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Advances in Bioresearch

ORIGINAL ARTICLE

Maternal General Health Status during Pregnancy and Adverse Birth Outcomes: Exposure Outcome in a Prospective Study

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ABSTRACT
The prevalence of LBW is varies among different regions and countries, so that 95% of LBW occurs in Low and Middle Income Countries (LMICs), especially in vulnerable populations, studies have investigated the effect of psychosocial factors such as; mental health, anxiety and depression on the perinatal outcomes in developing countries. Therefore, in this study we evaluated the maternal health situation and its association with adverse pregnancy complications. A Prospective cohort study was conducted in nine health center and health stations during March 2014 to Jun 2015 in Tehran city. 532 pregnant women who are interested to participating in the study were selected. In order general health questionnaire was used with 28 questions (GHQ-28), to measure the health status of pregnant mothers. In each center health centers midwife specialists, extracted lists of pregnant women in the period of 1 to 3 months of pregnancy. The data collected, entered in the Stata-V11 statistical software. Mean age of mothers was 29.3 years, Frequency of LBW and PTB in <19, 20-35, 35< age groups was 8.33, 7.84, 8.33 and 16.67, 3.81, 8.33 respectively. Risk of preterm birth in pregnant women with mild, moderate and severe symptoms of General health problems against normal pregnant women, in three innings was; RR=2.84, RR=2.40, RR=2.72 respectively, Risk of low birth weight in pregnant women with mild, moderate and severe symptoms of General health problems against normal pregnant women, in three innings was; RR=2.02, RR=1.82, RR=2.63 respectively. In this study, crude odds ratio for the relationship between low birth weight and premature birth in pregnant women with general health status were significant, however LBW association with maternal health status is ambiguous, but the PTB can be said that there is a positive correlation. Considering the result of previous studies and our estimates in this study seems to maternal health status during pregnancy is a risk factor for adverse outcomes and it is suggested that to improve maternal health during pregnancy be given more importance.
Keywords: *low birth weight, preterm birth, pregnancy outcomes, general health, epidemiology*

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INTRODUCTION

Reduction 30% of the low birth weight infants by 2025 is one of the goals of World Health Organization. Epidemiological studies have shown that 15 to 20 percent of the world's newborns were born underweight. Low birth weight (LBW) is defined as weighing less than 2500 grams [1]. Besides the fact that the probability of death at 28 days of age in these neonates is very high, children who have been LBW is likely to at adulthood with problems such as type II diabetes or heart problems will be encountered(2). The prevalence of LBW is varies among different regions and countries, so that 95% of LBW occurs in Low and Middle Income Countries (LMICs), especially in vulnerable populations [3, 4]. Studies have shown that such babies if survive, later in their lives with many medical problems such as hypernatremia, hypo-glycaemia, polycythemia, hyper-viscosity, hypertension, arteriosclerosis and evolutionary-neurological disabilities will be facing long-term(5, 6).Several studies stated the prevalence of LBW in Iran is between 4.7 to 11.8% [7-9]. Risk factors for LBW, although it may differ between populations. However, in several studies, pre-pregnancy height and weight, weight gain during pregnancy, smoking, alcohol consumption, socioeconomic status, Parity, occupation and the interval between births, Have a significant relationship with LBW and other adverse effects [6, 8, 10-12]. Also, LBW may be linked to preterm delivery and fetal growth in the womb, this causes to be small baby than gestational age, a term infants between weeks 37 to 42 of pregnancy and premature infants before 37 weeks of pregnancy will

be born [5]. However, fewer studies have investigated the effect of psychosocial factors such as; mental health, anxiety and depression on the perinatal outcomes indeveloping countries.Some studies have shown that maternal mental health, depression and stress during pregnancy may affect the IUGR and LBW [13-15]. In a study the risk of LBW for women's in low-income countries that are involved stressors, 2 to 3.8 times forecast(16).In a cohort study,Brittain and colleagues [10] reported that 21% of South Africa mothers were depressed and this has had a strong connection with LBW. However, other studies found no association between mental health status during pregnant and LBW and other adverse effects during pregnancy [17-20].

