

Sociodemographic factors and their relationship with therapeutic adherence in insulin-treated diabetic patients: a field study at the Diabetes Center of Médéa.

العوامل السوسيوديمغرافية وعلاقتها بالملاءمة العلاجية لدى مرضى السكري الخاضعين للأنسولين دراسة ميدانية بدار السكري المدية.

SEBBOUH Elbachir¹, NAIT ABDESSALEM Karima²

¹University of Tizi-Ouzou (Algeria), elbachir.sebbouh@ummtto.dz

²University of Tizi-Ouzou (Algeria), anisiheb3@live

Received: 25/02/2025 Accepted: 13/05/2025

Published:01/09/2025

Abstract:

The aim of this study is to explore the relationship between socio-demographic factors, specifically age and gender (male/female), and therapeutic adherence in insulin-dependent diabetic patients. The study was conducted at the Diabetes Center in Medea, and a descriptive approach was adopted with a sample of 59 patients (31 female and 28 male), aged between 30 and 80 years. The sample was selected purposefully, and we used the therapeutic adherence scale for kidney failure, developed by François Mai (1999), which was translated by several researchers, including Znad Dalila. We performed a psychometric evaluation of the scale, measuring its validity and reliability, and applied it to the sample to obtain the final results.

Keywords: Therapeutic adherence, diabetic patient, socio-demographic factors.

ملخص:

نهدف من خلال هذه الدراسة إلى معرفة مدى وجود علاقة بين العوامل السوسيو ديمغرافية والتي اخترنا منها عاملي السن ونوع الجنس ذكر أنثى بدرجة الملاءمة العلاجية لدى مرضى السكري الخاضعين للأنسولين ، حيث جرت الدراسة بدار السكري بالمدية وقد تم الاعتماد على المنهج الوصفي على عينة مكونة من 59 مريض 31 أنثى و 28 ذكر بدار السكري المدية ، سنهم يتراوح بين 30 و 80 سنة من الجنسين والتي تم اختيارها بطريقة قصديه واستخدمنا في دراستنا مقياس الملاءمة العلاجية للقصور الكلوي من إعداد فرنسوا مي (1999) *François Mai* وجماعته والذي ترجم من طرف العديد من الباحثين وعلى رأسهم زناد دليلة وقد قمنا بتحكيم المقياس وقياس خصائصه السيكومترية وقياس صدقه وثباته قمنا بتطبيقه على العينة وتوصلنا إلى النتائج النهائية.

الكلمات المفتاحية : الملاءمة العلاجية ، مريض السكري ، العوامل السوسيو ديمغرافية.

Corresponding author: SEBBOUH Elbachir

1. Introduction

Diabetes is one of the most common diseases in today's era, representing a major public health issue globally due to its widespread prevalence and its negative impact on individual health. Diabetes is a metabolic disease resulting from an imbalance in insulin secretion, causing abnormal blood sugar levels that lead to the manifestation of diabetes symptoms.

Health professionals have noticed that there are issues among diabetic patients related to their adherence to medical instructions, such as diet, medication, medical examinations, periodic checkups, and laboratory tests. This adherence is known as therapeutic adherence, and solving the problem of patient non-compliance with medical recommendations is considered more important than any other medical discovery. Diabetes is a chronic disease that requires continuous monitoring and follow-up, and it is affected by the type and quantity of food consumed, such as sugars and starches. Patients need to adopt appropriate behaviors to avoid the risks associated with the disease. Several factors influence the success of this behavior, including individual personality traits, psychological factors, economic factors, and social factors.

2. Study Problem and Hypotheses:

Psychosomatic diseases, especially the psychosomatic approach in medicine, have garnered significant attention in clinical and health psychology, focusing on psychological factors and the crises they create, accompanied by tension and psychological disorders.

Diabetes is one of the most common chronic psychosomatic diseases. According to the World Health Organization's statistics for 2016, the mortality rate from diabetes ranked sixth in Algeria at 7%, after cardiovascular diseases (41%), other non-communicable diseases (16%), infectious diseases, maternal and neonatal diseases, and nutritional diseases (15%), injuries (8%), and cancers (10%).

