

Association between Sunlight Exposure and Postpartum Depression among Saudi Women in Al-Quwiyah City

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Abstract: Postpartum depression is a major health problem in reproductive-aged women especially in the Saudi Arabia. The association of sunlight exposure and postpartum depression is still unclear.

The aim of this study was to investigate the association between sunlight exposure and postpartum depression among Saudi women in Al-Quwiyah city.

Design: A descriptive correlational analytical research design was adopted.

Setting: The study was conducted at the delivery and postpartum unit in Al-Quwiyah General Hospital, Al-Quwiyah city, Saudi Arabia.

Subjects: A total of 200 postpartum mothers were recruited.

Tools: Three tools were used; Structured interview questionnaire which included: socio-demographic characteristics as well as reproductive history; Edinburg Postpartum Depression Scale; and PHQ-9 Depression scale.

Results: The mean age of the study sample was 26.5 ± 5.7 years old. 86% were housewives. 74.5% were urban residence. 55% of the studied sample had postpartum depression and 1% had suicidal thoughts. There was a statistically significant difference between the depression severity degree among the studied sample ($p < 0.05$). The mean score of depression increased with the increased duration of postpartum.

In conclusion: There was a positive association between sunlight exposure and postpartum depression among Saudi women in Al-Quwiyah city.

Recommendation: Sunlight exposure may substantially reduce the frequency of postpartum depression among mothers. Educational programs to focus on the importance of sunlight exposure should be carried out in order to prevent postpartum depression among mothers. Educational and training program for nurses about how to use Edinburgh Postpartum Depression Scale is very important.

Keywords: Postpartum depression, Sunlight exposure.

I. INTRODUCTION

Mood disorders in the postpartum period are common and considered as a public health issue. In recent decades researchers have paid great amount of attention to these subjects and showed that mood illness related to childbirth can lead to serious maternal, fetal, and neonatal complications.[1,2] Postpartum depression(PPD) is a debilitating mental disorder with a prevalence between 5% and 60.8% worldwide.[3] The prevalence of postpartum depression in some Asian countries has been reported between 22 and 46.9 %.[4,5] There was a relatively high prevalence of Postpartum depression (PPD) in Kingdom Saudi Arabia(33.2%).[6]

World Health Organization(WHO) stated that depression was the leading cause of disability worldwide, affecting about (121) million people. In the United States, (14.8) million (or about 6.7%) of adults have depression. National Institutes of Mental Health(NIMH) stated that depression was the leading cause of disability for Americans between the ages of 15 and 44. Currently, the WHO has determined that depression is ranked the fourth on the global burden of the disease list. The rates of depression continue to increase and the WHO predicts that it will be the second most common global burden of disease by the year (2020). Depression costs \$36.6 billion and 225 million lost workdays in the United States annually.[7,8]

Postpartum period are associated with a significant psychological change, which sometimes leads to pathological changes and the occurrence of mental disorders and encounters the mother with many challenges. Although most postpartum mothers can take care of their child and adapt with these challenges, but for some women, the challenges of this period can be stressful to the extent that provokes mental disorders.[9, 10] The disease manifests as mood swings, changes in appetite, fear of injury, sleep disorders, serious concerns about the baby, much sadness and crying, difficulty in concentrating, lack of interest in daily activities, sense of doubt, and suicidal thoughts.[11,12] In addition, issues such as fear of harming the baby (36%), weak attachment to the baby (34%) and even, in extreme cases, child suicide attempts have been reported.[13,14] PPD may also lead to lower cognitive and linguistic development in the first year of life for the children[15], and they might experience behavioral disorders and impair physical development.[16, 17]

Recent research has shown that there was an association between serotonin and melatonin regulation and sunlight exposure. So, sunlight exposure can prevent postpartum depression by regulating the mood.[18, 19] Sunlight exposure is a nonpharmacological method of increasing serotonin production and promote happiness and well-being for mothers' health, it can protect against mental disorders by preventing negative mood.[20] The best-known benefit of sunlight exposure is its ability to boost the body's vitamin D supply; most cases of vitamin D deficiency are due to lack of outdoor sun exposure especially in the hot weather like in Saudi Arabia, and vitamin D has a role in preventing postpartum depression.[21]

Significance of the study:

Postpartum depression (PPD) places a burden on maternal and neonatal health. PPD exerts a negative impact on mothers' health and children's life.[22] *Alharbi* and *Abdulghani* ,(2014) recommended in their study that further studies are needed in the Saudi community to investigate further some of the risk factors that were found to be associated with PPD.[6] Another study done in Saudi Arabia concluded that postpartum depression is a common mental health problem in the Eastern Province of Saudi Arabia. Therefore, it is recommended to screen high-risk mothers for PPD during primary care well-baby visits and to refer the detected cases to the community mental health centers or the hospitals for early management and prevention of psychosocial impairment of the family.[23] Another study concluded that the level of prevalence of postpartum depression among Saudi women in Majmaa city is (50.7%).[24] There was a relationship between production of serotonin by the brain and the prevailing duration of sunlight exposure. Serotonin is very important hormone that regulate the mood and prevent occurrence of postpartum depression.[25] Several studies have examined whether light therapy improved mood, randomized (29) patients (16 with SAD and 13 controls) in a parallel fashion to either one hour or 15 minutes of light therapy in the morning for two weeks in the winter. One hour of light therapy daily significantly decreased depressive symptoms more so in the group with SAD than the control group ($p = .003$).[26] The researcher noted that there was not any screening for postpartum depression in the delivery and postpartum unit at Al-Quwiyah general hospital, Al-Quwiyah city. So, the researcher is interesting to investigate the association between sunlight exposure and postpartum depression among postpartum mothers.

