Postpartum Depression and Anxiety among Lebanese women: correlates and scales validation

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Research article

Keywords: postpartum, depression, anxiety, factors, Lebanon

Posted Date: March 3rd, 2020

DOI: https://doi.org/10.21203/rs.3.rs-15821/v1

Abstract

Background The last study conducted in Lebanon about postpartum depression dates back to 2014, whereas no studies have been conducted to assess postpartum anxiety (PPA). The shortage of research in this field and the potential opportunities to provide different aspects of postpartum care that respond to women's needs require a deeper understanding of the various problems faced by postpartum women. The study objectives were to delineate some factors associated with postnatal depression and anxiety among a sample of Lebanese women 4-6 weeks after delivery and validate the Edinburgh Postnatal Depression Scale (EPDS) and Perinatal Anxiety Screening Scale (PASS) in Arabic language in that sample.

Methods This cross-sectional study, carried out between July 2018 and March 2019, enrolled 295 participants who came for a postnatal checkup to four clinics.

Results Higher postpartum anxiety (Beta=0.25), higher insomnia (Beta=0.11) and having complications during delivery (Beta=1.81) were associated with higher postpartum depression. Higher postpartum depression score (Beta=1.38) and a premature baby birth compared to those born at term with normal weight (Beta=4.25) were associated with higher postpartum anxiety. The factor analysis for the EPDS and the PASS scales was run over the whole sample. The EPDS and PASS scales items converged over a solution of three and seven factors that had an Eigenvalue over 1 respectively, explaining a total of 64.73% and 65.12% of the variance respectively. High Cronbach's alpha values were found for the EPDS (0.826) and PASS (0.920) scales.

Conclusion Depression and anxiety prevalence rates in the Lebanese population is higher compared to other countries which may in part be due to differences of regional, social, and environmental culture. Different etiological factors could contribute to both depression and anxiety in the postpartum period, which could adversely affect both the mother and the infant.

Background

Childbirth causes an important change in the mother's physiology; which may induce in her an onset of psychopathological symptoms that differ in intensity and frequency [1,2]. More particularly, these psychopathological symptoms include various forms of anxiety and depression. In addition to that, short/long-term impacts on the mother's as well as the child's wellbeing are detected [3].

Sometimes, serious problems can arise, causing real harm to the mother's post-partum psychological stability [4]. These cases include a short lasting condition on commonly known as baby blues. It features mild symptoms such as: anxiety, mood swings, amplified emotional reactivity, with a minimal impact on functioning [4]. Baby blues were reported in 15–85% of women within the first 10 days after birth, with a peak incidence of the fifth day [5]. Although baby blues' postpartum occurrence is common and transient,

generally not requiring intervention, the relevance of its recognition should be noted as it is postulated as a risk factor for subsequent postpartum depression (PPD) [6].

The most statistically and clinically relevant psychological complication, related to giving birth to children is PPD [7]. About 10– 15% of women giving birth may develop PPD, with different population groups and geographical locations variability [7]. The psychiatric literature reference, known as DSM-5, states that the "Postpartum Onset" (a class of: Major Depressive Disorder) is characterized by symptoms appearing during 4–6 weeks after delivery [8]. More specifically, postpartum depression symptoms include: disturbances in appetite and sleep, energy loss, sensation of guilt, diminished attentiveness, as well as plausible suicidal thoughts [8]. Diagnosis of PPD is considered a challenge since changes in sleep patterns and appetite, moreover excessive fatigue are routine changes women go through after giving birth [9].

Previously established results, based on population based studies, demonstrated the following significant risk factors of PPD (in prenatal, perinatal and postnatal phases): (a) patient history of depression [10–12]; (b) psycho-social factors (such marital problems, decreased social support and negative life) [12,13]; (c) socio-economic factors (such as unemployment, poverty [10,13] and low education level [10,13]); (d) medical factors, including complications in delivery and pregnancy [10,11], substance (alcohol/nicotine) abuse while pregnant [10], poor sleep [12,13], post-delivery wound discomfort and drastic maternity blues [12]; (e) factors related to child (such as the sex of the baby, difficulties in breastfeeding and undesired pregnancy) [10].

Perinatal anxiety states anxiety experienced all through pregnancy (antenatal) and/or postpartum period (12 months after birth) [14]. Perinatal anxiety has been recognized as a solid leading indicator of postpartum depression [15]. A study carried out by Miller et al. detected that depression can be the consequence of anxiety being undetected, and untreated [16]. Another study found that women with anxiety disorder during pregnancy are at three times greater risk of postpartum depression[15]. Miscarriage, preeclampsia, preterm delivery, former perinatal loss, experience of a difficult birth and low birth weight are adverse pregnancy consequences that are associated with perinatal anxiety [17,18]. Furthermore, several studies have recognized risk factors associated with perinatal anxiety; these are the important factors: (a) previous psychiatric history, (b) poor relationship quality with companion [18–20], (c) childhood abuse, (d) denial/acceptance styles of coping, (e) personality traits, (f) insufficient social support and (g) high perceived stress and adverse life events [21].