Around 1.8 million people in Algeria suffer from diabetes, with an increase of 6.9% according to the International Diabetes Federation (2017) report. The uncertainty margin for the number of diabetics in Algeria ranges between 1.25 million and 2.45 million (Bouchoucha Mariam, 2021/2022, p. 112).

Algeria, like other countries, has placed great importance on managing chronic diseases, especially diabetes, providing services for diabetic patients, also known as medical care or health services. These services are provided by members of the medical team to individuals or groups, such as the treatment of a patient by a doctor in a private clinic or in the outpatient department of a government hospital (Al-Sha'ar et al., 2000, p. 11).

Blackwell et al. (1973) define therapeutic adherence as a series of behaviors starting from basic medication intake, following a proper diet, adopting other health behaviors such as respecting medical appointments, eating a balanced diet, exercising, avoiding smoking, and adopting a healthy lifestyle.

Given this, we can say that diabetes is a complex and chronic disease that requires the patient to follow a specific treatment regimen. Hence, the following research problem is posed: Is there a difference in therapeutic adherence among insulin-dependent diabetic patients based on demographic variables (gender and age)?

3. Research Questions:

1. Are there statistically significant differences in therapeutic adherence among insulin-dependent diabetic patients based on gender?

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2. Are there statistically significant differences in therapeutic adherence among diabetic patients based on age?

4. Hypotheses:

1. There are statistically significant differences in therapeutic adherence among insulin-dependent diabetic patients based on gender.
2. There are statistically significant differences in therapeutic adherence among diabetic patients based on age.

5. Study Objectives:

The main objectives of this study are:

1. To examine whether there is a difference in therapeutic adherence among diabetic patients based on gender (male, female).
2. To explore whether there is a difference in therapeutic adherence among diabetic patients based on age.

6. Significance of the Study:

The importance of this study stems from the need to understand whether gender (male and female) and age play a role in determining the degree of therapeutic adherence among diabetic patients.

7. Study Concepts:

7.1. Definition of Therapeutic Adherence: Haynes et al. (1979) define adherence as the extent to which the patient's behavior aligns with medical and health recommendations, including medication intake, diet, or other lifestyle changes (Anthony James Cuit, 2001, p. 77).

7.2. Researcher's Definition of Therapeutic Adherence: It is the individual's behavior in following and applying the instructions and recommendations given by the doctor regarding diet, consistency, and medication intake (to maintain their physical and psychological health).

7.3. Definition of Insulin-dependent Diabetes:

Definition of Diabetes: Diabetes typically refers to high blood sugar levels, characterized by frequent urination, a hallmark of the disease. It has been known since ancient times, though its current understanding did not exist until 1980, as specialists only reached a consensus on a precise definition then. This type of diabetes is characterized by a sharp rise in blood sugar levels due to insufficient insulin production by the pancreas... It represents a major public health concern globally (Khalifa, 2001, p. 7).

Definition of a Diabetic Patient: A diabetic patient is anyone suffering from diabetes and receiving treatment at the Diabetes Center in Medea, specifically those undergoing insulin injections.

8. Study Tools:

In this research, we used the Therapeutic Adherence Scale.

8.1. Therapeutic Adherence Scale:

Definition: The Therapeutic Adherence Scale for Kidney Failure, developed by François Mai (1999) and his team, was used. The scale consists of six sub-dimensions:

- Diet
- Medication intake
- Fluids
- Smoking
- Alcohol and sedatives
- Consistency

The scale was translated from English to Arabic in a study in Algeria by researcher Znad Dalila in 2009. The scale was then adapted for diabetic patients by researcher Djazia Bzari, where some sub-dimensions that were irrelevant to diabetes, such as alcohol and sedatives, were removed. New dimensions relevant to diabetes treatment were added, such as sugar intake, weight monitoring, exercise, and physical activity. The scale was modified and validated by a group of experts from the University of Blida 2 and the University of Tizi Ouzou. Additionally, a question on fluids was added under the diet category, as fluids are also related to the diet, according to all the experts. The final version of the scale was applied to both patients with kidney failure and those with diabetes.