Aim of the Study: To investigate the association between sunlight exposure and postpartum depression among Saudi women in Al-Quwiyah city.

Research Questions:

✓ Is there an association between sunlight exposure and postpartum depression among Saudi women in Al-Quwiyah city?

II. SUBJECTS AND METHODS

Research Design:

A descriptive correlational analytical research design was adopted to achieve the stated aim. Descriptive designs are useful to gain additional information about characteristics within a special area of study [27]. A correlational analytical study determines whether or not two variables are correlated or there was a relationship to each other. This means to study whether an increase or decrease in one variable corresponds to an increase or decrease in the other variable and explain the nature of the relationship.[28]

Settings:

The study was conducted at the delivery and postpartum unit at Al-Quwiyah general hospital, Al-Quwiyah city, Kingdom of Saudi Arabia. This unit provides free services such as delivery; postpartum care; and treatment of obstetrical complications as well.

Sampling Technique:

A purposive sample of (200) postpartum mothers. The researcher selected the women who met the following **inclusion criteria** including: normal healthy mothers, had no history of postpartum depression, had no family history for depression, had not any sunlight exposure during pregnancy, not taking antidepressant medication or vitamin D supplementation, and agree to participate in the study. While **the exclusion criteria** including: who had history of postpartum depression or family history of depression, taking antidepressant medication or vitamin D supplementation, and disagree to participate in the study.

Sample size:

A total of (200) participants were selected according to the following statistical formula $n = Zp(1-p)/d^2$, where z = level of confidence according to the standard normal distribution (for a level of confidence of 95%, $z = 1.96$). p = estimated proportion of the population that presents the characteristic (when unknown we use $p = 0.5$), d = (d is considered 0.05). $n = 196$

The researcher added (4) cases to the total sample size to become (200) cases to overcome any withdrawn cases during collection of the data.

Instruments of Data Collection:

Three instruments for data collection were developed by the researcher after a review of the past and current literature and used to collect the data by the researcher as the following:

Instrument I: AN INTERVIEWING QUESTIONNAIRE: This instrument was developed and used by the researcher after extensive literature review and it included two parts:

Part one: Socio- demographic characteristics of the studied women. Which included age, educational level of women, type of occupation for women and her husband, and site of residence.

Part two: Reproductive history of the previous pregnancies and deliveries of the women. It included, gravida, para, numbers of abortion, and types of delivery.

Instrument II: EDINBUR POSTPARTU DEPRESSION SCALE(EPDS):

The (EPDS) was developed for screening postpartum women in outpatient, home visiting settings, or at the two to eight week postpartum examination. It is developed by *Cox, J. L., Holden, J. M., & Sagovsky, R. (1987)* and translated into Arabic by the researcher. The EPDS consists of (ten) questions. The scale can usually be completed in less than five minutes. Responses are scored 0, 1, 2, 3 according to increased severity of the symptoms. Items in the (EPDS) marked with an asterisk (*) are reverse scored (i.e., 3, 2, 1, and 0). The total score is determined by adding together the scores for each of the ten items. Validation studies have utilized various threshold scores in determining which women were positive and required of referral. Cut-off scores ranged from nine to thirteen points. Therefore, woman scoring nine or more points or indicating any suicidal ideation, that is she scores (one or higher) on question (ten), should be referred immediately for

follow-up. Even if a woman scores less than nine, if the clinician feels the mother is suffering from postpartum depression, an appropriate referral should be made. The EPDS is only a screening tool. It does not diagnose depression, that is done by appropriately licensed health care personnel. [29]

Scoring system:

- **(0-9)** : Scores in this range may indicate the presence of **some symptoms of distress** that may be short-lived and are less likely to interfere with day to day ability to function at home or at work.
- **(10-12)** : Scores within this range indicate **presence of symptoms of distress** that may be discomforting.
- **(13 +)**: Scores above (12) require further assessment and appropriate management as the likelihood of **depression is high**.
- *Item 10: Any woman who scores (1, 2 or 3) on item ten **requires further evaluation** before discharge to ensure her own safety and that of her baby.

Instrument III: PATIENT HEALTH DEPRESSION SCALE (PHQ-9):

The (Patient Health Questionnaire -9) is the nine-item depression scale of the patient health questionnaire. It is developed by *Spitzer et al (2006) [30]* and translated into Arabic by the researcher. It is one of the most validated tools in the mental health and it is a powerful tool to assist the researcher with diagnosing postpartum depression and determine severity of postpartum depression. The scale can usually be completed in less than five minutes. The nine items of the Patient Health Questionnaire -9 are depend on the nine diagnostic criteria for major depressive disorder in the DSM-IV. The nine items cover the experience of pleasure, feeling down, sleep disruption, energy levels, appetite, feeling a self-failure, trouble concentrating, speaking slowly or being fidgety and having negative thoughts around suicide or self-harm over the previous two weeks. Cut-off scores ranged from four to twenty seven points; responses are scored (0, 1, 2, 3) according to the increased severity of the symptoms. The total score is determined by adding together the scores for each of the nine items.