The Edinburgh postnatal depression scale (EPDS) is viewed as well-accepted PPD screening tool. Several language versions have been conducted to validate this scale in a number of countries like Brazil [22], Nepal [23], Mexico [24], Chile [25], Hungary [26], Italy [27] and France [28]. However, there is no Arabic form of the EPDS that had been validated. The Perinatal Anxiety Screening Scale (PASS) is a scale that screens for a wide range of anxiety disorders as well as some common perinatal-specific fears. It is a valid and useful tool for identifying pregnant women and new mothers with problematic anxiety. This scale was also validated in other languages [29,30] but not Arabic.

The last study conducted in Lebanon about postpartum depression dates back to 2014 [31], whereas no studies have been conducted to assess postpartum anxiety (PPA). Postpartum morbidities in Lebanon have never been thoroughly investigated. The shortage of research in this field and the potential opportunities to provide different aspects of postpartum care that respond to women's needs require a deeper understanding of the various problems faced by postpartum women. This study's main objective is to delineate some of the factors connected to postnatal depression and anxiety, as well as to linguistically validate in Arabic language the EPDS and PASS scales; among the sample of Lebanese women 4–6 weeks after delivery.

Methods

Study design

This cross-sectional study was carried out between July 2018 and March 2019. Participants were recruited from four gynecologists' clinics located in four different governorates in Lebanon. For the choice of participants, each Lebanese married woman, aged more than 18 years old, who came for a postnatal checkup to the clinic 4-6 weeks after delivery was asked if she would like to participate in this study and after her written consent she was considered as a participant. Patients excluded were women with physician's diagnosed mental illness or who refused to take part in the study.

Sample size calculation

The Epi info program was used to calculate the minimum sample size needed for our study, with an acceptable 5% margin of error and an expected 12.5% frequency of women with postpartum depression[7] for an estimate of 86000 births per year in Lebanon [32], the results indicated that we need 168 participants to participate in the study.

Survey details

The survey was administered at the obstetrician's clinics in Arabic without the presence of a third party observant (e.g. husband, family member, etc.) and took approximately 25 minutes to be completed. The questionnaire was self-administered to the mother unless she was illiterate, in which case the investigator helped out by reading for her the questions.

The first part of the questionnaire consisted of the sociodemographic features including age, gender, and region, the level of education, professional status, insurance type as well as history of diseases and other questions that were linked to factors associated with postpartum depression and anxiety according to the literature review [10,11,13,33].

The second part consisted of the scales used in the study as follows:

- We used the Edinburgh Postnatal Depression Scale (EPDS) to screen for the possible presence of postpartum depression. It is the standardized tool used postnatally to quantify the severity and establish an estimation of postpartum depression [34]. EPDS is a valid 10-questions scale, valuable to identify potential risk of depression following childbirth, and an effective screening tool, demonstrating sensitivity and high reliability. Regarding the scoring of the EDPS questionnaire, the following is done: answers are scored on a scale, from 0 (not at all) to 3 (as much as I ever did). The total score therefore ranges from 0 to 30, with the score of 11 and more: deemed positive for postpartum depression. On the total EPDS score, the threshold value ≥11 is deemed a relevant diagnostic criterion, in order to diagnose appropriately postnatal depression, during the post delivery time range of 4–6 weeks [34].

-The Lebanese Insomnia Scale (LIS), a newly validated scale to assess insomnia in Lebanon, is composed of 18 items used to screen for the diagnosis of insomnia based upon several validated and universally applicable self-report scales. It aims to provide valid, standardized and reliable reflection of sleep quality. Answers are scored according to a scale (1= never and 5=always); greater scores designate worse insomnia. Items 4, 18 and 22 are reversed. The Cronbach alpha value for this scale was 0.732.

- It includes as well the “Presumptive Stressful Life Events Scale” (PSLES) to evaluate if there is a number of stressful life events that may have happened to the mother up to 12 months before giving birth to her newborn. This scale is constructed and standardized for two time spaces; last one year and life time. The scale events are divided into 9 categories: family and social, work, financial, marital and sexual, health, bereavement, education, legal, and finally courtship and cohabitation. Each category has a series of events that he mother should respond by a “yes” if the event has occurred during the last year, or/and during her lifetime. The Cronbach alpha value for this scale was excellent (0.967).

- This questionnaire also contains the “Perinatal Anxiety Screening Scale” (PASS), to detect the severity of perinatal anxiety. The PASS is a trustworthy 31-item self-report questionnaire for postpartum and antenatal women to screen for anxiety. It distinguishes between high and low anxiety disorder risk by measuring specific anxiety symptoms. The mother scores these symptoms by indicating their frequency over the last month. The scales range between 0 (not at all), 1 (sometimes), 2 (often) and 3 (always). Scores between 0 and 20 indicate the absence of anxiety symptoms, scores between 21 and 41 indicate mild- to moderate symptoms, whereas scores between 42 and 93 indicate severe symptoms. High and low anxiety disorder risk are separated between the 26 cut-off score.

Forward and back translation

All scales were translated from English to Arabic through an initial translation and back translation process. A mental health specialist translated the English version into Arabic, then another expert translated the Arabic version back into English. Once the process was completed, the comparison of the two English versions showed no significant differences.

Statistical analysis

Statistical analysis was carried out using SPSS software version 23. For continuous quantitative variables, descriptive statistics mainly mean values and standard deviation (SD) were presented, whereas for nominal and ordinal variables frequencies and percentages were used. Using the Shapiro Wilk test, we checked the normality of distribution for all variables. The Student's t-test was conducted to observe differences between the means of two groups, whereas the ANOVA test was used to compare the means of three groups or more. Four stepwise linear regressions were conducted; the first two were conducted, taking the postpartum depression and anxiety scores as dependent variables but without taking them as independent variables in the models, whereas the other two included those variables as independent variables in each model respectively.