Psychometric Characteristics of the Therapeutic Adherence Scale:

To assess the psychometric properties of the scale, including validity and reliability, the following steps were taken:

1- Validity and Reliability of the Scale: The reliability of the Therapeutic Adherence Scale was evaluated in the current study using two methods: the half-split method with Guttman correction and Cronbach's Alpha (α) formula for the total score and its six sub-dimensions. The results are presented in the following table:

Table 1: Guttman and Cronbach's Alpha (α) Reliability Coefficients for the Therapeutic Adherence Scale and Its Sub-Dimensions

Therapeutic Adherence Scale and Sub-Dimensions	Number of Items	Guttman Coefficient	Cronbach's Alpha (α)
Diet	04	0.95	0.98
Medication Intake	03	0.87	0.77
Sugar Intake	03	0.74	0.89
Weight Monitoring	03	0.63	0.72
Exercise and Physical Activity	02	0.98	0.98
Consistency and Medical Examinations	05	08.0	0.78
Total Score	20	0.94	0.82

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From the table above, it is evident that the Guttman and Cronbach's Alpha coefficients for the six sub-dimensions of the scale range from 0.63 to 0.98. Specifically, the Guttman coefficients were:

- 0.95 for Diet,
- 0.87 for Medication Intake,
- 0.74 for Sugar Intake,
- 0.63 for Weight Monitoring,
- 0.98 for Exercise and Physical Activity,
- 0.80 for Consistency and Medical Examinations.

Similarly, the Cronbach's Alpha values were:

- 0.98 for Diet,
- 0.77 for Medication Intake,
- 0.89 for Sugar Intake,
- 0.72 for Weight Monitoring,
- 0.98 for Exercise and Physical Activity,
- 0.78 for Consistency and Medical Examinations.

As shown in the table above, the value of the Guttman and Alpha reliability coefficients for the total score of the therapeutic appropriateness scale were close to each other: 0.94 using the Guttman formula and 0.82 using the Alpha formula.

In light of these values, we can say that the therapeutic appropriateness scale scores provide high measurements at the dimension level that we can rely on. They also provide consistent measurements at the total score level, falling within the acceptable range, considering that the values obtained explain between 63% to 98% of the true score. These values meet the recommended standards, and thus the therapeutic appropriateness scale scores are stable in the general population, allowing us to rely on its results for the purposes of the current study.

Estimating the Validity of the Therapeutic Appropriateness Scale Scores

The validity of the therapeutic appropriateness scale scores in the current study was verified using the internal consistency method. We relied on this type of validity in the current study by calculating three forms of corrected correlation coefficients:

1. The corrected correlation between the total score of the therapeutic appropriateness scale and its items.
2. The corrected correlation between the six dimensions that make up the therapeutic appropriateness scale and the items belonging to each of them.
3. The corrected correlation between the six dimensions of the therapeutic appropriateness scale and its total score. The following three tables explain this.

Table 2: Corrected Inter-item Correlations between the Items and the Total Score of the Therapeutic Appropriateness Scale

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Item Numbers	Correlation	Item Numbers	Correlation	Item Numbers	Correlation	Item Numbers	Correlation	Item Numbers	Correlation
01	0.73	05	0.02	09	0.73	13	0.25	17	0.35
02	0.73	06	0.00	10	0.59	14	0.14	18	0.35
03	0.75	07	0.13	11	0.20	15	0.17	19	0.24
04	0.75	08	0.71	12	0.18	16	0.32	20	0.24
Arithmetic mean									0.38

It is clear from Table 2 that the corrected inter-item correlations between the total score of the therapeutic appropriateness scale and its items ranged from 0.13 to 0.75, with a mean of 0.38. It is also noted from the table that two items (05 and 06) had correlation values lower than the minimum threshold for this range.

In light of these values, we can say that most of the items explain an acceptable amount of variance in the total score of the scale, as they explain more than the minimum acceptable level of 09%. Therefore, the results of the therapeutic appropriateness scale can be relied upon in the current study.