Therefore, the results have been inconsistent so far, and recent studies systematic review was not find as certain trends of the results and suggested more studies to be done [21].Considering that today social support, education for pregnant mothers and improving quality of services among the major international debates on midwifery and reproductive health care.The main goal of improving quality of services is; protecting the rights of women, more encouraging people who need to go and receive care and enhance the effectiveness of provided care [1, 22].Therefore, in this study we evaluated the maternal health situation and its association with adverse pregnancy complications.

MATERIAL AND METHODS

Study population

A Prospective cohort study was conducted in nine health center and health stations during March 2014 to Jun 2015 in Tehran city. In Iran, pregnant women in health centers and health stations received pregnancy services. Each pregnant woman has a Health Record that mother demographic information's, ultrasonography and pregnancy where there registered. According to the latest revised edition of the integrated guidelines for care of pregnant women, that organized by the Ministry of Health and Medical Education Iran, the caring offered in 8 times during pregnancy (2 visitation in the first half and 6 visitation in the second half).

Pregnancy meeting times including; Week 6 to 10, Week 16 to 20, Week 24 to 30, Week 31 to 34, Week 35 to 37, Week 38, Week 39 and Week 40 [23].

Eligibility Criteria

575 pregnant women who were in the first to third months (first and second care) of their pregnancy were included.

Pregnant women who were

1- Ultrasonography to detect abnormalities or abortion (1 case)
2- pregnancy by using contraception (6 cases)
3- Breastfeeding, pregnancy at the same time (1 case)
4- Special Diseases (anemia, cardiovascular diseases, parasitic diseases, kidney disease, gastrointestinal disease and addiction), (11 cases)

At the beginning or during the study, and pregnant woman'swho did not desire to participate in the study (24 cases) were excluded, finally by Applying the criteria of the study, 532 pregnant women who are interested to participating in the study were selected. The questionnaires have been informed consent (including the objectives of the study and confidentiality of information's).

It is worth mentioning, all pregnant women delivery information's who were covered by a health center, in case of childbirth in hospital results will be announced to the health center. And recently the information system is being launched for pregnancy and childbirth that can be followed online by health centers. Therefore delivery results of pregnant women who delivered in hospital can be Accessible.

General health status of pregnant women

In order general health questionnaire was used with 28 questions (GHQ-28), to measure the health status of pregnant mothers. This questionnaire was published in 1970 by Goldberg *et al* [24] and has been used in different contexts and cultures [25-27].Persian version for this questionnaire in 2006 by Malakouti and colleagues [28] were validated.

The questionnaire consisted of four scales and each scale has 7 questions.

1. Somatic symptoms
2. Anxiety symptoms and sleep disturbances
3. Social functioning
4. Depressive symptoms

Four-point Likert-scale (1. less than usual 2. in usual 3.rather more than usual4.more than usual) was used for scoring. Zero Score (for first point) to 3 (for fourth point) for each question was considered. At every scale from 6 to above score and total score above 22 indicates signs of danger. Cut-off points in each scale (Mild 23-40 Medium 41-60 severe 61-84) were determined.

Confounding factors

In present study, confounding factors were defined as follows: age (age given in the records of pregnant mother<19 20-35 35<), Job (housewife Employee Self-employment), BMT (<18.5 18.5 24.525-29.9 30<), Smoking (nonsmoker - smoker, the mother who consume; one to nine cigarettes per day, more than 10 cigarettes), Alcohol consumption (use 1 or more than 1 time per week, so that occur the effects of alcohol consumption in pregnant women),Gravida (number of previous pregnancies plus the present pregnancy), parity (number of previous deliveries).

Study design

The prospective multicenter study was conducted and in each center health centers midwife specialists, extracted lists of pregnant women in the period of 1 to 3 months of pregnancy. It should be noted that in this study to get better results questioners were the midwives employed in health centers.In these circumstances we had the lowest Missing, because to pregnant mothers the midwives were dependable and easier and more honest responded to questions. Maternal demographic characteristics, including age, Gravida, parity, number of abortions, distance from the last delivery, BMI, smoking, alcohol consumption were obtained from the records. Pregnant women completed the PHQ-28questionnaires during the week 6 to week 10 and week 20 to week 24 and week 36,Scores overall and in subgroups examined. All three times the questionnaire presented by the midwife expert in the same center to pregnant women, and then was collected by the researcher.

