Libyan Journal of Medicine

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/zljm20

Prevalence and associated factors of perinatal depression among working pregnant women: a hospital-based cross-sectional study

Abdallah Jihed, Mohamed Ben Rejeb, Houyem Said Laatiri, Chekib Zedini, Manel Mallouli & Ali Mtiraoui

To cite this article: Abdallah Jihed, Mohamed Ben Rejeb, Houyem Said Laatiri, Chekib Zedini, Manel Mallouli & Ali Mtiraoui (2022) Prevalence and associated factors of perinatal depression among working pregnant women: a hospital-based cross-sectional study, Libyan Journal of Medicine, 17:1, 2114182, DOI: 10.1080/19932820.2022.2114182

To link to this article: https://doi.org/10.1080/19932820.2022.2114182

Published online: 24 Aug 2022.

LIBYAN JOURNAL OF MEDICINE
2022, VOL. 17, 2114182
https://doi.org/10.1080/19932820.2022.2114182

Taylor & Francis
Taylor & Francis Group

ORIGINAL ARTICLE

Prevalence and associated factors of perinatal depression among working pregnant women: a hospital-based cross-sectional study

Abdallah Jihed [a], Mohamed Ben Rejeb[a], Houyem Said Laatiri[a], Chekib Zedini[a,b], Manel Mallouli[a,b] and Ali Mtiraoui[a,b]

[a]Center for Evidence into Public Health Policy (C4EPH), Faculty of Medicine of Sousse, University of Sousse, Sousse, Tunisia; [b]Laboratory of Research LR12ES03, Department of Community and Family Health, Faculty of Medicine of Sousse, University of Sousse, Sousse, Tunisia

ABSTRACT

Perinatal depression is a major public health problem having serious negative impacts on personal, family, and child developmental outcomes. This study aimed to determine the prevalence of major depressive disorder (MDD) and its associated factors in working pregnant women. This descriptive, cross-sectional study was performed on 389 working pregnant women enrolled from four Tunisian public maternity hospitals. Data collection tools were the sociodemographic, obstetric, family relationships, and work environment questionnaire, and the Center for Epidemiologic Studies Depression Scale (CES-D). The mean score of depression was 27.39 ± 6.97 and 76.1% of women had major depressive symptoms using cutoff points on the CES-D ≥ 23. Family income, diagnosis with a chronic illness, history of depression, and employment categories were associated with major depressive symptoms. In multivariate analyses, family income and work posture were significantly associated with MDD. These results suggest an increased burden of MDD during pregnancy in Tunisian women. Prevention, early detection, and interventions are needed to reduce the prevalence of perinatal depression.

ARTICLE HISTORY
Received 30 June 2022
Accepted 13 August 2022

KEYWORDS
Pregnancy; CES-D; major depressive disorder; risk factor; working women

1. Introduction

Depression is a serious public health problem as it is the third leading cause of the global burden of disease in 2008, as stated by World Health Organization (WHO). The latter has projected that this disease will rank first by 2030 [1]. It can affect people of any age. In addition, it is more common in women of childbearing age who frequently suffer from anxiety and depression. It is also one of the most prominent mental disorders in women during pregnancy and postpartum [2]. Major depressive disorder (MDD) is diagnosed when an individual has a persistently low or depressed mood, anhedonia or decreased interest in pleasurable activities, feelings of guilt or worthlessness, lack of energy, poor concentration, appetite changes, psychomotor retardation or agitation, sleep disturbances, or suicidal thoughts [3]. Evidence states that perinatal depression is a significant risk factor for maternal self-harm or suicide, impaired fetal growth, preterm delivery or low birthweight infants, impaired maternal functioning, inadequate mother-child bonding, and adverse effects on later childhood development [4–6]. To tackle these issues, the Council on Patient Safety in Women's Health Care has published recommendations to improve the screening and management of women with perinatal mood disorders, including depression [7].

The prevalence rates of depression during pregnancy range from 11.3% to 19.6% [1,8–10]. Perinatal depression is closely associated with depression in the postpartum period with a prevalence varying between 17% and 17.7% [11–15]. In their systematic review, Norhayati et al. (2015) demonstrated that perinatal depression and anxiety are significant risk factors for postnatal depression in developed countries [16]. Also, in their systematic review including 21 articles involving 19,284 patients, Bennett et al. (2004) demonstrated a high prevalence of psychopathology during pregnancy that is comparable to its prevalence in non-pregnant women of the same age. They also demonstrated that the prevalence rates (95% CIs) are 7.4% (2.2, 12.6), 12.8% (10.7, 14.8), and 12.0% (7.4, 16.7) for the first, second, and third trimesters, respectively [10].

The relationship between work and pregnancy, two basic social functions, is not always clear. In fact, some occupational activities can be considered a risk factor for pregnancy, especially when the working conditions are difficult [17]. Indeed, pregnancy is a very important period in a woman's life [17]. During this period, potential complications should be avoided so that pregnancy runs smoothly. Mentally ill workers tend to be absent for longer

CONTACT Abdallah Jihed abdallahjihed@hotmail.fr University of Sousse, Faculty of Medicine of Sousse, Tunisia

periods compared to workers who are sick due to other medical conditions and they have a higher risk of poor long-term health and social outcomes [18]. This not only leads to suffering for the individual, but also to higher costs for employers and social security systems. Therefore, reducing the burden of mental health problems and absenteeism due to mental illness has recently become a major priority for the WHO [18], especially among working pregnant women, with the increase in the number of female workers in the reproductive age [17].

