ORIGINAL RESEARCH

# Prevalence of Paternal Prenatal Depression and Its Associated Factors in Saudi Arabia

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**Background:** Paternal prenatal depression affects not only the fathers but also their spouses and children's future lives. Many socioeconomic and cultural factors affect the probability of paternal depression. Little is known about the prevalence of and factors associated with paternal prenatal depression in the Middle East.

**Aim:** To estimate the prevalence of paternal prenatal depression among fathers visiting a tertiary university hospital, as well as to determine the factors associated with paternal prenatal depression within study participants.

**Methods:** This analytical cross-sectional study included 442 fathers whose wives were pregnant and were undergoing regular assessments at antenatal clinics in a tertiary university hospital in Riyadh, Saudi Arabia. The Edinburgh Postnatal Depression Scale (EPDS) was used to assess paternal depression. Bivariate and multivariate analyses were performed.

**Results:** The prevalence of paternal prenatal depression was 26.9%. It was correlated with smoking (odds ratio (OR)=1.8, p=0.006), maternal depression (OR=4.59, p<0.001), and experiencing isolation (OR=5.34, p<0.001). The odds of paternal prenatal depression decreased with social support from friends and family (OR=0.227 and 0.133, respectively) and p<0.001.

**Discussion and Conclusion:** Paternal prenatal depression was prevalent within the study participants. Notably, experiences of isolation and maternal depression emerged as prominent factors that were significantly associated with the manifestation of paternal depression. Consequently, it becomes imperative to implement systematic depression screenings for expectant fathers and to meticulously consider the array of the factors associated with paternal depression.

**Keywords:** paternal depression, prenatal period, expectant fathers, determinants of depression

## Introduction

Over the past two decades, maternal depression has been extensively investigated and became a well-known condition among both healthcare professionals and the general population. However, paternal depression has not received much attention, despite its significant impact on family, children, and, consequently, the community.[1–3] Prenatal depression, also called antenatal depression, is defined as a depressive episode that occurs during pregnancy.[4,5]

Depression is a serious medical condition that can lead to the end of an individual's life. According to the World Health Organization (WHO), 800,000 suicide deaths are reported annually due to depression.[6] Additionally, depression is expected to be one of the top three global burdens of disease by 2030.[7]

Prenatal paternal depression is a prevalent condition across the world with an estimated prevalence of 9.76% according to a multinational systematic review and meta-analysis.[8]

The prevalence of prenatal paternal depression varies between communities. In America, it was 14.1%.[9] In Germany, the prevalence of paternal depression in prenatal and postnatal periods was 9.8 and 7.8%, respectively.[10] In Japan, the prevalence of paternal depression during pregnancy, birth period, and one to two months after birth was 9.7, 10.2, and 8.8%, respectively.[3]

Very few studies have investigated paternal depression during the perinatal period in the Arab region. In Egypt, the prevalence of depression among fathers expecting newborns was 31.8%.[11] However, only one study has investigated the incidence of paternal depression in Saudi Arabia. This study included fathers in the postnatal period and revealed that 16.6% of them experienced paternal postnatal depression.[12]

Various factors have been associated with paternal depression. Notably, maternal depression has shown a consistent association with paternal depression across diverse populations.[13–17]

On the contrary, good marital relationship has been reported to decrease the likelihood of paternal depression.[11] Moreover, social support, smoking, family history of depression, and the gender of the child may potentially affect the risk of paternal depression.[11,12,17–19]

The presence of depression among fathers has the potential to compromise the well-being and progress of their entire family, especially exerting particular influence on the growth and development of their children. Several recent studies have shown that the effects of paternal depression in children range from increased incidence of crying in infants to the development of psychiatric disorders later in life.[9] Moreover, paternal depression has been linked to increased rates of hyperactivity disorder and poor school performance in children.[9] Notably, paternal depression was more strongly associated with the development of anxiety disorders in teenage children than maternal depression.[9]

Paternal depression is considered a serious and underestimated health problem that affects not only fathers, but also their spouses and children. To the best of our knowledge, only one study has investigated paternal depression in Saudi Arabia, focusing on paternal depression during the postpartum period.[12]

Paternal prenatal depression may lead to postpartum depression in fathers.[20] Factors associated with paternal prenatal depression remain unidentified, especially in Saudi Arabia. To the best of our knowledge, this is the first study to investigate the prevalence of paternal prenatal depression and its associated factors among fathers in Saudi Arabia. This research aims to estimate the magnitude of this problem and its determinants which consequently will help in providing services and support directed to affected groups.