Data analysis

The data collected, entered in the Stata-V11 statistical software, adjusted odds ratio for variables influencing fetal outcomes, including possible confounding factors on the fetus were calculated using logistic regression models. PHQ scores in two categories; at risk (mild to severe) and normal were classified, and Risk Ratio indicator was calculated to determine its relationship with LBW and Prematurity.

RESULTS

Mean age of mothers was 29.3 years, 88.72% of mothers were in the 20 to 35 years age group. Frequency of LBW and PTB in <19, 20-35, 35< age groups was 8.33, 7.84, 8.33 and 16.67, 3.81, 8.33 respectively. 16.67% of women who ever three times have been pregnant, their infants were LBW. As well as 9.09% and 18.18% of mothers who reported a history of previous miscarriage, their infants were LBW and PTB [preterm birth] respectively.In Table 1: other variable frequencies for the two outcomes are investigated.

Table1: Effective Characters of LBW and Prematurity

Variables	LBW				Prematurity			
	Yes		No		Yes		No	
	N	%	N	%	N	%	N	%
Age								
<19	2	8.33	22	91.67	4	16.67	20	83.33
20-35	37	7.84	435	92.16	18	3.81	454	96.19
35<	3	8.33	33	91.67	3	8.33	33	91.67
Job								
Housewife	10	5.68	166	94.32	8	4.55	168	95.45
Employee	19	8.26	211	91.74	9	3.91	221	96.09
Self-Employment	10	9.71	93	90.29	7	6.80	96	93.20
Pregnancy Times								
1	30	8.24	334	91.76	15	4.12	349	95.88
2	7	5.43	122	94.57	7	5.43	122	94.57
3	5	16.67	25	83.33	2	6.67	28	93.33
4	-	-	6	-	1	16.67	5	83.33
5	-	-	3	-	-	-	3	-
Delivery Times								
0	31	8.42	337	91.58	16	4.35	352	95.65
1	6	4.76	120	95.24	6	4.76	120	95.24
2	5	15.15	28	84.85	3	9.09	30	90.91
3	-	-	2	-	-	-	2	-
4	-	-	3	-	-	-	3	-
Abortion								
0	41	7.87	480	92.13	23	4.41	498	95.59
1	1	9.09	10	90.91	2	18.18	9	81.82
Delivery Distance								
<3	2	25	6	75	2	25	6	75
3≤	9	5.81	146	94.19	8	5.16	147	94.84

BMI								
<18.5	1	50	1	50	-	-	2	-
18.5-24.9	28	8.46	303	91.54	20	6.04	311	93.96
25-29.9	13	6.84	177	93.16	5	2.63	185	97.37
30+	-	-	5	-	-	-	5	-
Smoking								
Non Smoking	34	7.34	429	92.66	21	4.54	442	95.46
1-9 Cigarettes	4	11.11	32	88.89	2	5.56	34	94.44
10 Cigarettes≤	1	16.67	5	83.33	1	16.67	5	83.33
Alcohol								
No Drink	37	7.55	453	92.45	24	4.90	466	95.10
1 Time	2	10.53	17	89.47	1	5.26	18	94.74
1 Time<	-	-	2	-	-	-	2	-
PHQ								
<23	30	6.76	414	93.24	16	3.60	428	96.40
≥23	12	13.67	76	86.36	9	10.23	79	89.77
PHQ2								
<23	29	6.86	394	93.14	16	3.78	407	96.22
≥23	11	12.50	77	87.50	8	9.09	80	90.91
PHQ3								
<23	22	5.66	367	94.34	13	3.34	376	96.66
≥23	18	14.88	103	85.12	11	9.09	110	90.91

Table 2 shows the relationship between general health status of pregnant women in three stages of prenatal care and LBW. The risk of low birth weight in pregnant women with mild, moderate and severe symptoms of General health problems(PHQ score ≥23)against normal pregnant women (PHQ score <23), in three innings was; RR=2.02, RR=1.82, RR=2.63 respectively. In the first innings (P = 0.03) and third (P = 0.001) this difference was significant.