The work environment can also lead to mental health problems [19]. It has been demonstrated that having a job has a positive effect on women's health [20]. Indeed, active women are in better physical and mental health compared to housewives and have lower morbidity and mortality rates [21].

Only a limited number of studies examining the associated factors of perinatal depression among working pregnant women in Tunisia are available. The aim of this study was to determine the prevalence of MDD in working pregnant women and to identify its associated factors.

2. Methods

2.1. Design and participants

This was a comparative cross-sectional study carried out in four public maternity hospitals in the region of Sousse, Tunisia: Farhat Hached Maternity Hospital, regional maternity hospital of Msaken, regional maternity hospital of Enfidha, and Al -Wassit Sousse health center between November 2021 and April 2022. Women were recruited on the day they came for the check-up appointments.

The sample size was estimated using the following formula [22]: $n = [p0 *(1-p0) *(z_{\alpha/2})^2 /i^2]$. Where n = sample size; zα/2 = the level of confidence (α = 5%, $Z_{\alpha/2}$ = 1,96); p0 = expected prevalence or proportion of the main event of interest; i = degree of precision (i = 0.05).

We considered that the prevalence of depression during pregnancy was 20.4% [23]. The sample size of pregnant needed to conduct this study would be 249 with an augmentation of 20% to anticipate non-responses or dropouts.

We defined a working pregnant woman as a pregnant woman who is engaged in gainful activities usually outside the home, she began working before gestation and continues to work full-time during pregnancy. The inclusion criteria were working pregnant women, those who agreed to participate by signing the consent form, those aged ≥18 years, those who consulted a gynecologist during the 2nd trimester of pregnancy, those having a single pregnancy and not suffering from severe chronic conditions (other than high blood pressure, asthma, diabetes, etc.) or those with a condition that puts them at risk of preterm delivery (placenta previa, incompetence of the cervix, fetal anomalies, etc.).

The exclusion criteria included women with fetal malformations, those with severe chronic conditions (other than high blood pressure, asthma, diabetes, etc.), and those who simply refused to give informed consent.

Written informed consent was obtained from all the included women prior to taking part in the study. The study protocol was approved by the local research ethics committee.

2.2. Instrument used

2.2.1. Center for Epidemiologic Studies-Depression Scale (CES-D)

The center for Epidemiologic Studies Depression Scale (CES-D) was used to detect MDD. This scale is a 20-item self-report tool used to measure depressive symptoms in the general population [24]. It measures depressed mood and symptoms over the past seven days (e.g. sadness, hopelessness, fatigue, crying, sleep disturbances, and loss of appetite). The CES- D is widely used in medical research. Among women, good psychometric values for the scale are supported in terms of reliability [25] and validity [26]. The scale has excellent internal consistency, with Cronbach's alpha ranging from 0.85 (general population) to 0.90 (psychiatric patients), and adequate test-retest reliability (0.54), for a scale designed to be sensitive to adverse changes in a respondent's environment [24] scale. The Arabic version, demonstrating Cronbach's alpha = 0.84 [27], was used in the current.

The total CES-D score was obtained by averaging the scores of all the items after reversing the scores of four positively-stated items. The total scores range from 0 to 60, with higher scores indicating more experiences of major depressive symptoms. A score of 23 is the cut-off point to differentiate between those with and without complaints of MDD [24].

2.2.2. Sociodemographic, obstetric, family relationships, and work environment questionnaire

A pre-coded structured questionnaire was designed after an extensive literature search. The questionnaire included age, educational level, marital status, chronic health problems, parity, co-morbidity, abortion history, chronic fetal health problems, pregnancy satisfaction, pregnancy monitoring, level of education of the spouse, and working conditions, including employment status categories, time of work, posture, absenteeism, seniority, social coverage, means of transport for work, type of employer and income.

2.3. Statistical analysis

Descriptive statistics, including means and standard deviations (S.D.) for quantitative variables and percentages for categorical variables were calculated to examine the maternal characteristics and CES-D scores.

Chi-square test was used to compare percentages. Student t test and analysis of variance (ANOVA) were used to compare means. The level of significance was set at <0.05.

Multivariate analysis using a stepwise binary logistic regression procedure was performed, including only variables with p-value <0.20. Bivariate analysis and adjusted odds ratios (95% CI) were then obtained to determine the factors independently associated with major depressive symptoms. The study analyses were performed using the Statistical Package for Social Sciences data software, version 20.

3. Results

A total of 389 women were enrolled. The demographic characteristics are presented in Table 1.

The mean age of the included women was 30.1 ± 6.4 years. Of the total number of women, 43.4% had university diplomas and 58.9% had house activity help during pregnancy. All the included women were married and 56% were multiparous (i.e. more than one child). The majority of the women (94.3%) were satisfied with pregnancy, 94.9% were enrolled in regular antenatal care, and 13.9% had a history of abortion.

