methods study. Puebla I, ed. *PLoS ONE*. 2018;13(12):e0207583. doi:10.1371/journal.pone.0207583
22. Yazew KG, Walle TA, Azagew AW. Prevalence of anti-diabetic medication adherence and determinant factors in Ethiopia: A systemic review and meta-analysis, 2019. *International Journal of Africa Nursing Sciences*. 2019;11:100167. doi:10.1016/j.ijans.2019.100167
23. Almeida C, Rocha C, Cruz R. Impact of adverse effects to oral antidiabetics on adherence and quality of life in patients with type 2 diabetes. *European Journal of Public Health*. 2020;30(Supplement_2):ckaa040.020. doi:10.1093/eurpub/ckaa040.020
24. Mohamed MR, Ramsdale E, Loh KP, et al. Associations of Polypharmacy and Inappropriate Medications with Adverse Outcomes in Older Adults with Cancer: A Systematic Review and Meta-Analysis. *The Oncologist*. 2020;25(1):e94-e108. doi:10.1634/theoncologist.2019-0406
25. Procidano ME, Heller K. Measures of perceived social support from friends and from family: Three validation studies. *American J of Comm Psychol*. 1983;11(1):1-24. doi:10.1007/BF00898416
26. Al-Qazaz HKh, Hassali MA, Shafie AA, Sulaiman SA, Sundram S, Morisky DE. The eight-item Morisky Medication Adherence Scale MMAS: Translation and validation of the Malaysian version. *Diabetes Research and Clinical Practice*. 2010;90(2):216-221. doi:10.1016/j.diabres.2010.08.012
27. Bekalu AF, Yenit MK, Tekile MT, Birarra MK. Medication-related burden and associated factors among diabetes mellitus patients at Felege Hiwot Comprehensive Specialized Hospital in northwest Ethiopia. *Front Clin Diabetes Healthc*. 2022;3:977216. doi:10.3389/fcdhc.2022.977216
28. Abhilash, Dsouza DJ, S S, et al. Factors influencing adherence towards oral hypoglycaemic agents- A cross-sectional study among patients with Type II Diabetes Mellitus. *Diabetes Epidemiology and Management*. 2023;12:100163. doi:10.1016/j.deman.2023.100163
29. Huber CA, Reich O. Medication adherence in patients with diabetes mellitus: does physician drug dispensing enhance quality of care? Evidence from a large health claims database in Switzerland. *Patient Prefer Adherence*. 2016;10:1803-1809. doi:10.2147/PPA.S115425
30. Cho SJ, Kim J. Factors associated with nonadherence to antihypertensive medication. *Nursing and Health Sciences*. 2014;16(4):461-467. doi:10.1111/nhs.12145

31. Aravindakshan R, Abraham SB, Aiyappan R. Medication Adherence to Oral Hypoglycemic Drugs among Individuals with Type 2 Diabetes Mellitus - A Community Study. *Indian J Community Med*. 2021;46(3):503-507. doi:10.4103/ijcm.IJCM_985_20
32. Alqarni AM, Alrahbeni T, Qarni AA, Qarni HMA. Adherence to diabetes medication among diabetic patients in the Bisha governorate of Saudi Arabia - a cross-sectional survey. *Patient Prefer Adherence*. 2019;13:63-71. doi:10.2147/PPA.S176355
33. Setiadi. *Konsep & Proses Keperawatan Keluarga*. Graha Ilmu; 2018.
34. Arifin, Damayanti S. Hubungan Dukungan Keluarga dengan Kepatuhan Dietdiabetes Melitus Tipe 2 di Poli Penyakit Dalam RSUP DR. Soeradji Tirtonegoro Klaten. *Jurnal Keperawatan Respati*. 2015;II(September):1-18.
35. Friedman. *Buku Ajar Keperawatan Keluarga*. 5th ed. EGC; 2014.
36. Sarafino, E.P. Edward. *Health Psychology Biopsychology Interaction. Third Edition.* John Willey and Sans.; 2014.
37. Anggraeni R. Hubungan Dukungan Keluarga dengan Kepatuhan Minum Obat Pasien DM di Poli Penyakit Dalam RSUD. R. Syamsudin, S.H. Kota Sukabumi. *Journal Health Society*. 2021;11(1):133-138.

TABLES

Table 1. Distribution of Respondents Characteristics, Duration of Illness, Family Support, and Medication Adherence

Variable	n (90)	%
Gender		
Male	38	42,2
Female	52	57.8
Age		
< 60 years old	69	76.7
≥ 60 years old	21	23.3
Education		
Low level	70	77.8
High level	20	22.2
Occupation		
Employed	36	40
Unemployed	54	60
Duration of illness		
< 2 years	32	35.6
≥ 2 years	58	64,4
Family support		
Adequate	35	38.9
Good	55	61.1
Adherence		
Low	22	24.4
High	68	75.6

Table 2. The Relationship Between Medication Adherence with Some Determinant

Variable	n (90)	Medication Adherence		OR	95% CI	p
		Low	High			
Sex						
Male	38	7	31	0.557	0.20-1.54	0.259
Female	52	15	37			
Age						
< 60 years	69	12	57	0.232	0.80-0.67	**0.007***
≥ 60 years	21	10	11			
Education						
Low level	70	21	49	8.143	1.02-64.84	**0.048***
High level	20	1	19			
Occupation						
Employed	36	14	22	3.659	1.30-10.01	**0.012***
Unemployed	54	8	46			
Duration of illness						
< 2 years	32	9	23	1.355	0.51-3.64	0.547
≥ 2 years	58	13	45			
Family support						
Adequate	35	15	20	5.143	1.82-14.52	**0.002***
Good	55	7	48			

**Significant*

Table 3. Multiple Regression Medication Adherence with Some Determinant

Variable	β	Adjusted OR	95% CI	p
Age	-21.582	0.000	0.00-0,01	0.998
Education	22.919	898	0.00-0,01	0.998
Occupation	1.675	5.338	1.39-20.56	**0.015***
Family support	0.880	2.410	0.66-8.81	0.184
Constant	-4.733			

**Significant*

AUTHOR INFORMATION

--удалено редактором для рецензирования--