Scoring system:

- **(0-4)**: None
- **(5-9)**: Mild
- **(10-14)**: Moderate
- **(15-19)**: Moderately severe
- **(20-27)**: Severe

Content validity and reliability:

The tools were developed by the researcher after extensive literature review and tested for content validity by a jury of five experts in obstetric and maternity nursing to reach consensus of the best form to be implemented. Modifications were carried out according to the panel judgment on clarity of sentences and appropriateness of the content. Test reliability of the proposed tools was tested by (*cronbach's alpha=0.84*), showed a strong significant positive correlation between the items of tools. Also, tools were assessed by applying the questionnaire on (10) women using test–retest reliability.

Pilot Study:

It was conducted on 10 % of the total participants according to the selection criteria. All women participated in the pilot study excluded from the study sample. Based on the results of the pilot study and expert's opinion, modifications and omissions of some details were done.

Ethical consideration

An official permission to carry out the study was obtained from the director of Al-Quwiyah general hospital after submitting an official letter from the Dean of the Applied Medical Science College, Shaqra University explaining the purposes of the study and methods of the data collection.

Procedure:

This study was carried out through *three consecutive phases*: interviewing & assessment phase, implementation phase and evaluation phase. Data was collected in six months from the start of December (2018) to the end of May (2019). The researcher were attended to the previous mentioned hospital three times per week.

Interviewing & assessment phase:

Postpartum women were interviewed in a private room in the workplace of the nursing professionals, the researcher introduced herself to each woman to give her trust. Explanation about the purpose and methods of the data collection was provided by the researcher to gain their consent. oral consent was obtained from each woman. The researcher collected demographic data, reproductive history. The researcher begin to investigate the mothers for postpartum depression before discharge from the hospital by using (EPDS).

Implementation phase:

The researcher investigate the mothers for postpartum depression after discharge from the hospital in home visit. Instructions given to the mothers before filing the scales: 1-The mother is asked to underline one of four possible responses that comes the closest to how she has been feeling the previous seven days. 2-All items must be completed. 3- Instruct the mothers to avoid discussing her answers with others. 4-The mother should complete the scales by herself. The researcher read the items of the scale for illiterate mothers.

Researcher consideration in the scoring system:

✓ **(0-9)** : Scores in this range may indicate the presence of some symptoms of distress that may be short-lived and are less likely to interfere with day to day ability to function at home or at work. However if these symptoms have persisted more than (a week or two) **further assessment is required**. (36) cases (18%) of the studied sample had mild depression, and they need follow up.

✓ **(10-12)**: Scores within this range indicate presence of symptoms of distress that may be discomforting. Repeat the (EPDS) in two weeks' time and continue monitoring progress regularly. If the scores increase to above twelve reassess and consider **referral** as needed. (27) cases (13.5%) of the studied sample had moderate depression and referral had been done for these cases.

✓ **(13 +)**: Scores above twelve require further assessment and appropriate management as the likelihood of depression is high. **Referral to a psychiatrist/psychologist** may be necessary. (45) cases (22.5%) of the studied sample had severe depression and referral had been done for these cases.

✓ ***Item 10**: Any woman who scores (1, 2 or 3) on item ten requires further evaluation before discharge to ensure her own safety and that of her baby. (1%) of the studied sample had suicidal thought and **referral** had been done for these cases (two cases).

Evaluation phase:

The researchers completed the collection of the data about postpartum depression by using Edinburg Postnatal Depression Scale and Patient Health Depression Scale at two, four, six, and eight weeks postpartum. The researcher also had been made electronic questionnaire and had been sent to the women by using tele-nursing communication to collect these data.

Statistical Analysis:

The collected data were scored, tabulated and analyzed using Statistical Package for the Social Science (SPSS) program version (23). Descriptive as well as parametric inferential statistics was utilized to analyze data pertinent to the study. Correlate bivariate Pearson test was used to analyze data. (Frequencies, means, and standard deviations) were calculated to describe the sample. chi-square test (X^2) was used to investigate the association between sunlight exposure and postpartum depression. Level of significance was set at **p-value <0.05**.

III. RESULTS

The result of the study is divided into two parts as the following:

Part 1: Demographic and reproductive history.

Part 2: Association between sunlight exposure and postpartum depression.

Part 1: Demographic, obstetrical data and reproductive history:

Table (1): Demographic characteristics of the studied sample (n=200).

