

ORIGINAL CONTRIBUTION

Postpartum Depression and Quality of Life: A Path Analysis

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Purpose: The aim of this study was to model the relationship between risk factors of postpartum depression and quality of life in Iranian women. **Methods:** In this study, 306 women were included as a sample. The study tools of the Edinburgh Postpartum Depression Inventory included items such as socioeconomic characteristics, recent pregnancy history and outcome, and Quality of Life Questionnaire (SF-12). SPSS software was used for data analysis and a significance value of 0.05 was considered. **Results:** Most participants were homemakers with no instances of abortion, no stillbirth, no history of depression, no preterm delivery, no difficulties during pregnancy, no difficulties during delivery, no unplanned pregnancy, no smoking during pregnancy, had family support during pregnancy and after delivery, type of delivery was cesarean, had a healthy baby and satisfaction with neonatal sex, and never or rarely experienced partner violence. Their mean age, years of education, living arrangements, and breastfeeding of participants respectively were 29.73 ± 5.42 , 14.64 ± 1.96 , 1.09 ± 0.53 , and 5.61 ± 2.98 . The prevalence of postpartum depression was 5.6%. According to the path analysis, living arrangements with $\beta=0.73$ had the most direct effect and occupation with $\beta=0.69$ had the most indirect effect on postpartum depression. **Conclusions:** According to the path analysis model, postpartum depression is affected by many factors such as age, years of education, occupation, living arrangements, and quality of life.

BACKGROUND

For depression in the early postpartum period (variable defined, but typically starting in the first 8 weeks), symptom severity, heritability, and epigenetic data suggest that postpartum depression (PPD) may be present, whereas depression in the later postpartum period may be more like a major depressive disorder that occurs outside

the perinatal period [1]. Almost 10% to 20% of mothers suffer from PPD in the first year of postpartum of whom only 50% are diagnosed with apparent symptoms [2]. A meta-analysis from North America, Europe, Australia, and Japan showed a 13% occurrence of PPD symptoms in women worldwide [3,4]. Because PPD is one of the most common complications of childbirth, proper treatments must be applied to achieve optimal outcomes for mothers,

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Abbreviations: PPD, Postpartum Depression; QOL, quality of life; EPDS, Edinburgh Postnatal Depression Scale; SF-12, Quality of Life Questionnaire.

Keywords: Postpartum depression, Childbirth, Pregnancy, women, quality of life

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infants, and their families [5]. This condition may lead to chronic depression, interruption of mother-infant interaction, suicide, and in rare cases, infanticide [6]. Several lines of evidence suggest that PPD affects new mothers, infants, and their family relationships [7]. Some of the significant factors that are preconditions for PPD include smoking, lack of social support, low socioeconomic status, the complexity of childbirth, and having stress during pregnancy [8]. PPD is related to maternal harms and complications as well as poor responses to the infant's symptoms and adaptive behaviors, which ultimately lead to poor cognitive and emotional development in newborns [9,10]. Life quality is multi-dimensional and affects an individual in a myriad of ways: somatic, mental societal, and non-physical aspects of life, and can be influenced by politics, culture, economy, and beliefs [11]. In the course of PPD, women face a lot of biological, social, and emotional changes; therefore, during this period, women should pay attention to the impact of their quality of life (QOL). Assessing QOL in this course allows women to assess their postpartum status and help care providers to further improve the health of the puerperal women and infants [12]. In order to identify the relationship between risk factors and PPD, previous studies mainly used the methods of univariate factor and regression analysis [13]. Although some variables do not have a direct impact on PPD, there is an indirect impact through the intermediate pathway [8]. The relationship between PPD and related risk factors can be described with an existing theoretical and conceptual framework that can be used in epidemiological studies. This framework classifies the elements into three levels, namely proximal, intermediate, and distal [14-16] (Figure 1). Proximal causes include partner forcefulness and controlling behavior, intermediate causes cover both partners, and family causes include the role of a supportive family in the course of pregnancy and after delivery. Identifying the factors associated with stress and PPD is essential to designing effective interventions for mothers [17,18]. To this aim, we identify the relationship between PPD risk factors and identifying many potential risk factors by constructing a path model. This identifies how these factors affect PPD so that interventions can be made to help reduce the rate of PPD.

