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Adherence to Therapeutic Recommendations in Patients with Type 2 Diabetes

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Streszczenie

Wstęp: Poziom współczesnej medycyny sprawia, że średnia życia nieustannie ulega wydłużeniu. Fakt ten związany jest również z aspektem prawidłowego stosowania się pacjenta do zaleceń terapeutycznych. Proces ten dotyczy również pacjentów chorych na cukrzycę, gdzie często koniecznością jest przyjmowanie wielu leków i przestrzeganie reżimu terapeutycznego. W literaturze spotykamy jednak doniesienia o niestosowaniu się pacjentów do wyznaczonej terapii. Działanie to jest o tyle nagminne i ważne, że Światowa Organizacja Zdrowia (WHO) nieprzestrzeganie omawianych zaleceń zawarła w liście najpoważniejszych problemów zdrowotnych społeczeństwa, który stanowi przeszkodę w osiągnięciu pozytywnych wyników stosowanej terapii.

Cel pracy: Celem pracy jest ocena przestrzegania zaleceń terapeutycznych u chorych z cukrzycą typu 2.

Materiał i metody: W badaniu wzięło udział łącznie 105 pacjentów, ale ze względu na braki odpowiedzi do analizy włączono 98 prawidłowo wypełnionych ankiet. Metodą użytą w badaniu był sondaż diagnostyczny przy pomocy kwestionariusza ankiety. W badaniu użyto standaryzowanego narzędzia, skali adherence w chorobach przewlekłych ACDS, a dane socjodemograficzne i kliniczne uzyskano z dokumentacji medycznej i rozmowy z pacjentem.

Wyniki: W badanej grupie średni wynik w skali ACDS wynosił $19,29 \pm 3,85$ co oznacza niski poziom przestrzegania zaleceń terapeutycznych. Wśród kobiet przestrzeganie zaleceń wynosiło średnio $19,83 \pm 3,46$, u mężczyzn średnia była niższa i wynosiła $18,46 \pm 4,29$. Wskazane różnice nie były jednak różnicami istotnymi statystycznie ($p > 0,05$). Kobiety charakteryzowały się jedynie nieznacznie większym przestrzeganiem zaleceń lekarskich niż mężczyźni.

W zakresie przestrzegania zaleceń grupy wyłonione ze względu na okres trwania cukrzycy różnią się pomiędzy sobą w sposób istotny statystycznie ($p < 0,05$). Wystąpiły istotne różnice statystyczne ($p < 0,05$) pomiędzy osobami chorującymi do 20 lat a chorującymi powyżej 35 lat. Połowa osób chorujących do 20 lat charakteryzowała się przestrzeganiem zaleceń lekarskich nie mniejszym niż $Me = 21,00$, natomiast połowa osób powyżej 35 lat charakteryzowała się przestrzeganiem nie większym niż $Me = 18,00$. Osoby chore do 20 lat istotnie statystycznie ($p < 0,05$) bardziej przestrzegały zaleceń lekarskich niż osoby chore powyżej 35 lat.

Wnioski: Badaną grupę charakteryzuje niski stopień przestrzegania zaleceń terapeutycznych. Płeć nie wpływa na poziom przestrzegania zaleceń. Im dłuższy czas trwania choroby, tym niższy stopień przestrzegania zaleceń terapeutycznych.

Słowa kluczowe: cukrzyca, przestrzeganie zaleceń.

Abstract

Introduction: The level of modern medicine has led to a continuous extension of life expectancy. This fact is also linked to the aspect of proper adherence by patients to therapeutic recommendations. This process also applies to patients with diabetes, where it is often necessary to take multiple medications and adhere to a therapeutic regimen. However, the literature reports non-adherence to the prescribed therapy by patients. This behavior is so common and significant that the World Health Organization (WHO) included non-adherence to these recommendations in the list of the most serious health problems facing society, which is an obstacle in achieving positive outcomes of the therapy.

Objective: The aim of the study is to evaluate the adherence to therapeutic recommendations in patients with type 2 diabetes.

Materials and Methods: A total of 105 patients participated in the study, but due to missing responses, 98 correctly completed surveys were included in the analysis. The method used in the study was a diagnostic survey using a questionnaire. A standardized tool, the Adherence in Chronic Diseases Scale (ACDS), was used, and sociodemographic and clinical data were obtained from medical records and patient interviews.

