


Description of the Level of Knowledge About Insulin Injection in Patients with Type 2 Diabetes Mellitus at Anutapura Public Hospital, Palu, In 2024

Magfirah Melati Putri Pilomonu¹, Maria Rosa Da Lima Rupa¹, Misriyani^{1*}

¹ Department of Medical Education, Faculty of Medicine, University of Alkhairaat, Palu, Jl. Diponegoro 94221, Central Sulawesi

*Authors Correspondence: misriyani85@gmail.com

ARTICLE INFO	ABSTRACT
Article History: Received Accepted Published online	<i>The World Health Organization (WHO) predicts an increase in the number of people with diabetes mellitus in Indonesia from 8.4 million in 2000 to approximately 21.3 million in 2030. The objective is to determine the level of knowledge about Insulin in patients with type 2 Diabetes Mellitus at Anutapura Palu Regional General Hospital.</i>
Keywords: Insulin Injection; Diabetes Mellitus;	<i>This study used a quantitative descriptive design using a cross-sectional design to describe the level of knowledge of type 2 DM patients regarding insulin injection at Anutapura Palu Regional General Hospital. This research is descriptive, using primary data taken directly by giving questionnaires to patients with type 2 DM who use insulin at Anutapura Regional General Hospital as many as 85 samples. The characteristics of the respondents based in the gender of the respondents were mostly female. Age is mostly in the age range of 46-55 years. The last education of the majority of respondents has a secondary education level (SMA, MA, SMK). The most common occupation of respondents in this study is working as a housewife (IRT). The majority of respondents used insulin for 1 year. The description of the level of knowledge of respondents who have good knowledge as many as 25 respondents (29,4%), sufficient knowledge as many as 43 respondents (50,6%), and poor knowledge as many as 17 respondents (20,0%). Based on the results of the study, it can be concluded that most patients with type 2 diabetes mellitus at Anutapura Palu regional General Hospital have a sufficient level of knowledge regarding insulin injection. However, there are still respondents with insufficient knowledge who need further education.</i>
This is an open access article under the  CC-BY-SA license.	

INTRODUCTION

Diabetes mellitus is a chronic disease that occurs when the pancreas does not produce sufficient insulin or when the body is unable to effectively utilize the insulin produced.¹

The World Health Organization (WHO) predicts an increase in the number of people with diabetes mellitus in Indonesia from 8.4 million in 2000 to approximately 21.3 million in 2030. This projection indicates a 2–3-fold increase in the number of diabetes mellitus cases by 2035 in Indonesia.²

One of the most commonly used therapies in patients with diabetes mellitus is insulin therapy. Insulin is essential for patients with type 1 diabetes mellitus and is also used in patients with type 2 diabetes mellitus when oral antidiabetic medications are no longer effective. Insulin is a natural hormone produced by the pancreas. It is required by body cells to process and utilize glucose; from glucose, cells generate the energy needed to carry out their functions.³

According to a study by Vonna Azzizah et al. (2021) on the evaluation of knowledge and skills among patients with type 2 diabetes mellitus in

using insulin pens, it was found that the majority of respondents still performed insulin pen injections incorrectly (97.7%). The most neglected aspect among respondents was skill in insulin use. Knowledge is very important in the use of insulin pens to prevent hyperglycemia or hypoglycemia and to achieve optimal therapeutic outcomes.

Based on this background, type 2 diabetes mellitus is a medical condition with an increasing prevalence, particularly with advancing age and the aging global population. The use of insulin, especially insulin pens, has become an important method in diabetes management. However, proper understanding and knowledge regarding the correct use of insulin pens remain a challenge that requires special attention. Therefore, many patients with type 2 diabetes mellitus still lack adequate understanding and knowledge regarding insulin injection, making it important to conduct a study on the overview of knowledge levels regarding insulin injection among patients with type 2 diabetes mellitus at Anutapura Regional General Hospital, Palu.

