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Research Article

Assessing Patient Activation Among Individuals with Idiopathic Parkinson's Disease in Iraq: A Cross-Sectional Study Using the PAM-13 Tool

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Abstract

Background: The Patient Activation Measure (PAM-13) is a validated tool that evaluates individuals' knowledge, confidence, and skills in managing their health. While patient activation is widely acknowledged as crucial for managing chronic diseases, research is limited regarding patients' activation among the Parkinson's disease (PD) population, particularly in middle- and low-income countries such as Iraq. ***Objective***: To evaluate patients' activation levels and examine their association with sociodemographic variables and disease stage among Iraqi individuals with idiopathic PD. ***Methods***: This cross-sectional study included 100 patients with idiopathic PD attending outpatient neurology clinics in two hospitals and two private neurology clinics in Baghdad. The PAM-13 and a demographic questionnaire were used to collect data. Statistical analysis, such as independent sample t-test, one-way ANOVA, Fisher's exact test, and classification and regression tree model, was performed to identify key predictors of activation. ***Results***: The mean PAM-13 scores were 47.2, indicating generally low-to-moderate activation. Over half of the participants (52%) fell into the lowest activation category (Level 1). Advanced age, reduced educational attainment, and advanced disease stage were significantly associated with decreased activation. Classification and regression tree analysis listed age as the principal predictor, while education and illness stage functioned as secondary determinants. ***Conclusions***: This study demonstrated suboptimal activation levels among Iraqi individuals with idiopathic Parkinson's disease. Findings highlight the need for customized interventions to improve patient involvement and self-management, particularly among elderly patients with limited education and advanced disease stages.

Keywords: Disease stage, Parkinson's disease, Patient activation measure, Patient engagement, Sociodemographic factors.

تقييم تنشيط المرضى بين الأفراد المصابين بمرض باركنسون مجهول السبب في العراق: دراسة مقطعية باستخدام أداة PAM-13

الخلاصة

الخلفية: مقياس تنشيط المريض (PAM-13) هو أداة تم التحقق من صحتها تقيم معرفة الأفراد وثقتهم ومهاراتهم في إدارة صحتهم. في حين أن تنشيط المرضى معترف به على نطاق واسع على أنه أمر بالغ الأهمية لعلاج الأمراض المزمنة، إلا أن الأبحاث محدودة فيما يتعلق بتنشيط المرضى بين مرضى باركنسون (PD)، لا سيما في البلدان المتوسطة والمنخفضة الدخل مثل العراق. **الهدف**: تقييم مستويات تنشيط المرضى وفحص ارتباطهم بالمتغيرات الاجتماعية الديموغرافية ومرحلة المرض بين الأفراد العراقيين المصابين بمرض باركنسون مجهول السبب. **الطرائق**: شملت هذه الدراسة المقطعية 100 مريض مصاب بمرض باركنسون مجهول السبب من مراجعي عيادات طب الأعصاب الخارجية في مستشفيين وعيادتين خاصتين لطب الأعصاب في بغداد. تم استخدام PAM-13 والاستبيان الديموغرافي لجمع البيانات. تم إجراء التحليل الإحصائي، مثل اختبار t للعينة المستقلة، و ANOVA أحادي الاتجاه، واختبار فيشر الدقيق، ونموذج التصنيف وشجرة الانحدار، لتحديد التنبؤات الرئيسية للتنشيط. **النتائج**: كان متوسط درجات PAM-13 يساوي 47.2، مما يشير إلى تنشيط منخفض إلى متوسط بشكل عام. أكثر من نصف المشاركين (52٪) وقعوا في أدنى فئة تنشيط من المستوى 1. ارتبط التقدم في السن وانخفاض التحصيل العلمي ومرحلة المرض المتقدمة بشكل كبير بانخفاض التنشيط. أدرج تحليل شجرة التصنيف والانحدار العمر كمؤشر رئيسي، بينما كانت مرحلة التعليم والمرض بمثابة محددات ثانوية. **الاستنتاجات**: أظهرت هذه الدراسة مستويات تنشيط دون المستوى الأمثل بين الأفراد العراقيين المصابين بمرض باركنسون مجهول السبب، مما سلط النتائج الضوء على الحاجة إلى تدخلات مخصصة لتحسين مشاركة المريض والإدارة الذاتية، لا سيما بين المرضى المسنين ذوي التعليم المحدود ومراحل المرض المتقدمة.

