Prevalence and Risk Factors of Depression and Anxiety in Postmenopausal Women Attending PHCs, Riyadh, Saudi Arabia

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Citation: Almughamis A, Aljubair A, Alamro A, Murrad S, Kofi M (2022) Prevalence and Risk Factors of Depression and Anxiety in Postmenopausal Women Attending PHCs, Riyadh, Saudi Arabia. J Family Med Prim Care Open Acc 6: 175. DOI: 10.29011/2688-7460.100075

Received Date: 21 March, 2022; Accepted Date: 01 April, 2022; Published Date: 06 April, 2022

Abstract

Introduction: Depression and anxiety disorders are frequent in postmenopausal women and have deleterious effects on their physical and mental health. No studies have so far been conducted to measure the prevalence and risk factors of depression and anxiety in postmenopausal women who attend Primary Healthcare Centers (PHCs) in Saudi Arabia.

Methods: A cross-sectional study was conducted to measure the prevalence and risk factors of depression and anxiety in postmenopausal women attending peripheral health centers of Prince Sultan Military Medical City (PSMMC), Riyadh in the Kingdom of Saudi Arabia (KSA). Arabic translations of the self-administered General Anxiety Disorder (GAD)-7 and Patient Health Questionnaire (PHQ)-9 were used to diagnose and grade the severity of anxiety and depression respectively. Results: We included 280 women aged 54.5 +/- 1.49 years. The estimated prevalence of depression and general anxiety disorder was 31.4% (88). 62 (22.1%) of the participants had both depression and anxiety. Physical activity [0.36 (0.19-0.69)], diabetes mellitus [4.97 (2.85-8.67)], and previously either depression or anxiety [3.86 (1.66-8.94), 2.48 (1.01-6.12)] were significant predictors of depression using logistic regression. Physical activity [0.20 (0.10-0.40)] and a history of depression or anxiety [3.31 (1.42-7.67), 3.54 (1.46-8.57)] were significant predictors of anxiety. Conclusion: There is a high burden of depression and anxiety in postmenopausal Saudi women. We suggest routine screening for mental illnesses and promotion of regular physical activity in postmenopausal women in Saudi Arabia, particularly those with diabetes, low levels of physical activity, and a history of mental illness.

Keywords: Depression; Anxiety; Menopause

Introduction

Depression and anxiety disorders are prevalent mental disorders, which are a major cause of disability and Disability-Adjusted Life Years (DALYs) worldwide [1,2]. Depressive and anxiety disorders have reached 37.12% and 41.42% respectively and increased due to the COVID-19 pandemic [3]. It is estimated that 350 million people suffer from depression worldwide which contributes to a significant burden of disease [4]. Similarly, 264 million adults suffer from anxiety all over the world [5]. Unfortunately, the trend of depression and anxiety disorders is on the rise worldwide. In Saudi Arabia moderate to severe depression and anxiety, affect 19.8% and 22.0% of general population respectively [6].

Depression refers to persistent sadness and lack of interest in previously enjoyable activities [7]. It is a leading cause of global burden of disease with suicidal thoughts [8]. Major Depressive Disorder (MDD) is a complex interplay of neurotransmitters (such as serotonin, norepinephrine, dopamine, glutamate, etc.)
The aims and design of the study

This study aimed to measure the prevalence and associated risk factors of depression and anxiety in postmenopausal women attending peripheral health centres in Riyadh in the Kingdom of Saudi Arabia (KSA). To ascertain the same a cross-sectional study was carried out between 4/1/2020 and 4/1/2021 at all the primary healthcare centres of Prince Sultan Military Medical City (PSMMC), Riyadh, Saudi Arabia.

Study population

Based on previous literature, expecting a 23.9% prevalence of depression and anxiety in postmenopausal women aged between 45-70, a sample size was calculated to achieve 95% confidence and 80% power with a 5% margin of error [19]. A convenience sampling strategy was used to select participants among those attending the outpatient departments of primary health centers of PSMMC. 280 Arabic speaking postmenopausal women aged above 45 years, resident in the Kingdom of Saudi Arabia, attending the outpatient departments of primary health centers for clinical evaluation of any health concern were included in the study after obtaining informed consents. Men, premenopausal women, those physically or mentally incapable of filling in the questionnaire, and those who did not speak Arabic were excluded from the study.