Two factor analyzes were launched to confirm the validity of the depression and anxiety questionnaire in the Lebanese population by using the main component analysis technique, with a promax rotation since the extracted factors were found to be significantly associated. The Kaiser-Meyer- Olkin measure of sampling adequacy and Bartlett's test of sphericity were ensured to be adequate. The retained number of factors matched to Eigenvalues higher than one. Moreover, Cronbach's alpha was recorded for reliability analysis for the total score and for subscale factors. Significance was defined as a p-value less than 0.05.

Results

Sociodemographic characteristics of the participants

Out of 350 women approached, 295 (84.28%) of them accepted to participate in this study. The results of the sociodemographic characteristics of the participants are summarized in Table 1. The results showed that the mean age of the mothers at delivery was 29.53 ± 5.18 years, with 75.6% having a university level of education, 50.7% having a monthly income between 1000-2000 USD, 40.8% having a national social security funds (NSSF) insurance type. Moreover, 112 (38.2%) of the mothers had no depression, 44 (15.0%) had possible depression, 35 (11.9%) had fair high possibility of depression and 102 (34.8%) had positive screening of depression. Finally, 92 (32.3%) of the mothers had no anxiety symptoms, 156 (54.7%) had mild to moderate symptoms, whereas 37 (13.0%) had severe symptoms.

Principal component analysis

Out of all the items of EPDS scale, none of the items was removed. All items could be extracted from the list, since no items over-correlated to each other ($r > 0.9$), had a low loading on factors (< 0.3) or because of a low communality (< 0.3). The factor analysis for the EPDS and the PASS scales was run over the whole sample (Total n = 295). The EPDS scale items converged over a solution of three factors that had an Eigenvalue over 1, whereas the PASS converged over a total of 7 factors, explaining a total of 64.73% and 65.12% of the variance respectively. A Kaiser-Meyer-Olkin measure of sampling adequacy of 0.816 was found for the EPDS scale and 0.878 for the PASS scale respectively, with a significant Bartlett's test

of sphericity (p<0.001). According to the promax rotated matrix, the components are summarized in Table 2. Moreover, high Cronbach's alpha values were found for the EPDS (0.826) and PASS (0.920) scales respectively.

Bivariate analysis associated with postpartum depression

A higher mean depression score was found in mothers who had an illiterate/primary level of education (13.55) compared to all other categories, in those who were delivering the third child or more (12.84), in those who did not know if they were satisfied with the sex of the baby (18.00), in those whose babies wake up more than 5 times at night (14.04) and in those whose babies did not eat regularly compared to those who did (13.47 vs 10.22). Moreover, higher means depression scores were significantly found in mothers whose babies had health problems (14.13 vs 10.43), in those who had complications during pregnancy (12.44 vs 10.19), in those who had hypotension (15.33 vs 10.55), in those who lost consciousness (16.28 vs 10.71), in those who were hospitalized during pregnancy (12.64 vs 10.52), in those who had complications during delivery (12.81 vs 10.47), in those who had anemia after delivery (13.91 vs 10.58), in those who had previous abortions (12.28 vs 10.49), in those who did not have planned pregnancies (12.07 vs 10.07) and in those who were not happily married (13.65 vs 10.51) (Table 3).

Bivariate analysis associated with postpartum anxiety

A higher mean anxiety score was found in mothers who had an illiterate/primary level of education (34.65) compared to all other categories, in those who delivered via the caesarian method (29.81), in those whose babies were males (29.64 vs 26.01), who were admitted to the NICU (32.63 vs 26.77), who wake up more than 5 times during the night and who did not eat regularly compared to those who did (32.76 vs 26.33). Moreover, higher means anxiety scores were significantly found in mothers whose babies had health problems (35.14 vs 27.05), in those who had complications during pregnancy (31.36 vs 26.21), in those who had hypotension (34.33 vs 27.27), in those who were hospitalized during pregnancy (32.55 vs 26.87), in those who delivered with the help of the technology (32.71 vs 27.61), in those who did not have planned pregnancies (30.76 vs 25.68), in those who were not happily married (35.38 vs 27.01) and in those who had a delivery time of 20 hours or more (35.86) (Table 3).

Higher anxiety (r=0.628) and insomnia (r=0.359) were found to be significantly correlated with higher postpartum depression, whereas higher depression, higher insomnia (r=0.323) and higher number of waterpipes per week (r=0.59) were found to be significantly correlated with higher postpartum anxiety (Table 4).

Multivariable analysis

The results of a first stepwise linear regression, taking the postpartum depression score as the dependent variable and without taking the postpartum anxiety score as an independent variable, showed that higher insomnia (Beta=0.192), the baby having health problems (Beta=3.052) and having a National Social

Security Funds (NSSF) insurance type compared to not (Beta=1.563) were significantly associated with higher postpartum depression, whereas having a delivery period less than 14 hours compared to 14 hours (Beta=-2.762), having a mother's secondary level of education compared to an illiterate/primary level (Beta=-3.405) and having a happy married life (Beta=-3.356) were significantly associated with lower postpartum depression (Table 5, Model 1).