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INTRODUCTION

Parkinson's disease (PD) is a progressive neurodegenerative condition that has emerged as an international health crisis, with increasing evidence indicating it may be the fastest-growing neurological disorder globally [1]. It is increasingly seen not just as a degenerative and debilitating disease but also as an impending public health crisis with significant social and healthcare ramifications [2,3]. Parkinson's disease is characterized primarily by motor symptoms such as tremors, stiffness, and bradykinesia, along with non-motor symptoms, including cognitive deficits and mood abnormalities. A range of symptoms that collectively can significantly impact patients' quality of life and everyday functions [4] As the disease progresses, self-management becomes essential for individuals with PD to preserve

autonomy and enhance health outcomes [5]. Patient Activation Measure (PAM) is a validated instrument that evaluates an individual's knowledge, abilities, and confidence in health management [6]. Higher PAM scores have been associated with better self-management behaviors, favorable health outcomes, enhanced compliance with therapy, and decreased utilization of health care across several chronic illnesses, such as diabetes, heart failure, and asthma [7–9]. Higher activation levels were associated with improved quality of care and patient engagement in populations with neurological conditions. However, despite its extensive application, the use of the PAM tool in neurological illnesses has been considerably restricted. The existing literature focuses on a broader neurological population for tool validation. [10]. Parkinson's disease patients often experience cognitive decline, motor impairments, and fluctuating symptoms [11–13]. These factors may distinctly affect their capacity for self-management in contrast to individuals with other neurological disorders. Consequently, extrapolating data from larger neurological groups may not precisely reflect the experiences or needs of individuals with PD. As yet, a substantial research gap persists in comprehending how patient activation uniquely emerges in individuals with PD, especially in regions and populations of low- and middle-income nations like Iraq. To address this gap, this study aims to evaluate patient activation levels among Iraqi patients diagnosed with idiopathic PD using the PAM-13 tool [14]. In addition to measuring activation, the study explores how disease severity or demographic factors such as age, educational attainment, marital status, residency, and gender may affect patient activation levels.

METHODS

Study design, settings, and participants' recruitment

This cross-sectional study was conducted in two settings: outpatient neurology clinics in two hospitals in Baghdad, Iraq, Baghdad Teaching Hospital and Al-Nu'man Teaching Hospital, and two private specialized neurology clinics in Baghdad. Data collection lasted from October 2024 until February 2025. To provide clinical oversight and ensure compliance with neurological diagnostic criteria throughout the research procedure, this study was conducted under the supervision of two board-certified neurologists.

Inclusion criteria

Patients aged 18 years or older with a confirmed diagnosis of idiopathic PD and able to communicate verbally. There is no evidence of cognitive impairment (as screened by the Six-Item Cognitive Impairment Test (6CIT)) and willingness to participate in the study.

Exclusion criteria

Patients with atypical parkinsonism or secondary etiologies, significant communicative impairment, and patients who decline to participate in the study.

Sample size and sampling method

One hundred patients were recruited using a convenient sampling method from outpatient and private neurology clinics. The required sample size was determined utilizing G*Power version 3.1.9.7, based on a bivariate correlation analysis between Patient Activation Measure (PAM) scores and independent variables, including demographic parameters and disease severity. Assuming a medium effect size ($r = 0.3$), an alpha level of 0.05, and a statistical power of 0.80, the study determined that a minimum of 89 patients is required. To ensure enough power and accommodate any potential missing data, 100 patients were enlisted for the study [15].