Items	(N= 200)	
	Frequency	Percent%
Age:		
20-25 years.	25	12.5 %
26-30 years.	115	57.5 %
31-35 years.	30	15 %
36- 40 years.	20	10 %
41- 45years.	10	5 %
Mean \pmSD	26.5 \pm 5.7	
Educational level:		
Illiterate	5	2.5 %
Read &write	12	6 %
Secondary	54	27 %
University	127	63.5 %
Postgraduate	2	1 %
Women's occupation:		
Working	18	9 %
Not working	182	91 %
Women's Residence:		
Rural	49	24.5 %
Urban	151	75.5 %
Husband occupation:		
Worker	10	5 %
Employee	120	60 %
Teacher	23	11.5 %
Private work	44	22 %
Physician	3	1.5 %

Table (1): Showed that the demographic characteristics of the studied sample, which (57.5%) had aged from 26 to 30 years old of the studied sample. (63.5%) had university education of the studied sample and (9%) of women had working (while 91% were housewives). Also, (60%) of their husband occupation were employee. Regarding to residence (75.5%) were urban residence.

Figure (1): Distribution of age categories among the studied sample

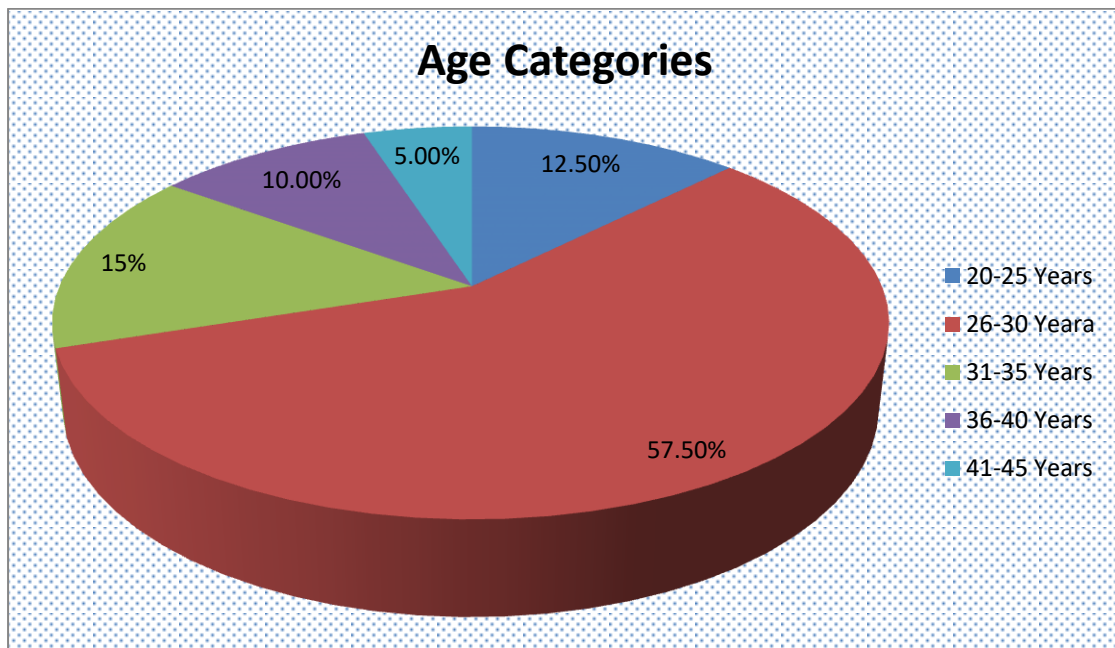


Figure (1): Distribution of age categories among the studied sample. It was found that More than half of them (57.5%) had aged from 26 to 30 years old of the studied sample

