International Journal of Basic & Clinical Pharmacology
Rina H. Int J Basic Clin Pharmacol. 2024 Jan;13(1):152-158
http://www.ijbcp.com
pISSN 2319-2003 | eISSN 2279-0780

DOI: https://dx.doi.org/10.18203/2319-2003.ijbcp20233827

Systematic Review

Effect of pharmacist counselling on patients with type 2 diabetes mellitus in reducing blood sugar levels: a systematic literature review

Habsyah Rina*

Apotek Jaya, Tanjung Balai, Sumatera Utara, Indonesia

Received: 29 November 2023
Accepted: 04 December 2023

***Correspondence:**
Habsyah Rina,
Email: habsyahrina685@gmail.com

ABSTRACT

Type 2 diabetes mellitus is one of the most common chronic diseases worldwide, and one approach to managing T2DM is through patient counselling. The aim of this study is to conduct a systematic literature review to identify the impact of pharmacist counselling on patients with T2DM in reducing blood sugar levels. This research utilized the systematic literature review method. Research data were sourced from published literature, retrieved from databases like PubMed and Google Scholar. The collected data were then qualitatively analysed. The results show that, based on 15 journal literatures reviewed, pharmacist counselling in patients with Type 2 Diabetes Mellitus significantly impacts the reduction of blood sugar levels (both glucose and HbA1c levels). The average blood sugar level decreased from 225.69 to 190.98, while another study reported fasting blood glucose levels dropping from 274.5 mg/dl to 239.8 mg/dl. However, there was one study that indicated counselling only managed to slow down the rate of glucose level increase in patients with Type 2 Diabetes Mellitus. Overall, these findings underscore the vital role of pharmacist counselling in the management and control of blood sugar levels in T2DM patients, contributing to better diabetes care and potentially reducing direct medical costs associated with the condition.

Keywords: Counselling, Pharmacist, T2DM patients, Direct medical costs

INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) is a chronic disease characterized by high blood sugar levels. It is also known as Type 2 Diabetes and typically occurs in middle-aged to older individuals. However, an increasing number of children and adolescents are being diagnosed with this condition. If not properly treated, the disease can lead to various complications, such as issues with the eyes, kidneys, nerves, and heart.[1] T2DM is one of the most common chronic diseases globally, and one of the strategies to manage it is through patient counselling. Counselling or education is a process of assistance provided by an expert (known as a counsellor or mentor) to individuals facing problems (referred to as counselees). The goal of counselling is to help individuals resolve their issues and achieve optimal personal development.[2] In the case of Type 2 Diabetes Mellitus, counselling can play a crucial role in helping patients manage their condition. For example, pharmacist counselling can assist patients in understanding their medications, overcoming barriers in following treatment plans, and providing emotional support. Counselling can also educate about the importance of healthy lifestyle changes, such as a balanced diet and regular exercise.[3] Pharmacist counselling has been recognized as a potentially effective approach in managing patients with T2DM. However, detailed information about the impact of pharmacist counselling on the direct medical costs of T2DM patients is still limited. A systematic literature review on this topic is relevant due to the need to understand the extent to which pharmacist counselling can play a role in reducing blood sugar levels associated with

the care of T2DM patients. The aim of this study is to conduct a systematic literature review to identify the impact of pharmacist counselling on patients with T2DM in reducing their blood sugar levels.

METHODS

This study employs the systematic literature review (SLR) method. A systematic literature review is a systematic research method for collecting, evaluating, and synthesizing existing evidence in scientific literature related to a specific research topic. The purpose of an SLR is to present a comprehensive and objective overview of the existing knowledge in a particular field and to identify potential research gaps that may need further investigation[4]. The research data were sourced from published literature, retrieved from the PubMed and Google Scholar databases using keywords such as 'impact of pharmacist counselling', 'T2DM patients', and 'reduction in blood sugar levels', with the following criteria:

Table 1: Data criteria.

riteria	Inclusion	Exclusion
Bahasa	Bahasa and English	Other than Bahasa and English
Publication Periods	2013-2023	Before 2013
Accessibility	Full Access	Paywalled

Based on these established criteria, the flow, and results of the research to be used in this study are illustrated in the following PRISMA diagram.