On average 50%, 45% and 62% of the incidence of LBW in women with mild to severe symptoms of PHQ, due to General health problems (somatic symptoms, anxiety, sleep disturbances, social functioning and depression,)respectively.

Table2: Unadjusted effect of PHQ-Score on LBW

```
. cs LBW PHQ_p
```

	PHQ_p Exposed	Unexposed	Total	
Cases	12	30	42	
Noncases	76	414	490	
Total	88	444	532	
Risk	.1363636	.0675676	.0789474	
	Point estimate		[95% Conf.	Interval]
Risk difference	.0687961		-.0066097	.1442019
Risk ratio	2.018182		1.075751	3.786247
Attr. frac. ex.	.5045045		.0704166	.7358862
Attr. frac. pop	.1441441			

chi2(1) = 4.78 Pr>chi2 = 0.0288

```
. cs LBW PHQ2_p
```

	PHQ2_p Exposed	Unexposed	Total	
Cases	11	29	40	
Noncases	77	394	471	
Total	88	423	511	
Risk	.125	.0685579	.0782779	
	Point estimate		[95% Conf.	Interval]
Risk difference	.0564421		-.0167321	.1296163
Risk ratio	1.823276		.9471381	3.509874
Attr. frac. ex.	.4515366		-.0558123	.7150895
Attr. frac. pop	.1241726			

chi2(1) = 3.22 Pr>chi2 = 0.0729

```
. cs LBW PHQ3_p
```

	PHQ3_p Exposed	Unexposed	Total	
Cases	18	22	40	
Noncases	103	367	470	
Total	121	389	510	
Risk	.1487603	.0565553	.0784314	
	Point estimate		[95% Conf.	Interval]
Risk difference	.0922051		.0247727	.1596375
Risk ratio	2.630353		1.460177	4.7383
Attr. frac. ex.	.6198229		.3151516	.7889539
Attr. frac. pop	.2789203			

chi2(1) = 10.86 Pr>chi2 = 0.0010

Table 3 shows the relationship between general health status of pregnant women in three stages of prenatal care and PTB. The risk of preterm birth in pregnant women with mild, moderate and severesymptoms of General health problems(PHQ score ≥23)against normal pregnant women (PHQ score <23), in three innings was; RR=2.84, RR=2.40, RR=2.72 respectivelyand in all three times this difference was statistically significant.

On average 65%, 58% and 63% of the incidence of PTB in women with mild to severe symptoms of PHQ, due to General health problems (somatic symptoms, anxiety, sleep disturbances, social functioningand depression,)respectively.

Table3: Unadjusted effect of PHQ-Score on PTB

```
. cs PTB PHQ_p
```

	PHQ_p Exposed	Unexposed	Total	
Cases	9	16	25	
Noncases	79	428	507	
Total	88	444	532	
Risk	.1022727	.036036	.0469925	
	Point estimate		[95% Conf.	Interval]
Risk difference	.0662367		.0005979	.1318755
Risk ratio	2.838068		1.295828	6.215819
Attr. frac. ex.	.6476476		.2282925	.8391202
Attr. frac. pop	.2331532			

chi2(1) = 7.19 Pr>chi2 = 0.0073

```
. cs PTB PHQ2_p
```

	PHQ2_p Exposed	Unexposed	Total	
Cases	8	16	24	
Noncases	80	407	487	
Total	88	423	511	
Risk	.0909091	.0378251	.0469667	
	Point estimate		[95% Conf.	Interval]
Risk difference	.053084		-.009671	.1158391
Risk ratio	2.403409		1.061685	5.440761
Attr. frac. ex.	.5839243		.0581013	.8162022
Attr. frac. pop	.1946414			

chi2(1) = 4.59 Pr>chi2 = 0.0322

```
. cs PTB PHQ3_p
```

	PHQ3_p Exposed	Unexposed	Total	
Cases	11	13	24	
Noncases	110	376	486	
Total	121	389	510	
Risk	.0909091	.033419	.0470588	
	Point estimate		[95% Conf.	Interval]
Risk difference	.0574901		.0032429	.1117373
Risk ratio	2.72028		1.251248	5.914035
Attr. frac. ex.	.6323907		.2007977	.8309107
Attr. frac. pop	.2898458			

