



Impact of Depression, Anxiety, and Self-Esteem on Medication Adherence among Diabetics in Morocco

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Abstract

Anxiety, depression and self-esteem can alter medication adherence in diabetic patients, with adverse health consequences. However, their impact remains poorly understood in the Moroccan diabetic population. This study aimed to assess the associations between these psychological dimensions and self-reported treatment adherence in 116 Moroccan patients with diabetes. The originality of this work lies in the investigation of these relationships in an understudied population. Participants completed validated questionnaires measuring their levels of anxiety and depression (HADS), self-esteem (Rosenberg scale) and medication adherence (Morisky scale). Correlation and multiple linear regression analyzes were performed. Anxiety and depression were negatively associated with medication adherence ($r = -0.62$ and $r = -0.48$ respectively; $p < 0.001$) while self-esteem was positively correlated ($r = 0.24$; $p = 0.009$). In multivariate analyzes, anxiety ($\beta = -0.47$) and depression ($\beta = -0.19$) emerged as significant predictors of poorer adherence (adjusted $R^2 = 41.3\%$). These results confirm, in Moroccan diabetic patients, the adverse influence that these frequent psychological disorders can have on treatment adherence. They support the importance of early identification of patients requiring psychosocial support to optimize their medication adherence and ultimately, their medical prognosis.

Keywords: Depression, Anxiety; Self-Esteem; Adherence; Diabetes; Morocco

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1. Introduction

Diabetes represents a major public health issue worldwide. Its prevalence continues to rise globally, especially in developing countries facing nutritional transition and sedentary lifestyles [1]. In Morocco, age-standardized prevalence escalated from 3.3% to 6.4% between 1998 and 2014 [2]. This surge is accompanied by increased morbidity and mortality from long-term micro and macrovascular complications if glycemic control remains suboptimal for years. Diabetes management requires major lifestyle adaptations from patients, through pharmacological treatments (oral hypoglycemic agents and/or insulin therapy) and extensive self-care behaviors including frequent blood glucose monitoring, controlled diet and regular physical activity. However, adhering to these demanding daily regimens long-term is challenging for many [3]. The World

Health Organization estimates that less than 50% of diabetic patients are adherent to their medications [4]. Poor adherence accelerates glycemic deterioration and onset of complications. Identifying psychological determinants of non-adherence is therefore of crucial importance.

Some evidence suggests emotional distress and self-esteem could alter therapeutic adherence in this population, but these relationships remain under-investigated, especially cross-culturally. Anxiety and depression are highly prevalent among diabetics (up to 40% vs 10% in the general population) [5]. These disorders reduce motivation and energy allocated to daily self-care [6,7]. Accordingly, several studies linked anxiety and depression to poorer medication adherence and worsened glycemic control [8,9]. However, the cross-cultural generalization of such findings cannot be assumed. Self-esteem, defined as the subjective appraisal of

one's own worth [10], could also play a role. High self-esteem associates with resilient coping abilities when facing adversity, while low self-esteem engenders feelings of personal ineffectiveness detrimental to treatment engagement [11]. Sparse evidence links diminished self-esteem to adherence difficulties [12], but data are lacking regarding Moroccan diabetic patients specifically.

The objective of this study was therefore to assess the relationships between anxiety, depression, self-esteem and self-reported medication adherence in Moroccan patients with diabetes. We hypothesized that high levels of anxiety and depression as well as poor self-worth would correlate with poorer adherence.

2. Materials and Methods

2.1. Participants

This cross-sectional study included 116 adult outpatients with diabetes, followed in an urban health center in Kenitra, Morocco. Convenience sampling was used. Patients were informed about the study during routine consultations. Inclusion criteria were having diabetes, being aged over 18 years, and sufficient cognitive abilities to reliably complete questionnaires in Moroccan Arabic. Exclusion criteria were major cognitive deficits or psychiatric conditions that could impede participation. After consenting, patients anonymously completed the measures prior to their medical visit.

2.2. Instruments

Three validated scales in Moroccan Arabic were used:

- Hospital Anxiety and Depression Scale (HADS) [13]: 14 items rated 0-3 measuring anxiety (7 items) and depressive symptoms (7 items). Score ≥ 11 indicates possible clinical case.
- Rosenberg Self-Esteem Scale (RSES) [14]: 10 items rated 1-4 assessing global self-worth. Higher scores denote higher self-esteem.
- Morisky Medication Adherence Scale [15]: 8 dichotomous (yes/no) items exploring medication adherence behaviors over the past week. Scores range from 0 (poor) to 8 (high).