Figure (2): Distribution of working condition among the studied sample

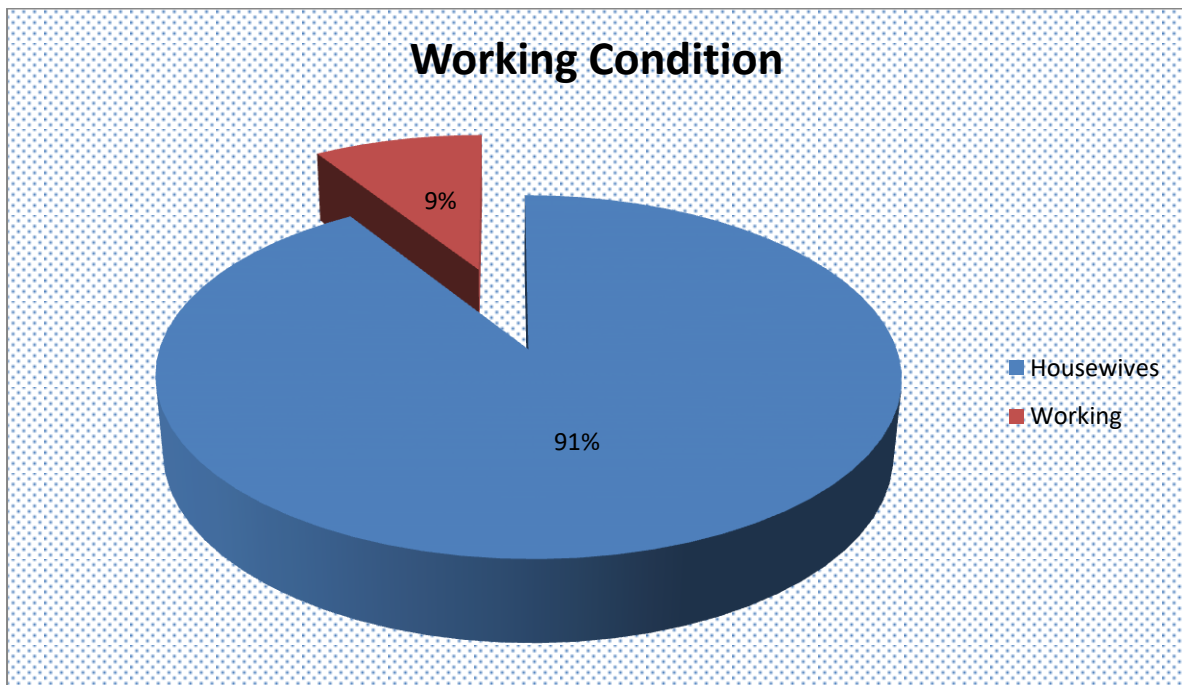


Figure (2): Clarified the distribution of working condition among the studied sample. It was found that (91%) were housewives and (9%) were working of the studied sample

Figure (3): Distribution of women's residence among the studied sample

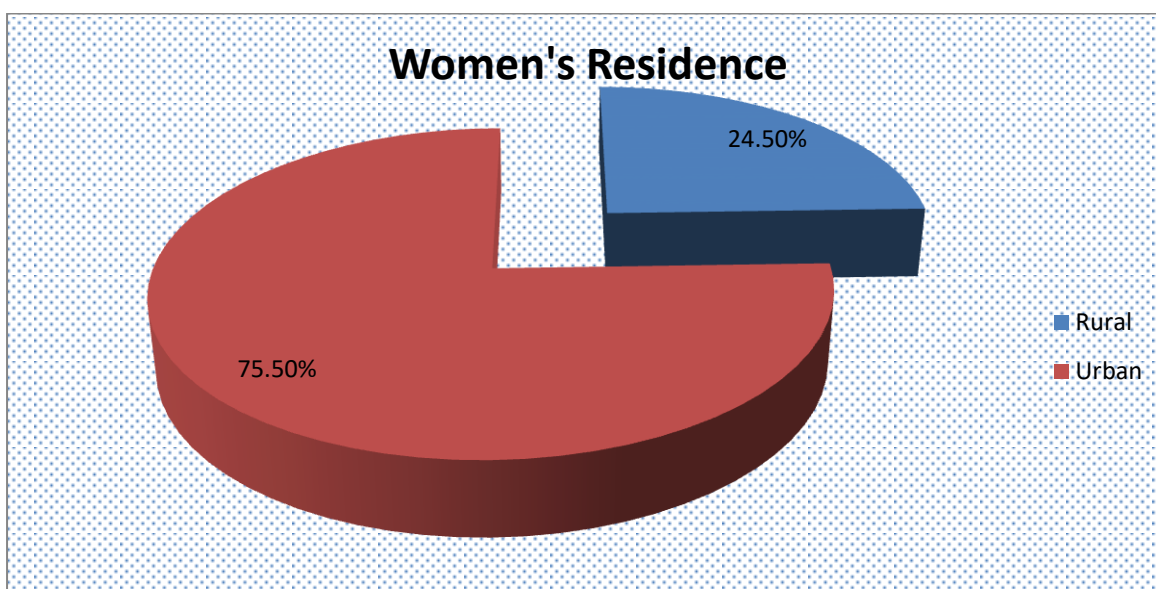


Figure (3): Clarified the distribution of women's residence among the studied sample. It was found that (75.5%) were urban residence of the studied sample

Table (2): Reproductive history of the studied sample (n=200).

Items	(N= 200)	
	Frequency	Percent%
Gravida		
2	37	18.5 %
3	85	42.5 %
4	27	13.5 %
5	27	13.5 %
>5	24	12 %
Para		
2	85	42.5 %
3	28	14 %
4	37	18.5 %
5	27	13.5 %
>5	23	11.5 %
No.of abortion		
None	105	52.5 %
1	52	26 %
2	15	7.5 %
3	14	7 %
>3	14	7 %
Type of delivery:		
Normal	110	55 %
Instrumental delivery	5	2.5 %
C.S	85	42.5 %

Table (2) Illustrated the obstetrical history of the studied sample, the most gravida were three with (42.5%) and the para two were with (42.5%). (47.5%) of the studied sample had history of abortion. The most type of delivery among women of the studied sample were normal vaginal delivery with (55%) , while cesarean section were (42.5%) and instrumental delivery with (2.5%) of the studied sample.