Summary

Results: In the studied group, the average score on the ACDS scale was 19.29 ± 3.85 , which indicates a low level of adherence to therapeutic recommendations. Among women, adherence to recommendations averaged 19.83 ± 3.46 , while among men the average was lower at 18.46 ± 4.29 . However, these differences were not statistically significant ($p > 0.05$). Women only slightly adhered to medical recommendations more than men.

In terms of adherence, groups distinguished by the duration of diabetes differed significantly ($p < 0.05$). There were significant statistical differences ($p < 0.05$) between individuals who had been ill for up to 20 years and those who had been ill for over 35 years. Half of the individuals who had been ill for up to 20 years adhered to medical recommendations at least as much as $Me = 21.00$, while half of those over 35 years adhered no more than $Me = 18.00$. Individuals who had been ill for up to 20 years adhered significantly more to medical recommendations than those who had been ill for over 35 years ($p < 0.05$).

Conclusions: The study group is characterized by a low degree of adherence to therapeutic recommendations. Gender does not influence the level of adherence. The longer the duration of the disease, the lower the degree of adherence to therapeutic recommendations.

Key words: diabetes, adherence

Introduction.

The level of contemporary medicine is such that life expectancy continues to extend. This fact is also associated with the aspect of proper adherence by patients to therapeutic recommendations. This process also pertains to diabetes patients, where the frequent necessity involves taking multiple medications [1] and adhering to a therapeutic regimen. However, literature reports non-adherence to designated therapy among patients. This action is so prevalent and critical that the World Health Organization (WHO) has included non-adherence to these recommendations in the list of the most serious health issues facing society, which hampers the achievement of positive therapeutic outcomes [2].

The process of disregarding medical recommendations is trivialized not only by the patients themselves but also by the prescribing doctors. This is mainly due to a high degree of tolerance towards individuals who do not adhere to the medical aspects of the treatment

process [2]. Among the most frequently mentioned actions associated with non-adherence to therapeutic recommendations are primarily failure to fill prescriptions, too rapid discontinuation of medications, taking medications at inappropriate times, and the lack of adherence to prescribed diets and incorporation of physical activity into daily routines [2].

Available literature on medicine differentiates a range of reasons for non-adherence to medical recommendations, which are classified through five areas.

Among the most important socio-economic reasons for a patient's non-adherence to therapeutic recommendations, particularly low status is included, determined by poverty, low education levels, unemployment, high treatment costs, or lack of access to medications (generated through insufficient funds for their purchase). Moreover, factors related to the healthcare system include especially: poor development of health services, bad distribution systems, lack of clear instructional communication from leading doctors, insufficient knowledge of healthcare workers on the specific health problem of the patient, and poor performance of the patient education system [2].

Adverse factors associated with therapy are encompassed in determinants related to taking too many medications, the occurrence of adverse effects, or lack of clarity in medication administration. Factors related to the disease include the absence of active symptoms, and often a long duration of the illness.

Meanwhile, factors directly related to the patient are associated with the lack of patient's conviction about the purposefulness of pharmacology, forgetfulness, high stress levels related to the illness, abuse of broadly defined psychoactive

/ psychotropic substances, the occurrence of depression, lack of basic knowledge regarding the treatment process, and benefits derived from treatment [2].

The aspect of patients adhering to therapeutic recommendations related to diabetes treatment is illustrated by, among others, the Morisky-Green scale, which is presented in Table 1.

Table 1. Determinants of the Morisky-Green Scale [1].

Scale	Determinant of the Scale
>90%	Very good adherence to recommendations by the patient (% of medication taken)
75-90%	Good adherence to recommendations by the patient (% of medication taken)
51-75%	Average adherence to recommendations by the patient (% of medication taken)
≤50%	Poor adherence to recommendations by the patient (% of medication taken)

The most crucial consequence of lack of treatment is disease progression, and only good doctor-patient cooperation guarantees success in the treatment of chronic diseases, especially diabetes. This is significant because data from the World Health Organization (WHO) confirm that every second patient does not follow therapeutic recommendations [3]. Full adherence by the patient to the medical recommendations issued results not only in a faster return to health but also in a return to professional work and social life. Moreover, it often outlines the need to abandon the existing diet, regularity of engaging in chosen physical activities, avoiding harmful substances, and changing habits and lifestyle. In the absence of active patient response, the patient's health deteriorates, and the continuously progressing disease leads to premature death.