Data collection tools

Patient Activation Measure (PAM-13): This is a 13-item validated scale to assess patient activation level. Insignia Health developed this tool, comprising a sequence of Likert-scale questions that give a continuous score, generally spanning from 0 to 100, corresponding to one of four incremental activation levels: 1) Disengaged and overwhelmed, 2) Becoming aware but still struggling, 3) Taking action, and 4) Maintaining behaviors and pushing further. The tool will be administered in the validated Arabic version, as appropriate. Demographic Questionnaire: This questionnaire captures the following variables: age, gender, marital status, education level, residency, and disease stage based on the modified Hoehn and Yahr scale [16], which classifies patients with PD into seven stages.

Validation of the Arabic version of PAM-13

A pilot study was conducted to validate the Arabic version of the Patient Activation Measure (PAM) [14]. The process began with face validation, which was performed by five academic clinical pharmacists from the Clinical Pharmacy Department at Baghdad University, College of Pharmacy, and one specialist neurologist from Al-Nu'man Teaching Hospital. Their feedback made minor modifications to the translated Arabic version of the PAM-13 tool. The final version was then tested for reliability and stability. Thirty-one patients with idiopathic PD completed the validated Arabic version of the PAM-13. Internal consistency was assessed using Cronbach's alpha, which demonstrated an acceptable-to-good level of internal consistency (Cronbach's alpha = 0.88). To assess test-retest reliability, each participant completed the PAM-13 tool twice, with a two-week interval between administrations. The correlation between the two sets of responses confirmed the instrument's stability over time ($r= 0.990$, $p< 0.001$). These results support the reliability and preliminary validity of the Arabic

version of the PAM for use in individuals with idiopathic PD.

Data collection procedure

Participants will be approached during routine clinic visits. After obtaining informed verbal consent, the researcher will administer PAM-13 and the demographic questionnaire via face-to-face interviews. A neurologist will determine each patient's disease stage. To mitigate selection bias, individuals were sequentially recruited from neurology clinics throughout Baghdad, guaranteeing diversity in disease severity and demographic attributes. All patients who fulfilled the inclusion criteria were invited to participate to prevent preferential selection. The PAM-13 tool was administered by a trained researcher, with instructions and clarifications delivered in the participants' native language to enhance understanding. To mitigate response bias, participants were guaranteed secrecy and informed that there were no correct or incorrect answers.

Ethical considerations

The research was conducted in accordance with the Declaration of Helsinki and was approved by the scientific and ethical committee of the College of Pharmacy, University of Baghdad (Approval number RECO624275). Each participant gave verbal consent to the study before participating, following a comprehensive elucidation of the study's objectives and assuring the participant of the confidentiality of the acquired data, which will remain anonymous and utilized solely for the present research. No incentive was offered to any participant.

Statistical analysis

Data analysis was conducted using the IBM Statistical Package for the Social Sciences SPSS software version 26. Descriptive statistics were calculated to describe the participants' clinical and demographic variables. Continuous variables such as age and PAM-13 scores were reported as means and standard deviations, while categorical variables such as educational level, residency, marital status, gender, disease stage, and PAM-13 levels were presented as frequencies and percentages. Inferential statistics were utilized to analyze the relationships between Patient Activation Measure (PAM-13) scores and diverse demographic and clinical characteristics. Independent samples t-test and one-way ANOVA were used to compare mean PAM-13 scores across binary and multicategory variables, respectively. Post hoc comparisons following ANOVA were conducted using Tukey's HSD test. Correlations between continuous and ordinal variables such as age, disease stage, PAM-13 scores, and PAM-13 levels were assessed using Pearson's or Spearman's correlation coefficients, as appropriate. Multiple linear regression analysis was performed to identify predictors of PAM-13 scores. A Fisher's exact test was utilized to check the correlation between categorical variables such as gender, education levels, marital Status, and PAM-13 levels. Finally, a Classification and Regression Tree (CRT) analysis was also performed to discover complex interactions between predictors and PAM-13 levels. There was no missing dataset. A p-value of <0.05 was considered statistically significant.

RESULTS

This study included 100 patients with idiopathic Parkinson's disease. The mean age was 63.61 ± 7.83 years, ranging from 50 to 79 years. The mean PAM-13 score was 47.16 ± 10.18, with scores ranging from 24.4 to 75.0. Gender was evenly distributed (50% male and 50% female). Most participants were married (95%), and the majority of them resided in Baghdad (83%). Education levels were diverse in this population: 20% had primary education, 41% had secondary education, and 39% attained a college degree.

