Fatigue and Cognitive Decline Associated With Depressive Symptoms Among Community-Dwelling Adults

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Abstract

To investigate the prevalence of depressive symptoms in community-dwelling Saudi adults aged ≥50 years and the associated risk factors. Patient Health Questionnaire 9 (PHQ-9) was dichotomized as depressive symptoms when the participants scored ≥10. Risk factors included age, sex, body mass index, education, employment, marital status, number of chronic diseases and medications, fatigue severity scale (FSS), and Montreal Cognitive Assessment (MoCA). Among the 206 participants, the prevalence of depressive symptoms was 17.48%. The number of chronic diseases, medications, and fatigue symptoms were significantly higher in those with depressive symptoms, whereas cognitive functions were significantly lower. Fatigue symptoms and cognitive functions were significantly associated with depressive symptoms. The cut-off scores for risk factors were ≥42 (FSS) and ≤23 (MoCA scale). Fatigue and cognitive impairments were the only risk factors that distinguished participants with and without depressive symptoms.

Keywords

mental health, depression, Saudi Arabia, cognition, fatigability

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What do we already know about this topic?
Previous research examined the prevalence of depressive symptoms among older adults, but the participants were recruited from primary health care clinics rather than the community. Patients visiting healthcare providers might have other conditions requiring medical intervention, thus affecting the generalizability of the results to the community.

How does your research contribute to the field?
Investigating depressive symptoms among adults in their 50s and above filled the gap of investigating depressive symptoms among middle age and older adults. The prevalence of depressive symptoms was 17.48% in community-dwelling Saudi adults. In addition, fatigue and cognitive impairments were associated with depressive symptoms.

What are your research's implications toward theory, practice, or policy?
Screening for depressive symptoms and using fatigue and cognitive function measures with specific cut-off scores should be considered for community adults and when establishing interventional approaches.

Introduction

Mental health disorders are common among adults, accounting for almost 10%, with depressive symptoms being the most common disorder worldwide.[1] These symptoms reduce life satisfaction,[2] affect physical activity and quality of relationships, and cause an increase in pain in older adults.[3] Depressive symptoms have been linked to risk factors such as decreased cognitive function, polypharmacy, and common chronic diseases, including arteriosclerosis, hypertension, arrhythmia, diabetes, Parkinson's disease, and osteoporosis.[4]

In 2008, the World Health Organization ranked depression as the third leading cause of morbidity and mortality worldwide.[5,6] Previous studies have reported different prevalence estimates of depressive symptoms.[7] Depressive symptoms may affect adults in various age groups, regions, and countries.[8] However, few studies have examined depressive

symptoms in Saudi Arabia. One meta-analysis reported a high prevalence (41%) of depressive symptoms in Saudi population.[9] Previous work examined the prevalence of depressive symptoms at younger age groups in general population (<40 years).[10,11] The prevalence of depressive symptoms among adults of 50 years and older in Saudi Arabia is unknown as this age group has a retirement option in Saudi Arabia. Only one study examined the prevalence of depressive symptoms among older adults and reported a prevalence rate of 39%.[12] This study has some limitations such as recruiting participants from primary health care clinics rather than community and not including age group of 50 to 59 years. Investigating depressive symptoms among adults in their 50s and above will fill the gap in the middle age and older adults and highlight important findings for better screening and prevention strategies. Therefore, this study aimed to determine the prevalence and associated risk factors of depressive symptoms among community-dwelling adults aged 50 years and older among Saudi Arabian population. Additionally, we aimed to investigate the cut-off scores of fatigue severity and cognitive declines that were associated with depressive symptoms in this population.

Methods

Study Design and Participants

This cross-sectional study was conducted from February to March 2022 and comprised a convenience sample of literate, community-dwelling adults of Saudi Arabia aged ≥50 years who were able to ambulate independently within the community. Exclusion criteria were non-Saudi residency, inability to read and write in Arabic, or inability to perform functional tasks safely. Participation was voluntary, in accordance with the Declaration of Helsinki, and all participants signed a consent form. The participants were informed about the study goals before signing the consent form. Moreover, the participants were given the option to voluntarily withdraw from the study at any time point without further reasoning from the study investigators. The study was approved by the Research Ethics Committee of Prince Sattam bin Abdulaziz University (No. RHPT/021/017).