A total of 31 women reported being hospitalized at least once during pregnancy and 17 women reported contracting COVID-19 during pregnancy and having a history of depression.

Of the total number of women, 76.6% worked in private companies, 70.2% had social security, 84.8% worked more than 8 hours/day, 66.6% spent between 30 minutes and 1 hour 30 minutes in the house-work transport time and worked with work schedule involving rotary (56.3%), day (40%), night (3%). The majority of them (65.6%) had seniority in the workplace of < 5 years and had an absenteeism rate of 77.4% during pregnancy; 56.3% of them move around within their working hours and 14.4% sat still.

The scores on the CES-D ranged between 0 and 40, with a mean of 27.39 ± 6.97 for the full sample. Of the total number of women, 296 (76.1%) had a score ≥ 23. A CES-D score ≥ 23 was strongly associated with family income ($p < 0.000$), chronic illness ($p < 0.023$), depression history ($p < 0.009$), and employment categories ($p < 0.036$).

The results of bivariate regression analysis are presented in Table 2. The risk of MDD increased in women with enough [1.59 (0.789–3.206)] and not enough family income [4.052 (2.003–8.196)] and those working in a standing position without moving (Table 2).

4. Discussion

4.1. Prevalence

In the current study, the prevalence of major depression symptoms was 76.1%. This high rate may be due

Table 1. Sociodemographic, obstetric, family relationships, and work environment variable in pregnant women stratified by the two levels of MDD (N = 389).

		Major depressive disorder CES-D score ≥ 23		
Data	N (%)	Yes (n=296)	No (n=93)	p-value
Age (mean =30,13± 6,432)				0.847
< 25 years	106 (27.2)	82	24	
[25-35[years	199 (51.2)	149	50	
≥ 35 years	84 (21.6)	65	19	
Marital Status				-
Married	389 (100)	296	93	
Education level				0.453
primary	120 (30.8)	96	24	
secondary	100 (25.7)	74	26	
university	169 (43.4)	126	43	
Husband education level				0.307
Uneducated	10 (2.6)	7	3	
primary	81 (20.8)	63	18	
secondary	118 (30.3)	96	22	
university	180 (46.3)	130	50	
Family Income				0.000
Not enough	203 (52.2)	174	29	
Enough	138 (35.5)	94	44	
Enough and saved	48 (12.3	28	20	
Diagnosed with a Chronic Illness				0.023
Yes	78 (20.1)	52	26	
No	311 (79.9)	244	67	
History of depression				0.009
Yes	17 (4.4)	17	0	
No	372 (95.6)	279	93	

(*Continued*)

Table 1. (Continued).

Data	N (%)	Major depressive disorder CES-D score ≥ 23		p-value
		Yes (n=296)	No (n=93)	
Hospitalization				0.472
Yes	31 (8)	23	8	
No	358 (92)	273	85	
COVID-19				0.383
Yes	17 (4.4)	12	5	
No	312 (95.6)	284	85	
House activity help				0.216
Yes	229 (58.9)	178	51	
No	160 (41.1)	118	42	
Regular antenatal examination				0.337
Yes	369 (94.9)	282	87	
No	20 (51.1)	14	6	
Pregnancy satisfaction				0.435
Yes	367 (94.3)	280	87	
No	22 (5.7)	16	6	
Parity				0.440
Yes	218 (56)	167	51	
No	171 (44)	129	42	
Abortion				0.453
Yes	54 (13.9)	42	12	
No	335 (86.1)	254	81	
Employment categories				0.036
Disadvantaged	208 (53.5)	163	45	
Middle	93 (23.9)	75	18	
Favored	88 (22.6)	58	30	
Nature of work company				0.266
Public	91 (23.4)	72	19	
Private	298 (76.6)	224	74	
Work schedule				0.307
Day	158 (40.6)	116	42	
Night	12 (3.1)	11	1	
Rotary	219 (56.3)	169	50	
Seniority				0.910
<5	255 (65.6)	195	60	
[5-10[	90 (23.1)	67	23	
≥10	44 (11.3)	34	10	
Absenteeism				0.055
Yes	301 (77.4)	223	78	
No	88 (22.6)	73	15	
Enrollment in social Security				0.321
Yes	273 (70.2)	210	63	
No	116 (29.8)	86	30	
working posture				0.058
Standing position without moving	114 (29.3)	82	32	
Sitting position without moving	56 (14.4)	35	21	
Moving around	219 (56.3)	179	40	
number of working hours / day				0.910
< 8 hours/day	59 (15.2)	11	48	
≥8 hours /day	330 (84.8)	288	42	
Home - work transport time				0.270
< 30 minute	130 (33.4)	96	34	
[30 minute – 1 hour 30 minutes[	259 (66.6)	200	59	
Depression				-
CES-D score (Mean (SD))	27.39± 6.97	296 (76.1%)	93 (23.9%)	

SD = standard deviation; CES-D = Center for Epidemiological Studies-Depression Scale; Significance levels based on P < 0.05; The chi-square test was used to compare the percentages while verifying the validity conditions of the test.

to the socio-economic conditions in Tunisia. Orr et al. (2006) demonstrated that the prevalence of MDD ranges between 16.2% and 27.5% in multiracial pregnant women [28]. According to the results of two meta-analyses, the average prevalence rate of perinatal depression is estimated to be approximately 12% [10,29]; however, the prevalence may reach 18%, depending on the mode of assessment and the socio-economic conditions [23]. The different results of studies using the CES-D score are presented in Table 3 [8,23,28,30–38].