METHODOLOGY

Study Design and Participants

In 2018, a cross-sectional study was performed on 306 women who suffered from PPD. The response rate was 90%; the sample was gathered from women who vaccinate their children at the governmental health center in the northwest of Tehran, Iran and had medical records in our clinics. Informed consent was obtained from all

females who contributed to the study. The inclusion criteria were as follows: being 18-years-of-age or older and a postpartum period of at least 6 months (post-delivery depression is more evident during this period) [19]. The exclusion criteria were physical disability and psychological problems other than PPD.

Data Collection

The data were collected using the Edinburgh Postnatal Depression Scale (EPDS) [20] containing 10 items. Background characteristics of the participants in this questionnaire, include age, living arrangements (number of people living with the person), educational level (number of education in years), occupation (at home, out of home, homemaker), abortion, stillbirth, history of PPD, history of depression, unplanned pregnancy, smoking during pregnancy, family support during pregnancy (yes, no) and after delivery, type of delivery, intimate partner violence (1 – Never. 2 – Rarely. 3 – Sometimes. 4 – Often. 5 – Always), preterm delivery, difficulties during pregnancy, difficulties during delivery, neonatal health, number of breastfeeding times (usually 8 to 12 times in a 24-hour period) and satisfaction with neonatal sex (Are you happy with your baby being a girl or a boy?). The responses to 10 items were scored based on the Likert 4-point scale, ranging from 0-3, and the sum of scores was in the range of 0-30. Wan Mahmud et al. [21] indicated that the sensitivity and specificity of this scale are 100% and 98.18% at a cutoff score of 11/12, respectively. In another study, to confirm its validity, a cutoff score of 11.5 was recommended with a sensitivity of 72.7% and specificity of 92.6%. Mothers with a score of 12 or higher were identified as PPD [20]. Quality of Life Questionnaire (SF-12), as a shorter form of the QOL questionnaire, consisted of 36 questions that are widely used in various studies [22]. The 12th quality of life questionnaire was designed in 1996 by Ware and colleagues [23]. The questionnaire includes eight sub-scales, and since its values are low, its overall score is usually considered. The questionnaire examines life quality regarding the overall understanding of wellbeing (question 1), bodily function (question 2, 3), bodily health (question 4, 5), emotional problems (question 6, 7), bodily pain (question 8), societal function (question 9), liveliness and vital energy (question 11), and mental health (question 10, 12). Ware et al. [23] examined the validity and reliability of the life quality questionnaire. In order to score this questionnaire, numbers that appear next to each option indicates the score of each individual option. For example, in question 4, the option "Yes" will be scored 1, and the "Good" option will be scored 2. Questions 1, 8, 10, and 11 are also scored in reverse order. For instance, the score of 5 in the phrase number 1 is converted to 1, while the

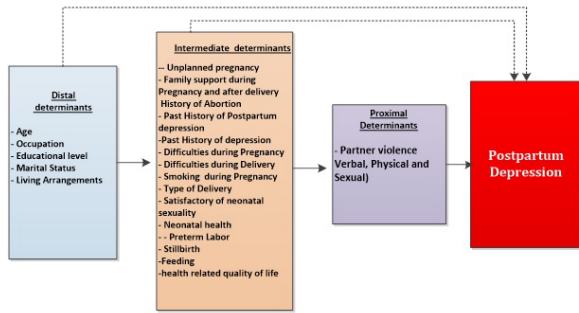


Figure 1. Conceptual framework illustrating the hierarchical model of risk factors for postpartum depression.

score of 1 in the same question is converted to 5. A high score indicates a higher QOL. After obtaining the values of each subject, the values are interpreted as follows; 12-24 poor, 25-36 moderate, 37-48 good. The subscales of mental and physical health were defined and calculated. Physical health is defined by complementary subscales of overall understanding of health, physical performance, physical health, and physical pain. Mental health is defined by emotional problems, social function, and vitality. The total score is obtained by summing all the scores of the questions.