chi2(1) = 6.80 Pr>chi2 = 0.0091

Table 4 shows adjusted effect of effective variables, including PHQ for first period of pregnancy cares (weeks 6 to 10) on the LBW, 476 pregnant women had the full data variables in the regression model (missing: 56 cases). The results show that under the same conditions in terms of age, job, BMI, Smoking and Alcohol drinking, the odds of LBW in pregnant women with mild symptoms of general health problems(PHQ Score= 23-40), against women with normal PHQ(PHQ Score< 23) was OR=1.94(95% CI: 0.75-5.02). Also on the same terms of variables in the model, the odds of LBW in women with moderate (PHQ Score= 41-60) and severe (PHQ Score= 61-84)symptoms of general health problems against women with normal PHQ was OR=1.48(95% CI: 0.31-7.18) and OR=3.48 (95% CI: 0.36-32.81) respectively.

It should be noted that these relationships were not statistically significant (P> 0.05). Also in all three models for LBW any other variables were not significant by Dummy analysis.

Table4: Logistic regression for PHQ andLBW, by Confounding factors

```
Logistic regression                               Number of obs   =        476
                                                  LR chi2(8)      =       6.43
                                                  Prob > chi2     =     0.5996
Log likelihood = -124.33826                       Pseudo R2       =     0.0252
```

LBW	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Age	.8731134	.4951061	-0.24	0.811	.2873359	2.653086
Job	1.331563	.3172355	1.20	0.229	.8347736	2.124
BMI	.6106521	.2418938	-1.25	0.213	.2809394	1.327318
Smoking	1.177342	.6142592	0.31	0.754	.4234501	3.273432
Alcohol	1.05971	.8088476	0.08	0.939	.2374043	4.730268
PHQ						
2	1.945543	.940009	1.38	0.168	.7546997	5.015423
3	1.482269	1.192752	0.49	0.625	.3061838	7.175822
4	3.448399	3.963608	1.08	0.281	.3624451	32.809

Table 5 shows adjusted effect of effective variables, including PHQ2 for second period of pregnancy cares (weeks 20 to 24) on the LBW, 454 pregnant women had the full data variables in the regression model (missing: 78 cases). The results show that under the same conditions in terms of age, job, BMI, Smoking and Alcohol drinking, the odds of LBW in pregnant women with mild symptoms of general health problems, against women with normal PHQ was OR=2.11(95% CI: 0.89-5), and on the same terms of variables in the model, the odds of LBW in women with moderatesymptoms of general health problemsagainst women with normal PHQ was OR=1.61(95% CI: 0.18-13.97), these relationships were not statistically significant (P> 0.05).

Table5: Logistic regression for PHQ2 and LBW, by Confounding factors

```
Logistic regression                               Number of obs   =        454
                                                  LR chi2(7)      =       6.20
                                                  Prob > chi2     =     0.5168
Log likelihood =  -117.7137                       Pseudo R2       =     0.0257
```

LBW	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Age	.9228113	.5480414	-0.14	0.892	.2881372	2.95547
Job	1.306613	.3187444	1.10	0.273	.8100261	2.107634
BMI	.5673514	.2325482	-1.38	0.167	.2540729	1.26691
Smoking	.8715604	.5143823	-0.23	0.816	.2741137	2.771177
Alcohol	1.231533	.9403702	0.27	0.785	.2757328	5.500521
PHQ2						
2	2.105472	.9289358	1.69	0.092	.8867453	4.999197
3	1.606051	1.772475	0.43	0.668	.1846517	13.969
4	(empty)					

Table 6 shows adjusted effect of effective variables, including PHQ3 for Fifth period of pregnancy cares (weeks 36) on the LBW, The results show that under the same conditions in terms of age, job, BMI, Smoking and Alcohol drinking, the odds of LBW in pregnant women with mild symptoms of general health problems, against women with normal PHQ was OR=3.1(95% CI: 1.41-6.69), and on the same terms of variables in the model, the odds of LBW in women with moderate symptoms of general health problems against women with normal PHQ was OR=3.34(95% CI: 0.88-12.77), odds of LBW in pregnant women with mild symptoms of general health problems, compared to those with normal health status has a significant difference (P = 0.005).