## Methods

This cross-sectional study was conducted at antenatal clinics in a tertiary university hospital in Riyadh, Saudi Arabia. The participants were husbands of pregnant women who were undergoing routine assessments in antenatal clinics. Individuals with a history of mental disorders, those undergoing treatment for mental health issues, or those whose pregnant spouses faced life-threatening situations or were at a risk of abortion, were ineligible for participation in the study.

The sample size was calculated using the standard formula for cross-sectional studies considering (80%) power, (5%) significance, (5%) precision, and prevalence of (31.8%).[11] Consequently, the calculated sample size amounted to 334 participants. Upon incorporating an additional (10%) to account for lost or incomplete data, the revised sample size amounted to 367 participants.

A simple random sampling technique was used to collect data from the husbands of pregnant women. Contact information of potential participants was gained from pregnant women who were selected randomly from the list of patients of each day. After that, expectant fathers were contacted to fill the electronic consent form and questionnaire. Reminders were sent subsequently to ensure completion of data. Data collectors visited antenatal clinics daily, both morning and afternoon clinics to ensure random sampling and to avoid missing any group of participants that might have common criteria.

The questionnaire consisted of 7 sections. The first part was the Edinburgh Postnatal Depression Scale (EPDS), which is a validated tool for measuring maternal and paternal postnatal depression,[12,21] and has also been used to measure paternal prenatal depression.[11] The tool was translated to Arabic language and validated by other researchers.[11]

Other sections included demographic characteristics and psychological factors, as well as information about the family, wife, pregnancy and delivery, and occupation.

The EPDS section comprises 10 questions scored on a 4-point Likert scale (0-never, 1-sometimes, 2-frequently, 3-always). Possible scores ranged from 0 to 30.[21] A score above nine was indicative of potential depression as suggested by Matthey et al.[21] Any response other than zero to question 10 was considered an emergency necessitating direct contact with a psychiatrist.[12]

## Pilot Study

The study was piloted on 37 participants to test for the clarity of the questionnaire, the time needed to complete the questionnaire, acceptability of the questions, and accessibility to participants. Participants included in the pilot study were excluded from the actual study.

## Statistical Analysis

Data were analyzed using the statistical package for the social sciences (SPSS) version 25.0 software.[22] Descriptive statistics included frequencies and percentages for categorical variables and medians and interquartile ranges (IQR) for continuously skewed variables, including age. Bivariate statistical analysis was conducted through the utilization of appropriate methods, including the Chi-square test, Fisher's exact test, and the Mann–Whitney $U$-test. Logistic regression analysis was performed to calculate the adjusted OR. All factors with a p<1 in bivariate analysis were entered to the regression model. A p<0.05 and 95% confidence interval (CI) were used to report the statistical significance and precision of the results.

## Ethical Consent

All participants signed an informed consent form before enrolment. Participants' anonymity was preserved and they had the right to withdraw from the study without any obligation.

Participants identified as having a high risk of depression were recommended to seek specialized assistance. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. The study protocol was approved by King Saud University Institutional Review Board (E-19-4438).

## Results

Between September 2020 and May 2021, 442 fathers were enrolled to the study with response rate of 96.5%. The median age of the fathers was 35 years (interquartile range (IQR):32–40) while that of the wives was 30 years (IQR:27–35).

More than two-thirds of wives (n=308, 69.7%) were in their third trimester of pregnancy. The majority of husbands (94.8%, n=419) had only one wife. Almost all couples (98.9%) were living together. More than half of the families (n=258, 58.4%) had one to three children. Higher education was attained by more than two-thirds of the fathers (n=335, 69.7%). Approximately one-third of fathers (n=138, 31.2%) were smokers, and 42.2% of them owned their homes. A mere 5% of the fathers were not employed (n=22). Among those employed, 85% held full-time positions, while 9.7% engaged in part-time work. In the context of family monthly income, 141 (31.9%) fathers had an income ranging between 9000 and 14,999 Saudi-Arabian Riyals (SAR). Paternal prenatal depression was detected in 26.9% of the participants (n=119) with a 95% CI=(22.77–31.04) (Table 1).