2.3. Analysis

Descriptive statistics were conducted. Pearson's correlations estimated links between psychological variables and adherence. Multiple linear regression examined unique effects of anxiety, depression and self-esteem on adherence. Significance level was set at $p < 0.05$.

3. Results and Discussions

Table 1 presents detailed descriptive statistics concerning the psychological variables and medication adherence. For anxiety, the mean score is $9.82 (\pm 2.23)$ on a scale from 0 to 21. The median is 10 and the score range is 5 to 13. 14.7% of patients have a score higher than 11, corresponding to a possible case of clinical anxiety. As Figure 1 shows, a very large majority of the scores obtained, representing nearly 80% of individuals, lie between 8 and 12, suggesting moderate to quite severe anxiety levels in this population. However, it appears that about 10% of participants present scores from 5 to 7, indicating very mild symptoms. At the other extreme, a few isolated cases reach the maximum score of 13, signifying very debilitating

anxiety. These results thus highlight a non-negligible variability of anxiety profiles within the analyzed population. As Figure 2 shows, the most frequent depression score is 6, with 44 cases representing 38.6% of the sample. Next come scores of 8 (17 cases, 14.9%), 7 and 10 (9 cases each, 7.9%), then 9 (7 cases, 7.9%). The extreme scores of 4 and 15 are less represented, with 7 (6.1%) and 10 cases (8.8%) respectively. Between these values, scores of 5, 11, 12 and 13 are even rarer, with less than 3% of cases each. We can thus say that the majority of depression scores in this sample lie between 6 and 10, with 78 cases representing 68.4% of the total. This demonstrates that depression levels tend to be moderate to quite severe for a substantial proportion of the individuals. However, nearly one in ten individuals presents either very mild symptoms (score of 4) or very severe symptoms (score of 15). This relatively broad distribution of depression scores highlights a certain variability of profiles within the studied population. The level of self-esteem has a mean of $23.76 (\pm 3.05)$ for possible scores from 10 to 30. The median is 22. As Figure 3 shows, the distribution of self-esteem scores is clearly polarized at the extremes, with nearly 40% of cases being very low (scores of 17-18) and 20% being very high (≥ 25). Central scores are infrequent. This distribution reveals the existence of two distinct psychological profiles within the population: very low self-esteem versus very high self-esteem. There is also noticeable interindividual variability in levels. Values around the median are underrepresented. It is thus a contrasted distribution between two opposing poles. Finally, medication adherence as measured by the Morisky score has a mean of $4.09 (\pm 1.21)$ out of 8. The median is 4 and the scores range from 1 to 6 in the sample. As Figure 4 shows, nearly 70% of individuals display poor treatment adherence (scores of 4-5). Conversely, only 7% show good compliance (maximum score of 6). About 14% even report non-adherence to treatment (score less than or equal to 3). Overall, these results largely reflect poor medication compliance behaviors in this population, although a minority of around 20% of cases have better adherence. There is also noticeable variability in individual adherence levels.

Table 2 presents Pearson correlation coefficients between the different quantitative variables. There is a strong positive correlation between anxiety and depression ($r = 0.58$; $p < 0.001$). Anxiety and depression are negatively and significantly associated with the level of self-reported medication adherence, with respective correlation coefficients of $r = -0.62$ ($p < 0.001$) and $r = -0.48$ ($p < 0.001$). Finally, positive correlations emerge between self-esteem and therapeutic adherence ($r = 0.24$; $p = 0.009$). The final regression model including anxiety, depression and self-esteem as predictors explains 41.3% of the variance in medication adherence (adjusted $R^2 = 0.413$). The model's F statistic is 12.24 ($p < 0.001$). The independent effects of psychological predictors on adherence are detailed in Table 3. Anxiety has a predominant effect with a standardized beta coefficient of -0.47 ($p < 0.001$). Depression also has a significant effect ($\beta = -0.19$; $p = 0.017$). Finally, the positive effect of self-esteem is modest but significant ($\beta = 0.17$; $p = 0.03$). This study aimed to assess the relationships between emotional distress, self-worth and medication adherence in Moroccan patients managing diabetes, considering cultural influences on health behaviors.