The worsening health condition forces the patient to revisit specialists in the given medical field, perform a series of further tests, and purchase a new batch of medications. This exposes the patient to the loss of his time and additional economic costs. It lays the foundation for the occurrence of the patient's mental breakdown, thus "deterioration of cognitive functions obviously affects adherence to therapeutic guidelines [3]."

Objective: The aim of the study is to assess adherence to therapeutic recommendations among patients with type 2 diabetes.

Materials and methods: The method used in the study was a diagnostic survey using a questionnaire. A standardized tool, the Adherence Scale in Chronic Diseases (ACDS) [4], was used, and sociodemographic and clinical data were obtained from medical records and patient interviews. Inclusion criteria for the study: duration of diabetes of at least 5 years; consent to participate in the study. Exclusion criteria: diabetes exclusion, duration of illness less than 5

years, lack of consent for the study. A significance level of $p = 0.05$ was adopted. Accordingly, results $p < 0.05$ will indicate the occurrence of significant relationships between variables. Parametric tests (Student's t-test or ANOVA) or their non-parametric equivalents (Mann-Whitney U test or Kruskal-Wallis test) were used to analyze quantitative variables presented by groups. The choice of tests was based on the distribution of variables, which was verified by the Shapiro-Wilk test. In the analysis of the relationship between two quantitative variables, a correlation coefficient was used. The type of coefficient applied was determined by the nature of the variable distribution, which was verified by the Shapiro-Wilk test. Calculations were performed in the statistical environment R version 3.6.0, PSPP program, and MS Office 2019.

The study was conducted among type 2 diabetes patients at the Clinic of Angiology, Arterial Hypertension and Diabetology and the Hospital Emergency Department of the University Clinical Hospital at Borowska Street 213 in Wrocław. The study took place from January 2023 to May 2023. The survey was conducted personally using questionnaire forms.

A total of 105 patients participated in the survey study, but due to missing responses, 98 correctly completed surveys were included in the analysis. The characteristics of the group are presented in Table 2.

Table 2. General Characteristics of the Study Group

Variable	Frequency	Percentage
Age Range		
Up to 75 years	30	30,60%
76 - 80 years	26	26,50%
Over 80 lat years	42	42,90%
Sex		
Woman	59	60,20%
Men	39	39,80%
Marital status		
Single	25	25,50%
In a relationship	73	74,50%
Education		
Elementary	11	11,20%

Vocational	45	45,90%
Secondary	33	33,70%
Higher	9	9,20%
Place of residence		
Rural	10	10,30%
Urban	87	89,70%
Employment Status		
Employed	16	16,30%
Unemployment	82	83,70%
Comorbidity		
Hypertension	71	72,45%
Ischemic disease	37	37,76%
Rheumatic diseases	15	15,31%
Kidney diseases	48	48,98%
Respiratory diseases	30	30,61%
Musculoskeletal disorders	30	30,61%
Diabetic foot	24	24,49%
Eye diseases	71	72,45%
None	7	7,14%
Duration of Diabetes		
Up 20 years	33	33,70%
21 - 35 years	34	34,70%
Under 35 years	31	31,60%
Type of Treatment*	Częstość	Procent
Oral medications	96	97,96%
Insulin	93	94,90%
Non-pharmacological	80	81,63%
Number of Diabetes Pills	Częstość	Procent
Up to two	47	48,50%
More than two	50	51,50%
BMI	Częstość	Procent
Underweight	2	2,00%

Normal	6	6,10%
Overweight	54	55,10%
Obesity	36	36,70%

*Does not sum up to 100% - multiple choice question.

In the studied group, 42.9% of all respondents were over 80 years old, 30.6% up to 75 years, and 26.5% between 76-80 years old. Women made up 60.2% of all respondents, and men 39.8%.

Nearly 75% of the group was in a relationship. 45.9% of the respondents had vocational education, 33.7% had secondary education. Slightly over 11% of all respondents had primary education, and another 9.2% had higher education.

Almost 90% lived in urban areas. Unemployed respondents accounted for 83.7%, and employed respondents for 16.3% of the total.

The period of illness lasting between 21 and 35 years was indicated by 34.7% of respondents, up to 20 years by 33.7% of respondents, and over 35 years by 31.6%. A total of 72.4% of respondents reported having comorbidities such as arterial hypertension and eye diseases. Kidney diseases were present in nearly 49% of respondents, ischemic disease in 38%, and respiratory and musculoskeletal diseases each accounted for 30.6%. Diabetic foot was present in 24.5% of respondents, and rheumatic diseases in 15.3%. A lack of any comorbidities related to diabetes was reported by 7.1% of all respondents.

