



Stress, Self-Esteem, and Medication Adherence in Moroccan Diabetic Patients

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Abstract

Chronic stress and self-esteem could impact diabetic patients' medication adherence, but their influence remains poorly understood in Morocco. This study aimed to assess the relationships between perceived stress, self-esteem and medication adherence in 116 Moroccan diabetic patients. Statistical analyses showed that stress was negatively associated with self-reported medication adherence. Lower self-esteem was also correlated with poorer adherence. In linear regression, stress emerged as the most important predictor, explaining 41% of adherence variance. These results suggest that addressing chronic diabetes-related stress could improve patients' treatment adherence in this cultural context.

Keywords: Stress; Self-Esteem; Adherence; Diabetes; Morocco

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1. Introduction

Diabetes represents a major public health issue, affecting over 400 million people worldwide [1]. Its prevalence keeps rising, especially in developing countries facing rapid urbanization and nutritional transition. In Morocco, the age-standardized diabetes prevalence increased from 3.3% to 6.6% between 1998 and 2012 [2]. This rapid rise entails considerable morbidity, premature mortality and healthcare costs. Diabetes is indeed responsible for numerous micro and macrovascular complications. Diabetes management relies on pharmacological treatments (oral hypoglycemic agents and/or insulin therapy) as well as extensive lifestyle modifications. However, long-term adherence to therapeutic and dietary recommendations represents a daily challenge for patients [3]. The World Health Organization estimates that adherence to anti-diabetic drugs ranges between 36 to 85% across studies [4]. Poor medication adherence usually leads to the progressive worsening of glycemic control, increasing risks of complications and diabetes-related mortality [5].

Understanding determinants of poor adherence thus

appears crucial to improve patient management. On a psychological level, chronic stress could play a major role. According to Lazarus and Folkman's transactional model of stress [6], when facing a stressful stimulus, the subject assesses situational demands and personal coping resources. Intense and prolonged stress can deplete these adaptive capacities. In diabetic patients, treatment burden, fear of complications or necessary lifestyle changes can generate such enduring distress [7]. A few North-American studies reported associations between high perceived stress and poorer medication adherence in this population [8,9]. However, the link between chronic stress and therapeutic adherence has never been specifically investigated in Morocco or the Arab-Muslim context. In addition, patients' self-esteem could impact their ability to manage the disease and follow treatment. Self-esteem refers to the overall subjective self-evaluation that people make about themselves [10]. Low self-esteem is usually tied to feelings of powerlessness and discouragement in the face of difficulties, potentially hindering motivation for demanding medical regimens [11]. Conversely, positive self-views promote self-efficacy and could facilitate treatment engagement in diabetes

[12]. Yet, to our knowledge, no study has directly examined the relationship between self-esteem level and medication adherence among Moroccan diabetic patients. Therefore, this research pursued a twofold objective:

1. Assess the relationships between perceived stress, self-esteem and self-reported medication adherence in Moroccan diabetic patients
2. Identify the respective contributions of perceived stress and self-esteem in explaining adherence variance

2. Materials and Methods

2.1. Participants

The study included 116 adult Moroccan patients monitored for diabetes in an urban health center in Kenitra province. Patients referred for routine follow-up or treatment initiation were informed about the study. After receiving clear information on objectives and procedures, and guarantees regarding data confidentiality, participating patients provided oral consent. Exclusion criteria were cognitive deficits or severe psychiatric conditions likely to impede reliable questionnaire completion.

Table 1 displays socio-demographic and clinical characteristics. The sample predominantly comprised middle-aged adults around 50 years old, with a slight female predominance (72% women). Mean diabetes duration was 10 years. Average body mass index corresponded to overweight but no frank obesity. About one third of patients were treated with insulin, in addition or not to oral hypoglycemic agents.

2.2. Measures

Three validated psychometric tools were used:

- The Moroccan Arabic version of Cohen & Williamson's Perceived Stress Scale [13]: 14 items self-report questionnaire assessing stress level over the past month, scored from 0 (never) to 4 (very often). Total score ranges from 0 to 56, with higher scores denoting greater perceived stress.
- Rosenberg's Self-Esteem Scale, Moroccan dialectal validation [14]: 10 items assessing global self-worth, rated from 1 to 4. Total score varies between 10 and 40.
- Morisky Medication Adherence Scale [15]: 8-item self-report questionnaire evaluating specific medication-taking behaviors through yes/no responses. Score ranges from 0 to 8, higher values reflecting better adherence.

2.3. Procedure

After providing oral consent, patients anonymously completed the questionnaires in the waiting room prior to consultation. A researcher explained instructions and answered questions during the ~20 min administration.

2.4. Statistical Analysis

Analyses were performed using SPSS 20.0. Descriptive statistics (mean, standard deviation) were computed for all quantitative variables. Distribution normality was checked via Kolmogorov-Smirnov test. Pearson's correlations evaluated relationships between perceived stress, self-esteem and therapeutic adherence. Finally, multiple linear regression analysis (stepwise method) was conducted by entering perceived stress and self-esteem

as predictors and medication adherence as dependent outcome. Significance level was set at $p < 0.05$.

3. Results and Discussions

Table 2 displays descriptive statistics for psychological variables. Mean perceived stress score lies around the scale's midpoint, denoting moderate stress levels overall. However, substantial interindividual variability is observed as shown by the standard deviation. Concerning self-esteem, average score slightly exceeds Rosenberg scale's midpoint, corresponding to moderate self-esteem. For medication adherence, the 4.09 mean score out of 8 indicates moderate self-reported adherence.