Table 1: Descriptive statistics of psychological variables and medication adherence (n=116)

Variables	HADS - Anxiety	HADS - Depression	Self-esteem	Adherence
Mean (SD) Median	9.82 (2.23) 10	7.81 (2.87) 8	23.76 (3.05) 22	4.09 (1.21) 4
Min-Max	5-13	4-15	17-30	1-6

Table 2: Pearson correlations between psychological variables and medication adherence (n=116)

Variables	Anxiety	Depression	Self-esteem	Adherence
Anxiety	-	0.58***	-0.41***	-0.62***
Depression	0.58***	-	-0.39***	-0.48***
Self-esteem	-0.41***	-0.39***	-	0.24**
Adherence	-0.62***	-0.48***	0.24**	-

** p<0.01; *** p<0.001

Table 3: Multiple linear regression model predicting medication adherence

Predictors	B	SE	β	p
Constant	6.05	0.99	-0.35	<0.001
Anxiety	-0.15	0.03	-0.47	<0.001
Depression	-0.05	0.02	-0.19	0.017
Self-esteem	0.04	0.02	0.17	0.03

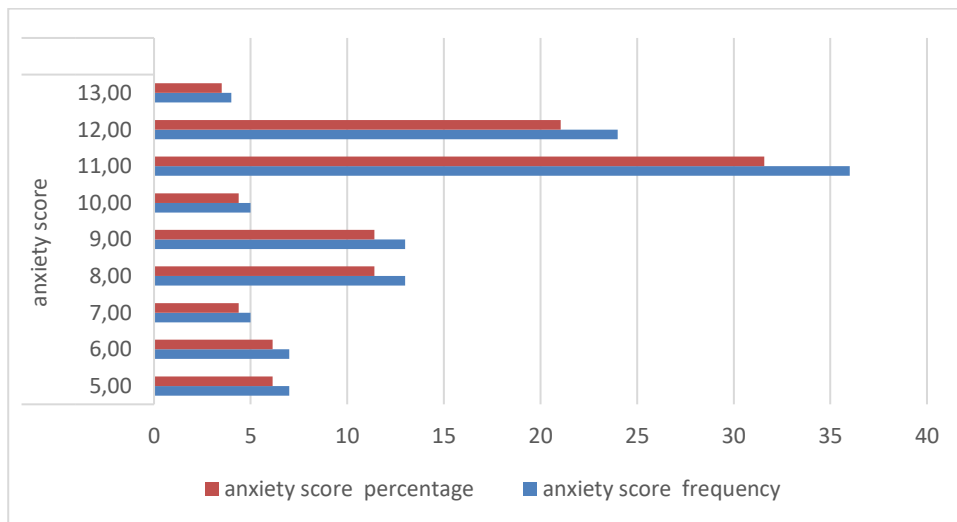


Figure 1: Distribution of anxiety scores (HADS scale)

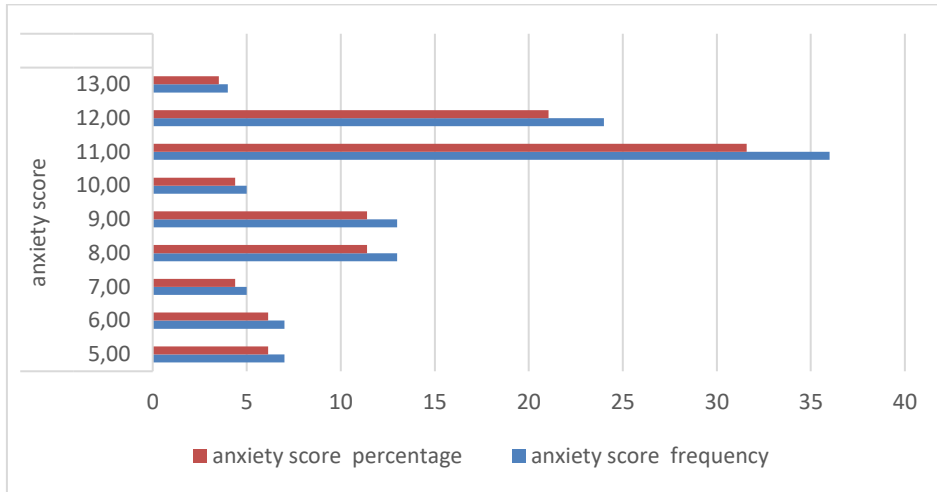


Figure 2: Distribution of Depression scores (HADS scale)