The results of a second stepwise linear regression, taking the postpartum anxiety score as the dependent variable and without taking the postpartum depression score as an independent variable, showed that higher insomnia (Beta=0.278) and the fact that the baby waked up more than 5 times per night compared to 1-2 times (Beta=4.324) were significantly associated with higher postpartum anxiety, whereas having a planned pregnancy compared to not (Beta=-5.081) and the fact that the baby eats regularly compared to not (Beta=-4.738) were significantly associated with lower postpartum anxiety (Table 5, Model 2).

The results of a third stepwise linear regression, taking the postpartum depression score as the dependent variable and taking the postpartum anxiety score as an independent variable, showed that higher postpartum anxiety (Beta=0.25), higher insomnia (Beta=0.11) and having complications during delivery (Beta=1.81) were significantly associated with higher postpartum depression, whereas having a mother's secondary level of education compared to an illiterate/primary level (Beta=-2.69) and having a delivery period less than 14 hours compared to a delivery period of 14 hours (Beta=-1.88) were significantly associated with lower postpartum depression (Table 5, Model 3).

The results of a fourth stepwise linear regression, taking the postpartum anxiety score as the dependent variable and taking the postpartum depression score as an independent variable, showed that higher postpartum depression score (Beta=1.38), a premature baby birth compared to those born at term with normal weight (Beta=4.25) and the use of technology help for delivery compared to not (Beta=2.10) were significantly associated with higher postpartum anxiety, whereas having a baby through a planned pregnancy (Beta=-4.66) was significantly associated with lower postpartum anxiety (Table 5, Model 4).

Discussion

The current study identified the clinical factors associated with postpartum depression and anxiety among a sample of Lebanese women. Postpartum depression is a debilitating health disorder that mandates greater efforts to raise the awareness among pregnant females about its natural occurrence and the counseling strategies that can be employed to cope with this situation. In this study, several factors both related to the mother and the child contributed to postpartum depression. Specifically, if the mother was illiterate, had delivered more than 3 babies, had complications both during pregnancy and post-partum, encountered hypotension, anemia, or abortion had higher depression scores. Even factors related to the child as wakening more than 5 times per night, did not consume food regularly compared to normal neonate feeding habits, or had health problems all had a risk to have higher depression score. As for anxiety, there were some factors which were related in depression as well increase the score of anxiety as being illiterate, had complications both during pregnancy, encountered hypotension, and had unhappy

marriage. Even factors related to the child as wakening more than 5 times per night, did not consume food regularly compared to normal neonate feeding habits, or had health problems all had a risk to have higher anxiety score in the post-partum period.

Validation of both scales

In our study, the EPDS scale items converged over a three-factors solution outlining a total of 64.73% of the variance, with an internal consistency of 0.826. Several validation studies in different countries have confirmed the clinical and epidemiological value of the scale; in Chile, the items of the EPDS converged over one factor with a Cronbach alpha of 0.914 [25]. In France, the EPDS items converged over a solution of two factors, with a Cronbach alpha of 0.76 [28]. Our results confirm that the Arabic version of the instrument has good psychometric properties, which explains the variability (64.73%).

As for the PASS scale items, in our study it joined over a total of 7 factors, explaining a total of 65.12% of the variance, and leading to an internal consistency of alpha Cronbach alpha = 0.920. These findings are different from those with the original developers (four factors) but similar in terms of internal consistency (Cronbach alpha = 0.96) [35]. The validation of this scale in Turkey [30] revealed that the Cronbach's Alpha value for the scale is = 0.95, and the sub-dimensions obtained by explanatory factor analysis are: (1) general anxiety and specific fear, (2) perfectionism and control, (3) social anxiety and adjustment disorder, (4) acute anxiety and trauma. This test was also validated in Bangladesh [29] and the exploratory factor analysis showed 4 factor solution of the Bangla PASS (1. Acute anxiety 2. General worry and specific fears 3. Perfectionism control and trauma 4. Social anxiety); whereas the temporal stability and internal consistency was also satisfactory (Cronbach's Alpha .970). The Australian validation in its turn, suggested a four-factor structure addressing symptoms of (1) acute anxiety and adjustment, (2) general worry and specific fears, (3) perfectionism, control and trauma and (4) social anxiety, with an excellent reliability (Cronbach's α = 0.96) [35]. As seen above, alpha Cronbach values show a very small variation between different countries, which means that these populations share very close anxiety and depression postpartum symptoms.

Factors associated with depression

This study revealed that the rate of depression and anxiety in the post-partum Lebanese population was 61.8% and 67.7% respectively where this finding is higher than a study done by Pan-Yen Lin, et al and meta-analysis which stated that the occurrence of depression was 5.1% at the fourth week of postpartum and 5.7% at 2 months postpartum [36,37]. In addition, it has been reported that the prevalence of post-partum depression affects about 10–15% of adult mothers annually with depressive symptoms lasting more than 6 months [38]. The rate of depression in this study is similar to another study conducted by Halbreich et al. that reported around 60% prevalence rate of depression [39].

In this study, the factors that were associated with post-partum depression are higher post-partum anxiety, insomnia, and complications development during pregnancy. In this study insomnia was highly

associated with the development of post-partum depression since sleep deprivation might be a trigger factor for the onset of certain psychological problems encountered post-delivery as the onset of mania and unbalanced sleep pattern is more prevalent in new mothers [40]. Maintenance of balanced sleeping hours aids in the relaxation and minimizes the risk of depression.