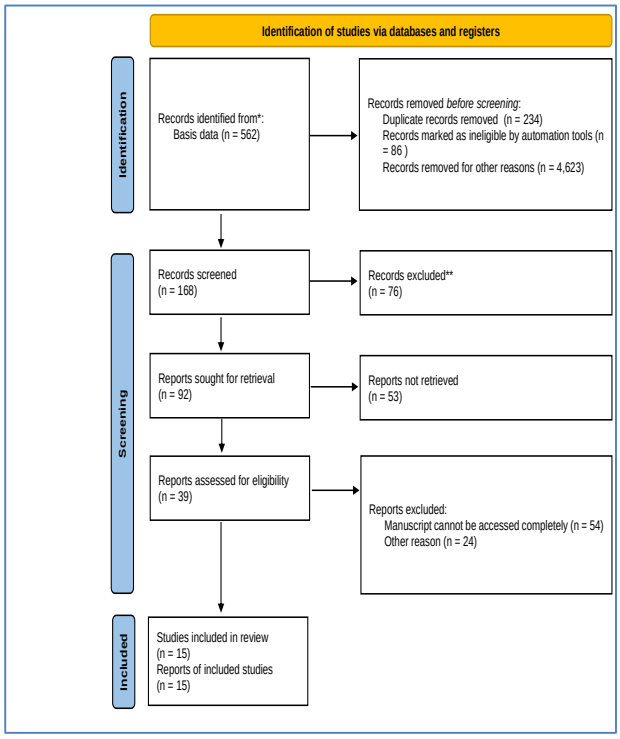

Figure 1: PRISMA diagram.

The data were sourced from the Google Scholar and PubMed databases, resulting in a total of 562 research findings. This number was then narrowed down by excluding the first 10 pages, leaving 168 remaining findings. After assessing their relevance, 92 findings were considered suitable for this study. Out of these, 39 journals were selected based on the research objectives. Following further exclusions, a total of 15 journals were included as the primary sources for this research. The collected data were then qualitatively analysed.

RESULTS

By following the PRISMA guidelines for systematic review, the search process defines 15 papers, included in the inclusion criteria as displayed in (Table 2).

DISCUSSION

An analysis by Mona et al found that lifestyle factors after intervention, such as increased consumption of vegetables and fruits, had a positive impact, whereas physical activity had a negative influence.[5] Counselling interventions in Type 2 Diabetes Mellitus patients undergoing outpatient treatment affected changes in lifestyle behaviour, blood glucose control, and improved quality of life. Another study by Ariyani et al showed that brief phone counselling by pharmacists for Type 2 DM patients at the South Alalak Community Health Centre (Puskesmas) could reduce blood sugar levels, but it did not always achieve the desired therapeutic targets.[6] Hence, this intervention can be utilized as an alternative to support the therapeutic outcomes of DM patients, especially during a pandemic. Research by Muslimin et al indicated that brief 5A modified counselling could enhance medication adherence in Type II DM patients at the outpatient pharmacy department of Sawerigading Regional Public Hospital in Palopo City and reduce FBG (p=0.001). It is hoped that this research can be implemented as periodic counselling therapy for Type II DM patients at Sawerigading Regional Public Hospital in Palopo City.[7]

The study by Prihandiwati et al revealed that the sample characteristics in the intervention and control groups were not significantly different.[8] The compliance scores in the control and intervention groups pre- and post-study showed significant differences. Compliance scores in both groups' pre-study were not significantly different. In the middle and post-study, compliance scores between the control and intervention groups differed significantly. Fasting blood glucose levels in the control group pre- and post-study showed no significant difference. Fasting blood glucose levels in the intervention group pre- and post-study differed significantly. Fasting blood glucose levels in both control and intervention groups pre-study showed no significant difference. In the post-study, fasting blood glucose levels between the control and intervention groups differed significantly.

Table 2: Literature records.