MATERIAL AND METHOD

Research Design

This study employed a quantitative descriptive design using a cross-sectional approach to describe the level of knowledge of patients with type 2 diabetes mellitus regarding insulin injection at Anutapura Regional General Hospital, Palu. The cross-sectional design was chosen because it allows the measurement of research variables, including respondent characteristics and knowledge levels, to be conducted at a single point in time

Time and Place of Research

This study was conducted from September 09, 2024, to February 25, 2025 at Anutapura Regional General Hospital, located at Jl. Kangkung No.1 Donggala Kodi, Ulujadi District, Palu City, Central Sulawesi Province.

Population and Sample

The population included all patients with type 2 diabetes mellitus using insulin who underwent outpatient treatment at Anutapura Regional

General Hospital, totaling 565 patients. The study subjects are 85 samples of respondents.

Data Presentation

Univariate analysis was performed to determine the frequency distribution and percentages (proportions) in describing the level of knowledge regarding insulin injection. Data processing in this study was carried out using computer-based methods with the SPSS 29.0 application.

RESULTS AND DISCUSSIONS

This study was conducted at Anutapura Regional General Hospital, Palu, from December 2024 to February 2025. The research subjects were patients who met the inclusion criteria at Anutapura Regional General Hospital, totaling 85 respondents.

Data Collection was carried out by administering questionnaires that had been distributed to patients regarding the description of the level of knowledge about insulin injection among patients with type 2 diabetes mellitus, which was categorized into good, moderate, and poor level of knowledge.

The results of the statistical analysis are presented systematically as follows:

1. Respondent Characteristics

The sample characteristics were based on gender, age, last education level, occupation and duration of insulin use.

Table 1. Frequency Distribution of Respondents Based on Gender at Anutapura Regional General Hospital Palu

Gender	n	%
Male	37	43.5%
Female	48	56.5%
Total	85	100.0%

Based on Table 1, the frequency distribution of respondent characteristics in this study shows that patients at Anutapura Regional General Hospital, Palu, who participated as

respondents based on gender consisted of 37 male respondents (43.5%) and 48 female respondents (56.6%).

Table 2. Frequency Distribution of Respondents Based on Age at the Anutapura Regional General Hospital Palu

Education Level	n	%
26 – 35	7	8.2 %
36 – 45	14	16.5 %
46 - 55	37	43.5 %
> 55	27	31.8 %
Total	85	100.0%

Based on Table 2, the frequency distribution of respondent characteristics in this study shows that patients at Anutapura Regional General Hospital, Palu, based on age were distributed as follows : 26-35 years consisted of 7 respondents (8.2%), 36-45 years consisted of 14 respondents (16.5%), 46-55 years consisted of 37 respondents (43.5%), and >55 years consisted of 27 respondents (31.8%)

Table 3. Frequency Distribution of Respondents Based on Educational Level at Anutapura Regional General Hospital, Palu

Nutritional Status	n	%
Primary Education	20	23.5 %
Secondary Education	36	42.4 %
Higher Education	29	34.1 %
Total	85	100 %

Based on table 3, the frequency distribution of respondents based on their last educational level shows that 20 respondents (23.5%) had primary education, 36 respondents (42.4%) had secondary education, and 29 respondents (34.1%) had higher education.

Table 4. Frequency Distribution of Respondents Based on Occupation at Anutapura Regional Hospital, Palu

Occupation	n	%
Housewife	23	27.1
Employee	15	17.6
Retired	9	10.6
Farmer	3	3.5
Civil Servant	16	18.8
Entrepreneur	19	22.4
Total	85	100

Based on table 4, the frequency distribution of respondents characteristics in this study shows that patients at Anutapura Regional General Hospital, Palu, based on occupation were distributed as follows: Housewife accounted for 23 respondents (27.1%), Employee for 15 respondents (17.6%), Retirees for 9 respondents (10.6%), farmers for 3 respondents (3.5%), government employees for 16 respondents (18.8%), and self-employed respondents for 19 respondents (22.4%).