Fathers with one to three children exhibited nearly twice the odds of depression in comparison to fathers who had four or more children (OR=1.98, p=0.034). Individuals who smoked exhibited a 1.84-fold elevated odds of depression (p=0.006). Conversely, living in the same house as one's spouse and maintaining a good marital relationship showed lower odds of depression (p<0.001). Similarly, owning a house correlated with a reduced odds of depression (OR=0.64, p=0.04).

**Table 1** Demographic Characteristics

| | Frequency (%) | | Frequency (%) |
|---|---|---|---|
| Father's age (Years): median [IQR] | 35 [32–40] | Marital status | |
| Mother's age (Years): median [IQR] | 30 [27–35] | Living together | 437 (98.9) |
| Trimester | | Separated | 5 (1.1) |
| 1st trimester | 17 (3.8) | Number of wives | |
| 2nd trimester | 117 (26.5) | 1 | 419 (94.8) |
| 3rd trimester | 308 (69.7) | >1 | 23 (5.2) |

*(Continued)*

**Table 1** (Continued).

| | Frequency (%) | | Frequency (%) |
|---|---|---|---|
| Father's formal education (yes) | 432 (97.7) | Number of children | |
| Wife's Formal education (yes) | 436 (98.6) | 0 | 105 (23.8) |
| Level of education | | 1–3 | 258 (58.4) |
| Any school education | 107 (24.2) | 4 or more | 79 (17.9) |
| University or higher | 335 (75.8) | Family history of depression (yes) | 29 (6.6) |
| Level of education (wife) | | Smoking (yes) | 138 (31.2) |
| Any school education | 109 (24.7) | Diabetes (yes) | 33 (7.5) |
| University or higher | 333 (75.3) | Hypertension (yes) | 31 (7.0) |
| Maternal depression (yes) | 70 (15.8) | Good marital relationship (yes) | 436 (98.6) |
| Wife's family member giving support at home (yes) | 78 (17.6) | Good relationship with parents (yes) | 435 (98.4) |
| Wife staying at her mother's house for support during pregnancy (yes) | 170 (38.5) | Spending more time at work to disconnect from home (yes) | 44 (10.0) |
| Planned pregnancy (yes) | 275 (62.2) | Feeling isolated (yes) | 51 (11.5) |
| IVF treatment for conceiving current pregnancy (yes) | 10 (2.3) | Social support from friends (yes) | 375 (84.8) |
| Maternal complications in the current pregnancy (yes) | 83 (18.8) | Social support from family (yes) | 418 (94.6) |
| Maternal complications in past pregnancies (yes) | 84 (19.0) | Attending antenatal checkups with wife (yes) | 353 (79.9) |
| Current fetal disease (Congenital/syndrome) | 4 (0.9) | Planning to attend delivery (yes) | 305 (69) |
| Previous child disease (yes) | 28 (6.3) | Risk of miscarriage in the current pregnancy (yes) | 22 (5) |
| Expected fetus gender | | Previous miscarriage (yes) | 131 (29.6) |
| Male | 179 (40.3) | Previous child death (yes) | 76 (17.2) |
| Female | 136 (30.8) | Delivery plan | |
| I do not know | 128 (29.0) | Vaginal delivery | 283 (64.0) |
| Kind of job commitment | | Cesarean | 43 (9.7) |
| Fulltime | 377 (85.3) | I do not know | 116 (26.2) |
| Part time | 43 (9.7) | Type of job | |
| No job | 22 (5.0) | Governmental | 370 (83.7) |
| Wife's occupation | | Private | 50 (11.3) |
| Employed | 110 (24.9) | No job | 22 (5.0) |
| Student | 31 (7.0) | Family monthly income | |
| Housewife | 301 (68.1) | <5000 SAR | 71 (16.1) |
| Depression | | 5000–8999 SAR | 119 (26.9) |
| Yes | 119 (26.9) | 9000–14,999 SAR | 141 (31.9) |
| No | 323 (73.1) | ≥15,000 SAR | 111 (25.1) |
| | | Home ownership (yes) | 191 (43.2) |

**Abbreviations**: IQR, Inter Quartile Range; IVF, In-Vitro Fertilization; SAR, Saudi Arabian Riyals.

Fathers with good relationships with their parents had a lower odds of depression in comparison to their counterparts, with an OR of 0.142 (p=0.007). Fathers who received social support from family and friends also exhibited a decreased odds of depression (OR= 0.133; p<0.001 and OR=0.227; p<0.001, respectively) (Table 2).

