

Adherence to medication regimens among patients with type 2 diabetes

Ocena przestrzegania zaleceń terapeutycznych przez pacjentów chorujących na cukrzycę typu 2

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Abstract

Background. Type 2 diabetes is one of the most common chronic diseases, and the one that has an effect on all aspects of human functioning. It afflicts over 194 million people worldwide. Type 2 diabetes requires proper treatment, whose purpose is to delay the development of diabetic complications, and to improve the quality of patients' lives. Patient adherence to therapeutic regimens refers to many aspects of the healing process, including taking medication as prescribed, controlling glucose levels, motor activity, and modification of eating habits. **The aim of this study** was to assess adherence to medication regimens among patients with type 2 diabetes with regard to sociodemographic and medical data. **Material and methods.** This survey-based study involved 200 respondents above 40 years of age with type 2 diabetes. The patients were hospitalized in the hospital in Chodzież, Eugenia and Janusz Zeyland Wielkopolskie Center of Pulmonology and Thoracic Surgery. The research instruments were a self-developed questionnaire, and the Adherence to Refills and Medications scale (ARMS). **Results.** The diabetic patients obtained an average score of 17.09 points on the ARMS. the analysis did not demonstrate statistically significant differences in the influence of sociodemographic and medical factors on adherence to therapeutic regimens according to the ARMS ($p > 0.05$). **Conclusions:** Adherence to therapeutic regimens among the type 2 diabetic patients was satisfactory and did not depend on sociodemographic and medical factors. (Gerontol Pol 2019; 27; 251-255)

Key words: adherence to therapeutic regimens, type 2 diabetes, patient

Streszczenie

Wstęp. Cukrzyca typu 2 jest jedną z najczęstszych chorób przewlekłych, która wpływa na wszystkie sfery funkcjonowania człowieka. Choroba ta dotyczy ponad 194 mln osób na całym świecie. Schorzenie wymaga właściwej terapii mającej na celu opóźnienie powstawania powikłań cukrzycowych i poprawę jakości życia chorych. Przestrzeganie zaleceń terapeutycznych przez pacjentów dotyczy wielu aspektów procesu leczenia i obejmuje systematyczne przyjmowanie zaordynowanych przez lekarza leków, samokontrolę poziomu glukozy, podejmowanie aktywności ruchowej oraz zmiany nawyków żywieniowych. **Celem pracy** była ocena przestrzegania zaleceń terapeutycznych przez pacjentów chorujących na cukrzycę typu 2 z uwzględnieniem czynników demograficznych i medycznych. **Materiał i metody.** W przeprowadzonym badaniu uczestniczyło 200 respondentów powyżej 40 r.ż. chorujących na cukrzycę typu 2. Pacjenci objęci badaniem byli hospitalizowani w Wielkopolskim Centrum Pulmonologii i Torakochirurgii w Poznaniu im. Eugenii i Janusza Zeylandów w szpitalu w Chodzieży. Badanie zostało przeprowadzone metodą sondażu diagnostycznego z wykorzystaniem narzędzi: autorskiego kwestionariusza ankiety i skali dostosowania do zaleceń farmakologicznych (ARMS). **Wyniki.** Badanie wykazało, iż pacjenci z cukrzycą uzyskali średnio 17,09 punktów kwestionariusza ARMS. Analiza nie wykazuje statystycznie istotnych różnic we wpływie czynników demograficznych i medycznych na przestrzeganie zaleceń terapeutycznych według skali ARMS ($p > 0,05$). **Wnioski.** Pacjenci chorujący na cukrzycę typu 2 przestrzegali zaleceń terapeutycznych w stopniu zadowalającym i nie było to zależne od zmiennych socjodemograficznych i medycznych. (Gerontol Pol 2019; 27; 251-255)

Słowa kluczowe: przestrzeganie zaleceń terapeutycznych, cukrzyca typu 2, pacjent

Introduction

In recent years, adherence to therapeutic regimens has become a topic often raised in both medical publications and those addressed to the general public.

Type 2 diabetes is one of the most common chronic diseases, and the one that has an effect on all aspects of human functioning. It afflicts over 194 million people worldwide, and in the coming years, the number of people affected is going to considerably grow. Type 2 diabetes requires proper treatment, whose purpose is to delay the development of diabetic complications, and to improve the quality of patients' lives [1,2]. Patient adherence to therapeutic regimens refers to many aspects of the healing process, including taking medication as prescribed, controlling glucose levels, motor activity, and modification of eating habits. Patient cooperation and patient involvement in the healing process, which are significant contributions to the end result of therapy, remain a big challenge for healthcare professionals [3,4].