Demographics and measurements. Demographics and medical information were obtained from the participants, including

age, sex, weight, height, marital status, level of education, occupation, smoking status, number of chronic diseases, and current medication usage. Patients' age was recorded in years and sex was recorded as male or female. Weight and height were measured and recorded in kilograms and centimeters, respectively. Body mass index (BMI) was calculated by dividing weight in kg by height in m^2 and was categorized according to the Centers for Disease Control and Prevention as underweight (BMI < 18.5), normal weight (18.5 < BMI < 25), overweight (25 ≤ BMI < 30), or obese (BMI ≥ 30).[13] Marital status was dichotomized as married or unmarried and divorced or widowed. Educational level was categorized as: below elementary, elementary school, middle school, high school, or university. The occupation was dichotomized into unemployed or employed. Smoking status was recorded based on self-reported smoking status (yes/no). The number of currently used medications was reviewed and recorded by a trained research assistant. The number of chronic diseases was recorded as the sum of self-reported chronic diseases, including diabetes, hypertension, dyslipidemia, cardiovascular diseases, anemia, lung diseases, cancer, osteoporosis, neurological conditions, arthritis, and low back pain.

Outcome Measures

Patients health questionnaire 9 (PHQ-9). Depressive symptoms were measured using the Arabic version of PHQ-9.[14] This questionnaire is a valid scale for detecting suspected cases of depression and anxiety in the general population as well as for assessing the severity of these mental diseases.[3,15] The original and Arabic version have shown good validity and reliability.[14,16] The questionnaire was required to be completed filled out by participants within 2 weeks. PHQ-9 includes 9 questions related to depressive symptoms. These questions were used to investigate several domains of depression, including anhedonia, depressed mood, sleep problems, fatigue, change in appetite, decreased self-esteem, concentration disturbance, psychomotor disorder, and suicidal thoughts.[15] A 10th question was added at the end of the questionnaire for patients who had ticked any of the problems in the questionnaire: "The number of days you faced difficulties, because of these mental problems, in doing your daily work, taking care of things at home, or getting along with other people." The answers were rated on a 4-point

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scale (0-3): "not at all=0," "several days=1," "more than half the days=2," and "nearly every day=3." The total score of the PHQ-9 is the sum of the 9-item scores and ranges between 0 and 27. In the current study, participants were classified as having depressive symptoms when the PHQ-9 score was ≥10.[17,18]

Fatigue severity scale (FSS). The FSS consists of a 9-item self-report scale assessing fatigue, its severity, and its impact on specific activities.[19] Answers were graded on a 7-point scale, with 1 representing strongly disagree and 7 representing strongly agree. The lowest possible FSS score was 9, and the maximum possible FSS score was 63. High FSS scores represent worst symptoms of fatigue and interferences with the person's activity. In the current study, the Arabic version of the FSS, which has good validity and reliability, was used in the current study.[20]

Montreal cognitive assessment (MoCA). The MoCA scale is a validated experimenter-administered tool for assessing cognitive impairment, dementia, and global cognitive function.[21] The MoCA is a timed test with a maximum score of 31, which takes approximately 10 min to complete. The test comprises 8 domains: visuospatial, executive function, name recall, memory, attention span, language skills, abstraction, and orientation. Tasks involving drawing a clock as well as copying a 3-dimensional cube are used to gage visuospatial skills. An alternation task measures executive function by connecting an ascending line from a number to a letter. By asking the participant to name 3 different animals (lion, camel, and rhinoceros), their ability to name is gaged. The ability to pay attention is tested using various exercises, including the forward and backward repetition of a list of digits, identifying a target, and serial subtraction of numbers. A fluency exercise and 2 syntactically complicated sentences are used to assess language skills. A similarity task assesses abstraction. Time and place are also examined. If the study period is 12 years or longer, one point may be added at the end. A score of less than 26 indicates mild cognitive impairment. In this study, a translated Arabic version of the MoCA with good validity and reliability was used.[21]

Statistical Analysis

The primary outcome of the current study was depressive symptoms using the PHQ-9, with cut-off scores of ≥10. Participants were divided into 2 groups depending on the presence or absence of depressive symptoms based on the PHQ-9 score. Descriptive statistics are expressed as counts for categorical variables and means with standard deviations for continuous variables for each group. To compare between groups (with and without depressive symptoms), the chi-square or Fisher's exact test and an independent *t*-test were used for categorical and continuous variables, respectively.