Authors and years of publication	Research findings
Ariyani et al[6]	Brief counselling over the phone by pharmacists for Type 2 Diabetes Mellitus (T2DM) patients at the South Alalak Community Health Center (Puskesmas) has been shown to lower blood sugar levels. However, it does not always achieve the desired therapeutic targets. Therefore, this intervention can be used as an alternative to support the therapeutic outcomes for DM patients, especially during a pandemic.
Suciantini[15]	In the case of dietary compliance of Type II Diabetes Mellitus patients at the internal medicine department of Bangli Regional Public Hospital (RSUD Bangli), 97.2% of the sample were compliant with the 3J diet principles (Type, Quantity, and Schedule) after receiving nutritional counselling. The fasting blood glucose level initially was 274.5 mg/dL, which decreased to an average of 239.8 mg/dl after nutritional counselling. The probability value obtained was $p<0.05$, indicating a significant difference in the average values before and after the nutritional counselling intervention.
Nugraheni et al[3]	The study results indicate that counselling with aids increases compliance and satisfaction, as well as improves clinical outcomes, achieving the targets for fasting blood glucose (FBG) and post-prandial blood glucose (PPBG). The average reduction in FBG and PPBG in the intervention group was 26.96±28.42 mg/dL and 26.88±65.49 mg/dl, respectively ($p<0.05$). A high level of compliance enhances clinical outcomes and therapy satisfaction, although the correlation strength is weak (r=0.2-0.4).
Rahmawaty et al[10]	Counselling has been found to change compliance in diabetes mellitus patients. Pharmacist counselling influences the level of adherence to oral antidiabetic medication, as measured by the MGL MAQ questionnaire ($p=0.000$), and blood sugar levels in demographic data ($p=0.000$) in diabetes mellitus patients.
Septiar et al[11]	The research demonstrates that one month of counselling by pharmacists led to an increase in the quality of life scores from pre-counselling at 215.24±16.42 to post-counselling at 221.72±15.33, with a p value of <0.05, specifically 0.00, indicating a significant difference. The average random blood glucose levels before counselling were 229.32 mg/dL, which decreased to 207.48 mg/dl after counselling, also with a significant p-value of <0.05, specifically 0.00. The conclusion of this study is that counselling conducted by a pharmacist can improve the quality of life and control of random blood glucose levels in T2DM patients at Gedong Tengen Community Health Center.
Syifannisa et al[12]	This research provides insights into patient compliance, showing an increase in medication adherence from 100% in the low category to 22.2%, from 0% to 64.8% in the medium category, and from 0% to 12.9% in the high category. The clinical outcomes show a decrease in the average blood sugar level from 225.69 to 190.98, as evidenced by a parametric paired sample t-test with a p-value of 0.000 ($p<0.05$). The conclusion of this study is that pharmacist counselling influences the medication compliance of DM patients. The study suggests further research to observe the overall adherence to diabetes mellitus treatment until recovery or improved quality of life is achieved. Community health centers are encouraged to enhance healthcare services, particularly counselling activities, to increase patient medication adherence.
Hidayati et al[13]	This study concludes that pharmacist counselling influences medication adherence and blood sugar levels in Type 2 Diabetes Mellitus patients at the Halmahera Community Health Center in Semarang.
Pahlevi et al[14]	The results indicate a significant decrease in fasting blood sugar levels in both groups in the post-study ($p<0.05$). The difference in the decrease of fasting blood sugar levels between the two groups was not significant ($p=0.16$). The reduction values for the control and intervention groups were 16.32±11.56 mg/dl and 16.87±27.88 mg/dl, respectively. The conclusion of this research is that the decrease in fasting blood sugar levels in diabetes mellitus patients, whether given brief counselling intervention or not, showed no significant difference.

Continued.