Statistical Methods

In order to analyze the obtained data, SPSS software version 22 (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.) and Lisrel version 8.8 (LISREL 8.80 for Windows. Lincolnwood, IL: Scientific Software International, Inc.) were used with the application of the path analysis. The relationship between the dependent variables, post-delivery depression, and socio-demographic causes, along with a recent history of pregnancy was calculated with the Chi-square test. According to the cutoff point, a score of 1 represented a woman with PPD, and a score of 0 represents those without PPD. Also, a multiple linear regression model was performed to examine the association between the independent variables with the total mean score of PPD, dependent variables, overall QOL, and physical and mental health scores. Significance level for this study was $P < 0.05$.

RESULTS

In this study, the sample size was 306, and the

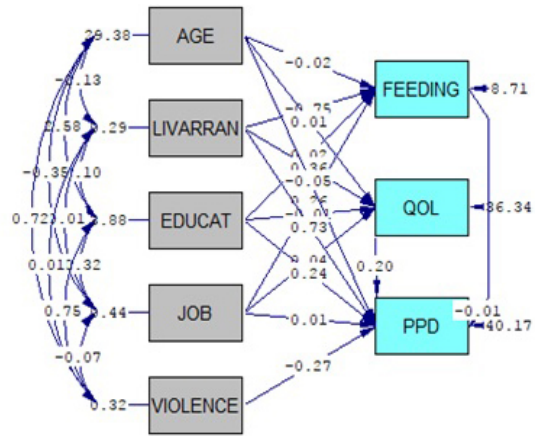


Figure 2. Full Empirical Model (Empirical Path Model) for effects of distal and intermediate determinants on postpartum depression).

mean age of participants was 29.73 ± 5.42 years. The demographic characteristics of the population studied are shown in Table 1, of which 5.6% had PPD at the time of study. QOL was divided into three categories: good, moderate, and poor. Among them, 55.6% had a good QOL, 40.8% moderate, and 3.6% poor. In our study, there was a significant correlation between PPD and QOL according to the Chi-square test ($p=0.011$). The rate of depression was lower in participants having a good QOL. Among the variables, there was a significant relationship between the total QOL and history of abortion ($p=0.011$), history of depression ($p=0.006$), family support ($p=0.04$), disease during pregnancy ($p=0.00$), the health of the infant ($p=0.012$), and satisfaction with the newborn sex ($p= 0.023$). The mean scores of the overall QOL for all women, as well as the physical and mental health, were 53.7, 54.5, and 52.9, respectively. The mean scores \pm standard deviation of the overall QOL, physical and mental health in women with PPD (34.76 ± 6.75 , 14.58 ± 2.55 , and 15.23 ± 2.99 , respectively) were significantly lower ($p < 0.0001$ for each) than those without PPD (36.23 ± 5.98 , 15.02 ± 2.47 , and 16.6 ± 2.79 , respectively) in the period of study. In addition, according to Pearson's correlation coefficient, there was an inverse linear medium correlation ($p < 0.0001$ for each variable) between the total score of PPD and the overall QOL, as well as the physical and mental health (correlation coefficient (r) = -0.490, -0.348, and -0.466, respectively). The correlation of PPD with the background variables is displayed in Table 2. The results demonstrated a significant ($p < 0.05$) correlation of PPD with a history of PPD, history of depression, unplanned pregnancy, and partner violence. The results of the multiple linear regression model showed that a one-unit increase in the mean score of PPD led to a significant decrease in the overall QOL, physical health domain

Table 1. Distribution of the women' baseline demographic characteristics (n=306).