**Table 2** Association Between Depression and Individual Characteristics

| | Depressed N (%) | Undepressed N (%) | P-value | Odds Ratio [95% CI] |
|---|---|---|---|---|
| **Father's age** (mean rank) | 219.39 | 222.28 | 0.833** | – |
| **Mother's age** (mean rank) | 225.8 | 219.92 | 0.667** | – |
| **Formal education** (Yes) | 115 (26.6) | 317 (73.4) | 0.346 | 0.544 [0.151, 1.963] |
| **Number of children** | | | | |
| 0 | 28 (26.7) | 77 (73.3) | 0.152 | 1.688 [0.821, 3.474] |
| 1–3 | 77 (29.8) | 181 (70.2) | 0.034 | 1.975 [1.046, 3.731] |
| 4 or more | 14 (17.7) | 65 (82.3) | Ref | – |
| **Family history of depression** | 12 (41.4) | 17 (58.6) | 0.069 | 2.019 [0.934, 4.365] |
| **Smoking** (Yes) | 49 (35.5) | 89 (64.5) | 0.006 | 1.840 [1.186, 2.855] |
| **Hypertension** | 12 (38.7) | 19 (61.3) | 0.125 | 1.794 [0.843, 3.820] |
| **Diabetes** | 9 (27.3) | 24 (72.7) | 0.962 | 1.019 [0.460, 2.261] |
| **Marital status** | | | | |
| Living together | 114 (26.1) | 323 (73.9) | 0.001* | – |
| Living separately | 5 (100.0) | 0 (0.0) | | |
| **Number of wives** | | | | |
| 1 | 113 (27) | 306 (73.0) | 0.926 | 1.046 [0.402, 2.720] |
| >1 | 6 (26.1) | 17 (73.9) | Ref | – |
| **Good relationship with parents** | 114 (26.2) | 321 (73.8) | 0.007 | 0.142 [0.027, 0.742] |
| **Social support from family** | 102 (24.4) | 316 (75.6) | 0.000 | 0.133 [0.054, 0.330] |
| **Social support from friends** | 82 (21.9) | 293 (78.1) | 0.000 | 0.227 [0.132, 0.389] |
| **Father educational level** | | | | |
| Any school education | 36 (33.6) | 71 (66.4) | 0.072 | 1.539 [0.961, 2.467] |
| University or higher | 83 (24.8) | 252 (75.2) | Ref | – |
| **Kind of job commitment** | | | | |
| Fulltime | 102 (27.1) | 275 (72.9) | 0.342 | 0.649 [0.264, 1.593] |
| Part time | 9 (20.9) | 34 (79.1) | 0.180 | 0.463 [0.148, 1.445] |
| No job | 8 (36.4) | 14 (63.6) | Ref | – |
| **Type of job** | | | | |
| Governmental | 98 (26.5) | 272 (73.5) | 0.311 | 0.631 [0.257, 1.549] |
| Private | 13 (26.0) | 37 (74.0) | 0.373 | 0.615 [0.21, 1.8] |
| No job | 8 (36.4) | 14 (63.6) | Ref | – |
| **Family monthly income** | | | | |
| <5000 SAR | 20 (28.2) | 51 (71.8) | 0.563 | 1.22 [0.621, 2.396] |
| 5000–8999 SAR | 38 (31.9) | 81 (68.1) | 0.2 | 1.46 [0.817, 2.607] |
| 9000–14,999 SAR | 34 (24.1) | 107 (75.9) | 0.969 | 0.989 [0.553, 1.766] |
| ≥15,000 SAR | 27 (24.3) | 84 (75.7) | Ref | – |

**Notes**: *By Fisher's exact test. **By Mann–Whitney *U*-test.
**Abbreviation**: SAR, Saudi Arabian Riyals.

The odds of depression was lower in those whose wives were in the 2nd or 3rd trimester in comparison to those whose wives were in the 1st trimester with (OR=0.25; p=0.007 and OR=0.33; p=0.02, respectively). The anticipated mode of the child's delivery appeared to be associated with depression. Not knowing the intended mode of delivery, as compared to normal delivery, was associated with a 1.7-fold increase in the odds of depression (p=0.028). Similarly, planned cesarean delivery increased the odds of depression by 1.8-fold; however, this association was not statistically significant (p=0.09).