Figure (4): Distribution of the types of delivery among the studied sample

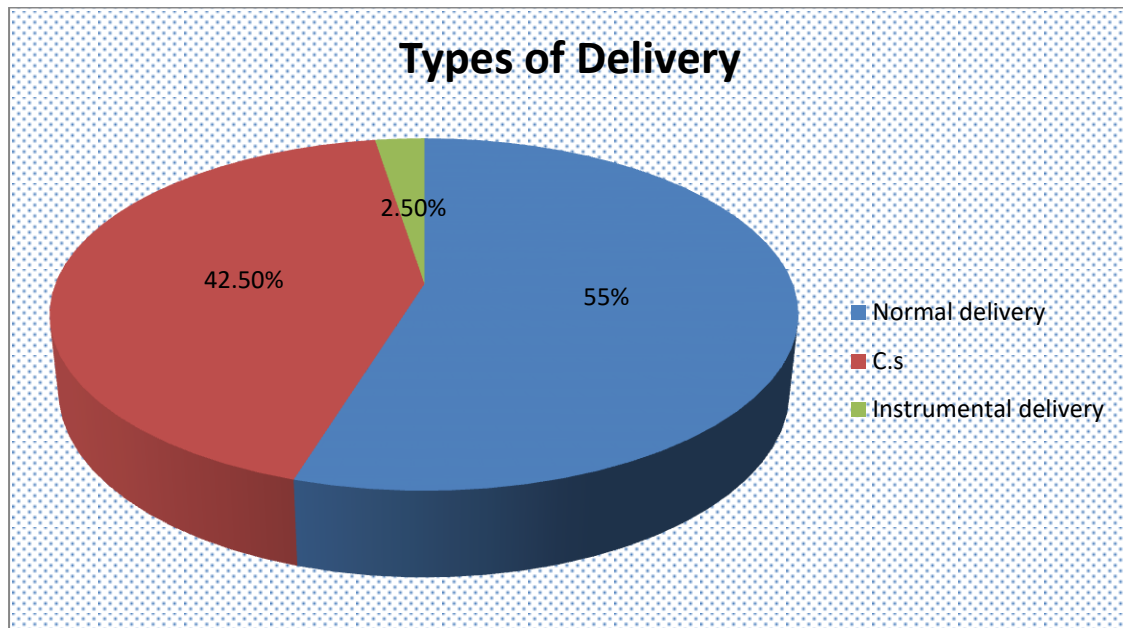


Figure (4): Clarified the distribution of the types of delivery among the studied sample. It was found that (55%) had normal deliveries, (42.5%) had cesarean section, and (2.5%) had instrumental delivery of the studied sample

Part 2: Association between sunlight exposure and postpartum depression

Figure (5): Distribution of the depression Score among mothers of the studied sample

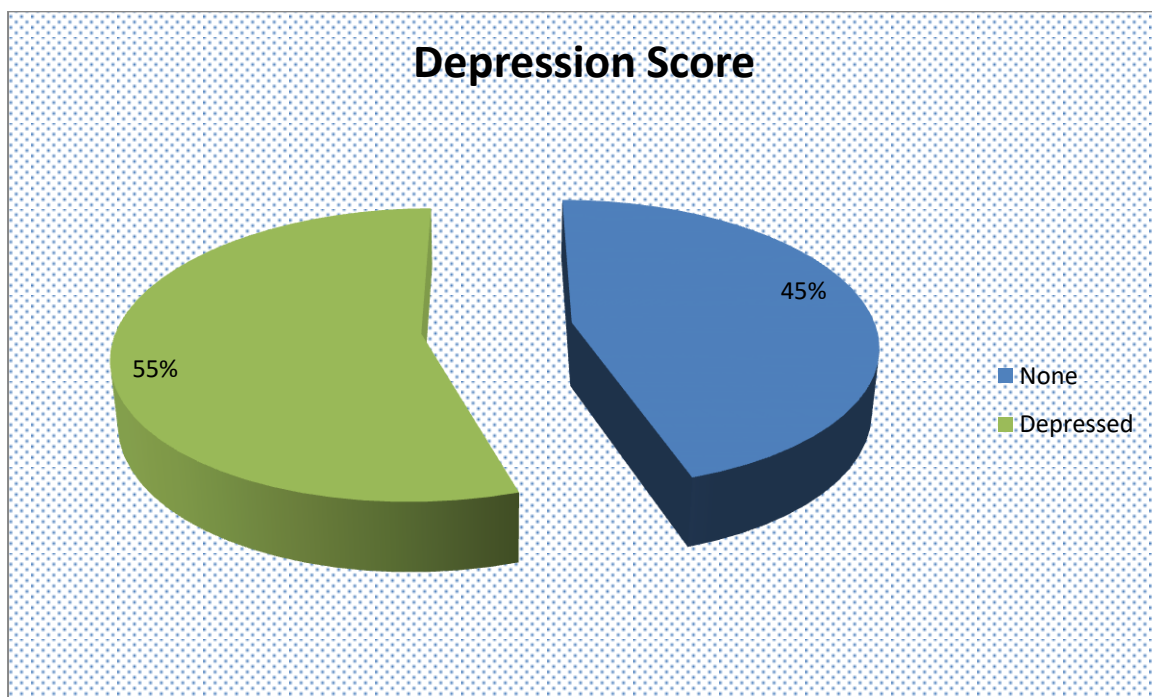


Figure (5): Showed the distribution of the depression score among mothers of the studied sample. It was found that (45%) none depression and (55%) had depression among the studied group.

Table (3): Depression severity among the studied sample (N= 200)

Depression severity	studied sample (n= 200)		X ²	P-value
	F	%		
- None	90	45	11.4	0.02*
- Mild	36	18		
- Moderate	27	13.5		
- Moderately severe	45	22.5		
- Severe	2	1		
Total	200	100		

* Statistically significant at p <0.05

Table (3): Indicated the depression severity among mothers of the studied sample. None with (45%), mild with (18%), moderate with (13.5%), moderately severe with (22.5%), and severe with (1%).