To examine the association between risk factors associated with depressive symptoms, multiple binary logistic regression was utilized along with odds ratios (OR) and 95% confidence interval (95% CI) for each risk factor. The analysis was adjusted for age, sex, BMI, education, employment status, number of chronic diseases, number of medications, cognitive function (MoCA), and FSS.

To determine the cut-off score for significant risk factors associated with depressive symptoms, a receiver operating characteristic (ROC) curve was utilized. The area under the ROC curve (AUC) indicates the overall accuracy of the model in detecting the presence or absence of depressive symptoms among participants. To determine the best cut-off score, the Youden index (sensitivity + [1−specificity]) was calculated, wherein the largest was used as the cut-off. Sensitivity and specificity were calculated, indicating true positive and true negative results, respectively. An alpha level of .05 was used for all analyses. All analyses were performed using IBM SPSS for Macintosh (version 25.0; SPSS Inc. Chicago, IL).

Results

Among the 206 participants included in the final analysis, the prevalence of depressive symptoms among community-dwelling adults was 17.48%. Participants were categorized as having depressive symptoms (n=36) if they scored ≥10 on the PHQ-9. Table 1 shows the demographics and risk factors of participants with depressive symptoms compared to those in the normal group. No participants were categorized as having underweight. Therefore, only 3 categories were reported in Table 1 including normal weight, overweight, and obese. The number of chronic diseases and medications as well as fatigue symptoms using the FSS were significantly higher among participants with depressive symptoms than those without these depressive symptoms. Cognitive function scores were lower among individuals with depressive symptoms, indicating cognitive impairment.

The results of multiple binary logistic regression analyses of the associated risk factors for depressive symptoms are shown in Table 2. Fatigue symptoms using FSS (OR: 1.84, 95%; CI: 1.38, 2.46; *P* < .001) and cognitive functions using the MoCA scale (OR: 0.86, 95%; CI: 0.77, 0.97; *P* = .018) were significantly associated with depressive symptoms after controlling for other covariates, including age, sex, BMI, education, employment status, marital status, number of chronic diseases and medications, cognitive functions (MoCA), and FSS. The results indicated that approximately 84% of participants with higher FSS and 14% with lower cognitive function were more likely to have depressive symptoms.

The results for the cut-off scores and ROC curve with an AUC for risk factors significantly associated with depressive symptoms are listed in Table 3 along with figure 1 and

Table 1. Demographical and Risk Factors of Participants.

Factors	Depressive symptoms group (n = 36)	Normal group (n = 170)	P-value*
Age, years (mean ± SD)	60.81 ± 8	59.27 ± 7	.3
Sex, male/female	12/24	84/86	.09
BMI category			.59
Normal BMI (<25), n (%)	7 (19.4)	47 (27.6)	
Overweight (25-29.9), n (%)	15 (41.7)	662 (36.5)	
Obese (>30), n (%)	14 (38.9)	61 (35.9)	
Marital status			.42
Married	33 (91.7)	145 (85.3)	
Divorced/Widowed	3 (8.3)	25 (14.7)	
Education			.08
None	5 (13.9)	6 (3.5)	
Elementary	8 (22.2)	41 (24.1)	
Middle	5 (13.9)	25 (14.7)	
High school	11 (30.6)	42 (24.7)	
University	7 (19.4)	56 (32.9)	
Employment status			.65
Retired/Unemployed	27 (75.0)	134 (78.8)	
Employed	9 (25.0)	36 (21.2)	
Number of chronic diseases (mean ± SD)	2.42 ± 1.6	1.24 ± 1.38	<.001
Number of medications (mean ± SD)	2.39 ± 2.3	1.24 ± 1.7	.001
FSS (mean ± SD)	45.72 ± 10.13	32.34 ± 14.8	<.001
MoCA scale (mean ± SD)	22.44 ± 5.66	25.35 ± 4.05	.006

Note. BMI = body mass index; FSS = fatigue severity scale; MoCA = montreal cognitive assessment.
*P-value was based on chi-square/Fisher's exact test for categorical variables or independent *t*-test for continuous variables.