Table 1: Demographics and clinical characteristics of the study participants.

Characteristic		Value
Number of participants		100
Age (year)		63.61±7.83 (range: 50–79)
Gender	Male	50(50)
	Female	50(50)
Marital Status	Married	95(95)
	Unmarried	5(5)
Residency	Baghdad	83(83)
	Other provinces	17(17)
Education level	Primary	20(20)
	Secondary	41(41)
	College degree	39(39)
PAM-13 scores		47.16±10.18 (range: 24.4–75.0)
PAM-13 activation levels	Level 1 (lowest)	57(57)
	Level 2	30(30)
	Level 3	11(11)
	Level 4 (highest)	2(2)
Disease stage	Stage 1	17(17)
	Stage 1.5	14(14)
	Stage 2	16(16)
	Stage 2.5	11(11)
	Stage 3	19(19)
	Stage 4	14(14)
	Stage 5	9(9)

Values were expressed as frequency, percentage, and mean±SD.

Disease stage (based on the modified Hoehn and Yahr scale) ranged from 1.0 to 5.0, with 57% of the participants in PAM-13 Level 1 (lowest activation) and just 2% in Level 4 (highest activation). The demographics and characteristics of the study participants are shown in Table 1. A Pearson's correlation analysis indicated a significant moderate negative correlation between age and PAM-13. sc ores ($r = –0.517$, $p< 0.001$). This suggests that patients of older age had the lowest PAM-13 scores and, hence, the lowest activation. A Spearman's rank-order correlation also revealed a significant negative association between PAM-13 level and both the disease stage ($\rho = –0.491$, $p< 0.001$) and age ($\rho = –0.537$, $p< 0.001$). A moderate positive correlation was shown between age and disease stage ($\rho = 0.407$, $p< 0.001$). The correlations between PAM-13 scores and participants' disease stage and age are shown in Figure 1 and Figure 2.

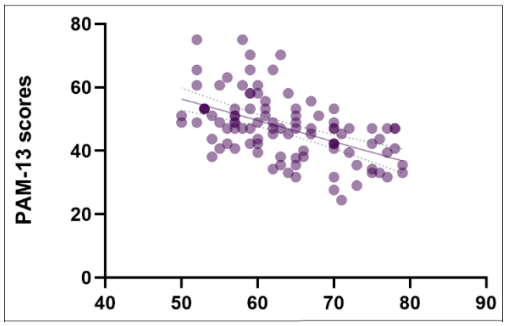

Figure 1: Correlation between age and the PAM-13 score in patients with idiopathic PD. A statistically significant moderate negative linear relationship was identified ($p< 0.0001$, $R^2 = 0.2673$), suggesting that advancing age correlates with a reduction in patient activation.

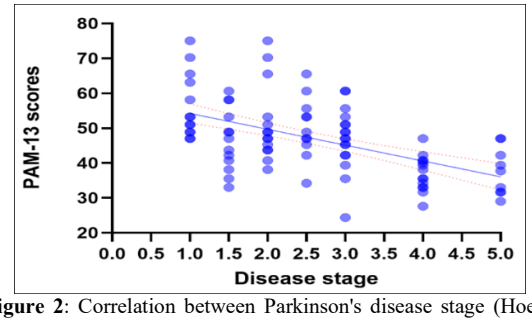

Figure 2: Correlation between Parkinson's disease stage (Hoehn and Yahr scale) and PAM-13 score. A significant moderate negative linear relationship was observed ($p< 0.0001$, $R^2 = 0.2982$), indicating that higher disease stages are associated with lower patient activation.