Data collection

All participants were screened for general anxiety disorder and depression using an Arabic translation of the self-administered General Anxiety Disorder (GAD)-7 and Patient Health Questionnaire (PHQ)-9 previously validated in the Arabic population [20]. A physician reviewed the questionnaire with the participant on completion to ensure that no fields were left incomplete. A physician recorded electronic health record information related to age, presence of hypertension and diabetes mellitus, amount of physical exercise, parity status, and previous history of either depression or anxiety.

Data analysis

The data obtained from the study were anonymized, tabulated, and analyzed by using the Statistical Package for Social Services version 20. Descriptive statistics were computed for all study variables. Quantitative variables were summarized with mean and standard deviation. Qualitative variables are presented as frequency and percentages. The PHQ-9 score was used to categorize the severity of depression as follows: [21] 0-4 none, 5-9 mild, 10-14 moderate, 15-19 moderately severe, and 20-27 severe. The GAD-7 score was used to categorize the severity of anxiety as follows: [22,23] 0-4 minimal anxiety, 5-9 mild anxiety, 10-14 moderate anxiety, and scores higher than 15 categorized as severe anxiety.

Univariable and multivariable binary logistic regressions were carried out to assess the association between patient clinical factors and having depression, anxiety, or both. Participants with a PHQ-9 score ≥10, previously shown to have a sensitivity of...
88% and a specificity of 88% for major depression, [21] were coded as having depression for the regression models. Likewise, participants with a GAD-7 score ≥8, previously shown to have a sensitivity of 92% and specificity of 76% for diagnosis generalized anxiety disorder [22,23], were coded as having general anxiety disorder for the regression models. Odd ratios were calculated with 95% confidence interval, for univariate analysis <0.25 and for multivariate analysis <0.05 kept as a significance level.

Ethical considerations

The study was approved by the Medical Ethics Committee of the Medical Services Department for Armed Forces Scientific Research Center in Riyadh (Ethics approval number PSMMC HP-01-R079) and conducted according to its guidelines. Written informed consent was obtained from all participants (or their legal guardians where applicable) before enrolment in the study. All patient identifying information obtained from electronic health records was completely anonymized.

Results

We included 280 women aged 54.5+/-.1.49 mean+/SD years. The majority were multiparous, 173 (61.8%), had diabetes mellitus, 131 (46.8%), or no physical activity per week, 130 (46.4). The demographic and clinical characteristics of the study participants are tabulated in Table 1.

| Study Variables       | Frequency | Percentage (%) |
|-----------------------|-----------|----------------|
| **Age groups**        |           |                |
| 45-55 years           | 170       | 60.7           |
| 56-65 years           | 95        | 33.9           |
| More than 65 years    | 15        | 5.4            |
| **Parity**            |           |                |
| None                  | 15        | 5.4            |
| 1-3                   | 92        | 32.9           |
| More than 3           | 173       | 61.8           |
| **Physical Activity** |           |                |
| No                    | 130       | 46.4           |
| 1-3 times a week      | 77        | 27.5           |
| More than 3 times a week | 73     | 26.1           |
| **Co morbidities**    |           |                |
| Hypertension          | 34        | 12.1           |
| Diabetes Mellitus     | 131       | 46.8           |

| Variable                         | Frequency | Percentage (%) |
|----------------------------------|-----------|----------------|
| Hypertension & Diabetes Mellitus | 16        | 5.7            |
| Previous history of Depression or Anxiety | 26  | 9.3            |
| Depression                       | 26        | 9.3            |
| Anxiety                          | 23        | 8.2            |
| Depression & Anxiety             | 26        | 9.3            |
| Depression Severity              | 7.68±5.31(0-27) |
| No                               | 9         | 3.2            |
| Minimal                          | 85        | 30.4           |
| Mild                             | 98        | 35             |
| Moderate                         | 49        | 17.5           |
| Moderate severe                  | 29        | 10.4           |
| Severe                           | 10        | 3.6            |
| Anxiety Severity                 | 5.70±4.31(0-19) |
| Minimal                          | 143       | 51.1           |
| Mild                             | 76        | 27.1           |
| Moderate                         | 48        | 17.1           |
| Severe                           | 13        | 4.6            |
| Total                            | 280       | 100            |

Table 1: Demographic Characteristics and outcome of the postmenopausal women.