Figure (6): Distribution of the depression severity among mothers of the studied sample

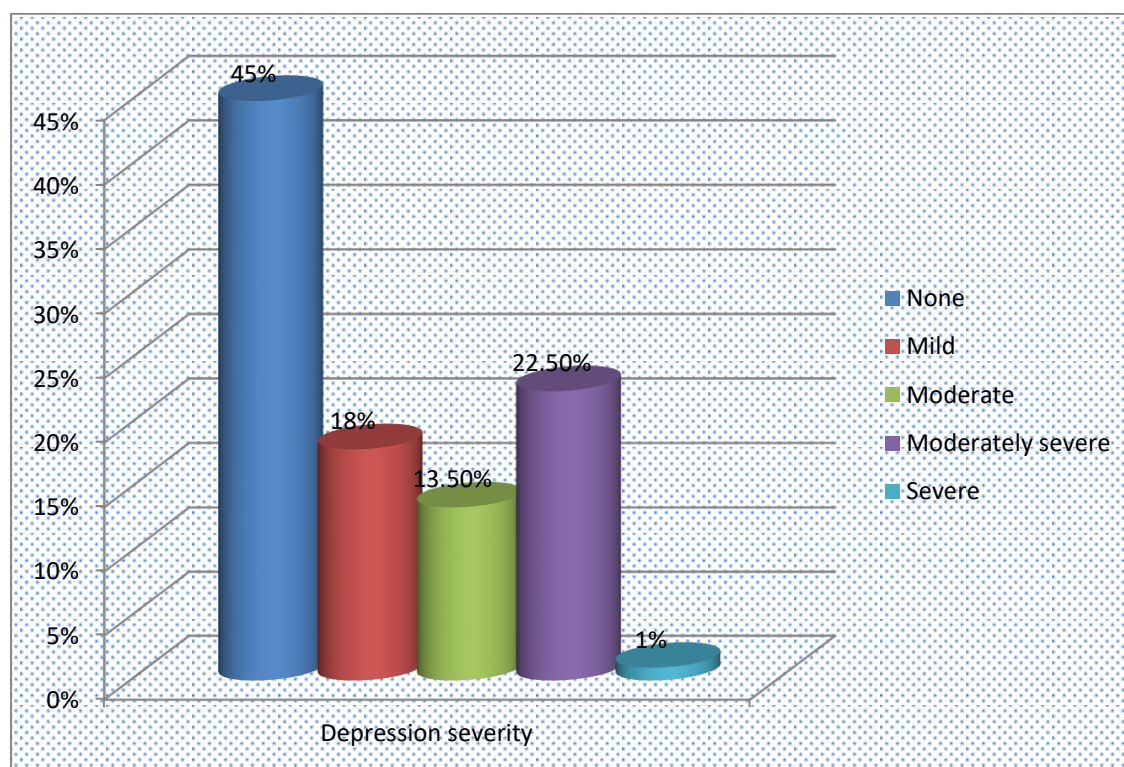


Figure (6): Showed the distribution of the depression severity among mothers of the studied sample. It was found that (22.5%) had moderately severe depression and (1%) had severe depression among the studied group.

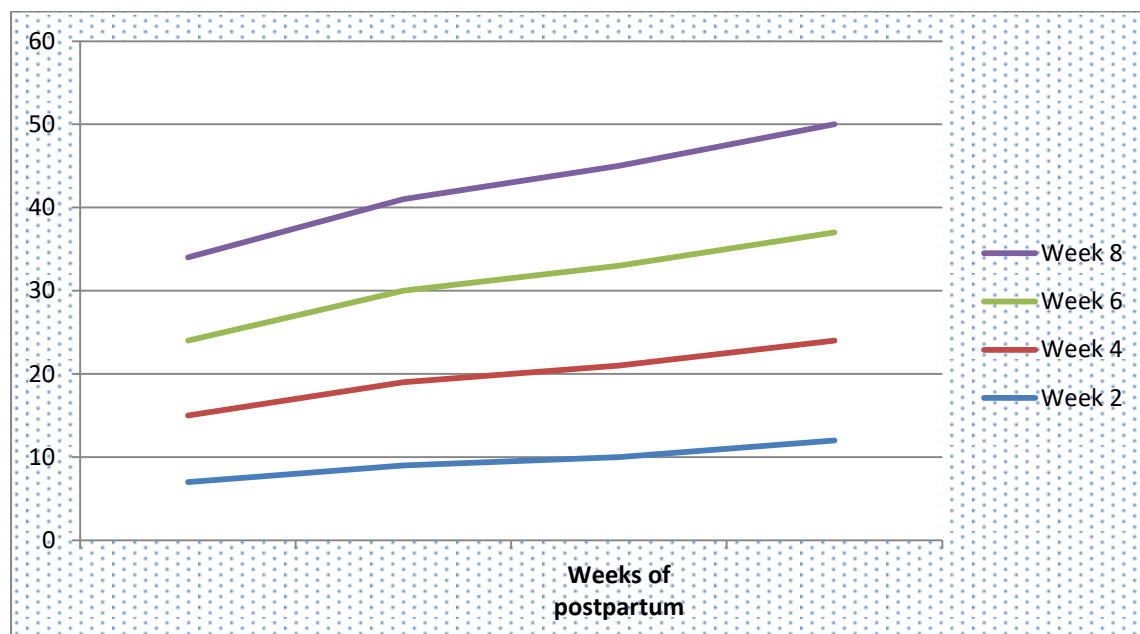
Figure (7): Distribution of the studied women according to their mean score of EPDS

Figure (7): Represented the distribution of the studied women according to their mean score of EPDS. It was found that increased the mean score of depression on EPDS with the increased weeks of postpartum.