The aim of this study

The aim of this study was to assess adherence to therapeutic regimens among type 2 diabetic patients with regard to their sociodemographic and medical data.

Material and methods

The study was conducted between June and October 2018 in the hospital in Chodzież, Eugenia and Janusz Zeyland Wielkopolskie Center of Pulmonology and Thoracic Surgery with the consent of the hospital's authorities. The study included 200 respondents with type 2 diabetes. Each patient was informed about the subject and purpose of the study, and assured that completion of the questionnaires was voluntary and anonymous and gave their written consent for participation. The patients who agreed to participate in the study received questionnaires and completed them on their own. Any uncertainties and doubts about questions were explained as they arose. The criteria for inclusion in the study were at least 40 years of age, and a diagnosis of type 2 diabetes. The exclusion criteria were an inability to understand the content of the questionnaires due to cognitive disorders, and the clinical status of the patient which made it impossible for them to complete the questionnaires independently.

The study was based on a survey performed using a self-developed questionnaire, and the *Adherence to Refills and Medications scale (ARMS)*. The self-developed questionnaire was used to collect information on

sex, age, education, place of residence, marital status, employment, duration of the disease, therapy, compliance with dietary recommendations, physical activity, and symptom control. The ARMS is an instrument measuring patient adherence to pharmacological treatment and therapeutic guidelines. It includes 12 items, the first eight of which concern the act of taking medication on schedule or taking medication as prescribed, and the other four – the act of filling new prescriptions or refilling prescriptions on time. The scale does not provide ranges defining whether the level of patient adherence is low or high, but the possible scores range from 12 to 48 points, where higher scores denote worse medication adherence [5].

Statistical analysis of quantitative and qualitative variables was performed. Quantitative variables in two groups were compared using the Mann-Whitney U test, and in three or more groups using the Kruskal-Wallis test. Logistic regression was employed to analyze the influence of medical data on the odds of obtaining exactly 12 points on the ARMS. The results were presented as odds ratios (OR) with 95% confidence intervals (CI). The level of significance was set at 0.05. The analysis of the questionnaire results was performed using R software v 3.5.1.

The study was conducted in accordance with the Declaration of Helsinki, and was approved by the Bioethical Commission of the Pomeranian Medical University in Szczecin.

Results

The study involved 200 type 2 diabetic patients – 100 women and 100 men – in the 41-92 age bracket. The mean age was 68 years, so the ages in the study group typically ranged from 62 to 72 years. The majority of the respondents (64%) were married, 3% lived in a cohabitation. 72.5% of the surveyed were retired, and only 2.5% were unemployed. 66.5% lived in cities. The most numerous (42.5%) were respondents with the vocational education, and the least numerous (8.5%) those with tertiary education (Table II).

The mean duration of the disease was 8 ± 6.72 years, and fluctuated between 1 and 40 years; typically the disease lasted from 3 to 10 years.

A vast majority of those surveyed (67.5%) took oral antidiabetic agents. The respondents using insulin for diabetes treatment constituted 18%, and those taking oral drugs and insulin – 14.5%.

48.5% of the respondents were patients of the diabetes outpatient clinic, others were treated by primary care physicians. 50.5% of the surveyed who were patients of

the diabetes outpatient clinic consulted a diabetes specialist once every half-year, 28.9% – once per 2-5 months, 1% – once a month, and 19.6% – less often. 94.5% of the patients of the diabetes outpatient clinic had been informed by the physicians about the necessity of sticking to a diet. 57% of the participants were informed about diet issues during every visit, and 42% received such information only during the first visit.

The surveyed adhered to the diet regimen to varying degrees – only 14% followed the instructions scrupulously, 67.5% rather stuck to them, 14% followed only some instructions, and 4% did not adhere to them at all.

To manage their diabetes, the patients monitored their blood glucose levels, inspected their feet, and controlled their body weight and blood pressure. The largest group of respondents (97%) measured their levels of glycemia, 75.5% assessed their blood pressure. Few respondents (only 37%) controlled their weight, and 24.5% inspected their feet.

67.5% of the respondents were moderately physically active, only 2% played sports intensively, and 30.5% were not physically active due to their health status.

The scores on the ARMS ranged from 12 to 43 points, which means that some patients followed all doctors' instructions scrupulously. The best possible minimum score was achieved by 13 respondents. No one obtained the maximum score suggesting absolute non-adherence to therapeutic regimens. The mean score on the ARMS was 17.09.

The analysis did not demonstrate statistically significant differences in the influence of sociodemographic factors (sex, place of residence, marital status, education, employment, education, and type of therapy) on the patients' adherence to therapeutic regimens according to the ARMS ($p > 0.05$) (Table II).