An independent samples t-test was conducted to compare PAM-13 scores across males and females. Although males displayed slightly higher PAM-13 scores (M= 48.22 ± 9.84) than females (M= 46.10 ± 10.5), the difference was not statistically significant (mean difference = 2.12, $p= 0.301$). A one-way ANOVA test was conducted to examine whether PAM-13 scores differed significantly across educational levels of individuals with PD. The analysis displayed a significant difference in mean PAM-13 scores across educational groups ($F(2, 97) = 3.481$, $p= 0.035$). Levene's test for equality of variance was non-significant ($p= 0.351$), indicating that the assumption of homogeneity of variance was met. Post hoc analysis using Tukey's HSD test showed that patients with primary education, when compared with those with secondary education, had significantly lower PAM-13 scores, $p= 0.036$ (M = 41.95 ± 11.01), (M = 48.76 ± 10.37). On the other hand, no significant differences were detected between secondary and college education groups ($p= 0.960$) or between primary and college education groups ($p= 0.064$). A Fisher's exact test was conducted, which revealed a statistically significant association between patients' educational level and their PAM-13 (low for level 1 vs. high for levels 2,3 and 4 levels), ($p= 0.024$). Patients with lower education (primary level) were most likely to exhibit a low activation level, with 80% falling in the low activation category. In contrast, individuals with higher education (secondary or college) demonstrated a more balanced distribution, with 48.8% classified as low activation and 51.2% as high activation. The effect size, shown by Cramer's V (0.232, $p= 0.020$), indicates a moderate correlation between the two variables. These findings underscore the potential impact of educational attainment on patients' involvement and empowerment in controlling PD. Furthermore, no significant association was observed ($p= 0.387$) between marital Status (married vs. unmarried) and PAM-13 levels. This result is possibly due to the small sample size of unmarried participants in this study (n=5). There was no statistically significant association between gender (male vs. female) and PAM-13 level ($p= 0.225$). Although descriptively, more females have low activation than males, the difference is not statistically significant. These results are presented in Table 2.

Table 2: Association between education level, marital status, gender, and PAM-13 level

Association between education level and PAM-13 level				
Education level	PAM-13 level	n(%)	*p*-value	Cramer's V
Low (primary)	Low activation	16(80)		
	High activation	4(20)		
High (secondary and college)	Low activation	41(51.2)	0.024	0.232
	High activation	39(48.8)		
Association between gender and PAM-13 level				
Gender	PAM-13 level	n(%)	*p*-value	Cramer's V
Male	Low activation	25(50)		
	High activation	25(50)		
Female	Low activation	32(64)	0.225	0.141
	High activation	18(36)		
Association between marital status and PAM-13 level.				
Marital Status	PAM-13 level	n(%)	*p*-value	Cramer's V
Married	Low activation	53(55.8)		
	High activation	42(44.2)		
Unmarried	Low activation	4(80)	0.387	0.107
	High activation	1(20)		

A multiple linear regression was implemented to predict the PAM-13 score based on age, gender, disease stage, and education. The model was significant, F (4, 95) = 15.66, $p < 0.001$, and explained 39.7% of the variance in PAM-13 scores ($R^2 = 0.397$). The significant predictors were age (B = -0.444, $p < 0.001$) and disease stage (B = -3.162, $p < 0.001$), which indicate that advanced stages in PD and older age are associated with lower PAM-13 scores. At the same time, gender and education were not statistically significant predictors. A Classification and Regression Tree (CART) model was performed to predict PAM-13 levels among individuals with Parkinson's disease. The model included six independent variables: age, education, gender, marital status, residency, and disease stage. The most important predictor was age, with a split at 61.5 years. Amongst younger patients (≤61.5 years), those with secondary education or below had a greater probability of being classified in Level 1 (93.8%). In elderly patients (>61.5 years), the disease stage was the primary differentiator. Individuals in earlier phases (≤1.5) exhibited more activation than those in advanced stages. The model accurately identified 64% of cases and exhibited robust prediction capability for Levels 1 and 2. These findings are presented in Figure 3.