4.2. Risk factors

In the present study, the factors associated with perinatal major depressive symptoms included family income, chronic illness, depression history, and employment categories. Low family income and work position were also associated with perinatal depression in multivariate analyses. In their systematic review, Biaggi et al. (2016) reported that the most relevant factors associated with perinatal depression are the lack of partner or social support, history of

Table 2. Logistic regression models for major depressive disorder (CES-D).

	CES-D ≥ 23		
Data	Adjusted OR	95% CI	p-value
Family Income			
Enough and saved	-	-	0.000
Enough	1.591	0.789 − 3.206	0.194
Not enough	4.052	2.003–8.196	0.000
working posture			
Standing position without moving	-	-	0.036
Sitting position without moving	0.726	0.354–1.492	0.384
Moving around	1.627	0.935–2.829	0.850

CES-D = Center for Epidemiological Studies-Depression Scale; CI = confidence interval; OR = Odds Ratio; P ≤ 0.05 considered significant

abuse or domestic violence, personal history of mental illness, unplanned or unwanted pregnancy, adverse events in life and high perceived stress, present/past pregnancy complications, and pregnancy loss [39].

In another systematic review investigating the same issue, Lancaster et al. (2010) focused on identification of the risk factors for perinatal depression. They found that maternal anxiety, life stress, history of depression, lack of support, domestic violence, unintended pregnancy, low income, lower education, single status, and bad relationship with the partner are associated with depressive symptoms during pregnancy in bivariate analyses. Life stress, lack of social support, and domestic violence continue to be associated with perinatal depression in multivariate analyses [40]. Other findings have indicated that women with perinatal depression are more likely to be single or unpartnered, multiparous, and of lower educational level. These women perceive themselves to be at a lower income level compared to their non-depressed peers [23,41,42]. Other reviews have demonstrated that the substantial risk factors for depression during pregnancy are personal history of mood and anxiety disorders, previous postpartum depression, family history of psychiatric disorders, young age, unplanned pregnancy, ambivalence or negative feelings towards pregnancy, greater number of children, substance abuse or smoking, lower

Table 3. Studies of perinatal depression using CES-D questionnaire.

Author (year)	Country	Sample size	Instrument and the cut-off point	Depression mean score	Associated variables
(Orr, Blazer, and james 2006)	Greenville, U.S.A.	N = 1163	CES-D score ≥16 and ≥23	The CES-D mean = 16.2 * 44.4% ≥16 * 24.1% ≥23	Poorer self-reported health and functional status.
(Records and Rice 2007)	Pacific northwest U.S.A.	N = 139	CES-D score ≥16	* 38.2% ≥16:	Negative mood states, lack of marital satisfaction, social support, and gravida.
(Marcus et al. 2003)	South-eastern michigan	N = 3472	CES-D score ≥16	*20.4% ≥16	Past history of depression, poorer overall health, greater alcohol consumption, smoking, being unmarried, unemployment, and lower educational level
(Westdahl et al. 2007)	Atlanta U.S.A.	N = 1,047	CES-D score ≥16	The mean = 12.74 * 33% ≥ 16	Social support and conflict
(Lara et Navarrete 2012)	Mexico	N = 98	CES-D score ≥16	The mean ces-d = 24.13	NR
(Mosack and Shore 2006)	Mid-western U.S.A.	N = 19	CES-D score ≥16	The CES-D mean = 19.4 *31.6%≥16	History of depression
(Canady, Stommel, and Holzman 2009)	Michigan, U.S.A.	N = 750	CES-D score ≥16	The CES-D mean = 16.5	NR
(Gavin et al. 2009)	Michigan, U.S.A.	N = 3,019	Ces-d ≥ 24	*17% ≥ 24	NR
(Eick et al. 2020)	California, U.S.A.	N = 1,548	CES-D score ≥16	The CES-D mean = 11.6	Negative life experiences
(Setse et al. 2009)	Baltimore U.S.A.	N = 200	CES-D score ≥16	*15%≥16 in the 1st *14%≥16 in the 2nd *30%≥16 in the 3rd trimesters	Medical conditions, payment source, race, employment status
(Elsenbruch et al. 2007)	Berlin, Germany	N = 896	ads-k ≥ 18	- women with low social support (ads-k mean = 16.1) - women with medium social support ads-k mean = 11.3) - women with high social support (ads-k mean = 7.6)	Low social support
(Vargas-Terrones et al. 2021)	Madrid, Spain	N = 61	CES-D score ≥16	CES-D score at baseline CG:23.2 ± 5.2[a] IG: 22.0 ± 5.0[a] CES-D score at week 38 CG:14.4 ± 8.6 [a] IG: 19.4 ± 11.1[a]	NR

CG: Control group; IC: Intervention group; * Prevalence; NR: not-reported; [a]: Mean± standard deviation

educational level, and unemployment [43]. Similarly, to the systematic review of Lancaster et al. (2010), low income has been found to be associated with perinatal depression [40]. However, some studies [44–48] have found that low income or financial difficulties are relevant factors. For instance, one study of the risk factors for perinatal depression conducted in South Africa found that depression is significantly more likely to affect women of younger age and lower income [49]. Studies carried out in developed and developing countries have found that a low socioeconomic status is one of the main risk factors for depression and anxiety in the general population and for postnatal depression [50,51]. Similarly, a study found that the higher prevalence rate of depression among Black and Hispanic mothers is mainly explained by the lower income and financial hardship [45]. Another study found that financial concerns, rather than belonging to a specific ethnic group, are significantly associated with mental health difficulties during pregnancy [52].