Authors and years of publication	Research findings
Abidin et al[16]	The first phase of the research showed the implementation of health education in the internal medicine department using the method of counselling by doctors. The evaluation of physical activity, diet, and medication compliance for most Type II DM patients in the internal medicine department of Airlangga University Hospital was in the medium compliance category. Most respondents believed they were in the confident category. The second phase of the research found that health education with social media reminders and audiovisual approaches influences physical compliance (p=0.000), dietary compliance (p=0.002), medication compliance (p=0.000), and blood glucose levels (p=0.000). Discussion: Health education with social media reminders and audiovisual aids can improve compliance and reduce blood glucose levels in Type 2 DM patients. Health education from a multidisciplinary professional team involving audiovisual and reminders can enhance patient compliance.
Muslimin et al[7]	The research results show that the implementation of modified 5A brief counselling can improve medication adherence in Type II DM patients at the outpatient pharmacy department of Sawerigading Regional Public Hospital in Palopo City and reduce FBG (p=0.001). It is hoped that this research can be applied as periodic counselling therapy for Type II DM patients at Sawerigading Regional Public Hospital in Palopo City.
Febiyanti et al[9]	The results of the Chi-square statistical test on knowledge and compliance levels indicated an influence on increased knowledge with a p value of 0.001 and an increase in medication adherence with a p value of 0.006. The results of the T-test also showed an influence on the decrease in pre and post fasting blood glucose (FBG) levels with a p value of 0.002, and pre and post HbA1c levels with a p value of 0.001. Patients experienced increased compliance after receiving counselling with leaflets, from 67.7% to 73.5%, which was statistically significant. This was also followed by an increase in knowledge leading to greater medication adherence, resulting in a significant decrease in the mean FBG levels from pre-counselling at 183.32 mg/dL to post-counselling at 148.23 mg/dl, and a significant decrease in HbA1c levels from 8.45 to 7.03. Pharmacist counselling with leaflets significantly improves knowledge, medication adherence, and reduces blood sugar levels (FBG & HbA1c) in type 2 diabetes mellitus (dm) patients at krembung public health center in Sidoarjo District.
Mona et al[5]	The analysis of lifestyle factors after intervention showed that consumption of vegetables and fruits had a positive impact, while physical activity had a negative influence. Counselling intervention in Type 2 DM patients undergoing outpatient treatment affected changes in lifestyle behavior, blood glucose control, and improved quality of life.
Prihandiwati et al[8]	The study results indicated that the sample characteristics in the intervention and control groups were not significantly different. The compliance scores in the control and intervention groups pre and post-study were significantly different. Compliance scores in both groups pre-study were not significantly different. In the middle and post-study, compliance scores between the control and intervention groups differed significantly. The fasting blood glucose levels in the control group pre and post-study showed no significant difference. Fasting blood glucose levels in the intervention group pre and post-study differed significantly. Fasting blood glucose levels in both control and intervention groups pre-study showed no significant difference. In the post-study, fasting blood glucose levels between the control and intervention groups differed significantly. Based on these results, it can be concluded that brief counseling intervention by pharmacists in Type II DM outpatient patients can improve medication adherence and reduce blood sugar levels.
Sucipto (2014)	The analysis showed significant differences before and after counselling in medication adherence in the intervention group (p diet=0.001; p control=0.002; p pill count=0.000; p post-prandial blood glucose (GDPP)=0.000) and no significant difference in the exercise group (p value=0.549).

Continued.

Authors and years of publication	Research findings
Sucipto (2014)	This study demonstrates that counselling is highly effective in improving dietary compliance in diabetes, control, and pill count as well as post-prandial blood glucose (PPBG) adherence but not effective in enhancing exercise compliance in patients.
Nuraliya et al[17]	The results of this study indicate that there were no significant differences in the average glucose levels and body mass index (BMI) before and after nutritional and lifestyle counselling in the intervention group (p=0.426) and (p=0.552), respectively. However, in the control group, there were significant differences in the average glucose levels and BMI after counselling (p=0.009) and (p=0.036), respectively. Comparisons of glucose levels between the intervention and control groups showed no significant difference (p=0.865), nor did comparisons of BMI between the intervention and control groups (p=0.405). Nutritional and lifestyle counselling could only slow down the rate of blood glucose levels and BMI in Type 2 diabetes mellitus patients.