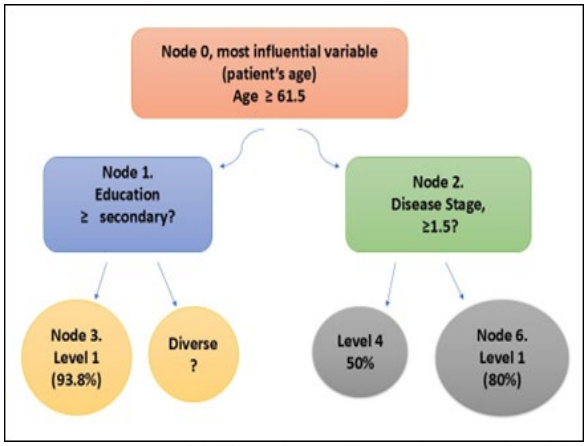

Figure 3: CART model, illustrating predictors of PAM-13 levels in Parkinson's disease. Age was the most significant variable. In patients (≤ 61.5 years), poor educational attainment predicted Level 1 activation (93.8%). In patients (> 61.5 years), early disease stage was associated with increased activation (50% in Level 4), but advanced stage was linked to decreased activation (80% in Level 1).

DISCUSSION

This study assessed the relationship between sociodemographic factors, disease stage, and patient activation levels among Iraqi individuals with idiopathic Parkinson's disease using the PAM-13 tool. The mean PAM score was 47.16, indicating low-to-moderate activation. Most patients fell into the lowest activation category (PAM Level 1: 57%). In this study, our findings displayed that age negatively affects both PAM-13 scores and levels, revealing a moderate negative correlation with PAM-13 scores (r = –0.517, $p < 0.001$) and a significant negative correlation with PAM-13 levels (ρ = –0.537, $p < 0.001$). When implementing multiple linear regression to predict PAM-13 scores, age was a significant negative predictor (B = -0.444, $p < 0.001$). After conducting a CART model, age was the most influential variable, with a split at 61.5 years. These findings show that elderly individuals with PD demonstrated significantly lower activation levels. These findings align with the current literature that discusses how aging adversely affects patients' capacity to actively participate in their health management since aging intensifies cellular vulnerabilities and motor deterioration in Parkinson's disease, leading older patients to face more pronounced quality-of-life challenges. Highlighting the significance of aging as a proactive factor in the deterioration of health in Parkinson's disease [17-18]. A Chinese cross-sectional study's result was consistent with our findings that older age is associated with lower activation levels in patients with chronic conditions [19]. Recent literature opposes a "one-size-fits-all" strategy as inadequate. Older individuals may require more specialized care, such as more organized health coaching, and interventions customized for older patients may be essential to enhancing self-management practices. A significant negative association (Spearman rank order) was detected between the PAM-13 level and the disease stage (ρ = –0.491, $p < 0.001$). When conducting a multiple linear regression, disease stage was a sturdy predictor (B = -3.162, $p < 0.001$). In the CART model, the disease stage was the primary differentiating factor for geriatric patients (>61.5 years). Individuals in earlier phases (≤1.5) had more activation than those in advanced stages. Our findings indicate that as PD progresses, the activation level of patients gets lower, which is expected due to the chronic degenerative nature of PD. This finding is similar to a cross-sectional correlational study conducted in Taiwan that explained how, as Parkinson's disease advances, physical constraints diminish autonomy, adversely affecting the quality of life [20]. These results may indicate that early-stage or stage-specific interventions may be necessary for PD individuals to assist in equipping patients with information on coping methods, lifestyle adjustments, and accessible support services to augment their capacity to manage symptoms and elevate their quality of life. When conducting a Fisher's exact test, differences in PAM-13 levels between males and females were not statistically significant ($p = 0.225$). When comparing PAM-13 scores across males and females, a t-test of independence results showed that although males displayed slightly higher PAM-13 scores (M= 48.22 ± 9.84) than females (M= 46.1 ± 10.5), the difference was not statistically significant (mean difference = 2.12, $p = 0.301$), This suggests that any discerned disparity in PAM-13 scores between genders may result from random variation. This finding aligns with a cross-sectional study, which discovered that there was no statistically significant difference in activation between males and females [18]. Another Iraqi study conducted in Baghdad on individuals with idiopathic PD also discovered no significant differences in symptoms across gender groups [21]. In contrast to our findings, which show that gender did not