The current study also revealed that working in a standing position without moving was associated with increased major depressive symptoms. A systematic review involving 15 studies found a negative association between moderate exercise during pregnancy and perinatal depression [53]. In addition, some studies have also shown that women who are inactive during pregnancy have a 16% higher probability of having perinatal depression. Another study providing a three-month exercise intervention revealed that the intervention group had a four-point decrease post intervention on average [54]. Similarly, in a 12-week exercise program, the authors found just over a 5-point decrease in scores post-intervention [55]. These results are promising as they show that exercise may have a strong effect on women at risk of depression. The guidelines released in Canada indicate that pregnant women should have 150 minutes of physical activity every week over at least three sessions [56]. Women meeting these guidelines during pregnancy have decreased depressive symptoms [57]. Additionally, many studies have affirmed the positive association between exercise and prevention of maternal perinatal depression [21,38,53,58–61]. A recent meta-analysis found that perinatal exercise reduces the severity of depressive symptoms and the odds of developing perinatal depression by 67% [62]. The aforementioned study also found that having a history of depression is associated with MDD. Our results are consistent with those found in previous studies [40,45,63–65]. In bivariate analysis, personal history of depression is significantly associated with an increased risk of antepartum depressive symptoms. Also, Marcus et al. (2003) reported that women with a history of depression are almost five times more likely to have a CES-D score compared to their peers without prior depression history [23].

Diagnosis with a chronic illness was also found to be associated with major MDD. This finding is similar to some studies [36,66,67]. Indeed, Keliyo et al. (2021) reported that women with chronic medical illness are twice more likely to have perinatal depression than those with no chronic depression [OR = 2:21 (95% CI: 1.09–4.45)] [66].

In this study, employment categories were also found to be associated with major MDD. Furthermore, working conditions, such as psychosocial work demands and change in employment status can influence the incidence of severe depressive symptoms [68]. The most commonly encountered hazard was prolonged standing. Yeh et al. (2018) found that the majority of women think that the workplace provides no information on the safety or rights of pregnant women. However, those exposed to ≥ 4 hazards have more access to such services ($p < 0.05$) and 13% of pregnant women may have suffered from depressive symptomatology [68]. High levels work-related burnout, lower job control, and reduced workplace support are significantly associated with possible perinatal depressive symptoms [68]. Fall et al. (2013) found that working women have the lowest proportion of major depressive symptoms [7.6% (6.6–8.7%); n = 2514] compared to housewives [19.1% (16.5–21.8%); n = 893], women who

stopped working [14.4% (12.7–16.1%); n = 1665], and students [14.3% (10.3–19.1%); n = 265].

These different results in the literature confirm previous evidence that mood disorders during pregnancy and early parenthood have a complex and multifactorial etiology, where multiple factors are involved in the onset of depression and anxiety [69].

5. Study strength and limitations

5.1. Limitations

This study included only a sample of working pregnant women consulting in public health settings, which may limit the generalizability of the findings. Additionally, key depressive symptoms were self-reported and not clinically diagnosed. Therefore, educational level and cultural and/or economic factors may have contributed to over- or under-reporting depressive symptoms.

Another limitation was that the CES-D measures were taken only once during pregnancy and it was unclear if the symptoms were transient.

5.2. Strength

Despite these limitations, we were able to meet the objectives of our study and to determine the factors

associated with depression during the 2nd trimester of pregnancy in the region of Sousse. Furthermore, these symptoms were measured using the CES-D scale with a cutoff score of ≥ 23 rather than the Structured Clinical Interview for Depression (SCID). This cutoff is considered the 'gold standard' for the diagnosis of depression. This cross-sectional study was conducted in a large multicenter involving women from diverse sociodemographic settings. Other strengths of the present study are the large sample size and the low rate of missing information.

6. Conclusion

In conclusion this study showed that 76.1% of the included women had MDD. Family income, diagnosis with a chronic illness, history of depression, and employment categories were associated with MDD. However, women with CES-D score above the cut-off should be followed-up with a diagnostic interview to specify a clinical diagnosis and differentiate those who deserve therapeutic attention from those for whom a prevention program is suitable. Thus, improving maternal health and obstetric services as well as routine screening of women during pregnancy may be helpful to reduce the burden of antenatal depression.

7. Recommendations

A multidisciplinary approach is needed when dealing with perinatal depression, which affects not only the mother but also the fetus. Working pregnant women are exposed to substantial levels of occupational hazards and may therefore experience depressive symptoms. Thus, their work conditions require monitoring and improvement. Further research is required into other associated risk factors, such as psychosocial work demands and socioeconomic status. Accordingly, primary (information, education, and social support), secondary (screening and detection), and tertiary (intervention) preventive measures focusing on Tunisian working pregnant women are needed.