Table 3 displays Pearson's correlations between quantitative variables. A significant negative correlation emerged between perceived stress and self-reported medication adherence level ($r = -0.64$; $p < 0.001$). In other words, higher perceived stress was associated with poorer adherence. Moreover, self-esteem was positively and significantly related to therapeutic adherence ($r = 0.25$; $p = 0.009$). The higher patients' self-worth, the better their reported treatment adherence. To assess the respective contributions of perceived stress and self-esteem in explaining medication adherence variance, multiple linear regression was performed with adherence as dependent outcome and stress and self-esteem as predictors.

Results are displayed in Table 4. The final model explained 41.3% of adherence variance. Perceived stress emerged as the strongest contributor, accounting uniquely for 40.5% of explained variance. Its negative regression coefficient reflects the association between higher stress and poorer adherence. Self-esteem also had a significant, albeit more modest contribution to the model (0.8% unique explained variance). Its positive coefficient indicates that more favourable self-views relate to better treatment adherence. This study pursued dual aims. First, it evaluated associations between chronic stress, self-esteem and self-reported medication adherence in Moroccan type 2 diabetic patients. Second, it sought to delineate the relative importance of perceived stress and self-esteem in explaining adherence variance.

Results clearly confirm our initial hypothesis. A strong correlation emerged between patients' high perceived stress and poorer anti-diabetic treatment adherence. These findings are consistent with Lazarus & Folkman's stress model [6], as well as previous North American studies that uncovered this pattern in diabetic samples [8,9]. However, they provide original evidence regarding this specific relationship in the understudied Moroccan diabetic population. Moreover, our observations echo data from research on other chronic conditions attesting to the detrimental impact of enduring high stress on self-care and medical adherence [16,17].

Regression analysis brings more accurate insight by revealing perceived stress as the predominant driver, accounting uniquely for 40% of adherence variance. As such, stress represents a pivotal psychological determinant that could be targeted by interventions aiming to improve medication-taking behaviors in the Moroccan context. This result also underlines the importance of patients' subjective stress appraisals, profoundly influencing their ability to follow recommended treatment.

Table 1: Sample characteristics (n=116)

Variables	age (years)	Gender ratio (F/H)	Diabetes duration (years)	BMI (kg/m2)	Insulin treatment (%)
Mean (SD) or %	50,5 (13,3)	72% / 28%	10 (3,8)	28,7 (6,2)	30%

Table 2: Descriptive statistics for psychological variables (n=116)

Psychological Variables	Perceived Stress (0-56 score)	Self-Esteem (10-40 score)	Adherence (0-8 score)
Mean (SD)	21.8 (3.3)	23.8 (3.0)	4.1 (1.2)

Table 3: Pearson’s Correlations between psychological variables

Variables	Stress	Self-Esteem	Adherence
Stress	-	-0.09	-0.64***
Self-Esteem	-0.09	-	0.25**
Adherence	-0.64***	0.25**	-

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

Table 4: Multiple linear regression model predicting medication adherence

Predictors	B	SE	β	p	Unique R2
Perceived Stress	-0.196	0.029	-0.642	<0.001	40.5%
Self-Esteem	0.039	0.018	0.172	0.035	0.8%

Regarding self-esteem, analyses equally confirm the existence of a positive association with declared adherence level. In other words, more positive self-views relate to better medication-taking behaviors in our sample. This validates our second hypothesis and prior findings linking self-esteem to medical adherence in diabetes and other chronic illnesses [11,12]. Theoretically, heightened self-worth may promote patients’ self-efficacy and facilitate active engagement in treatment management. However, given the very modest explained variance (0.8%), self-esteem appears to play a negligible role compared to perceived stress. Further studies with repeated measurements are required to confirm these results, which diverge from research identifying self-esteem as the central driver of medical adherence [18,19].

More broadly, findings underscore accounting for patients’ psychological distress in interventions promoting optimal adherence and global health outcomes among diabetic patients across Morocco or similar cultural settings. Several therapeutic strategies targeting perceived stress reduction and coping skills enhancement may prove useful in this regard. Cognitive-behavioral approaches have shown promising effects in diabetics by alleviating disease-related stress, developing adaptive strategies and ultimately, jointly improving mood, treatment adherence and glycemic control [20–22]. Likewise, psychoeducational and motivational counselling focused on diabetes-related emotions management could yield beneficial metabolic outcomes [23,24]. By restoring adequate psychological wellbeing and quality of life, such comprehensive and integrative interventions appear promising for supporting therapeutic

engagement and self-care efforts critically needed for optimal long-term diabetes control.

Nevertheless, this study presents certain limitations worth acknowledging. The small convenience sample from a single healthcare center restricts results generalization to the entire Moroccan diabetic population. The cross-sectional design equally prevents ascertaining clear causal links between perceived stress or self-esteem and medication-taking behaviours.

Longitudinal studies are required to confirm these predictive relationships. Moreover, adherence was evaluated through self-report rather than objective pill counts or electronic monitoring. Social desirability bias may have affected patient responses. Still, the Morisky scale demonstrated adequate validity for identifying diabetic individuals with suboptimal adherence [15]. Finally, a structured psychiatric interview constituting the gold standard for anxiety or depression assessment was not conducted. However, the primary focus lied specifically on exploring modifiable perceived stress and self-esteem appraisals, in line with Lazarus & Folkman’s theoretical framework.

4. Conclusion

In summary, findings highlight a negative association between perceived chronic stress and medication adherence among Moroccan diabetic patients. They also reveal a more modest yet significant correlation between patients’ self-esteem levels and therapeutic engagement. Clinically, results support the importance of comprehensive,

patient-centered care integrating psychological factors potentially hindering optimal adherence required for successful diabetes control. They especially advocate routine stress screening during consultations and culturally appropriate stress and emotion management strategies. By restoring acceptable psychological functioning, such psychosocial interventions represent a promising avenue for bolstering treatment adherence and ultimately, advancing health outcomes among diabetic patients across developing countries.

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