Depression and anxiety morbidity in the population

The estimated prevalence of depression and general anxiety disorder in this population of postmenopausal women calculated using the cutoffs of PHQ-9 score ≥10 and GAD-7 score ≥8 respectively were both 88 (31.4%). 62 (22.1%) of the participants had both depression and anxiety. The representation of the different severities of depression and anxiety in the population is provided in Figure 1. When asked how difficult their mental health problems have made their work, taking care of things at home, or getting along with others, 155 (55.4%) of the participants answered somewhat difficult, while 30 (10.7%) answered very difficult, and 8 (2.9%) answered extremely difficult. A complete tabulation of participant responses to the different questions in PHQ-9 and QAD-7 is provided in Table 2.
Figure 1: Depression and Anxiety status of Post-menopausal Women.

| Patient Health Questionnaire (PHQ-9) | Not at all | Several days | More than half the days | Nearly every day | Mean ±SD |
|-------------------------------------|-----------|--------------|-------------------------|-----------------|----------|
| 1- Little interest or pleasure in doing things | 65(23.2%) | 128(45.7%) | 77(27.5%) | 10(3.6%) | 1.11±0.80 |
| 2- Feeling down, depressed, or hopeless | 48(17.1%) | 136(48.6%) | 81(28.9%) | 15(5.4%) | 1.22±0.79 |
| 3- Trouble falling or staying asleep, or sleeping too much | 59(21.1%) | 134(47.9%) | 70(25%) | 17(6.1%) | 1.16±0.82 |
| 4- Feeling tired or having little energy | 69(24.6%) | 126(45%) | 64(22.9%) | 21(7.5%) | 1.13±0.87 |
| 5- Poor appetite or overeating | 98(35%) | 118(42.1%) | 53(18.9%) | 11(3.9%) | 0.92±0.83 |
| 6- Feeling bad about yourself — or that you are a failure or have let yourself or your family down | 149(53.2%) | 71(25.4%) | 43(15.4%) | 17(6.1%) | 0.74±0.93 |
| 7- Trouble concentrating on things, such as reading the newspaper or watching television | 137(48.9%) | 92(32.9%) | 40(14.3%) | 11(3.9%) | 0.73±0.85 |
8- Moving or speaking so slowly that others people could have noticed. Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual

| Problem                                                                 | Yes (%) | No (%) | Somewhat (%) | Very (%) | Extremely (%) | Score |
|-------------------------------------------------------------------------|---------|--------|--------------|----------|---------------|-------|
| 198(70.7%)                                                             | 53(18.9%) | 22(7.9%) | 7(2.5%) | 0.42±0.74   |

9- Thoughts that you would be better off dead or of hurting yourself in some way

| Problem                                                                 | Yes (%) | No (%) | Somewhat (%) | Very (%) | Extremely (%) | Score |
|-------------------------------------------------------------------------|---------|--------|--------------|----------|---------------|-------|
| 228(81.4%)                                                             | 37(13.2%) | 14(5%) | 1(0.4%) | 0.42±0.74   |

Table 2: Assessment of Depression & Anxiety.

Clinical factors associated with depression

Table 3 provides a tabulation of the final multivariable logistic regression model between depression and clinically associated factors. In a model adjusted for age, physical activity, diabetes mellitus, and a history of either depression or anxiety remained statistically significant. Participants with diabetes mellitus were 3.34 times more likely to have depression, adjusted odd's ratio (AOR): 3.34 (1.76-6.32), p<0.001. The prevalence of depression in those with diabetes was higher than that in those without diabetes, 64 (48.9%) compared to 24 (16.1%). Participants with a history of depression were 3.2 times more likely to have depression now, AOR: 3.19 (1.27-7.97), p=0.013. Similarly, participants with a history of both depression and anxiety were nearly 22 times more likely to have depression now, AOR: 21.5 (5.75-80.5), p<0.001.
### Table 3: Association between depression and associated factors.