Table 3: Corrected Inter-item Correlations between the Items and Sub-dimensions of the Therapeutic Appropriateness Scale

Diet		Medication Intake		Sugars		Weight Monitoring		Exercise and Sports		Consistency and Check-ups	
Item	Correlation	Item	Correlation	Item	Correlation	Item	Correlation	Item	Correlation	Item	Correlation
01	0.96	05	0.80	08	0.81	11	0.72	14	0.98	16	0.55
02	0.96	06	0.41	09	0.89	12	0.46	15	0.98	17	0.61
03	0.97	07	0.80	10	0.68	13	0.50			18	0.61
04	0.97									19	0.62
										20	0.62
x	0.96	x	0.67	x	0.80	x	0.56	x	0.98	x	0.60

It is clear from the table above that the corrected inter-item correlations for the first dimension (Diet) ranged from 0.96 to 0.97, with a mean of 0.96. The corrected inter-item correlations for the second dimension (Medication Intake) ranged from 0.41 to 0.80, with a mean of 0.67. For the third dimension (Sugars), the correlations ranged from 0.68 to 0.89, with a mean of 0.80. For the fourth dimension (Weight Monitoring), the correlations ranged from 0.46 to 0.72, with a mean of 0.56. For the fifth dimension (Exercise and Sports), the correlations were all 0.98, and for the sixth dimension (Consistency and Check-ups), the correlations ranged from 0.55 to 0.62, with a mean of 0.60.

In light of these values, we can say that most of the items explain an acceptable amount of variance in their respective sub-dimensions, reflecting the consistency of these items with

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their dimensions in measuring the concept of therapeutic appropriateness. Therefore, the results of the measurement tool can be relied upon in the current study.

Table 4: Raw and Adjusted Correlation between the Total Score of the Therapeutic Appropriateness Scale and the Total Scores of Its Sub-dimensions

Sub-dimensions	Raw Correlation	Adjusted Correlation	Statistical Significance
Diet	0.81	0.66	0.00
Medication Intake	0.12	0.01	0.38
Sugars	0.81	0.66	0.00
Weight Monitoring	0.36	0.13	0.00
Exercise and Physical Activity	0.30	0.09	0.02
Consistency and Check-ups	0.52	0.27	0.00

From the table above, we can observe that the raw correlation values between the six sub-dimensions of the therapeutic appropriateness scale and its total score ranged from 0.12 to 0.81. Specifically, the raw correlation was 0.81 for the first dimension (Diet), 0.12 for the second dimension (Medication Intake), 0.81 for the third dimension (Sugars), 0.36 for the fourth dimension (Weight Monitoring), 0.30 for the fifth dimension (Exercise and Physical Activity), and 0.52 for the sixth dimension (Consistency and Check-ups). It is worth noting that all these correlations were statistically significant, except for the correlation of the second dimension related to Medication Intake.

Additionally, the adjusted correlation between the six sub-dimensions and the total score of the scale ranged from low to high, with values of 0.66 for the first dimension (Diet), 0.01 for the second dimension (Medication Intake), 0.66 for the third dimension (Sugars), 0.13 for the fourth dimension (Weight Monitoring), 0.09 for the fifth dimension (Exercise and Physical Activity), and 0.27 for the sixth dimension (Consistency and Check-ups).

Based on the results presented in the table above, we can conclude that the six dimensions are internally consistent with the total score in measuring therapeutic appropriateness among the study sample, except for the second dimension related to Medication Intake. Therefore, the scale scores are valid, and we can rely on its results in this study.

It is also noteworthy that these results, derived from the three forms of inter-item correlations (between item and total score, between item and dimension, and between dimension and total score), support the reliability evidence for the total score obtained using

the Guttman and Alpha coefficients, align with them, reinforce them, and confirm their validity.