Authors' contributions

All authors read and approved the final manuscript.

A. *Study Design;* ***B.*** *Data Collection;* ***c.*** *Statistical Analysis;* ***D.*** *Data Interpretation;* ***E.*** *Manuscript Preparation;* ***F.*** *Literature Search;* ***G.*** *Funds Collection.*

- Jihed Abdallah: A, B, E, F
- Mohamed Ben Rejeb: A, C, D, E
- Houyem SaidLatiri, Chekib Zedini, Manel Mallouli and Ali Mtiraoui: A, G

Acknowledgments

The authors wish to thank the participants for their cooperation. The authors would also like to thank Professor Samir Boukattya for his invaluable contribution to improving the writing quality of the present article.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This research has not received any funding from any other public, commercial, or non-profit sector

ORCID

Abdallah Jihed http://orcid.org/0000-0002-1301-5880

References

[1] Dadi AF, Akalu TY, Wolde HF, et al. Effect of perinatal depression on birth and infant health outcomes: a systematic review and meta-analysis of observational studies from Africa. Arch Public Health. 2022 December;80(1):34.

[2] Bonari L, Pinto N, Ahn E, et al. Perinatal risks of untreated depression during pregnancy. Can J Psychiatry. 2004 nov;49(11):726- 35.

[3] Bains N, Abdijadid S. Major depressive disorder. In: 2022 Jun 1. In: StatPearls [internet]. Treasure Island (FL): StatPearls Publisching; 2022 jan. 2022. PMID:32644504.

[4] Grote NK, Bridge JA, Gavin AR, et al. A meta-analysis of depression during pregnancy and the risk of preterm birth, low birth weight, and intrauterine growth restriction. Arch Gen Psychiatry. 2010 oct 4;67(10):1012.

[5] Dunkel Schetter C, Tanner L. Anxiety, depression and stress in pregnancy: implications for mothers, children, research, and practice. Curr Opin Psychiatry. 2012 March;25(2):141- 8.

[6] Jahan N, Went TR, Sultan W, et al. Untreated depression during pregnancy and its effect on pregnancy outcomes: a systematic review. Cureus. 2021 August 17;13(8). [Internet]. [cité 13 mai 2022];(). Disponible sur . https://www.cureus.com/articles/66106-untreated-depression-during-pregnancy-and-its-effect-on-pregnancy-outcomes-a-systematic-review

[7] Kendig S, Keats JP, Hoffman MC, et al. Consensus bundle on maternal mental health: perinatal depression and anxiety. J Midwifery Womens Health. 2017 March;62(2):232- 9.

[8] Gavin AR, Holzman C, Siefert K, et al. Maternal depressive symptoms, depression, and psychiatric medication use in relation to risk of preterm delivery. Womens Health Issues. 2009 sept;19(5):325- 34.

[9] Shorey S, Chee CYI, Ng ED, et al. Prevalence and incidence of postpartum depression among healthy mothers: a systematic review and meta-analysis. J Psychiatr Res. 2018 sept;104:235- 48.

[10] Bennett HA, Einarson A, Taddio A, et al. Prevalence of depression during pregnancy. Systematic Review. 2004;103(4):12.

[11] Abasiubong F, Bassey E, Ekott J. Postpartum depression among women in Uyo, Akwa-Ibom State. Niger J Psychiatry. 2008 nov 25;6(2):65- 9.