significantly influence patient activation, other studies observed higher activation levels in males [22,23]. Research suggests that women with Parkinson's disease are believed to differ from men due to unique experiences and pathogenic mechanisms; female individuals may have a milder phenotype of PD due to the hormonal effect of estrogen, which some suggest has a neuroprotective action [24,25]. Gender did not substantially affect patient activation in this study, which is positive news, indicating that both males and females were comparably interacting with their health. Although this discovery is promising, it is essential to acknowledge that more studies with bigger and more diverse populations would aid in validating these results. When conducting a one-way ANOVA test, there was a significant difference between Pam-13 scores across primary and secondary educational levels. Similarly, Fisher's exact test revealed a statistically significant association between patients' educational level and their PAM-13 level (p= 0.024). In a CART model, individuals with secondary education or below were more likely to be classified in PAM-13 Level 1 (93.8%). Our findings suggest that higher educational achievement, specifically the completion of secondary education, correlates with improved activation. This corresponds with international literature relating education to health literacy and proactive health habits. A cross-sectional study in China debated that a lower educational level is associated with lower patient activation [19]. To optimize efficacy, patient materials and treatments must be tailored to diverse educational backgrounds. Our study found no association between marital status and PAM-13 levels, $\chi^2(3, n= 100) = 1.488$, $p= 0.685$. This result is similar to another cross-sectional study in which the marital status of patients played no role in their activation level [19]. In contrast to our findings, an observational longitudinal cohort study found that marriage may enhance mental well-being by providing more social support in patients with chronic conditions [26], and a prospective study found that there is an increased mortality among the unmarried population with cardiovascular disease [27]. Our results indicate that targeted activation tactics for PD must prioritize elderly individuals, patients in more progressive stages, and individuals with low formal education. In this context, pharmacists, as easily accessible healthcare practitioners, can play a pivotal role in providing individuals with PD with a tailored educational program, especially in countries with scarce resources, such as Iraq, where access to follow-up treatment and specialist neurology services may be limited, while there are a substantial number of expert pharmacists available who could be put to beneficial use [28,29]. A cross-sectional Iraqi study demonstrated that Iraqi community pharmacists had an optimistic perspective on patient counseling and pharmacy education initiatives [30]. Recent studies discussed how educational sessions led by clinical pharmacists can have positive outcomes on quality of life and significantly aid in mitigating difficulties associated with disease-modifying therapies (DMTs) and chemotherapy for patients with chronic conditions like multiple sclerosis [31], breast cancer [32], and liver cirrhosis in identifying issues related to medications and mitigating their incidence [33]. Furthermore, pharmacists within a multidisciplinary collaboration team that includes neurologists, physiotherapists, and other healthcare providers may improve activation levels for individuals with PD by addressing the complex needs of those patients.

Study limitations

This study has several limitations. The results might not accurately represent the general population of patients with idiopathic PD, even though some participants lived in other provinces, despite being selected from Baghdad's hospitals and clinics. A multi-site investigation encompassing various geographic areas would provide a more thorough viewpoint. The causal interpretation of the relationship between disease stage, sociodemographic characteristics, and patient activation is limited by the cross-sectional methodology. Furthermore, it's possible that the comparatively small sample size hindered the ability to identify more nuanced associations.

Conclusion

The results showed a score of low to moderate average activation. Most of the participants were classified at the lowest activation level, indicating a restricted ability for self-management. Age and disease stage were the most significant negative predictors of patient activation. Indicating that older patients and those in a more advanced stage of the disease exhibited lower activation scores. Education was substantially correlated with activation, as patients with just primary education scored markedly lower than those with higher educational qualifications. In contrast, gender and marital Status had no significant correlation with activation levels, indicating that these characteristics may exert minimal effect within this group. The findings underscore the necessity for focused methods that prioritize older patients, people with poor education, and those in advanced stages of disease. Customized interventions—especially pharmacist-led counselling, readily available health information, and early-stage assistance—could enhance patient activation and involvement in treatment.

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Conflict of interests

The authors declared no conflict of interest.

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Data sharing statement

Supplementary data can be shared with the corresponding author upon reasonable request.

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