| Associated factors | Depression | Crude OR(95% CI): Sig | Adjusted OR(95% CI): Sig |
|--------------------|------------|------------------------|--------------------------|
|                    | Yes        | No                     |                          |
| **Age groups**     |            |                        |                          |
| 45-55 years        | 41(24.1%)  | 129(75.9%)             | Ref                      | Ref                      |
| 56-65 years        | 40(42.1%)  | 55(57.9%)              | 2.28(1.34---3.92);0.003* | 1.49(0.78---2.82);0.224 |
| More than 65 years | 7(46.7%)   | 8(53.3%)               | 2.75(0.94---8.05);0.064* | 1.18(0.33---4.22);0.791 |
| **Parity**         |            |                        |                          |
| None               | 4(26.7%)   | 11(73.3%)              | Ref                      | -----                    |
| 1-3                | 13(14.1%)  | 79(85.9%)              | 0.45(0.12---1.64);0.227  | -----                    |
| More than 3        | 71(41%)    | 102(59%)               | 1.91(0.58---6.25);0.282  | -----                    |
| **Physical Activity** |        |                        |                          |
| No                 | 59(45.4%)  | 71(54.6%)              | Ref                      | Ref                      |
| 1-3 times a week   | 18(23.4%)  | 59(76.6%)              | 0.36(0.19---0.69);0.002* | 0.72(0.35---1.47);0.362 |
| More than 3 times  | 11(15.1%)  | 62(84.9%)              | 0.21(0.10---0.44);0.000* | 0.48(0.21---1.09);0.079 |
| **Hypertension & Diabetes Mellitus** | |            |                          |
| No                 | 85(32.2%)  | 179(67.8%)             | Ref                      | -----                    |
| Yes                | 3(18.8%)   | 13(81.3%)              | 0.48(0.13---1.75);0.270  | -----                    |
| **Hypertension**   |            |                        |                          |
| No                 | 75(30.5%)  | 171(69.5%)             | Ref                      | -----                    |
| Yes                | 13(38.2%)  | 21(61.8%)              | 1.41(0.67---2.96);0.363  | -----                    |
| **Diabetes Mellitus** |        |                        |                          |
| No                 | 24(16.1%)  | 125(83.9%)             | Ref                      | Ref                      |
| Yes                | 64(48.9%)  | 67(51.1%)              | 4.97(2.85---8.67);0.000* | 3.34(1.76---6.32);0.000* |
| **Previous history of D or A** | |            |                          |
| No                 | 42(20.6%)  | 162(79.4%)             | Ref                      | Ref                      |
| Depression         | 13(50%)    | 13(50%)                | 3.86(1.66---8.94);0.002* | 3.19(1.27---7.97);0.013* |
| Anxiety            | 9(39.1%)   | 14(60.9%)              | 2.48(1.01---6.12);0.049* | 2.32(0.88---6.14);0.090 |
| Both               | 24(88.9%)  | 3(11.1%)               | 30.8(8.86---107.4);0.000*| 21.5(5.75---80.5);0.000* |

Binary logistic regression applied. For Univariate analysis significant set as 0.25 and for multivariate analysis 0.05.
Clinical factors associated with anxiety

Table 4 provides a tabulation of the final multivariable logistic regression model between anxiety and clinically associated factors. In a model adjusted for age, parity, hypertension, and diabetes mellitus only physical activity and history of depression or anxiety remained statistically significant. Participants with physical activity 1-3 times per week were 71% less likely to have anxiety compared to those who were not physically active, AOR: 0.29 (0.13-0.64), p=0.002. Participants with a history of anxiety were 3.7 times more likely to have anxiety now, AOR: 3.69 (1.39-9.78), p=0.009. Similarly, participants with a history of both depression and anxiety were 13 times more likely to have anxiety now, AOR: 13 (3.89-43.6), p<0.001.