Scoring Method: The scale items are scored as follows: Always (03), Sometimes (02), Never (01) for positive statements, and the reverse (Always = 01, Sometimes = 02, Never = 03) for negative statements. Positive statements include (1), (2), (3), (4), (5), (8), (9), (12), (13), (15), (16), (17), (20), (21), (22). Other statements are negative. The score range is from 21 (lowest) to 57 (highest), and the scores are classified as follows:

Table 5: Classification of Therapeutic Appropriateness Scale Scores

Degree of Therapeutic Appropriateness	Score Range
Weak Therapeutic Appropriateness	21 - 33
Moderate Therapeutic Appropriateness	34 - 45
Good Therapeutic Appropriateness	46 - 57

9. Statistical Methods Used in the Current Study:

For data analysis in the current study, version 25 of the SPSS (Statistical Package for Social Sciences) software was used, applying the following statistical methods:

- Kolmogorov-Smirnov and Shapiro-Wilk tests to check the normality of the distribution of the therapeutic appropriateness scale scores and its six sub-dimensions.
- Levene's test to verify homogeneity of variance.
- Mann-Whitney test for testing the first hypothesis data, with the use of effect size r .
- Kruskal-Wallis test for testing the second hypothesis data, with the use of effect size eta-squared (η^2).

10. First Hypothesis Results:

The first hypothesis is as follows: There are statistically significant differences in the level of therapeutic appropriateness among insulin-treated diabetic patients between males and females.

To test this hypothesis, and due to the lack of normal distribution, we used the Mann-Whitney test as a non-parametric alternative to the independent t-test to compare the therapeutic appropriateness scale scores of insulin-treated diabetic patients based on gender. The results are as follows:

Table 6: Results of the Mann-Whitney Test for Comparing the Scores of Insulin-Treated Diabetic Patients on the Therapeutic Appropriateness Scale According to Gender

Variable	Gender	Sample Size	Mean Ranks	Mann-Whitney U	Statistical Significance	Effect Size r
Diet	Males	28	30.93	408.00	0.62	0.06 small
	Females	31	29.16			
	Males	28	30.29	426.00	0.83	0.03

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Medication Intake	Females	31	29.74			small
Sugars	Males	28	29.13	409.50	0.65	0.06
	Females	31	30.79			small
Weight Monitoring	Males	28	29.80	428.50	0.89	0.02
	Females	31	30.18			small
Exercise and Physical Activity	Males	28	27.50	340.00	0.5	0.02
	Females	31	32.26			small
Consistency and Check-ups	Males	28	27.50	364.00	0.10	0.02
	Females	31	32.26			small
Total Score	Males	28	30.55	418.50	0.81 Not significant	0.03
	Females	31	29.50			small

From the table above, it is evident that the male sample consisted of 28 patients, with a mean rank of 30.55 for their scores on the therapeutic appropriateness scale. The female sample consisted of 31 patients, with a mean rank of 29.50 for their scores. The calculated Mann-Whitney U test value for the two independent samples was 418.50, which is not statistically significant. Additionally, the effect size (Cohen's r) was small, not exceeding 0.03.

Based on these values, we conclude that the data from the current study do not support the first hypothesis. Therefore, we cannot claim there are statistically significant differences in therapeutic appropriateness between male and female insulin-treated diabetic patients.

This can be reported according to the American Psychological Association (APA) publication guidelines as follows: "We found no significant difference in therapeutic appropriateness, $r=0.03$, $U(59)=418.50$, $p=0.81$, between the male sample (3055 MR=) and the female sample (29.50 MR=)."

Furthermore, from the table above, we can see that the gender differences in the six sub-dimensions of the therapeutic appropriateness scale were also not statistically significant, except for the fifth dimension related to exercise and physical activity. In this dimension, the differences were statistically significant at the 0.05 level. Referring back to the descriptive statistics in the table above, these differences favored males, as they had a mean rank of 33.36, while females had a mean rank of 26.97. This suggests that therapeutic appropriateness in the exercise and physical activity dimension was better among males than females.

11. Second Hypothesis Results

The second hypothesis is as follows: There are statistically significant differences in therapeutic appropriateness levels among insulin-treated diabetic patients based on age groups, with the older age group showing higher levels of therapeutic appropriateness.