97.96% of respondents reported taking pills as a treatment method, 94.9% used insulin, and 81.63% used non-pharmacological treatment. 51.5% of those associated with the disease took more than two pills.

Based on the collected data, the Body Mass Index was also calculated. The vast majority of respondents (55.1% of all) were overweight. Another 36.7% of respondents were classified as obese. A normal weight was possessed by 6.1% of all respondents, and the next 2.0% of respondents were underweight.

Table 3. Quantitative data on the characteristics of the study group

	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Maks</i>	<i>Me</i>
Age	98	76,85	10,38	35,00	92,00	79,00
Heigh	98	169,44	5,58	156,00	184,00	169,00
Body weight	98	83,08	10,56	50,00	110,00	85,00
BMI	98	28,94	3,44	17,93	36,57	29,07
Duration of Diabetes	98	28,95	13,66	2,00	62,00	30,00
Number of pills for diabetes	97	2,49	0,60	1,00	4,00	3,00
Number of all pills	97	10,12	3,42	3,00	20,00	10,00
N – sample size; M – mean; SD – standard deviation; Min – minimum; Max – maximum; Me – median						

Results

The study utilized the Adherence to Clinicians' Recommendations Scale in Chronic Diseases (ACDS), which has a scoring range from 0 to 28 points. The higher the score, the better the adherence to medical recommendations, with scores below 20 indicating a low level of adherence, 21 – 26 points indicating an average level of adherence, and above 26 points indicating a high level of adherence.

Table 4. Adherence to Clinicians' Recommendations Scale (ACDS)

	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Maks</i>	<i>Me</i>
Adherence to Recommendations	98	19,29	3,85	11,00	27,00	20,00

N – sample size; M – mean; SD – standard deviation; Min – minimum; Max – maximum; Me – median

In the studied group, the average score on the ACDS scale was 19.29 ± 3.85 , which indicates a low level of adherence to therapeutic recommendations. Subsequently, it was examined whether adherence to recommendations is influenced by the gender of the participants.

Table 5. T-test results for independent samples

		Descriptive Statistics				
		<i>t</i>	<i>df</i>	<i>p</i>	<i>M</i>	<i>SD</i>
Sex	Adherence	-	96	0,084		
	Woman	1,74			19,83	3,46
	Men				18,46	4,29

t – test statistic; df – degrees of freedom; p – statistical significance; M – mean; SD – standard deviation

Among women, the average adherence to recommendations was 19.83 ± 3.46 , while among men the average was lower at 18.46 ± 4.29 . However, these differences were not statistically significant ($p > 0.05$). Women only slightly adhered more to medical recommendations than men. The study thus showed that gender did not significantly differentiate adherence to recommendations in a statistically significant way.

The next step was to examine whether the duration of the disease significantly differentiates adherence to recommendations. After verifying the assumptions of normal distribution, it was justified to use the non-parametric Kruskal-Wallis test, which compares the medians of the dependent variable in different groups. The results of the Kruskal-Wallis test are presented in Table 6.

Table 6. Kruskal-Wallis Test Results

		χ^2	<i>p</i>	<i>M</i>	<i>M</i>	<i>M</i>
Duration of Diabetes		<i>f</i>	<i>in</i>	<i>aks</i>	<i>e</i>	<i>e</i>
Adherence	Up 20 years			1	2	2
	21 - 35 years	15	<	5,00	7,00	1,00
	Under 35 years	,26	0,001	1,00	5,00	0,00
				1	2	1
				1,00	3,00	8,00

χ^2 – test statistic; df – degrees of freedom; p – statistical significance; Min – minimum score; Max – maximum score; Me – median

In terms of adherence to recommendations, groups distinguished by the duration of diabetes differ significantly from each other statistically ($p < 0.05$).

To precisely determine between which groups the differences are significant, a post hoc Bonferroni test was conducted – pairwise comparison. The results are presented in Table 7.