Table 2. Binary Logistic Regression of Significant Risk Factors Associated With Depressive Symptoms.

Factors	OR (95% CI)	P-value
FSS	1.84 (1.38, 2.46)	<.001
MoCA scale	0.86 (0.77, 0.97)	.018

Note. CI = confidence interval; OR = odds ratio; FSS = fatigue severity scale; MoCA = Montreal cognitive assessment covariates included age, gender, BMI, education, employment status, marital status, number of chronic diseases, number of medications, cognitive functions (MoCA), and FSS.

Table 3. Receiver Operating Characteristic (ROC) Curve and Cut-off Scores of Significant Risk Factors Associated With Depressive Symptoms.

Variables	AUC (95% CI)	Cut-off score (sensitivity, specificity)
FSS	0.77 (0.70, 0.85)	≥ 42.5 score (0.72, 0.75)
MoCA	0.65 (0.54, 0.76)	≤ 23.5 score (0.73, 0.56)

Note. AUC = area under the ROC curve; CI = confidence interval; FSS = fatigue severity scale; MoCA = Montreal cognitive assessment.

figure 2. The cut-off scores for risk factors associated with depressive symptoms were ≥42 for FSS and ≤23 for the MoCA scale.

Discussion

There is a lack of research on depressive symptoms in adults aged 50 years and older in the Saudi Arabian population. This study examined the prevalence and risk factors associated with depressive symptoms among community-dwelling Saudi adults. The prevalence of depressive symptoms was 17.48% among adults aged 50 years and older in the community. This prevalence was consistent with some previous work in different countries such as India[22] and Malaysia,[23] and lower than reported in other studies such as in China[24] and Iran.[25] In participants with depressive symptoms, the number of chronic diseases, medications, and fatigue symptoms measured using the FSS were significantly higher than those without depressive symptoms. The cognitive function also tended to be lower in patients with depressive symptoms. The findings identified the cut-off scores of FSS and MoCA scale that distinguished participants with and without depressive symptoms.

Al Shammari and Al Subaie[12] reported that 39% of the Saudi Arabian population have depressive symptoms, among which 30% and 8.4% had mild and severe symptoms, respectively. However, the higher percentage could be attributed to the source of sample seeking medical treatment from primary health care centers across the country. In contrast, our study recruited participants from the community to improve the generalizability of the results. Another Saudi study using health care centers found higher prevalence
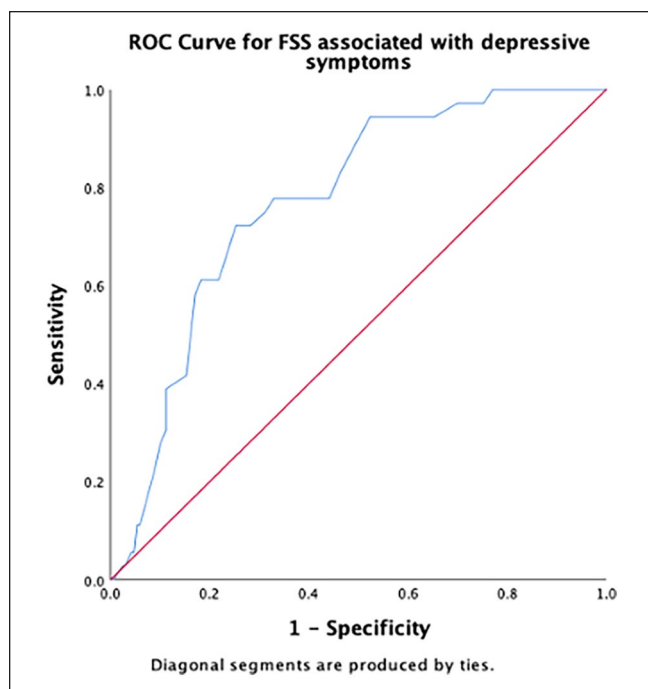
Figure 1. ROC for FSS associated with depressive symptoms.

Figure 2. ROC for MoCA score associated with depressive symptoms.