Participants who believed their wives were depressed had a significantly higher odds of depression (OR=4.59, p<0.001). Additionally, the odds of depression increased when the wife stayed at her parents' house during pregnancy (OR=1.71, p=0.013).

Fathers experiencing depression exhibited a five-fold elevation in the likelihood of feeling isolated, as well as dedicating extended hours to work as a means of distancing themselves from home, as evidenced by odds ratios of 5.28 and 5.34 respectively (p<0.001) (Table 3).

**Table 3** Association Between Depression and Marital Relationship Factors

| | Depressed N (%) | Undepressed N (%) | P-value | Odds Ratio [95% CI] |
|---|---|---|---|---|
| Feeling that wife is depressed (yes) | 39 (55.7%) | 31 (44.3) | 0.000 | 4.592 [2.696,7.821] |
| Wife staying at her mother's house for support during pregnancy (yes) | 57 (33.5%) | 113 (66.5) | 0.013 | 1.709 [1.116,2.616] |
| Wife's family member giving support at home (yes) | 23 (29.5%) | 55 (70.5) | 0.527 | 1.167 [0.681,2.003] |
| Good marital relationship (yes)<br>No | 113 (25.9%)<br>6 (100) | 323 (74.1)<br>0 (0) | 0.000* | – |
| Spending more time at work to disconnect from home and family (yes) | 27 (61.4%) | 17 (38.6) | 0.000 | 5.283 [2.758,10.12] |
| Feeling isolated and disconnected from partner (yes) | 31 (60.8%) | 20 (39.2) | 0.000 | 5.337 [2.899,9.824] |
| Wife's formal school education (yes) | 116 (26.6%) | 320 (73.4) | 0.350* | 0.363 [0.072,1.821] |
| Planned pregnancy (yes) | 69 (25.1%) | 206 (74.9) | 0.265 | 0.784 [0.510, 1.204] |
| IVF treatment for conceiving the current pregnancy (yes) | 3 (30.0%) | 7 (70.0) | 0.824 | 1.167 [0.297, 4.591] |
| Attending antenatal visits with wife (yes) | 89 (25.2%) | 264 (74.8) | 0.106 | 0.663 [0.402,1.094] |
| Planning to attend delivery (yes) | 79 (25.9%) | 226 (74.1) | 0.470 | 0.848 [0.541,1.328] |
| Previous child death (yes) | 22 (28.9%) | 54 (71.1) | 0.662 | 1.130 [0.654,1.953] |
| Previous miscarriage (yes) | 36 (27.5%) | 95 (72.5) | 0.864 | 1.041 [0.658,1.647] |
| Currently employment (yes) | 111 (26.4%) | 309 (73.6) | 0.306 | 0.629 [0.257,1.539] |
| Home ownership (yes) | 42 (22.0%) | 149 (78.0) | 0.041 | 0.637 [0.412,0.984] |
| Risk of miscarriage in current pregnancy (yes) | 8 (36.4%) | 14 (63.6) | 0.306 | 1.591 [0.650,3.894] |
| Trimester<br>  1st trimester<br>  2nd trimester<br>  3rd trimester | <br>9 (52.9%)<br>26 (22.2%)<br>84 (27.3%) | <br>8 (47.1)<br>91 (77.8)<br>224 (72.7) | <br>Ref<br>0.007<br>0.023 | <br>–<br>0.254 [0.089,0.724]<br>0.333 [0.125,0.892] |
| Maternal complications in the current pregnancy (No) | 95 (26.5%) | 264 (73.5) | 0.650 | 0.885 [0.521,1.502] |
| Maternal complications in past pregnancies (No) | 90 (25.1%) | 268 (74.9) | 0.081 | 0.637 [0.383,1.060] |
| Congenital anomaly or syndrome in the current pregnancy (No) | 118 (26.9%) | 320 (73.1) | 1.000* | 1.106 [0.114,10.74] |