Logistic regression demonstrated that the duration of the disease (OR 0.885; 95% CI: 0.761-1.028) and type

Table I. The results on the ARMS

ARMS [score]				
n	M ± SD	Me	Min-Max	Q ₁ -Q ₃
200	17.09 ± 4.67	15	12-43	13-20

n – number of participants, M ± SD – arithmetic mean and standard deviation, Me – median, Q₁ – quartile 1, Q₃ – quartile 3, p – level of statistical significance

Table II. The relationships between adherence to therapeutic regimens, sociodemographic data, and type of therapy

Variables n (%)	ARMS [scores]					
	M ± SD	Me	Q ₁ -Q ₃	p		
Sex	Woman	100 (50)	16.48 ± 4.12	15	13-18	p > 0.05
	Man	100 (50)	17.69 ± 5.12	16.5	13.75-21	
Place of residence	City	133 (66.5)	16.83 ± 4.73	15	13-19	p > 0.05
	Rural areas	67 (33.5)	17.6 ± 4.56	16	14-22	
Marital status	Single	11 (5.5)	22 ± 9.4	20	15-24.5	p > 0.05
	Married / cohabiting	134 (64)	16.93 ± 4.24	15	13-20	
	Widowed	55 (27.5)	16.49 ± 3.8	15	14-18	
Education	Primary	30 (15)	16.73 ± 4.63	14.5	13-21.25	p > 0.05
	Vocational	85 (42.5)	16.89 ± 4.41	15	13-19	
	Secondary	68 (34)	17.4 ± 5.4	16	13.75-21	
	Tertiary	17 (8.5)	17.41 ± 2.69	18	15-20	
Employment	Employed	26 (13)	18.73 ± 7.15	16	14-22	p > 0.05
	Retired	145 (72.5)	16.79 ± 4.15	15	13-20	
	Pensioner	24 (12)	17.25 ± 4.01	17	14-19	
Type of therapy	Insulin	36 (18)	16.83 ± 4.01	15.5	13.75-19.25	p > 0.05
	Oral antidiabetic agents	135 (67.5)	17.26 ± 4.96	15	13.5-20	
	Insulin and antidiabetic agents	29 (14.5)	16.59 ± 4.09	15	13-19	

n – number of participants, M ± SD – arithmetic mean and standard deviation, Me – median, Q₁ – quartile 1, Q₃ – quartile 3, p – level of statistical significance

Table III. Therapy according to the ARMS

Type of therapy	n (%)	12 points on the ARMS	OR	95% CI	p
Oral antidiabetic agents	135 (5.93)	8	1	referential level	—
Insulin	36 (11.11)	4	1.984	0.562-7.005	p > 0.05
Insulin and antidiabetic agents	29 (3.45)	1	0.567	0.068-4.718	p > 0.05

n – number of participants, OR – odds ratio, 95% CI – confidence interval, p – level of statistical significance

of therapy (Table III) did not significantly contribute to the odds of obtaining exactly 12 points on the ARMS ($p > 0.05$).

Discussion

In our study, patient adherence to therapeutic regimens was on an average level. Non-adherence can be either intentional or unintentional, especially when information concerning treatment is misunderstood, and instructions are either ignored or followed improperly. Non-adherence to therapeutic regimens substantially differ between various nosological entities, treatment regimens, and populations of patients. Over 50% of diabetic patients do not adhere to therapeutic recommendations [6].

In our investigation, adherence to therapeutic regimens did not depend on sociodemographic data (sex, marital status, place of residence, education, employment). Consistently with our results, the study of 3637 type 2 diabetic patients conducted in France showed that sex had no impact on taking medications correctly. A factor contributing to medication adherence was an employment status – employed patients significantly more often did not follow doctors' orders, forgot to take medicines, or took them after the scheduled time [7]. According to Celczyńska-Bajew et al., the dwellers of rural areas had better contact with physicians, who supported them in disease, than the residents of cities, where an obstacle in the physician-patient relationship was physicians' lack of time to explain issues [8].

Our analysis demonstrated that a treatment method (using either insulin or oral antidiabetic agents, or using both insulin and oral antidiabetic agents) had no influence on the level of adherence to therapeutic recommendations. On the other hand, Dudzińska et al., who analyzed patients undergoing insulin therapy previously trained to apply this new form of therapy, observed their greater involvement in the therapeutic process. The patients more often controlled glycemia, as well as followed and knew the principles of the diabetic diet. Insulin therapy requires regular mealtimes, glycemic self-control, and the awareness of the consequences of dietary mistakes, which may promote change in eating habits [9]. Glyce-

mic self-control, on the other hand, gives patients the feeling of safety and better metabolic balance. Glycemic self-control and correct interpretation of the results enable diabetes treatment and its modifications, thus giving patients the feeling that they can influence their health and control their disease [10]. Also Strojek et al. observed good and very good adherence to therapeutic recommendations based on their study of patients treated with *prolonged-release metformin* [11], which however was not confirmed by our findings.