| Associated factors         | Anxiety | Crude OR(95%CI);Sig | Adjusted OR(95%CI);Sig |
|----------------------------|---------|---------------------|------------------------|
|                            | Yes     | No                  |                        |
| Age groups                 |         |                     |                        |
| 45-55 years                | 40(23.5%) | 130(76.5%)         | Ref                    | Ref                     |
| 56-65 years                | 39(41.1%) | 56(58.9%)          | 2.26(1.32---3.89);0.003* | 1.31(0.67---2.59);0.430 |
| More than 65 years         | 9(60%)   | 6(40%)              | 4.87(1.63---14.5);0.004* | 2.76(0.76---10.05);0.122 |
| Parity                     |         |                     |                        |
| None                       | 2(13.3%) | 13(86.7%)          | Ref                    | Ref                     |
| 1-3                        | 20(21.7%) | 72(78.3%)         | 1.81(0.37---8.67);0.460 | 1.96(0.34---11.1);0.449 |
| More than 3                | 66(38.2%) | 107(61.8%)        | 4.01(0.87---18.3);0.073* | 3.57(0.66---19.4);0.140 |
| Physical Activity          |         |                     |                        |
| No                         | 65(50%)  | 65(50%)            | Ref                    | Ref                     |
| 1-3 times a week           | 13(16.9%) | 64(83.1%)         | 0.20(0.10---0.40);0.000* | 0.29(0.13---0.64);0.002* |
| More than 3 times a week   | 10(13.7%) | 63(86.3%)        | 0.16(0.07---0.34);0.000* | 0.25(0.11---0.59);0.001* |
| Hypertension & Diabetes Mellitus |       |                     |                        |
| No                         | 86(32.6%) | 178(67.4%)       | Ref                    | Ref                     |
| Yes                        | 2(12.5%)  | 14(87.5%)         | 0.29(0.07---1.33);0.112* | 0.31(0.06---1.64);0.169 |
| Hypertension               |         |                     |                        |
| No                         | 79(32.1%) | 167(67.9%)       | Ref                    | ----                   |
| Yes                        | 9(26.5%)   | 25(73.5%)        | 0.76(0.34---1.71);0.507 | ----                   |
| Diabetes Mellitus          |         |                     |                        |
| No                         | 29(19.5%) | 120(80.5%)       | Ref                    | Ref                     |
| Yes                        | 59(45%)   | 72(55%)           | 3.39(1.99---5.77);0.000* | 1.44(0.74---2.80);0.281 |
| Previous history of D or A |         |                     |                        |
| No                         | 42(20.6%) | 162(79.4%)      | Ref                    | Ref                     |
| Depression                 | 12(46.2%) | 14(53.8%)        | 3.31(1.42---7.67);0.005* | 2.40(0.92---6.25);0.072 |
Clinical factors associated with depression and anxiety

Table 5 tabulates the final multivariable logistic regression model between clinically associated factors and having both anxiety and depression. Physical activity, having diabetes mellitus, and a history of anxiety or depression were statistically significant in the model. Participants with physical activity 1-3 times per week were 73% less likely to have both anxiety and depression compared to those who were not physically active, AOR: 0.27 (0.10-0.69), p=0.006. Participants with diabetes mellitus were nearly 3 times more likely to have both depression and anxiety compared to those without diabetes mellitus, 2.92 (1.39-6.10), p=0.004. Participants with a history of both depression and anxiety were 10 times more likely to have both depression and anxiety now, AOR: 10 (3.64-27.7), p<0.001.

| Associated factors                  | Depression & Anxiety | Crude OR(95%CI);Sig | Adjusted OR(95%CI);Sig |
|-------------------------------------|----------------------|---------------------|------------------------|
|                                     | Yes                  | No                  |                        |                        |
| **Age groups**                      |                      |                     |                        |                        |
| 45-55 years                         | 28 (16.5%)           | 142(83.5%)          | Ref                    | Ref                    |
| 56-65 years                         | 27 (28.4%)           | 68(71.6%)           | 2.01(1.10---3.68);0.023* | 1.21(0.59---2.47);0.603 |
| More than 65 years                  | 7 (46.7%)            | 8(53.3%)            | 4.44(1.49---13.2);0.008* | 2.49(0.69---8.95);0.160 |
| **Parity**                          |                      |                     |                        |                        |
| None                                | 0 (0%)               | 15(100%)            | Not applicable         | Not applicable         |
| 1-3                                 | 10 (10.9%)           | 82(87.1%)           | Not applicable         | Not applicable         |
| More than 3                         | 52 (30.1%)           | 121(69.9%)          | Not applicable         | Not applicable         |
| **Physical Activity**               |                      |                     |                        |                        |
| No                                  | 48 (36.9%)           | 82(63.1%)           | Ref                    | Ref                    |
| 1-3 times a week                    | 7 (9.1%)             | 70(90.9%)           | 0.17(0.07---0.40);0.000* | 0.27(0.10---0.69);0.006* |
| More than 3 times a week            | 7 (9.6%)             | 66(90.4%)           | 0.18(0.08---0.43);0.000* | 0.42(0.16---1.06);0.067 |
| **Hypertension & Diabetes Mellitus**|                      |                     |                        |                        |
| No                                  | 60 (22.7%)           | 204(77.3%)          | Ref                    | -----                  |
| Yes                                 | 2 (12.5%)            | 14(87.5%)           | 0.49(0.12---2.19);0.348 | -----                  |
| **Hypertension**                    |                      |                     |                        |                        |
| No                                  | 55 (22.4%)           | 191(77.6%)          | Ref                    | -----                  |
| Yes                                 | 7 (20.6%)            | 27(79.4%)           | 0.90(0.37---2.18);0.816 | -----                  |
| **Diabetes Mellitus**               |                      |                     |                        |                        |
Table 5: Association between depression & anxiety and associated factors.