Based on these results, it can be concluded that brief counselling intervention by pharmacists in Type II DM outpatient patients can improve medication adherence and reduce blood sugar levels. The Chi-square statistical test results on knowledge and compliance levels in the study by Febiyanti et al showed an influence on increased knowledge with a p value of 0.001, and an increase in medication adherence with a p value of 0.006. The T test results also showed an influence on the decrease in pre and post FBG levels with a p value of 0.002, and pre and post HbA1c levels with a p value of 0.001.[9] Patients experienced increased compliance after receiving counselling with leaflets, from 67.7% to 73.5%, which was statistically significant. This was also followed by an increase in knowledge leading to greater medication adherence, resulting in a significant decrease in the mean FBG levels from pre-counselling at 183.32 mg/dl to post-counselling at 148.23 mg/dl, and a significant decrease in HbA1c levels from 8.45 to 7.03. Pharmacist counselling with leaflets significantly improves knowledge, medication adherence, and reduces blood sugar levels (FBG & HbA1c) in type 2 diabetes mellitus patients at Krembung community health centre in Sidoarjo District. The study by Nugraheni et al shows that counselling with aids increases medication adherence and satisfaction, as well as clinical outcomes, achieving targets for fasting blood glucose (FBG) and post-prandial blood glucose (PPBG).[3] The average reduction in FBG and PPBG in the intervention group was 26.96±28.42 mg/dl and 26.88±65.49 mg/dl, respectively (p<0.05). A high level of compliance enhances clinical outcomes and therapy satisfaction, although the correlation strength is weak (r=0.2-0.4). Counselling also influenced medication adherence in diabetes mellitus patients, as pharmacist counselling impacted the level of adherence to oral antidiabetic medication, as measured by the MGL MAQ questionnaire (p=0.000), and blood sugar levels in demographic data (p=0.000).[10]

Another study by Septiar et al demonstrated that one month of counselling by pharmacists led to an improvement in quality-of-life scores from pre-counselling at 215.24±16.42 to post-counselling at 221.72±15.33, with a p value of <0.05, specifically 0.00, indicating a significant difference. The average random blood glucose levels before counselling were 229.32 mg/dl, which decreased to 207.48 mg/dl after counselling, also with a significant p value of <0.05, specifically 0.00. The conclusion of this study is that counselling conducted by a pharmacist can improve the quality of life and control of random blood glucose levels in Type 2 DM patients at Gedong Tengen Community Health Center.[11] The study by Syifannisa et al provides insights into patient compliance, showing an increase in medication adherence from 100% in the low category to 22.2%, from 0% to 64.8% in the medium category, and from 0% to 12.9% in the high category. The clinical outcomes show a decrease in the average blood sugar level from 225.69 to 190.98, as evidenced by a parametric paired sample t test with a p value of 0.000 (p<0.05). The conclusion of this study is that pharmacist counselling influences the medication compliance of DM patients. The study suggests further research to observe the overall adherence to diabetes mellitus treatment until recovery or improved quality of life is achieved, and community health centres are encouraged to enhance healthcare services, particularly counselling activities, to increase patient medication adherence.[12]

The study by Hidayati concludes that pharmacist counselling influences medication adherence and blood sugar levels in Type 2 Diabetes Mellitus patients at Halmahera Community Health Center in Semarang.[13] Research by Pahlevi et al indicates a significant decrease in fasting blood sugar levels in both groups in the post-study (p<0.05). The difference in the decrease of fasting blood sugar levels between the two groups was not significant (p=0.16). The reduction values for the control and intervention groups were 16.32±11.56 mg/dl and 16.87±27.88 mg/dl, respectively. The conclusion of this research is that the decrease in fasting blood sugar levels in diabetes mellitus patients, whether given brief counselling intervention or not, showed no significant difference. Meanwhile, the study by Sucipto (2014) showed significant differences before and after counselling in medication adherence in the intervention