Matej-Butrym et al. reported that the duration of the disease had an effect on adherence to dietary regimen among patients of the diabetes outpatient clinic, which might have resulted from positive experiences associated with following dietary recommendations during disease. It should be emphasized that at the beginning type 2 diabetes gives no symptoms. As time goes by, chronic complications develop and symptoms start to occur [3]. Kardas asserts that adherence to therapeutic regimens is better among patients receiving treatment for symptomatic diseases than those with asymptomatic health conditions [12]. In our investigation, the duration of the disease had no effect on the level of adherence to therapeutic guidelines.

Adherence to the principles of long-term therapy requires patients' knowledge, discipline, and awareness of possible consequences. It can be both a mobilizing factor, and the cause of depression, therefore it is so important that chronically treated patients are under care of a therapeutic team. Such patients should not be left alone with their disease, but rather supported and motivated to undertake actions to maintain their health, and their health status should be monitored [13].

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Conclusions

1. Adherence to therapeutic regimens among the type 2 diabetic patients was satisfactory.
2. Adherence to therapeutic regimens did not depend on sociodemographic and medical factors.

Conflict of interest

None

References

1. Humańska MA, Felsmann M, Sopalska J. Sprawność funkcjonalna osób w podeszłym wieku chorujących na cukrzycę – doniesienia wstępne. *Gerontol Pol.* 2016;24:98-101.
2. Kalinowski P, Bojakowska U, Kowalska ME. Ocena wiedzy pacjentów o powikłaniach cukrzycy. *Med Ogól i Nauki o Zdr.* 2012;18(4): 302-307.
3. Matej-Butrym A, Butrym M, Jaroszyński A. Samoocena przestrzegania zaleceń lekarskich a gospodarka węglowodanowa u chorych na cukrzycę typu 2. *Fam Med Primary Care Rev.* 2015;17(2):111-114.
4. García-Pérez LE, Alvarez M, Dilla T et al. Adherence to therapies in patients with type 2 diabetes. *Diabetes Ther.* 2013;4:175-194.
5. Lomper K, Chabowski M, Chudiak A et al. Psychometric evaluation of the Polish version of the Adherence to Refills and Medications Scale (ARMS) in adults with hypertension. *Patient Prefer Adherence.* 2018;12:2661-2670.
6. Di Matteo MR. Variations in patients' adherence to medical recommendations: a quantitative review of 50 years of research. *Med Care.* 2004;42:200–209.
7. Tiv M, Viel JF, Mauny F et al. Medication adherence in type 2 diabetes: the ENTRED study 2007, a French Population-Based Study. *PLoS One* 2012;7(3): e32412.
8. Celczyńska-Bajew L, Ignaszak-Szczepaniak M, Posadzy-Małańczyńska A et al. Przestrzeganie zaleceń lekarskich - czy istnieją różnice między pacjentami praktyk lekarzy rodzinnych w mieście i na wsi? *Forum Med Rodz.* 2016;10(2):79–83.
9. Dudzińska M, Tarach JS, Malicka J et al. Ocena zmian w zakresie samokontroli wśród pacjentów z cukrzycą typu 2 po wdrożeniu insulinoterapii – badanie prospektywne. *Fam Med Primary Care Rev.* 2013;15(3):315-317.
10. Pietrzak M, Araszkiewicz A. Jak nauczyć pacjenta samokontroli cukrzycy? *Med Dopl.* 2017;26(3): 64-68.
11. Strojek K, Kurzeja A, Gottwald-Hostalek U. Stosowanie się pacjentów do zaleceń terapeutycznych i tolerancja leczenia metforminą o przedłużonym uwalnianiu u chorych na cukrzycę typu 2. *Badanie GLUCOMP. Clin Diabet.* 2016;5(1):15-21.
12. Kardas P. Rozpowszechnianie i następstwa nieprzestrzegania zaleceń terapeutycznych. W: Gaciong Z, Kardas P (red.), *Nieprzestrzeganie zaleceń terapeutycznych.* Warszawa: Naukowa Fundacja Polpharmy; 2015, ss. 25–34.
13. Maciąg D, Cichońska M, Zboina B et al. Wpływ wybranych czynników społeczno-demograficznych oraz stanu wiedzy pacjenta na temat cukrzycy typu 2 na poziom akceptacji choroby. W: Turowski K (red.), *Medyczne wymiary dobrostanu.* Lublin: Wyd. Naukowe NeuroCentrum; 2018, ss. 205-229.