Table 7. Bonferroni Post Hoc Test – Pairwise Comparison

		Duration of Diabetes		p	
Adherence		Up 20 years	21 - 35 years	0,061	
		Up 20 years	Under 35 years	<	***
		21 - 35 years	Under 35 years	0,094	

* $p < 0,05$; ** $p < 0,01$; *** $p < 0,001$; p – statistical significance

Significant statistical differences ($p < 0.05$) occurred between individuals who had been ill for up to 20 years and those who had been ill for over 35 years. Half of the people who had been ill for up to 20 years had adherence to medical recommendations of no less than $Me = 21.00$, whereas half of those over 35 years had adherence no greater than $Me = 18.00$. Statistically ($p < 0.05$), individuals who had been ill for up to 20 years adhered more to medical recommendations than those who had been ill for over 35 years.

Discussion

Type 2 diabetes is a progressive disease, and the inclusion of pharmacological treatment is essential to maintain proper glycemic levels. Even when patients with diabetes adhere properly to medication regimens, the outcomes of their treatment are often unsatisfactory. Numerous studies confirm that there are many different reasons leading to non-adherence to therapeutic recommendations among patients with diabetes [5]. A key role in diabetes therapy is played by adherence to therapeutic recommendations, which include: maintaining a healthy lifestyle (achieving appropriate body weight, proper diet, physical activity). Adherence to therapeutic recommendations is crucial in diabetes therapy because it provides the opportunity to avoid acute and chronic complications. An indispensable element

of diabetes therapy is monitoring glycemic levels, as well as regular follow-up visits to the diabetologist. Adherence to therapeutic recommendations, termed adherence in diabetes, largely depends on the self-discipline of the patients, known as self-care. The effectiveness of diabetes therapy, the need for modifications to the existing treatment process, is discussed in detail with the patient during follow-up visits with the entire therapeutic team, which includes a diabetologist, diabetes nurse, and dietitian. Thus, it can be said that the measure of therapeutic success in pharmacologically treated diabetes is a high level of adherence in patients. Irregular medication intake, contrary to the recommendations of the therapeutic team, can lead to irreversible health problems, often resulting in disability. Undoubtedly, one of the most important elements of treatment is identifying factors that will influence adherence to therapeutic recommendations in diabetes [6-9].

In studies by Swiątoniowska et al. [10], it was noted that effective and adequate adherence to therapeutic recommendations among chronically ill individuals with diabetes in developed countries reaches up to 75%. In economically underdeveloped countries, this rate hovers around 40%. It is also a fact that about 20-30% of prescription drugs are never picked up, and about 40% of patients do not fill the next prescription. Many patients purchase medications that they later do not take. These data are also confirmed by studies by Raebel et al. [11], and Glombiewski et al. [12] concerning the German population, as well as residents of the USA [9].

Alongside the lack of implementation of medical recommendations related to taking essential pharmacology, patients with diabetes often do not adhere to recommendations such as changing their diet or implementing daily physical activity. Their lifestyle remains the same. It is also important to note the low percentage of diabetic patients participating in diabetes education. This fact is emphasized by Matej-Butrym et al. [13].

Furthermore, the problem of non-adherence to all therapeutic recommendations primarily affects older individuals. Often, they experience a syndrome of personality burnout, which is confirmed by the studies of J. Hawryluk et al. [14] (the relationship of poor mental well-being with non-adherence to therapeutic recommendations).

Only the patient's internal feeling that the pharmacology and therapy applied in their case are bringing the right effects yields the results everyone expects. The fact is that an improvement in health condition contributes to an increased desire to continue the therapy applied, including taking medications [15].

The results obtained in this study differ significantly from those presented by other authors concerning the Polish population. Bonikowska et al. [16], in a study conducted in

2021 among older patients with diabetes, showed that only 22% of the surveyed patients had a high level of adherence to therapeutic recommendations, while more than half of the patients exhibited an average level of adherence to therapeutic recommendations in diabetes. In our own research, the average indicates a very low level of adherence to recommendations.

In holistic care for a patient with diabetes, a correct relationship between the patient and the therapeutic team is important. This relationship should be grounded in an attitude of safety and devoid of anxiety. Otherwise, it may lead to mutual frustration. Moreover, the therapeutic team supporting the conduct of education or medical procedures should encourage the patient to lead a healthy lifestyle and conduct self-monitoring [17].

Conclusions

1. The studied group is characterized by a low degree of adherence to therapeutic recommendations.
2. Gender does not influence the level of adherence to recommendations.
3. The longer the duration of the disease, the lower the degree of adherence to therapeutic recommendations.

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