In this study, secondary level of education compared to illiterate was associated with lower PPD that could be potentially explained by the increased levels of maturity, greater exposure to certain life experiences, and to more education that enables mothers to deal with the emotions allied with motherhood more than less educated females [41].

Additional research is required to elucidate the relation between the level of education and postpartum depression as the results from studies are contradictory since some studies reported no association between the level of education and PPD and others noted that education is a predictor of PPD [42,43].

Our study found that complications during delivery is strongly associated with PPD which can be explained by the emergence of physical and mental troubles encountered by the mother due to the fear from the consequences of complications development, where this outcome is consistent with the outcomes of other studies [17,44]. Our study found that delivery periods of less than 14 hours had a more protective effect compared to duration more than 14 hours which can be demonstrated by the pain associated with giving birth that increases the risk of PPD development as the duration of labor is prolonged.

Factors associated with anxiety

As for anxiety prevalence, the range was reported to be from 13 to 40% which is lower than the findings in this study [45]. This wide variation in the anxiety prevalence rates is highly reliant on the type of anxiety assessment, the scale depicted in the assessment, the cut-off score for anxiety, the severity of anxiety, the timing and the frequency of the assessment, and the country of origin [45,46].

In this study, the high rates of anxiety in the post-partum period may relate to the fact that the anxiety scale scores were based on interviews where denying symptoms may be hindered through face-to-face contact.

The factors associated with postpartum anxiety in this study include higher postpartum depression, premature birth and the use of technology during delivery. The results of this study supporting the relation between preterm infants and post-partum anxiety is encountered in previous studies concluding that in preterm infant mothers, the risk of anxiety was 2.7 times higher than in full-term infant mothers [33,47].

A multitude of studies have observed the combined relationship between symptoms of anxiety and PPD, which is consistent with the findings in this study [48]. Onset of anxiety can range from few days to few weeks after delivery and usually peaks in the first 2–3 months following childbirth. Postpartum anxiety appears mainly in mothers who have the fear from cot death. One plausible explanation that might

elaborate on the reason why this accumulation of fear over time leads to postpartum anxiety is that: nocturnal vigilance deprives mothers from the normal sleeping pattern, since this causes them to remain awake listening to the breathing of the infant. Therefore, the irregular sleeping pattern and anxiety (through constant worrying) seem to be related. This recurrent checking for the safety and health of their children predisposes to anxiety and depression [49,50].

In our study, anxiety was associated with planned pregnancy and an indifferent attitude to pregnancy. An unwanted pregnancy may significantly change life, be a stressful experience with different impacts on quality of life and may trigger certain psychological problems as anxiety [51]. In our study, the delivery of premature baby is associated with PPA which concluded the same in other studies [52,53]. The underlying reasons for this relation can be depicted by the isolation that the parents are exposed to after the delivery of premature babies that mandate hospitalization due to the difficulty in discharging premature infants without being admitted to neonatal intensive care units. The isolation of infants and a lengthy hospital stay pose sudden changes on the bonding of the parents with their offspring [54].

The normal bonding process starts before birth and develops after it where neonatal intensive care units is a contributing stressful factor as demonstrated [55]. The early relationship between parents and newborn infants encountered in the first moments immediately post-delivery is fundamental and plays a crucial role in this intimate bonding [56].

During hospital admission to premature babies, mothers often experience negative thoughts and ideas and contradictory emotional reactions that is usually diagnosed as grief, sorrow, guilt, fear, anger, loss of self-esteem, and sense of failure [57]. This situation and feelings predispose mothers to anxiety.

Limitations

There are some limitations to this study. Prevalence rates of perinatal depression were assessed in this study using self-reported instruments such as EPDS, which is not considered solid evidence in the clinical depression diagnosis and typically overestimate incidence rates [58,59]. The EPDS is a screening test requiring further diagnostic confirmation through a structured or semi-structured interview. Consequently, accurate conclusions cannot be drawn. The utilization of a comprehensive tool as Patient Health Questionnaire that aids in screening, diagnosing, monitoring, and measuring the intensity of depression is a more useful instrument. In addition, there might an information bias where participants might either over- or underestimate their symptoms. Also, a selection bias might be present since the sample was taken from doctor’s clinics and is not representative of the whole population.

Clinical Implications

This highly prevalent problem of postpartum depression and anxiety among Lebanese women has several risk factors. An interplay of these factors is likely to play a role in causing postpartum depression and anxiety. Taking care of these highly modifiable risk factors can prevent PPD and PPA development. Thus, early recognition of risk factors for PPD/ PPA may aid clinicians in early intervention and

management. A collaborative-care approach (for example, a mental-health professional and an obstetrician collaboration) would be appropriate to identify high-risk mothers for PPD and PPA development. Resolving marital and family conflicts before conception, helping the mothers to draw a support plan, having realistic expectations of birth and parenting, addressing issues of self-esteem and encouraging them to quit smoking and waterpipe might be some of the ways to prevent postpartum disorders. We also recommend that a psychiatrist and a psychologist attend a postnatal care unit to advise mothers at risk of developing PPD or PPA as well as other psychiatric disorders.