| No                            | 15(10.1%) | 134(89.9%) | Ref                             | Ref |
|-------------------------------|-----------|------------|---------------------------------|-----|
| Yes                           | 47(35.9%) | 84(64.1%)  | 4.9(2.63---9.49);0.000*         | 2.92(1.39---6.10);0.004* |
| Previous history of D or A    |           |            |                                 |     |
| No                            | 28(13.7%) | 176(86.3%) | Ref                             | Ref |
| Depression                    | 8(30.8%)  | 18(69.2%)  | 2.79(1.11---7.03);0.029*        | 1.74(0.63---4.80);0.285 |
| Anxiety                       | 6(26.1%)  | 17(73.9%)  | 2.22(0.81---6.11);0.123*        | 2.11(0.71---6.32);0.181 |
| Both                          | 20(74.1%) | 7(25.9%)   | 17.9(6.95---46.4);0.000*        | 10.0(3.64---27.7);0.000* |

Binary logistic regression applied. For Univariate analysis significant set as 0.25 and for multivariate analysis 0.05.

Discussion

Our study found the prevalence of depression and anxiety to be 31.4% (88 women) and 31.4% (88) respectively in postmenopausal women attending the outpatient departments of primary health centers of PSMMC in the Kingdom of Saudi Arabia. 22.1% (62) of the participants had both anxiety and depression. This alludes the massive burden of these mental health conditions in nearly 1.8 million postmenopausal women in the Saudi population [24]. Though most of the cases of depression and anxiety identified in our study were mild, 3.6% and 4.6% of the population suffered from severe depression and anxiety respectively, running a higher risk for self-harm and suicide [25]. Additionally, depression and anxiety can greatly deteriorate the quality of life. In our study 12.9% of the participants reported that their mental health problems made it very difficult to work, take care of things at home, or get along with others.

Our findings correlate with a similar study conducted by Alanzai, et al. [26] in Riyadh who found the prevalence of depressive symptoms to be 29% in postmenopausal women. Our study found a higher prevalence of depression in postmenopausal women compared to that reported in pregnant Saudi women (26.8% and 23.9% respectively) [27]. This could be due to the added physical and emotional stress of menopause along with the physical and sociocultural ramifications of ageing. However, there is a paucity of research on prevalence of mental health conditions and their associated factors in women of other age groups in Saudi Arabia, an area for future research.

Diabetes and mental illness

Through logistic regression, we found diabetes mellitus to be a strong predictor for suffering from depression alone and depression and anxiety simultaneously indicating that postmenopausal women with diabetes are a key segment of population at risk of depression, which requires active screening for depressive symptoms. This concurs with the findings and recommendations of Alzahrani, et al. The physical ailments related to diabetes along with the social stigma related to diabetes may lead to an increased risk of depression in this population.

Physical activity and mental illness

A low level of physical activity was a key predictor of anxiety alone or depression with anxiety, highlighting the protective effect of exercise for mental health illnesses. Interventions aimed at increasing physical activity in this age group would improve mental health and address diabetes, hypertension, and other co-morbidities that are common in this age group [28].

History of mental illness

History of depression and anxiety was an important predictor of current mental illness. It is therefore essential to screen those with a history of mental illnesses in regular intervals.

Limitations of the Study

Our study was conducted in a single center, the primary health care centre of Prince Sultan Military Medical City (PSMMC), Riyadh. Our results may therefore not be generalizable to the entire population of Saudi Arabia. These data were collected between 2020 and 2021. The COVID-19 pandemic and the ensuing health, social, and economic repercussions could have impacted the mental health of the studied women. However, we did not study the impact of the pandemic on their mental health.

Conclusions

Our study found a high prevalence of depression (31.4%) and anxiety (31.4%) in postmenopausal women of Saudi Arabia. Presence of diabetes, low physical activity, and history of mental illness were key predictors of anxiety and depression. We suggest
routine screening for mental illnesses and promotion of regular physical activity for these vulnerable groups.

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