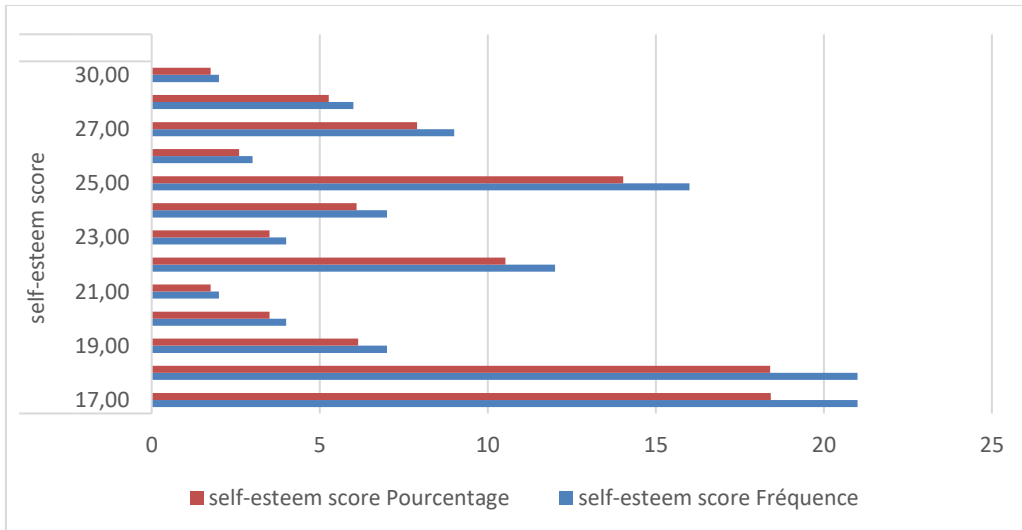


Figure 3: distribution of self-esteem score

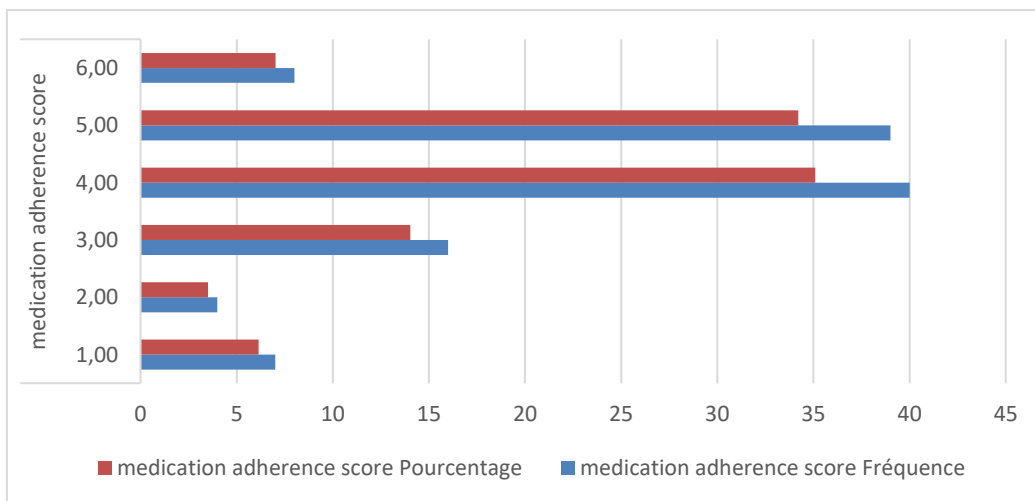


Figure 4: Distribution of medication adherence score (Morisky scale)

Our findings generally confirmed hypotheses. More severe anxious and depressive symptoms related to poorer self-reported adherence, while higher self-esteem associated with better adherence. These results align with models linking emotional distress to self-care difficulties in diabetes [16]. They also extend predominantly Western research to this understudied cultural setting. The particularly strong links observed between anxiety, depression and suboptimal adherence match previous reports [8,9]. The adverse motivational and attentional effects of these highly prevalent conditions among diabetics plausibly undermine their daily self-management. Self-esteem may exert a protective effect by promoting feelings of self-efficacy regarding treatment.

Interestingly, anxiety emerged as the most robust predictor of adherence challenges in multivariate analysis, underscoring its clinical salience. Routine screening for anxiety/depression appears warranted in diabetic patients from this cultural background, to enable targeted psychological support when appropriate. Cognitive-behavioral or mindfulness-based therapies, for instance, could conjointly alleviate emotional distress and enhance self-care behaviors [17,18]. The holistic approach advocated considers psychological health within quality care provision to diabetic patients, irrespective of cultural specificities. However, this study has certain limitations including the small sample size, self-reported adherence and cross-sectional design precluding causal inference. Further research should confirm whether improving psychological well-being translates into better observable adherence and glycemic indicators over time in these cultural patients.