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To test this hypothesis, and given the lack of homogeneity between groups (see appendix), we used the Kruskal-Wallis test to compare the therapeutic appropriateness scale scores of insulin-treated diabetic patients based on age categories (45-55 years, 56-65 years, and 66-80 years). The results are as follows:

Table 7: Results of the Kruskal-Wallis Test for Comparing the Mean Scores of Insulin-Treated Diabetic Patients on the Therapeutic Appropriateness Scale According to Age Categories

Therapeutic Appropriateness	Age Categories	Number	Mean Ranks	Chi-Square Value	Freedom degrees	Statistical Significance	Eta-squared (η^2)
Diet	45 to 55	22	29.20	0.18	02	0.92	0.00 Null
	56 to 65	21	30.93				
	66 to 80	16	29.88				
Medication Intake	45 to 55	22	26.57	5.09	02	0.08	0.09 Average
	56 to 65	21	30.93				
	66 to 80	16	33.50				
Sugars	45 to 55	22	29.11	1.43	02	0.49	0.02 Small
	56 to 65	21	32.83				
	66 to 80	16	27.50				
Weight Monitoring	45 to 55	22	31.09	3.99	02	0.14	0.07 Average
	56 to 65	21	32.29				
	66 to 80	16	25.50				
Exercise and Physical Activity	45 to 55	22	34.50	5.39	02	0.07	0.09 Average
	56 to 65	21	28.90				
	66 to 80	16	25.25				
Consistency and Check-ups	45 to 55	22	30.55	0.08	02	0.96	0.00 Null
	56 to 65	21	29.67				
	66 to 80	16	29.69				
Total Score	45 to 55	22	30.70	0.74	02	0.69	0.01 Small
	56 to 65	21	31.55				
	66 to 80	16	27.00				

As shown in the table, there are 22 patients aged 45 to 55 years, with a mean rank of 30.70 for their total scores on the therapeutic appropriateness scale. There are 21 patients aged 56 to 65 years, with a mean rank of 31.55. Additionally, 16 patients aged 66 to 80 years had a mean rank of 27.00.

The Chi-Square test value for the total score of the therapeutic appropriateness scale was 0.74 with 02 degrees of freedom, which is not statistically significant. The eta-squared value indicates that the effect size for the total score was small, as it did not exceed 0.01.

Therefore, the data from the current study do not support the second hypothesis, and we cannot claim that there are statistically significant differences in therapeutic appropriateness among insulin-treated diabetic patients based on age categories.

The results can be reported according to the guidelines of the American Psychological Association (APA) as follows:

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"We found that therapeutic appropriateness does not differ across age groups, $H(2)=0.74 > 0.05$, $(\text{Eta})^2 = 0.01$."

As observed in the table above, the differences between the three age groups (45 to 55 years, 56 to 65 years, and 66 to 80 years) in the six dimensions of the therapeutic appropriateness scale were also not statistically significant. This supports the idea that therapeutic appropriateness, both in terms of total score and the individual dimensions, does not differ based on the age group of insulin-treated diabetic patients.

12. General Conclusion:

Based on the interpretation and analysis of the study results, we conclude that the data from the current study do not support the first hypothesis. Therefore, we cannot claim that there are statistically significant differences in therapeutic appropriateness between male and female insulin-treated diabetic patients.

This was confirmed by a study conducted by Mohamed Abdel-Salam et al. (2013) in Saudi Arabia.

13. Results:

Most patients (70.4%) were aged between 40-60 years. The majority of the patients were men (around 60%) and Saudi nationals. Most patients did not have a university degree. Younger patients (under 40 years old) were more compliant with all aspects of management, except for medication adherence (23.8%). Women were significantly more compliant with exercise (49.7%), while men were significantly more compliant with follow-ups (81.1%). Saudi patients were significantly more compliant with medication (79.2%), while non-Saudis were more compliant with exercise (62.9%). All unmarried patients adhered to the diet. Smokers were significantly less compliant with exercise, and patients with a normal BMI were significantly more compliant with diet and exercise.

14. Conclusion:

Thus, it was found that patients were generally less compliant with the diet. The socio-demographic factors most significantly associated with non-compliance were age, gender, nationality, educational status, marital status, smoking status, and BMI.

The results of this study contradict the findings of the second hypothesis, which suggests statistically significant differences in therapeutic appropriateness in diabetic patients based on age.

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