[12] Chi X, Zhang P, Wu H, et al. Screening for postpartum depression and associated factors among women in china: a cross-sectional study. Front PsycholInternet. 2016 nov 1;[cité 16 juin 2022];7. Disponible sur. http://journal.frontiersin.org/article/10.3389/fpsyg.2016.01668/full
[13] Falah-Hassani K, Shiri R, Dennis CL. The prevalence of antenatal and postnatal co-morbid anxiety and depression: a meta-analysis. Psychol Med. 2017 sept;47 (12):2041- 53.
[14] Mallikarjun PK, Oyebode F. Prevention of postnatal depression. J R Soc Promot Health. 2005 sept;125 (5):221- 6.
[15] Masmoudi J, Charfeddine F, Trabelsi S, et al. Postpartum depression: prevalence and risk factors. A prospective Study concerning 302 Tunisian parturients. Tunis Med. 2014 oct;92(10):615- 21.
[16] Norhayati MN, Nik Hazlina NH, Asrenee AR, et al. Magnitude and risk factors for postpartum symptoms: a literature review. J Affect Disord avr. 2015;175:34- 52.
[17] Fall A, Goulet L, Vézina M. Exposition aux contraintes psychosociales au travail des femmes enceintes de la région de Montréal, Québec. Arch Mal Prof Environ. 2014 sept;75(4):418- 29.
[18] Heinonen N, Lallukka T, Lahti J, et al. Working conditions and long-term sickness absence due to mental disorders. J Occup Environ Med. 2022 February;64 (2):105- 14.
[19] Niedhammer I, David S, Bugel I, et al. Catégorie socio-professionnelle et exposition aux facteurs psychosociaux au travail dans une cohorte professionnelle. Travailler. 2001;5(1):23.
[20] Fall A, Goulet L, Vézina M. Comparative study of major depressive symptoms among pregnant women by employment status. SpringerPlus déc. 2013;2(1):201.
[21] Field T, Diego M, Delgado J, et al. Yoga and social support reduce prenatal depression, anxiety and cortisol. J Bodyw Mov Ther. 2013 oct;17(4):397- 403.
[22] Serhier Z, Bendahhou K, Ben Abdelaziz A, et al. Methodological sheet n°1: how to calculate the size of a sample for an observational study? Tunis Med janv. 2020;98(1):1- 7.
[23] Marcus SM, Flynn HA, Blow FC, et al. Depressive symptoms among pregnant women screened in obstetrics settings. J Womens Health. 2003;12(4):373- 80. mai.
[24] Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. Appl Psychol Meas. 1977;1(3):385- 401. juin.
[25] Zauszniewski JA, Graham GC. Comparison of short scales to measure depressive symptoms in elders with diabetes. West J Nurs Res. 2009 March;31(2):219- 34.
[26] Spijker J, van der Wurff FB, Poort EC, et al. Depression in first generation labour migrants in Western Europe: the utility of the center for epidemiologic studies depression scale(CES-D). Int J Geriatr Psychiatry juin. 2004;19(6):538- 44.
[27] Kazarian SS, Taher D. Validation of the Arabic center for epidemiological studies depression (CES- D) scale in a Lebanese community sample. Eur J Psychol Assess Janv. 2010;26(1):68- 73.
[28] Orr ST, Blazer DG, James SA. Racial disparities in elevated prenatal depressive symptoms among black and white women in eastern north Carolina. Ann Epidemiol juin. 2006;16(6):463- 8.
[29] Gavin NI, Gaynes BN, Lohr KN, et al. Perinatal depression: a systematic review of prevalence and incidence. Obstet Gynecol. 2005 nov;106(5, Part 1):1071- 83.
[30] Records K, Rice M. Psychosocial correlates of depression symptoms during the third trimester of pregnancy. J Obstet Gynecol Neonatal Nurs. 2007;36 (3):231- 42. mai.
[31] Westdahl C, Milan S, Magriples U, et al. Social support and social conflict as predictors of prenatal depression. Obstet Gynecol juill. 2007;110(1):134- 40.
[32] MaA L, Navarrete L. Screening for depression in pregnant Mexican women with the CES-D. Salud Ment. 2012 February 1;35:51- 6.
[33] Mosack V, Shore ER. Screening for depression among pregnant and postpartum women. J Community Health Nurs. 2006 March;23(1):37- 47.
[34] Canady RB, Stommel M, Holzman C. Measurement properties of the centers for epidemiological studies depression scale (CES-D) in a sample of African American and non-Hispanic white pregnant women. J Nurs Meas. 2009 August 1;17(2):91- 104.
[35] Eick SM, Meeker JD, Swartzendruber A, et al. Relationships between psychosocial factors during pregnancy and preterm birth in Puerto Rico. Nair M, éditeur. PLOS ONE. 2020 January 29;15(1):e0227976.
[36] Setse R, Grogan R, Pham L, et al. Longitudinal study of depressive symptoms and health-related quality of life during pregnancy and after delivery: the Health Status in Pregnancy (Hip) study. Matern Child Health J. 2009 sept;13(5):577- 87.
[37] Elsenbruch S, Benson S, Rücke M, et al. Social support during pregnancy: effects on maternal depressive symptoms, smoking and pregnancy outcome. Hum Reprod. 2007 March;22(3):869- 77.
[38] Vargas-Terrones M, Nagpal TS, Perales M, et al. Physical activity and prenatal depression: going beyond statistical significance by assessing the impact of reliable and clinical significant change. Psychol Med. 2021 March;51(4):688- 93.
[39] Biaggi A, Conroy S, Pawlby S, et al. Identifying the women at risk of antenatal anxiety and depression: a systematic review. J Affect Disord. 2016 February;191:62- 77.
[40] Lancaster CA, Gold KJ, Flynn HA, et al. Risk factors for depressive symptoms during pregnancy: a systematic review. Am J Obstet Gynecol Janv. 2010;202(1):5- 14.
[41] Larsson C, Sydsjö G, Josefsson AH. Sociodemographic data, and pregnancy outcome in women with antepartum depressive symptoms. Obstet Gynecol. 2004 sept;104(3):459- 66.
[42] Anderson C, Roux G, Pruitt A. Prenatal depression, violence, substance use, and perception of support in pregnant middle-class women. J Perinat Educ. 2002;11 (1):14- 21.
[43] Ryan D, Milis L, Misri N. Depression during pregnancy. Can Fam Physician. 2005 August 1;51(8):1087- 93.
[44] Faisal-Cury A, Rossi Menezes P. Prevalence of anxiety and depression during pregnancy in a private setting sample. Arch Womens Ment Health. 2007 February 26;10(1):25- 32.
[45] Rich-Edwards JW. Sociodemographic predictors of antenatal and postpartum depressive symptoms among women in a medical group practice. J Epidemiol Community Health. 2006 March 1;60(3):221- 7.
[46] Weobong B, ten Asbroek AHA, Soremekun S, et al. Association of antenatal depression with adverse consequences for the mother and newborn in rural Ghana: findings from the DON population-based cohort study. Fischer G, éditeur PLoS ONE. 2014 December 30;9(12): e116333.