4. Conclusions

In conclusion, this study demonstrated significant associations between severity of anxious/depressive symptoms, self-esteem and self-reported medication adherence among Moroccan patients managing diabetes. These findings clinically emphasize the value of integrating psychological health within a comprehensive, patient-centered approach to enable optimal self-care abilities and glycemic control in this cultural context. Systematic emotional distress screening and appropriate supportive interventions appear warranted toward this end. Further research through longitudinal designs is required to elucidate the directionality and potentially reciprocal influences between emotional wellbeing and capacity for diabetes self-care over time. Qualitative studies could also provide deeper insight into patients' perspectives and lived experience regarding these psychological determinants of adherence. Additionally, the design and empirical evaluation of tailored psychosocial interventions addressing emotional distress in this population would constitute logical next steps toward translating these observational findings into improved health outcomes.

References

- [1] J.E. Shaw, R.A. Sicree, and P.Z. Zimmet. (2010). Global estimates of the prevalence of diabetes for 2010 and 2030. *Diabetes Research and Clinical Practice*. 87(1): 4-14.
- [2] L. Guariguata, D.R. Whiting, I. Hambleton, J. Beagley, U. Linnenkamp and J.E. Shaw. (2014). Global estimates of diabetes prevalence for 2013 and projections for 2035. *Diabetes Research and Clinical Practice*. 103(2): 137-149.
- [3] L. Fisher, J.S. Gonzalez, and W.H. Polonsky. (2014). The confusing tale of depression and distress in patients with diabetes: a call for greater clarity and precision. *Diabetic Medicine*. 31(7): 764-772.
- [4] E. Sabaté. (2003). Adherence to long-term therapies: evidence for action. World Health Organization.
- [5] J.S. Gonzalez, N.S. Kane, D.H. Binko, A. Shapira, and C.J. Hoogendoorn. (2016). Tangled up in blue: Unraveling the links between emotional distress and treatment adherence in type 2 diabetes. *Diabetes Care*. 39(12): 2182-2186.
- [6] Fisher, L., Gonzalez, J.S., & Polonsky, W.H. (2014). The confusing tale of depression and distress in patients with diabetes: a call for greater clarity and precision. *Diabetic Medicine*. 31(7): 764-772.
- [7] J.S. Gonzalez, N.S. Kane, D.H. Binko, A. Shapira, C.J. Hoogendoorn. (2016). Tangled up in blue: Unraveling the links between emotional distress and treatment adherence in type 2 diabetes. *Diabetes Care*. 39(12): 2182-2186.
- [8] J.E. Aikens. (2012). Prospective associations between emotional distress and poor outcomes in type 2 diabetes. *Diabetes Care*. 35(12): 2472-2478.
- [9] P.J. Lustman, and R.E. Clouse. (2005). Depression in diabetic patients: the relationship between mood and glycemic control. *Journal of Diabetes and its Complications*. 19(2): 113-122.
- [10] M. Rosenberg. (1965). Society and the adolescent self-image. Princeton University Press.
- [11] M. Mann, C.M. Hosman, H.P. Schaalma, and N.K. De Vries. (2004). Self-esteem in a broad-spectrum approach for mental health promotion. *Health Education Research*. 19(4): 357-372.
- [12] M.L. Schiøtz, M. Bøgelund, T. Almdal, B.B. Jensen, I. Willaing. (2012). Social support and self-management behaviour among patients with type 2 diabetes. *Diabetic Medicine*. 29(5): 654-661.
- [13] Bendahhou K, Serhier Z, Khalil AI, Radallah D, Amegrissi S, Battas O, Benider A. Validation of the Moroccan Arabic dialectal version of the HADS scale for screening anxious and depressive disorders. *Ann Endocrinol (Paris)*. 2017;78(2):S53.
- [14] El Mâachi, B., Belcaid, K. (2021). Arabic adaptation and validation of the Rosenberg Self-Esteem Scale among Moroccan college teenagers. *Journal of Educational Administration*. (10): 78-100.
- [15] Hamdi, S., Kammoun, I., Grira, W., Mesbah, H., Ayedi, F. (2016). Therapeutic compliance among unbalanced diabetic patients: evaluation and interfering factors. *Annales d'Endocrinologie*. Volume 77, Issue 4: 512.