IV. DISCUSSION

Postpartum period is the most risky time for psychological and mental disorders including sadness, depression and psychosis. Postpartum depression is the most common postpartum disorder that may disturb relationship of the mother with the newborn and family and in the absence of appropriate attention and treatment may have irreparable damages.[31] Therefore, the purpose of this study is investigating the relationship between sunlight exposure and postpartum depression among Saudi women in Al-Quwiyah city.

The study results showed that there were more than half (55%) of the mothers suffered postpartum depression, this findings in accordance with study of *Mohamed et al (2018)*, which concluded that the level of prevalence of postpartum depression among Saudi women in Majmaa city is (50.7%).[24] In addition, study of *Omar Al-Modayfer et al (2015)* concluded that (14%) of the Saudi women (from a group of 1200 women) experienced postpartum depression and recommended about the importance of screening of postpartum depression.[32] Finally, the study of *A Alharbi (2014)* estimated that from the (352) postpartum females, the prevalence of postpartum depression symptom risk was 117 (33.2%), and concluded that early detection for postpartum depression help clinicians in early intervention and management.[6]

The results of the present study showed that there was a statistically significant deference between the depression severity degree among the studied sample ($p < 0.05$) and the mean score of depression increased with the increased duration of the postpartum. This result in the same line with *Justin Thomas et al, (2017)* which illustrated that there was a relationship between sunlight exposure and postpartum depression among women in the United Arab Emirates and recommended that promoting awareness of the relationship between VTD deficiency and depression may be an incentive for people to adopt less sun-avoidant attitudes.[33]

On the same line study of *Lambert et al (2002)* showed that the turnover of serotonin by the brain was lowest in winter ($p=0.013$). Furthermore, the rate of production of serotonin by the brain was directly related to the prevailing duration of bright sunlight exposure ($r=0.294$, $p=0.010$), and rose rapidly with increased luminosity. The study recommended that further evidence for the notion that changes in release of serotonin by the brain underlie mood seasonality and seasonal affective disorder was needed.[25]

This study findings was in concordant with *Winkler et al (2006)* and *Srinivasan et al (2006)* which had shown that there was an association between serotonin and melatonin regulation and sunlight exposure. So, sunlight exposure can prevent postpartum depression by regulating the mood.[18,19] Also *Simon et al (2007)* had illustrated that sunlight exposure was a nonpharmacological method of increasing serotonin production and promote happiness and well-being for human health, it can protect against mental disorders by preventing negative mood.[20] Also, *Nathaniel (2008)* had reported that the best-known benefit of sunlight exposure was its ability to boost the body's vitamin D supply; most cases of vitamin D deficiency are due to lack of outdoor sun exposure, and vitamin D has a role in preventing postpartum depression.[21]

This study findings was in concordant with study of *Sue et al (2010)* which have examined whether light therapy improved mood by randomized (29) patients (16 with SAD and 13 controls) in a parallel fashion to either one hour or 15 minutes of light therapy in the morning for two weeks in the winter. *Sue* study concluded that one hour of light therapy daily significantly decreased depressive symptoms more so in the group with SAD than the control group ($p = .003$).[26]

The study findings showed that there were two cases of severe depression with suicidal thought (1%). This result supported by *Benjamin et al, (2014)* which suggested that the duration of sunshine influences suicide rates independent of seasonal rhythms. Besides, they show that sunshine has a bimodal effect on suicidal behavior as an increase in suicide was found in short time scales, while after longer periods more sunshine was associated with decreased suicide. *Benjamin* study recommended that further research is warranted to determine which patients with severe episodes of depression are most susceptible to the suicide-triggering effects of sunshine.[34]

V. CONCLUSION

Insufficient exposure to sunlight are important risk factor for postpartum depression. (55%) of mothers of the studied sample had experienced postpartum depression and (1%) had suicidal thought. There was a big association between sunlight exposure and postpartum depression among Saudi women in Al-Quwiyah city. This results also focusing on the importance of screening postpartum mothers for depression.

VI. RECOMMENDATIONS

The "results of the current study" emphasize the importance of early screening and detection of postpartum depression. Educational program for nurses about how to use Edinburgh Postpartum Depression Scale is very important. Edinburgh Postpartum Depression Scale should be in the routine care of the postpartum mothers. The nurses in the hospital and health centers should give counselling to the postpartum mothers about the importance of sunshine exposure for half an hour in midday every day to prevent postpartum depression.

List of abbreviations:

PPD: Postpartum Depression

WHO: World Health Organization

NIMH: National Institutes of Mental Health

DSM-IV: Diagnostic and Statistical Manual of Mental Disorders

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