group (p diet=0.001; p control = 0.002; p pill count = 0.000; p PPBG = 0.000) and no significant difference in the exercise group (p value=0.549). This study demonstrates that counselling is highly effective in improving dietary compliance in diabetes, control, and pill count as well as post-prandial blood glucose (PPBG) adherence but not effective in enhancing exercise compliance in patients.[14] The study by Suciantini aligns with these findings. In this study, 97.2% of Type II Diabetes Mellitus patients at Bangli Regional Public Hospital adhered to the 3J diet principles (Type, Quantity, and Schedule) after receiving nutritional counselling. Following the counselling, there was a decrease in the average fasting blood glucose level from 274.5 mg/dl to 239.8 mg/dl, indicating a significant difference before and after the nutritional counselling intervention.[15] In the study by Abidin it was found that most Type II DM patients in the internal medicine department of Airlangga University Hospital had moderate compliance in treatment. The majority of respondents also felt confident about their treatment. The second phase of the study showed that health education using social media reminders and audiovisual approaches influenced physical compliance (p=0.000), dietary compliance (p=0.002), medication compliance (p=0.000), and blood glucose levels (p=0.000) in Type 2 DM patients. The discussion indicated that providing health education from a multidisciplinary professional team involving audiovisual and reminders can enhance patient compliance and reduce blood glucose levels.[16] Contrary to other studies, research by Nuraliya et al showed that there were no significant differences in the average glucose levels and body mass index (BMI) before and after nutritional and lifestyle counselling in the intervention group (p=0.426) and (p=0.552), respectively. However, in the control group, there were significant differences in the average glucose levels and BMI after counselling (p=0.009) and (p=0.036), respectively. Comparisons of glucose levels between the intervention and control groups showed no significant difference (p=0.865), nor did comparisons of BMI between the intervention and control groups (p=0.405). Nutritional and lifestyle counselling could only slow down the rate of blood glucose levels and BMI in Type 2 diabetes mellitus patients.[17]

CONCLUSION

The analysis of 15 journal articles investigated showed that pharmacist counselling in patients with type 2 diabetes mellitus (T2DM) is effective in lowering blood sugar levels (FBG & HbA1c). The average decrease in blood sugar levels from 225.69 to 190.98 was observed in several studies, while another study reported a decrease in fasting blood glucose from 274.5 mg/dl to 239.8 mg/dl. However, there was one study indicating that counselling only managed to slow the rate of increase in blood glucose levels in patients with type 2 diabetes mellitus. Based on these research findings, several recommendations can be made to improve medication compliance in T2DM patients through pharmacist counselling: Pharmacist counselling should be comprehensive, covering aspects of patients' knowledge, skills, and attitudes, Pharmacist counselling should be ongoing and conducted periodically, and Pharmacist counselling should be provided by pharmacists who have competence and experience in delivering pharmacist counselling.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Type 2 Diabetes Mellitus. Available at: https://www.health.harvard.edu/a_to_z/type-2-diabetes-mellitus-a-to-z. Accessed on 20 May 2023.
2. Adi KJ. Esensial Konseling: Pendekatan Trait and Factor Dan Client Centered. Garudhawaca. 2013.
3. Nugraheni AY, Puspitasari I, Andayani TM. Pengaruh konseling apoteker dengan alat bantu pada pasien diabetes melitus. J Manage Pharm Pract. 2015;5(4): 233-40.
4. Okoli C, Schabram K. A guide to conducting a systematic literature review of information systems research. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1954824. Accessed on 20 May 2023.
5. Mona M. Pengaruh Intervensi Konseling Terhadap Gaya Hidup, Pengendalian Gula Darah Dan Kualitas Hidup Penderita Diabetes Mellitus Type 2 Di Puskesmas Kebomas Gresik. Calyptra. 2018;7(1): 2117-35.
6. Ariyani H, Rahmani R, Hendera H. Pengaruh Konseling Singkat Melalui Telepon Terhadap Penurunan Kadar Gula Darah Pasien Diabetes Melitus Di Puskesmas Alalak Selatan Banjarmasin Utara. J Curr Pharma Sci. 2022;5(2):506-13.
7. Muslimin MA, Setiadi AAP, Wibowo YI. Pengaruh Brief Counseling Modifikasi 5A Terhadap Kepatuhan dan Kadar Gula Darah Pasien Diabetes Melitus Tipe II Di RSUD Sawerigading Kota Palopo. J Pharma Sci. 2021;8(2):149-57.
8. Prihandiwati E, Rahem A, Rachmawati R. Pengaruh Brief Counseling Terhadap Kepatuhan Minum Obat dan Kadar Gula Darah Pasien Diabetes Mellitus Tipe II di RSUD Ulin Banjarmasin. Indones J Nurs Pract. 2018;1(1):8-20.
9. Febiyanti DA, Setiadi AAP, Wibowo YI. Pengaruh Konseling Dengan Leaflet Oleh Apoteker Terhadap Tingkat Pengetahuan, Kepatuhan Dan Kadar Gula Darah Pasien Dm Tipe 2 Di Puskesmas Krembung Kabupaten Sidoarjo (Influence Of Counseling with Leaflets by Pharmacists on The Level Of Knowledge, Compliance, and Blood Sugar Levels Of Type 2 DM Patients In Krembung Health Center In Sidoarjo Regency). J Pharma Care Anwar Medika. 2022;4(2): 20-30.
10. Rahmawaty A, Anggraeni NW. Pengaruh Konseling Apoteker Terhadap Tingkat Kepatuhan Minum Obat Dan Kadar Gula Darah Pasien Diabetes Mellitus.