Conclusion

Depression and anxiety prevalence rates in the Lebanese population is higher compared to other countries which may in part be due to differences of regional, social, and environmental culture. It is worth concluding that great importance from healthcare professionals should be implemented to raise the awareness about PPD and create health promotion program to increase the well-being of delivery women. Different etiological factors could contribute to both depression and anxiety in the postpartum period, which could adversely affect both the mother and the infant. Preventive techniques should be employed early before delivery and even continued post-delivery to aid mothers on the most effective ways on how to cope with the situations and feelings experienced in this period.

Abbreviations

EPDS= Edinburgh Postnatal Depression Scale

PASS= Perinatal Anxiety Screening Scale

PPD= postpartum depression

PPA= postpartum anxiety

LIS= Lebanese Insomnia Scale

PSLES= Presumptive Stressful Life Events Scale

SD= standard deviation

NSSF= National Social Security Funds

Declarations

Ethics Approval and Consent to Participate

The study protocol has been approved by the Holy Spirit University ethics committee. A written informed consent was acquired from each mother prior to entering the study.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analyzed during this study are not publicly available to maintain the privacy of the individuals' identities. The dataset supporting the conclusions is available upon request to the corresponding author.

Competing interests

The authors have nothing to disclose.

Funding

None.

Author contributions

EH, MO, ZS, HB, EH, DM and NK were responsible for the data collection and entry. SH designed the study; EH, MO and DM and drafted the manuscript; SH carried out the analysis and interpreted the results; SO and PS assisted in drafting and reviewing the manuscript; All authors reviewed the final manuscript and gave their consent; SH was the project supervisors.

Acknowledgements

We would like to thank as well all patients who agreed to participate in these studies.

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Tables

Table 1. Sociodemographic characteristics of the participants.	
Variable	**Mean ± SD**
Mother's age at delivery (in years)	29.53 ± 5.18
Father's age at delivery (in years)	34.32 ± 5.87
Postpartum depression	10.90 ± 6.17
Postpartum anxiety	27.87 ± 13.23
Postpartum insomnia	47.88 ± 10.11
Stress last year score	5.22 ± 8.06
Stress lifetime score	2.86 ± 5.21
	N (%)
Governorate	
Beirut	32 (10.9%)
Mount Lebanon	104 (35.5%)
North	44 (15.0%)
South	109 (37.2%)
Bekaa	4 (1.4%)
Mother's education level	
Illiterate/primary	18 (6.1%)
Complementary	14 (4.7%)
Secondary	40 (13.6%)
University	223 (75.6%)
Monthly income	
No income	53 (18.8%)
< 1000 USD	42 (14.9%)
1000-2000 USD	143 (50.7%)
>2000 USD	44 (15.6%)
Insurance type	
No insurance	29 (10.2%)
Private insurance	56 (19.7%)
NSSF	116 (40.8%)
Private and NSSF	49 (17.3%)
Army	22 (7.7%)
COOP	12 (4.2%)
Sex of the baby	
Male	152 (51.7%)
Female	142 (48.3%)

ıble 2. Promax rotated matrix of the postpartum depression scale.								
ıctor	Items	Factor 1	Factor 2	Factor 3				
ıave blamed myself unnecessarily when things went rong	EPDS 3	0.851						
ıings have been getting on top of me	EPDS 6	0.796						
ıave been so unhappy that I have been crying.	EPDS 9	0.747						
ıave felt scared or panicky for no very good reason	EPDS 5	0.7447						
ıave felt sad or miserable	EPDS 8	0.656						
ıave been so unhappy that I have had difficulty sleeping	EPDS 7	0.656						
ıave been able to laugh and see the funny side of things	EPDS 1		0.831					
ıave looked forward with enjoyment to things	EPDS 2		0.795					
ıave been anxious or worried for no good reason	EPDS 4		0.761					
ıe thought of harming myself has occurred to me	EPDS 10			0.798				
ronbach alpha		0.852	0.667	-				
ercentage of variances explained		40.64	14.00	10.92				
ıctor 1: depressive symptoms as feelings of guilt, depressed mood, Insomnia disturbance and Anxiety ; Factor 2: Positive perception of the ture ; Factor 3: Suicidal thoughts								

romax rotated matrix of the postpartum anxiety scale.								
ıctor	Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
fficulty adjusting to recent changes	PASS 26	0.816						
voiding social activities because I might be nervous	PASS 22	0.743						
eeling agitated	PASS 31	0.706						
ıxiety getting in the way of being able to do things	PASS 27	0.685						
eeling detached like you're watching yourself in a movie	PASS 24	0.648						
ıcing thoughts making it hard to concentrate	PASS 28	0.636						
eeling really uneasy in crowds	PASS 21	0.612						
ɔsing track of time and can't remember what happened	PASS 25	0.597						
ear of losing control	PASS 29	0.507						
eeling panicky	PASS 30	0.500						
fficulty stopping checking or doing things over and er	PASS 14		0.807					
ɔset about repeated memories, dreams or nightmares	PASS 18		0.703					
eeling overwhelmed	PASS 6		0.687					
eeling jumpy or easily startled	PASS 15		0.685					
ɔncerns about repeated thoughts	PASS 16		0.542					