Table 5. Frequency Distribution of Respondents Based on Duration of Insulin Use at Anutapura Regional General Hospital, Palu

Duration of Insulin Use	Frequency	%
< 1 Year	40	47.1
1-2 Year	38	44.7
3-5 Year	7	8.2
Total	85	100

2. Overview of the Level of Knowledge Regarding Insulin Injection Among Patients with Type 2 Diabetes Mellitus at Anutapura Regional General Hospital, Palu

Table 6. Distribution of Respondents Based on Knowledge Level Among Patients with Type 2 Diabetes Mellitus at Anutapura Regional General Hospital, Palu

Knowledge Level	Frequency	%
Good	25	29.4%
Moderate	43	50.6%
Poor	17	20.0%
Total	85	100

Based on Table 6, it shows that among patients with type 2 diabetes mellitus using insulin pens at Anutapura Regional General Hospital, Palu, 25 respondents (29.4%) had good knowledge, 43 respondents (50.6%) had moderate knowledge, and 17 respondents (20.0%) had poor knowledge.

DISCUSSION

1. Characteristics of Respondents with Type 2 Diabetes Mellitus

a. Gender Characteristics

Based on Table 1, among 85 respondents in this study, the majority were female, totaling 48 respondents (56.5%).

This finding is consistent with a study conducted by Wahyu Tonato⁴, which reported that females were more frequently affected by type 2 diabetes mellitus, accounting for 10 respondents (30%). Diabetes mellitus is more prevalent in females due to differences in insulin sensitivity in muscle and liver tissues. Additionally, the balance of estrogen hormones influences blood glucose levels; increased estrogen levels may lead to insulin resistance.⁵

b. Age Characteristics

Based on Table 2, among the 85 respondents, the majority were in the age group of 46–55 years, totaling 37 respondents (43.5%).

These findings are consistent with research conducted by Ramadani⁶, which stated that an increase in blood glucose levels begins around the age of 45 years and continues to rise with increasing age. This is also supported by a study by Enggar Fitria Nur Susanti⁷, which reported that individuals over 45 years old have a higher risk of developing diabetes mellitus and glucose intolerance. This condition is associated with degenerative factors leading to decreased

function of pancreatic beta cells in producing insulin for glucose metabolism.

c. Educational Level Characteristics

Based on Table 3, the results of this study among 85 respondents showed that the majority had a secondary education level (Senior High School/Vocational High School), totaling 36 respondents (42.4%).

This finding is in line with a study by Ega Aprilianti⁸, which showed that most respondents had a high school/vocational high school education level, totaling 29 respondents (82.9%).

d. Occupational Characteristics

Based on Table 4, the results of this study among 85 respondents showed that the majority were homemakers, totaling 23 respondents (27.1%).

This finding is consistent with research conducted by Syahla Faizasha⁹, which indicated that most respondents were homemakers, totaling 28 respondents (40.0%). Activities performed by homemakers are generally more home-based. According to the American Diabetes Association¹⁰, women, especially those without formal employment, tend to have lower levels of physical activity compared to those working outside the home. This lack of activity increases the risk of insulin resistance and obesity, which are major contributing factors in the development of type 2 diabetes mellitus.

e. Duration of Insulin Use Characteristics

Based on Table 5, among the 85 respondents in this study, the majority had used insulin for less than 1 year, totaling 40 respondents (47.1%).

This finding is consistent with a study conducted by Wahyu Tanoto⁴, which reported that respondents who had used insulin for less than 1 year totaled 10 respondents (63%). This indicates that patients who have recently started using insulin may not yet fully master the techniques and understanding required for independent diabetes management.

2. Overview of Knowledge Level Regarding Insulin Injection Among Patients with Type 2 Diabetes Mellitus at Anutapura Regional General Hospital, Palu

Knowledge about diabetes is an important component for both control and prevention. With adequate knowledge, individuals are able to determine appropriate self-management strategies and behaviors to manage their condition.¹¹

Based on Table 6, data obtained from 85 respondents who used insulin pens showed that 25 respondents (29.4%) had good knowledge, 43 respondents (50.6%) had moderate knowledge, and 17 respondents (20.0%) had poor knowledge. From these data, it can be seen that the majority of respondents (50.6%) had a moderate level of knowledge regarding insulin use.