	N	%
Occupation		
At home	30	9.8
Out of home	113	36.9
Homemaker	163	53.3
Partner violence		
Never	149	48.7
Rarely	146	47.7
Sometimes	11	3.6
Abortion		
Yes	69	22.5
No	237	77.5
Stillbirth		
Yes	5	1.6
No	301	98.4
History of postpartum depression		
Yes	23	7.5
No	283	92.5
History of depression		
Yes	49	16.0
No	257	84.0
Unplanned pregnancy		
Yes	91	29.7
No	215	70.3
Smoking during pregnancy		
Yes	29	9.5
No	277	90.5
Family support during pregnancy and after delivery		
Yes	274	89.5
No	32	10.5
Type of delivery		
NVD	80	26.1
Cesarean	226	73.9
Preterm delivery		
Yes	26	8.5
No	280	91.5
Difficulties during pregnancy		
Yes	49	16.0
No	257	84.0
Difficulties during delivery		
Yes	24	7.8
No	282	92.2

Neonatal health		
Yes	279	91.2
No	27	8.8
Satisfaction with neonatal sex		
Yes	295	96.4
No	11	3.6
Age	29.73±5.42	
Years of education	14.64±1.96	
Living arrangements	1.09±0.53	
Breastfeeding	5.61±2.98	

scores, and mental health domain scores by 1.14, 1.30, 1.42, respectively. Regression analysis was used to determine which variable has a significant relationship with dependent variables in the theoretical framework. For the path analysis, first, the bivariate analysis was applied, and the correlations between variables were assessed. The results demonstrated that PPD was positively correlated with partner violence and occupation, whereas PPD was negatively correlated with years of education, age, living arrangements, breastfeeding, and QOL. This means that people who have experienced more partner violence and have had the occupation of homemaker are more likely to experience PPD. At the same time, people with higher education, lower age, living with more people, more breastfeeding, and better QOL, experience less PPD. In the path analysis method, first, the effects of variables (partner violence, QOL, living arrangements, occupation, years of education, age) on PPD were examined. The model was fitted, and its indicators shows high fitness and suitability and that a rational relationship among the variables was based on the conceptual model. Accordingly, there was no significant difference between the fitted and conceptual models (Table 3). According to the path diagram (shown in Figure 2, Empirical Path Model for Effects of distal and intermediate determinants on PPD) in direct paths, living arrangement ($\beta=0.73$) and in indirect paths, occupation ($\beta=0.69$) had the most effects on PPD. Partner violence ($\beta=-0.27$), QOL ($\beta=0.20$), and breastfeeding ($\beta=-0.01$) affected PPD only through one direct path. Age has a negative direct effect ($\beta=-0.05$) and positive indirect effect on PPD by affecting the parameters of QOL and breastfeeding ($\beta=0.20$). The living arrangement can directly and indirectly affect positively on PPD through QOL and breastfeeding ($\beta=0.53$). In this model, 0.14% of PPD parameter variance is explained by the parameters affecting Table 4. It shows the direct, indirect, and the overall effects of parameters influencing the risk of PPD (Table 4) and shows path coefficients for QOL and background factors.

DISCUSSION

The prevalence of PPD in this study was 5.6%. The literature review showed wide diversity in the prevalence of PPD. For example, Alasoom and Koura indicated that the prevalence of PPD is in a range of 0.5%-60% in Asian countries [24]. In Asian countries, Malaysia and Pakistan have the lowest and highest prevalence of PPD (3.5% and 63.3%), respectively [25]. The prevalence of PPD in low-income countries varies, ranging from 4.9% to 12.4% and even reaches 59.4% [26]. In some studies, the prevalence of PPD was reported to be in a range of 3.3% to 58.8% [3,11,26-30]. Such variations in the prevalence of PPD may be due to time-shift difference and the methods used, as well as the discrepancies between the population of women studied in terms of economic, social, family, and fertility, or other variables [31]. Therefore, it is necessary to use the path analysis model to determine the multiple determinants of PPD. In this study, using path analysis, we tried to have a strong theoretical relationship between research and practice. As a result of the study, educational years has both direct and indirect effect on PPD through the QOL and breastfeeding. As a result of the study of Abdul Rahman et al. (2021), it has been observed that the rate of breastfeeding is lower in mothers with higher education and this is more related to socio-economic factors than women's lack of awareness [32]. In low- and middle-income countries, breastfeeding is more common among low-educated women than highly educated women [33]. Regarding the QOL, a higher level of education will lead to a better QOL and ultimately less PPD. Al-Hamdan et al. [11] showed an inverse relationship between education level and PPD. These findings were in line with the results of some countries, such as Lebanon [34], Italy [35], and Iran [36]. Contrary to these results, Iranfar et al. (2005) in their study concluded that there is no relationship between income, level of education, or employment and unwanted pregnancy, or PPD [37]. In some studies, other risk factors were ascribed to the risk of PPD in mothers, including maternal age, lower

Table 2. Comparisons of baseline characteristics between groups of non-postpartum depression and postpartum depression.