Jurnal Riset Kefarmasian Indonesia. J Riset Kefarmasian Indonesia. 2023;5(1):181-93.
11. Septiar HE, Utami P. Pengaruh Konseling Farmasis Terhadap Kualitas Hidup Dan Kadar Gula Darah Pada Pasien Diabetes Mellitus Tipe 2 Di Puskesmas Gedong Tengen Periode Maret-Mei. J Farma Sains dan Prak. 2015;1(1):29-34.
12. Syifannisa R, Muthoharoh A, Ningrum WA, Rahmatullah S. Pengaruh Konseling Apoteker Terhadap Kepatuhan Pengobatan dan Outcome Klinis Pasien DM Tipe 2 Puskesmas Mulyoharjo. J Ilmiah Kesehatan. 2022;15(2):93-102.
13. Hidayati W. Pengaruh Konseling Apoteker Terhadap Kepatuhan Minum Obat Dan Kadar Gula Darah Pada Pasien Diabetes Melitus Tipe 2 Di Puskesmas Halmahera Semarang. J Riset Kefarmasian Indones. 2023;5(1):181-93.
14. Pahlevi MR, Rahem A, Metasartika V, Alfian R. Pengaruh Brief Counseling Terhadap Kadar Gula Darah Pasien Diabetes Melitus Tipe 2 Di RSUD Dr. H. Moch. Ansari Saleh Banjarmasin. J Ilmiah Ibnu Sina. 2018;3(2):224-33.
15. Suciantini NWA. Pengaruh Konseling Gizi Terhadap Kepatuhan Diet Dan Kadar Glukosa Darah Pada Pasien Diabetes Mellitus Tipe II Di Poli Interna RSUD Bangli. Dissertation. Poltekkes Kemenkes Denpasar. 2022.
16. Abidin Z. Health Education Dengan Pendekatan Social Media Reminder Dan Audiovisual Terhadap Kepatuhan Dan Kadar Glukosa Darah Pasien Dm Tipe 2 Di Rumah Sakit Universitas Airlangga Surabaya. Available at: https://repository.unair.ac.id/78148/. Accessed on 20 February 2023.
17. Nuraliya ST. Pengaruh Konseling Gizi Dan Gaya Hidup Terhadap Kadar Glukosa Darah Dan Indeks Massa Tubuh (IMT) Pada Penderita Diabetes Melitus Tipe 2 Di Wilayah Kerja Puskesmas Minasa UPA Kota Makassar Tahun. Available at: https://repository.unhas.ac.id/id/eprint/10120/1/stnuraliya-2382-1-13-st.n-a%201-2.pdf. Accessed on 20 February 2023.

Cite this article as: Rina H. Effect of pharmacist counselling on patients with type 2 diabetes mellitus in reducing blood sugar levels: a systematic literature review. Int J Basic Clin Pharmacol 2024;13:152-8.