(49.9%) of depressive symptoms among Saudi adults.[10] However, this study reported moderate depressive symptoms of approximately 13% and moderate to severe of approximately 5%.[10] Therefore, the results were similar to our study. Most previous studies have concentrated on socioeconomic status, which is the main reason for depressive disorders in the elderly. Park et al[26] published a 10-year, cross-sectional study of the Korean population and observed a significant increase in the prevalence of depression due to changes in socioeconomic status. In our study, only fatigue symptoms and cognitive impairments were significantly associated with depressive symptoms after adjusting for other covariates.

In the current study, participants with depressive symptoms consumed more medications than those without these symptoms. Qato et al[27] reported that the estimated risk of depression increased from 6.9% for patients taking 1 drug to 15.3% for patients using 3 or more drugs, with depression as a side effect, compared to 4.7% for patients not taking such drugs. Future studies should examine the type of medications and their frequency in relation to depressive symptoms.

In the current study, fatigue symptoms were significantly associated with depressive symptoms. Corfield et al[28] reported that the risk of depression in fatigued individuals is approximately twice as high as that in non-fatigued individuals, implying that fatigue could be used as a predictor for the early detection of depression.

Regardless of cognitive impairment, a significant inverse relationship exists between depression and MoCA score. In other words, a lower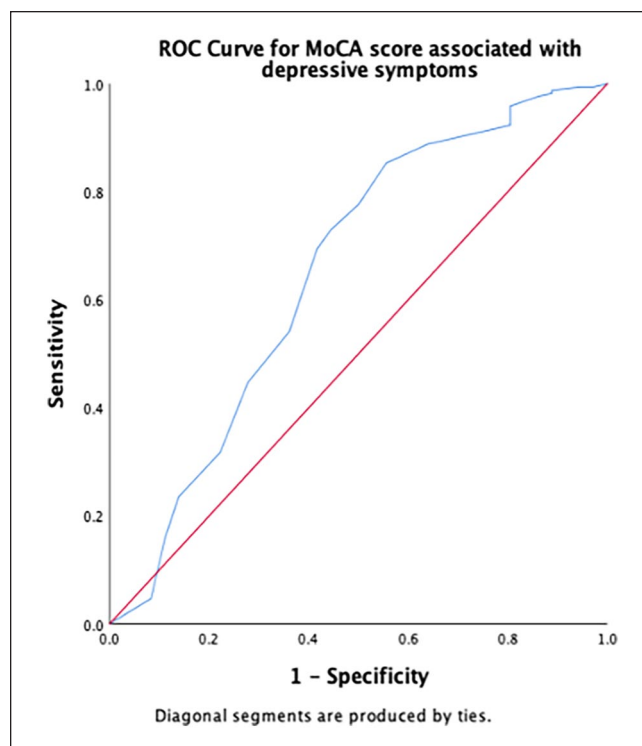 MoCA score is linked to a higher risk of depressive symptoms, as reported in our study. Our results found that declined cognitive function was associated with depressive symptoms. This was consistent with previous reports.[23,29,30] Rock et al[31] demonstrated that moderate depression is linked to deficits in all executive functions, memory, and attention. Future studies should investigate the association between depressive symptoms and executive function at all levels among younger and older adults.

This study has some limitations. First, this study was limited to a convenient sample of community-dwelling adults. Future research should examine the prevalence and associated risk factors using a random sampling technique to improve generalizability of the results. Further research with a larger population and random sampling is required to offer normative data. The small sample is another limitation in this study since that may limit the generalizability of the results. The cross-sectional design of this study limits causality and longitudinal analysis over time; for example, we examined baseline depressive symptoms, cognitive function, and fatigue symptoms. The retrospective assessment of depression is also a limitation of this study, given the possibility of recall bias.

Clinical implications of the current study included screening and identifying who are at risk of depressive symptoms. Clinicians including rehabilitation specialists such as physical therapists may use routinely collected data such as

cognitive functions and fatigue to identify depressive symptoms. Future research should use longitudinal design to predict future depressive symptoms incidence using tools such as MoCA and FSS. Clinical prediction rules are of interest to improve accuracy of diagnostic model for depressive symptoms.

Conclusion

The results of this study revealed that 17.48% of community-dwelling Saudi adults have depressive symptoms. In addition, fatigue and cognitive impairments were associated with depressive symptoms with cut-off scores and should be considered during patient screening and when establishing interventional approaches.

Data Availability Statement

The original dataset will be available upon reasonable request.

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Supplemental Material

Supplemental material for this article is available online.

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