udden rushes of extreme fear or discomfort	PASS 8		0.405					
ear that harm will come to the baby	PASS 2			0.901				
orry about the baby/pregnancy	PASS 1			0.884				
orry about many things	PASS 4			0.612				
sense of dread that something bad is going to happen	PASS 3			0.554				
orry about the future	PASS 5				0.902			
anting things to be perfect	PASS 12				0.870			
eeding to be in control of things	PASS 13				0.792			
aving to do things in a certain way or order	PASS 11				0.651			
eally strong fears about thing (needles, blood, birth, in, etc)	PASS 7					0.777		
fficulty sleeping even when I have the chance to sleep	PASS 10					0.576		
epetitive thoughts that are difficult to stop or control	PASS 9					0.427		
ear that others will judge me negatively	PASS 20						0.865	
orry that I will embarrass myself in front of others	PASS 19						0.790	
oiding things which concern me	PASS 23							0.791
eing 'on guard' or needing to watch out for things	PASS 17							0.643
onbach alpha		0.898	0.801	0.819	0.706	0.704	0.733	0.539
ercentage of variances explained		31.92	9.55	6.63	4.98	4.36	4.14	3.54

actor 1: & **Factor 2**: **Cognitive, behavioral and emotional anxiety symptoms**; **Factor 3: Negative anticipation mainly related to the baby**; **Factor Excessive worry; Factor 5: Sleeping disorders with rumination and fear; Factor 6: Fear of the judgment of others; Factor 7: Avoidance and pervigilance**.

onbach alpha for the EPDS scale= 0.826 and the PASS scale=0.920.

Table 3. Bivariate analysis of categorical variables associated with postpartum depression and anxiety among the participants.				
Variable	**Depression score**	**p-value**	**Anxiety score**	**p-value**
Governorate		0.374		**0.003**
Beirut	11.53 ± 6.77		31.44 ± 13.87	
Mount Lebanon	10.16 ± 6.55		24.54 ± 14.19	
North	11.07 ± 5.55		26.09 ± 12.90	
South	11.49 ± 5.77		30.85 ± 11.38	
Bekaa	7.25 ± 7.22		33.25 ± 5.25	
Mother's education level		**0.014**		**0.048**
Illiterate/primary	13.55 ± 3.07		34.65 ± 4.86	
Complementary	13.85 ± 6.02		26.85 ± 10.70	
Secondary	9.17 ± 6.18		27.72 ± 14.40	
University	10.80 ± 6.26		27.43 ± 13.52	
Insurance type		0.073		0.859
No insurance	8.76 ± 5.77		26.28 ± 13.17	
Private insurance	9.80 ± 5.53		27.19 ± 15.06	
NSSF	12.08 ± 5.95		27.75 ± 11.49	
Private and NSSF	11.00 ± 7.44		28.91 ± 15.55	
Army	9.86 ± 6.24		29.41 ± 12.79	
COOP	10.58 ± 5.55		31.45 ± 13.27	
Number of deliveries		**<0.001**		0.192
First child	9.29 ± 6.25		26.52 ± 13.84	
Second child	11.47 ± 5.48		27.96 ± 12.42	
Third child or more	12.84 ± 6.21		30.02 ± 12.94	
Gestational week		0.152		0.057
Premature birth	11.48 ± 7.08		32.50 ± 14.41	
At term but weight less than normal	9.10 ± 5.37		26.11 ± 11.29	
At term with normal weight	11.04 ± 6.16		27.02 ± 13.37	
Satisfied with the sex of the baby		**0.01**		0.153
No	13.77 ± 8.18		35.89 ± 17.60	
Yes	10.72 ± 6.07		27.49 ± 13.14	
Do not know	18.00 ± 3.39		32.80 ± 2.95	
Delivery mode		0.252		**0.006**
Normal delivery	10.02 ± 5.64		24.48 ± 11.68	
Normal delivery with help during delivery	11.05 ± 5.16		28.68 ± 14.36	
Caesarian section	11.31 ± 6.55		29.81 ± 13.61	
Sex of the baby		0.102		**0.02**
Male	11.44 ± 6.44		29.64 ± 13.53	
Female	10.26 ± 5.82		26.01 ± 12.67	
Admission to NICU		0.057		**0.004**
No	10.56 ± 6.06		26.77 ± 13.36	
Yes	12.37 ± 6.59		32.63 ± 11.68	
Baby wakes up at night		**<0.001**		**<0.001**
1-2 times	9.17 ± 6.14		24.08 ± 14.52	
3-5 times	10.95 ± 5.85		28.46 ± 11.68	
>5 times	14.04 ± 5.56		34.43 ± 12.05	
Baby eats regularly		**<0.001**		**0.001**
No	13.47 ± 6.12		32.76 ± 11.94	
Yes	10.22 ± 5.99		26.33 ± 13.52	
Baby has health problems		**0.013**		**0.029**
No	10.43 ± 5.86		27.05 ± 12.34	