[47] Zeng Y, Cui Y, Li J. Prevalence and predictors of antenatal depressive symptoms among Chinese women in their third trimester: a cross-sectional survey. BMC Psychiatry. 2015 August 2;15:66.
[48] Lydsdottir LB, Howard LM, Olafsdottir H, et al. The mental health characteristics of pregnant women with depressive symptoms identified by the Edinburgh postnatal depression scale. J Clin Psychiatry Avr. 2014;75(4):393- 8.
[49] Brittain K, Myer L, Koen N, et al. Risk factors for antenatal depression and associations with infant birth outcomes: results from a South African birth cohort study: antenatal depression and infant birth outcomes. Paediatr Perinat Epidemiol. 2015 nov;29(6):505- 14.
[50] Lovisi GM, Jrra L, Coutinho ESF, et al. Poverty, violence and depression during pregnancy: a survey of mothers attending a public hospital in Brazil. Psychol Med. 2005 oct;35(10):1485- 92.
[51] Patel V, Kleinman A. Poverty and common mental disorders in developing countries. Bull World Health Organ. 2003;81(8):609- 15.
[52] Prady SL, Pickett KE, Croudace T, et al. Psychological distress during pregnancy in a multi-ethnic community: findings from the born in Bradford cohort study. PLoS ONE. 2013 August 30;8(4):e60693.
[53] Sánchez-Polán M, Franco E, Silva-José C, et al. Exercise during pregnancy and prenatal depression: a systematic review and meta-analysis. Front Physiol. 2021 June 28;12:640024.
[54] Robledo-Colonia AF, Sandoval-Restrepo N, Mosquera-Valderrama YF, et al. Aerobic exercise training during pregnancy reduces depressive symptoms in nulliparous women: a randomised trial. J Physiother. 2012 March;58(1):9- 15.
[55] El-Rafie M, Khafagy G, Gamal M. Effect of aerobic exercise during pregnancy on antenatal depression. Int J Womens Health. 2016 February;8: 53–57.
[56] Mottola MF, Davenport MH, Ruchat SM, et al. Canadian guideline for physical activity throughout pregnancy. Br J Sports Med. 2019 [nov 2018];52(21):1339- 46.
[57] Gaston A, Prapavessis H. Tired, moody and pregnant? Exercise may be the answer. Psychol Health Déc. 2013;28(12):1353- 69.
[58] Haakstad LAH, Torset B, Bø K. What is the effect of regular group exercise on maternal psychological outcomes and common pregnancy complaints? An assessor blinded RCT. Midwifery Janv. 2016;32:81- 6.
[59] Ussher M, Lewis S, Aveyard P, et al. Physical activity for smoking cessation in pregnancy: randomised controlled trial. BMJ. 2015 May 14;350(may14 16):h2145-h2145.
[60] Perales M, Refoyo I, Coteron J, et al. Exercise during pregnancy attenuates prenatal depression: a randomized controlled trial. Eval Health Prof. 2015 March 1;38(1):59- 72.
[61] Zhu Y, Wang R, Tang X, et al. The effect of music, massage, yoga and exercise on antenatal depression: a meta-analysis. J Affect Disord. 2021 sept 1;292:592-602.
[62] Davenport MH, McCurdy AP, Mottola MF, et al. Impact of prenatal exercise on both prenatal and postnatal anxiety and depressive symptoms: a systematic review and meta-analysis. Br J Sports Med. 2018 nov;52 (21):1376- 85.
[63] Escribè-Agüir V, Gonzalez-Galarzo MC, Barona-Vilar C, et al. Factors related to depression during pregnancy: are there gender differences? J Epidemiol Community Health. 2008;62(5):410- 4. mai.
[64] Edwards B, Galletly C, Semmler-Booth T, et al. Antenatal psychosocial risk factors and depression among women living in socioeconomically disadvantaged suburbs in Adelaide, South Australia. Aust N Z J Psychiatry janv. 2008;42(1):45- 50.
[65] Buesching DP, Glasser ML, Frate DA. Progression of depression in the prenatal and postpartum periods. Women Health. 1986;11(2):61- 78.
[66] Keliyo ET, Jibril MK, Wodajo GT. Prevalence of antenatal depression and associated factors among pregnant women attending antenatal care at health institutions of Faafan Zone, Somali Region, Eastern Ethiopia. Depress Res Treat. 2021 August 30;2021:e2523789.
[67] Kaiyo-Utete M, Dambi JM, Chingono A, et al. Antenatal depression: an examination of prevalence and its associated factors among pregnant women attending Harare polyclinics. BMC Pregnancy Childbirth. 2020 August 6;20:197.
[68] Yeh SS, Lee CN, Wu YH, et al. Occupational hazard exposures and depressive symptoms of pregnant workers. J Occup Environ Med. 2018 March;60(3):e134- 8.
[69] Bilszta JLC, Tang M, Meyer D, et al. Single motherhood versus poor partner relationship: outcomes for antenatal mental health. Aust N Z J Psychiatry janv. 2008;42 (1):56- 65.