Variables		Women without PPD	Women with PPD	P. value
		n%	n%	0.771
Occupation	At home	29(96.7)	1(3.3)	0.798
	Out of home	104(92.0)	9(8.0)	
	Homemaker	156(95.7)	7(4.3)	
Partner violence	Never	15(10.1)	134(89.9)	0.206
	Rarely	8(5.5)	138(94.5)	
	Sometimes	0(0.0)	11(100.0)	
Abortion	Yes	61(88.4)	8(11.6)	0.441
	No	228(96.2)	9(3.8)	
Stillbirth	Yes	5(100.0)	0(0.0)	1.00
	No	284(94.4)	17(5.6)	
History of postpartum depression	Yes	23(100.0)	0(0.0)	0.04*
	No	266(94.0)	17(6.0)	
History of depression	Yes	45(91.8)	4(8.2)	0.022*
	No	244(94.9)	13(5.1)	
Unplanned pregnancy	Yes	200(93.0)	15(7.0)	0.032*
	No	89(97.8)	2(2.2)	
Smoking during pregnancy	Yes	27(93.1)	2(6.9)	0.493
	No	262(94.6)	15(5.4)	
Family support during pregnancy and after delivery	Yes	257(93.8)	17(6.2)	0.233
	No	32(100.0)	0(0.0)	
Type of delivery	NVD	79(98.8)	1(1.3)	0.266
	Cesarean	210(92.9)	16(7.1)	
Preterm delivery	Yes	25(96.2)	1(3.8)	0.566
	No	264(94.3)	16(5.7)	
Disease during pregnancy	Yes	46(93.9)	3(6.1)	0.742
	No	243(94.6)	14(5.4)	
Difficulties during delivery	Yes	24(100.0)	0(0.0)	0.379
	No	265(94.0)	17(6.0)	
Neonatal health	Yes	25(92.6)	2(7.4)	0.653
	No	264(94.6)	15(5.4)	
Satisfaction with neonatal sex	Yes	278(94.2)	17(5.8)	1.00
	No	11(100.0)	0(0.0)	
Age		29.75±5.41	29.47±5.64	0.836
Years of education		14.64±1.97	14.58±1.97	0.911
Living arrangements		1.17±0.72	1.09±0.52	0.534
Breastfeeding		6.58±3.06	5.56±2.97	0.168

Table 3. Goodness of fit indices for the model, N=306.

Model index	X2	df	p	GFI	CFI	RMSEA
	26.86	3	0.63	0.94	0.89	0.00

Table 4. Path Coefficients for quality of life and background factors on postpartum depression.

Predictor variables	Effects			Model coefficients	t-value	R2	Errorvar
	direct	indirect	total				
Partner violence	-0.27	-	-0.27		-0.27	0.14	40.17
Breastfeeding	-0.01	-	-0.01	-0.07	-0.07		
Quality of life	0.20	-	0.20	0.20	3.37		
Age ^a	-0.05	0.20	0.15	-0.04	-0.64		
Years of education ^a	0.24	0.20	0.44	0.24	0.94		
Living arrangements	0.73	-0.20	0.53	0.73	1.03		
Occupation	0.01	0.69	0.70	0.014	0.01		