Yes	14.13 ± 7.44		35.14 ± 18.57	
Complications during pregnancy		**0.005**		**0.003**
No	10.19 ± 6.11		26.21 ± 12.46	
Yes	12.44 ± 6.11		31.36 ± 14.44	
Hypotension during pregnancy		**<0.001**		**0.029**
No	10.55 ± 6.21		27.27 ± 13.10	
Yes	15.33 ± 3.77		34.33 ± 14.26	
Loss of consciousness during pregnancy		**0.018**		0.074
No	10.71 ± 6.17		27.50 ± 13.31	
Yes	16.28 ± 4.50		36.57 ± 7.81	
Hospitalized during pregnancy		**0.022**		**0.005**
No	10.52 ± 6.01		26.87 ± 12.45	
Yes	12.64 ± 6.64		32.55 ± 15.39	
Complications during delivery		**0.016**		0.102
No	10.47 ± 6.12		27.22 ± 13.41	
Yes	12.81 ± 6.17		30.68 ± 12.04	
Anemia after delivery		**0.013**		0.09
No	10.58 ± 6.14		27.54 ± 12.97	
Yes	13.91 ± 5.80		32.55 ± 16.49	
Technology help during delivery		0.236		**0.027**
No	11.08 ± 6.20		27.61 ± 13.56	
Yes	9.19 ± 6.05		32.71 ± 7.27	
Previous abortions		**0.037**		0.164
No	10.49 ± 6.03		27.27 ± 12.49	
Yes	12.28 ± 6.50		19.86 ± 15.35	
Planned pregnancy		**0.006**		**0.001**
No	12.07 ± 6.37		30.76 ± 12.73	
Yes	10.07 ± 5.89		25.68 ± 13.22	
Happy with married life		**0.008**		**0.001**
No	13.65 ± 5.83		35.38 ± 13.63	
Yes	10.51 ± 6.08		27.01 ± 12.98	
Alcohol during pregnancy		0.065		0.106
No	10.90 ± 6.14		27.36 ± 13.38	
Yes	13.93 ± 6.65		33.07 ± 10.65	
Delivery period		0.06		**<0.001**
14 hours	8.90 ± 4.74		18.54 ± 10.07	
20 hours or more	13.40 ± 4.34		35.86 ± 9.63	
Less than 14 hours	9.75 ± 6.45		26.57 ± 14.08	

Table 4. Pearson's correlations of continuous variables associated with postpartum depression and anxiety among the participants.				
Variable	**Depression**		**Anxiety**	
	r	**p-value**	**r**	**p-value**
Depression	1	-	0.628	**<0.001**
Anxiety	0.628	**<0.001**	1	-
Insomnia	0.359	**<0.001**	0.323	**<0.001**
Stress during last year	0.037	0.532	0.058	0.331
Stress during lifetime	0.028	0.636	0.013	0.833
Mother age at delivery	-0.09	0.124	-0.086	0.148
Father age at delivery	-0.06	0.307	-0.033	0.585
Number of previous abortions	0.184	0.155	0.057	0.664
Number of cigarettes per day	-0.076	0.845	0.595	0.091
Number of waterpipes per week	0.168	0.549	0.590	**0.021**

Table 5. Multivariable analysis.

Model 1: Stepwise linear regression taking the postpartum depression score as the dependent variable, without taking the postpartum anxiety score as an independent variable.

Variable	Unstandardized Beta	p-value	95% Confidence Interval	
Insomnia score	0.192	<0.001	0.124	0.259
Delivery period less than 14 hours compared to 14 hours	-2.762	0.001	-4.340	-1.184
Baby has health problems (yes vs no*)	3.052	0.009	0.761	5.343
Mother secondary education level compared to illiteracy	-3.405	0.001	-5.491	-1.320
Happy married life (yes vs no*)	-3.356	0.009	-5.878	-0.835
NSSF insurance type compared to no insurance	1.563	0.039	0.083	3.044

*Reference group; Nagelkerke R^2 for model 1=15.9%

Model 2: Stepwise linear regression taking the postpartum anxiety score as the dependent variable, without taking the postpartum depression score as an independent variable.

Variable	Unstandardized Beta	p-value	95% Confidence Interval	
Insomnia score	0.278	0.001	0.115	0.440
Planned pregnancies (yes vs no*)	-5.081	0.003	-8.396	-1.766
Baby eats regularly (yes vs no*)	-4.738	0.012	-8.436	-1.040
Baby waked up more than 5 times per night compared to 1-2 times	4.324	0.039	0.210	8.438

*Reference group; Nagelkerke R^2 for model 1=15.9%

Model 3: Stepwise linear regression taking the postpartum depression score as the dependent variable and taking the postpartum anxiety score as an independent variable.

Variable	Unstandardized Beta	p-value	95% Confidence Interval	
Postpartum anxiety score	0.25	<0.001	0.205	0.296
Postpartum insomnia score	0.11	0.001	0.047	0.165
Mother's secondary level of education (compared to illiterate/primary level)	-2.69	0.003	-4.452	-0.933
Delivery period less than 14 hours (compared to 14 hours)	-1.88	0.005	-3.189	-0.563
Complications during delivery (yes vs no*)	1.81	0.029	0.191	3.434

Model 4: Stepwise linear regression taking the postpartum anxiety score as the dependent variable and taking the postpartum depression score as an independent variable.

Variable	Unstandardized Beta	p-value	95% Confidence Interval	
Postpartum depression score	1.38	<0.001	1.165	1.593
Planned pregnancy (yes vs no*)	-4.66	0.001	-7.356	-1.962
Gestational week premature birth (compared to birth at term with normal weight)	4.25	0.04	0.187	8.322
Use of technology help for delivery (yes vs no*)	2.10	0.047	0.028	4.174

*Reference group; Nagelkerke R^2 for model 3=47.3%; Nagelkerke R^2 for model 4=45.1%.