This finding is consistent with a study conducted by Issang¹², which reported that the majority of respondents had a moderate level of knowledge. It is also in line with research conducted by Tjok Dwi Agustyawan Pemayun¹³, which found that most respondents had moderate knowledge, totaling 60 respondents (63.2%).

CONCLUSION

Based on the results of the study conducted on the Overview of Knowledge Level Regarding Insulin Injection Among Patients with Type 2 Diabetes Mellitus at Anutapura Regional General Hospital, Palu, the findings are as follows:

1. The characteristics of respondents based on gender showed that the majority were female. The most common age range was 46–55 years. Most respondents had a secondary level of education (senior high school/vocational school). The majority of respondents were homemakers. Most respondents had used insulin for less than 1 year.
2. The distribution of respondents' knowledge levels showed that 25 respondents (29.4%) had good knowledge, 43 respondents (50.6%) had moderate knowledge, and 17 respondents (20.0%) had poor knowledge.

Based on these findings, it can be concluded that most patients with type 2 diabetes mellitus at Anutapura Regional General Hospital, Palu, have a moderate level of knowledge regarding insulin injection. However, there are still respondents

with a low level of knowledge who require further education.

AUTHOR CONTRIBUTIONS

Conceptualization, M.M.P.P, M.R.D.L.R, M; Methodology, M.M.P.P.; Validation, M.R.D.L.R, M.; Formal Analysis, M.M.P.P.; Investigation, M.M.P.P., Resources, M.M.P.P.; Data Curation, M.M.P.P.; Writing-Original Draft Preparation, M.M.P.P., M.R.D.L.R and M.; Visualization, M.M.P.P. All authors have read and agreed to the published version of the manuscript.

CONFLICTS OF INTEREST

The authors declares that there is no conflict of interest.

REFERENCES

1. PERKENI. (2021a). *Guidelines for the Management and Prevention of Type 2 Diabetes Mellitus in Indonesia*.
2. World Health Organization (WHO). (2023). *Diabetes mellitus*.
3. American Diabetes Association (ADA). (2018). *Standards of Medical Care in Diabetes—2018*. Diabetes Care. <https://www.copyright.com>
4. Tanoto, W. (2023). *Patient knowledge of diabetes mellitus regarding insulin injection in the working area of UPTD Puskesmas Kandangan, Kandangan District, Kediri Regency*. <https://journalmandiracendikia.com/jikmc>
5. Rosita, R., Kusumaningtiar, D. A., Irfandi, A., & Ayu, I. M. (2022). Physical activity among elderly with type 2 diabetes mellitus at Balaraja Public Health Center, Tangerang Regency. *Jurnal Kesehatan*

- Masyarakat (Undip)*, 10(3), 364–371. <https://doi.org/10.14710/jkm.v10i3.33186>
6. Rahmadani, S. (2020). Development of a diabetes care application as self-care. In Directorate of Prevention and Control of Non-Communicable Diseases (RI). *Stay productive, prevent, and manage diabetes mellitus*.
 7. Susanti, E. F. N. (2019). *Description of risk factors for diabetes mellitus among patients with type 2 diabetes mellitus*.
 8. Aprilianti, E. (2022). *Description of knowledge regarding insulin administration among patients with type 2 diabetes mellitus in Yehembang Village, Mendoyo District, Jembrana Regency, 2021*.
 9. Faizasha, S. (2024). *The relationship between insulin education and glycemic control in patients with type 2 diabetes mellitus at RSU Cut Meutia*.
 10. American Diabetes Association. (2022). *Diabetes basics*. <https://www.diabetes.org/diabetes>
 11. Indra, S. F., Rohimah, S., Rosdiana, N. (2020). Description of knowledge of diabetes mellitus patients regarding risk factors for complications in the Parungponteng Health Center area, Tasikmalaya Regency, 2020.
 12. Issang, N. A. (2022). *Description of the level of knowledge of diabetes mellitus patients regarding insulin injection at RSPTN Hasanuddin University, Makassar*.
 13. Pemayun, T. D. A. (2020). Description of knowledge level regarding diabetes mellitus management among patients with diabetes mellitus at Sanglah General Hospital. *Jurnal Medika Udayana*, 9(8). ISSN: 2597-8012.