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**Table 3** (Continued).

| | Depressed N (%) | Undepressed N (%) | P-value | Odds Ratio [95% CI] |
|---|---|---|---|---|
| Wife's occupation | | | | |
| Employed | 38 (34.5%) | 72 (65.5) | 0.073 | 1.535 [0.959,2.458] |
| Student | 4 (12.9%) | 27 (87.1) | 0.118 | 0.431 [0.146,1.27] |
| Housewife | 77 (25.6%) | 224 (74.4) | Ref | – |
| Delivery plan | | | | |
| Vaginal delivery | 65 (23.0%) | 218 (77.0) | Ref | – |
| Cesarean | 15 (34.9%) | 28 (65.1) | 0.091 | 1.797 [0.905,3.566] |
| I do not know | 39 (33.6%) | 77 (66.4) | 0.028 | 1.699 [1.057,2.73] |
| Previous child disease (yes) | 6 (21.4%) | 22 (78.6) | 0.498 | 0.726 [0.287,1.838] |
| Level of education (wife) | | | | |
| Any school education | 36 (33.0%) | 73 (67.0) | 0.098 | 1.485 [0.928,2.377] |
| University or higher education | 83 (24.9%) | 250 (75.1) | Ref | – |
| Expected fetus gender | | | | |
| Male | 47 (26.4%) | 131 (73.6) | 0.527 | 0.85 [0.513,1.41] |
| Female | 34 (25.0%) | 102 (75.0) | 0.393 | 0.789 [0.459,1.358] |
| I do not know | 38 (29.7%) | 90 (70.3) | Ref | – |

**Note**: *By Fisher's exact test.
**Abbreviation**: IVF, In-Vitro Fertilization.

**Table 4** Logistic Regression for Paternal Prenatal Depression and Significant Factors

| | *Adjusted OR | 95% CI | p-value |
|---|---|---|---|
| **Smoking** | 1.879 | 1.117–3.161 | 0.017 |
| **Social support from friends** | 0.421 | 0.211–0.841 | 0.014 |
| **Wife looks depressed** | 2.46 | 1.269–4.769 | 0.008 |
| **Spending more time at work to disconnect from Home and family (yes)** | 3.315 | 1.481–7.42 | 0.004 |
| **Feeling isolated and disconnected from partner (yes)** | 2.568 | 1.14–5.788 | 0.023 |
| **Second trimester /1st** | 0.234 | 0.063–0.864 | 0.029 |
| **Wife any school education / higher** | 2.518 | 1.355–4.68 | 0.004 |

**Notes**: *Model adjusted for family history of depression, good relation with parents, social support from family, wife went to her parents' house for rest during pregnancy, good relation with wife, home ownership, level of education, no. of children, delivery plan, trimester, previous maternal complications, social status, wife's occupation.
**Abbreviations**: OR, Odds Ratio; CI, Confidence Interval.

After adjusting for confounders using a logistic regression model, the factors that were associated with paternal depression in the prenatal period included increased work hours to distance from home and family, the experience of isolation, level of education of the wife, smoking, social support from friends, and the specific trimester of pregnancy. Adjusted odds ratios along with 59% CI and p-values, are reported in Table 4.

# Discussion

This study aimed to demonstrate the prevalence of paternal depression during the prenatal period and to expand our knowledge of its associated factors. In this study, the prevalence of prenatal paternal depression was 26.9%. This was lower than the prevalence reported by Mousa et al in Egypt in 2012.[11] Nonetheless, expectant fathers in Western societies encountered a reduced susceptibility to prenatal paternal depression, with prevalence rates ranging from 9.8% in Germany,[10] 11% in Canada,[23] 12% in Brazil,[23] and to 14% in the USA.[9] Similarly, in Japan, a comparable trend emerged, with 9.7% of expectant fathers exhibiting signs of depression.[3]

The prevalence of prenatal paternal depression among Arabian countries is notably higher in comparison to other countries across different parts of the world. Arabian countries have strong social relationships, duties, and family ties that may be affected by the lifestyle changes that accompany pregnancy and childbirth. This could be stressful and depressive for fathers belonging to the Arab society.