^aNo significance

level of education, smoking during pregnancy, depression history, inadequate marriage status, poor family status, negative life events, lack of social support, PPD, and anxiety [8]. In our study, QOL had direct effects on PPD. The relationship among the physical health domain, mental health domain, QOL, and PPD was determined. The correlation of PPD with QOL and physical and mental health domains was a finding found in a study performed by Alhamdan et al. (2017) study, which is consistent with the results of previous studies [11]. Poor QOL of mothers, especially during the postpartum period, has serious health and maternal consequences for them and their newborns. In our study, partner violence had a direct effect on PPD. The association between partner violence and PPD has been poorly understood [27]. One of the neglected issues in Iranian public health is intimate partner violence [38]. Coker et al. (2000) also demonstrated the prevalence of intimate partner violence and characterized its type and timing. They also evaluated the association of physical assault, sexual assault, battering, and emotional abuse with PPD [39]. In our study, 96.4% of cases experienced violence never or rarely. This is possibly due to perceptions about what constitutes intimate partner violence; verbal violence could be considered abuse, but sexual violence by a spouse might not. In clinical studies, the prevalence of partner violence has been estimated to be between 4% and 44% last year [40]. According to the literature, partner violence usually occurs before or during pregnancy, not after childbirth [27]. The impact of partner violence on pregnancy-related depression has been studied in a limited number of recent studies, as some investigations indicate PPD could be an outcome of this behavior [41]. Various studies have shown that the risk of PPD

is increased in women who have been subjected to sexual and physical violence [42]. In the present study, according to the bivariate analysis and in contrast to the results obtained by Budathoki et al., a significant association was found between partner violence and PPD [43]. Several lines of evidence indicated the significance of intimate partner violence on health and wellbeing. The factors that are directly and indirectly associated with PPD may pave the way to diagnose and treat PPD in women [44]. Our study showed that living arrangements had direct and indirect effects (through QOL and breastfeeding) on PPD. In fact, these women are likely to have better family support, better QOL, and more breastfeeding, and are less likely to suffer from PPD. Occupation had direct and indirect effects by QOL and breastfeeding on PPD. In fact, maternal occupation can affect the conditions of pregnancy and childbirth due to depression, caused by various factors, such as the type of occupation and working conditions. Having to work for long-durations, having difficult and stressful duties, standing up for long periods, and heavy physical work are considered the most common adverse effects of maternal occupation on pregnancy outcomes, such as preterm delivery and low-birthweight, as well as from neonatal mortality [45]. A previous study in Nepal showed a reverse correlation between the consequences of low-income, depression, low maternal care, and social status [46]. According to a study performed by Ahmed et al., marital status, education, and occupation are directly related to the development of PPD [47]. Similar to many Asian countries, women in Malaysia, regardless of their out-of-home employment, have primary responsibility for caring for children as well as housekeeping [15]. Miyake et al. (2011) demonstrated that employment status,

especially full-time work and professional or technical occupations, may decrease the risk of PPD [48]. According to a study conducted by Lanes et al., maternal stress during pregnancy, the availability of postnatal support, and pre-depression diagnosis were among the most significant factors associated with the development of PPD [49]. There is a significant relationship between breastfeeding and the QOL related among pregnant women. Increasing symptoms of anxiety and depression will stop breastfeeding before and within 6 months of childbirth [50].

One of the limitations of the research is the small size of the research sample and conducting it in a medical center as well as the easy sampling method, which is difficult to generalize with the findings. Other limitations of the present study are the lack of a history of stressful events, the presence or absence of social support, and the feeling of inability to care for a child in the study population. PPD, which has been reported in various studies, needs to be further studied in the prenatal and postnatal period.

CONCLUSION

The prevalence of PPD was reported to be low in this study. Even in a normal pregnancy and childbirth, women undergo significant changes that reduce their QOL. When large problems such as pregnancy complications and childbirth or depression are added to this cycle, the quality level of women's lives decrease. QOL plays an important role in women's mental health during pregnancy and after childbirth. Therefore, women can improve their quality of life and reduce the psychological effects of pregnancy and after by changing their lifestyle and have a very good experience of this period. Variables associated with PPD symptoms can be targeted for screening and preventive interventions. In Iran, further research, especially qualitative studies, are required to explore the PPD-related cultural variables. Potential risk factors and symptoms of depression during pregnancy and postpartum should be timely diagnosed to prevent the development of PPD-related complications in women.

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