The factors that had the strongest association with prenatal paternal depression in this study were experiences of isolation and the inclination to devote extended work hours as a means of distancing from the home and family. Each of these factors increased the odds of depression by more than five-fold.

This finding is consistent with that of a study by Shaheen et al, who investigated paternal depression in the postnatal period and deduced that the experience of isolation was one of the most important factors associated with paternal depression.[12] In Arab countries, fathers often find themselves less engaged in the preparations associated with welcoming a newborn, potentially leading to feelings of isolation. However, experiencing isolation and trying to disconnect from the house and family may be a result of depression, which could explain the strong association between these two factors and paternal depression.

The presence of a wife afflicted with depression emerged as a significant factor, elevating the odds of prenatal paternal depression by 4.6-fold. This finding aligns with a prospective study conducted in the UK, which concluded that maternal depression was a risk factor for paternal depression.[19] In addition, a systematic review conducted in 2020 to investigate the factors associated with paternal depression in the perinatal period revealed that maternal depression increased the odds of paternal depression by more than three-fold (OR 3.34).[23]

Several studies have examined the effects of the quality of marital relationships on paternal depression.[4,10,11,23] In the current study, all participants who had poor marital relationships or were separated from their wives experienced depression. A study conducted in Australia reported that paternal postnatal and prenatal depression was associated with poor relationship satisfaction.[14] This finding is also supported by a systematic review that included 23 studies from different countries.[24]

Couple therapy is not commonly practiced in Arab communities.[25] Our study findings emphasize the significance of couples being proactive in seeking professional support when necessary. The nature of their marital relationship can profoundly influence their mental well-being during parenthood, thereby, potentially influencing the health of their future progeny.[1,3]

Fathers with good social support, especially from friends, had lower odds of paternal depression than those with no or poor social support. Similarly, a study conducted by Belay et al in Ethiopia concluded that social support decreased the odds of paternal depression.[4] Over the past two decades, numerous researchers have extensively explored maternal depression.[26–28] However, only a few studies emphasized paternal perinatal depression, especially in Saudi Arabia. This reflects a lack of awareness of paternal perinatal depression and its attributes. In addition, because fathers are not expected to experience depression, they do not receive the required social support, which may further worsen their mental health. This observation underscores the need for screening fathers whose wives are diagnosed with depression since early recognition leads to better outcomes.[19,23]

In the current study, the odds of depression was 1.8-fold higher in fathers who smoked than in fathers who did not smoke. This finding is consistent with that of Alibekova's study conducted in Taiwan.[17] However, Moussa et al did not establish any correlation between smoking and paternal depression among expectant Egyptian fathers.[11] This variation in evidence might be due to the heterogeneous populations across different studies with diverse socioeconomic statuses and levels of education, which may potentially affect smoking behavior.[29]

Fathers whose spouses were in their second trimester of pregnancy demonstrated a lower odds of depression than those whose spouses were in the first trimester. This discrepancy may arise from the fact that pregnant women in the second trimester experience fewer symptoms and a heightened sense of well-being.[30]

Another significant association was found between paternal depression and a lower level of wives' education in comparison to a higher level of education. Having a wife with a higher educational level may potentially reduce the financial and social burden of raising children for fathers, subsequently leading to reduced depression.

## Conclusion

In conclusion, paternal prenatal depression is a serious medical condition that affects not only fathers but also their spouses and children. This necessitates prenatal screening for depression in both parents. Furthermore, the integration of

marriage counseling within our society becomes imperative, given its pivotal role in assisting couples in nurturing healthy and supportive relationships, ultimately leading to a reduction in the likelihood of experiencing depression.

## Study Limitation

This study is one of the few studies to investigate paternal depression in Arab countries. The study participants were from a university hospital that serves a wide population with diverse socioeconomic statuses. However, community surveys could improve the generalizability of the study results. In addition, participant enrolment based on professional psychological evaluations might provide more accurate results.

## Data Sharing Statement

Data used in this research are available upon request from the corresponding author.

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## Disclosure

The authors report no conflicts of interest in this work.

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