Table6: Logistic regression forPHQ3 and LBW, by Confounding factors

```
Logistic regression                               Number of obs   =        454
                                                  LR chi2(7)      =      14.58
                                                  Prob > chi2     =     0.0418
Log likelihood = -113.52518                       Pseudo R2       =     0.0603
```

LBW	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Age	.9067413	.5231867	-0.17	0.865	.2926463	2.809466
Job	1.404459	.3429095	1.39	0.164	.8703254	2.2664
BMI	.4766885	.2062535	-1.71	0.087	.2041442	1.113095
Smoking	.9219345	.5695536	-0.13	0.895	.2746907	3.094256
Alcohol	1.212583	.9509035	0.25	0.806	.2607365	5.639244
PHQ3						
2	3.067362	1.219418	2.82	0.005	1.407256	6.685857
3	3.344296	2.285253	1.77	0.077	.876303	12.76307
4	(empty)					

Table 7 shows adjusted effect of effective variables, including PHQ for first period of pregnancy cares on the PTB, The results show that under the same conditions in terms of age, job, BMI, Smoking and Alcohol drinking, the odds of PTB in pregnant women with mild symptoms of general health problems, against women with normal PHQ was OR=2.91(95% CI: 1-8.49), and on the same terms of variables in the model, the odds of PTB in women with moderate symptoms of general health problems against women with normal PHQ was OR=2.95(95% CI: 0.58-14.93), odds of PTB in pregnant women with mild symptoms of general health problems, compared to those with normal health status has a significant difference (P = 0.05).

Table7: Logistic regression for PHQ and PTB, by Confounding factors

```
Logistic regression                               Number of obs   =        471
                                                  LR chi2(7)      =       8.94
                                                  Prob > chi2     =     0.2567
Log likelihood =  -87.40258                       Pseudo R2       =     0.0487
```

PTB	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Age	.4940481	.3356022	-1.04	0.299	.1304836	1.870606
Job	1.186294	.3467828	0.58	0.559	.6689065	2.103873
BMI	.5360977	.27677	-1.21	0.227	.1948928	1.47466
Smoking	1.976943	1.064207	1.27	0.205	.6883099	5.678115
Alcohol	.5113679	.5399178	-0.64	0.525	.0645668	4.050027
PHQ						
2	2.913555	1.589853	1.96	0.050	.9998713	8.489894
3	2.950728	2.440457	1.31	0.191	.5833462	14.92561
4	(empty)					

Table 8 showsadjusted effect of effective variables, including PHQ2 for second periodof pregnancy cares on the PTB, The results show that under the same conditions in terms of age, job, BMI, Smoking and Alcohol drinking, the odds of PTB in pregnant women with mild symptoms of general health problems, against women with normal PHQ was OR=1.58(95% CI: 0.49-5.06), and on the same terms of variables in the model, the odds of PTB in women with moderatesymptoms of general health problemsagainst women with normal PHQ was OR=6.10(95% CI: 1.08-34.52), odds of PTB in pregnant women with moderatesymptoms of general health problems, compared to those with normal health status has a significant difference (P = 0.041).

Table8: Logistic regression for PHQ2 and PTB, by Confounding factors

```
Logistic regression                               Number of obs   =        454
                                                  LR chi2(7)      =       7.67
                                                  Prob > chi2     =     0.3625
Log likelihood = -84.217783                       Pseudo R2       =     0.0436
```

PTB	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Age	.5798287	.4048488	-0.78	0.435	.1475613	2.278383
Job	1.07131	.3262587	0.23	0.821	.5897782	1.945995
BMI	.6394015	.330345	-0.87	0.387	.2322751	1.760129
Smoking	2.104234	1.139511	1.37	0.170	.7280158	6.082013
Alcohol	.6351855	.6550428	-0.44	0.660	.0841567	4.79416
PHQ2						
2	1.580662	.9377948	0.77	0.440	.4941147	5.056505
3	6.097013	5.393502	2.04	0.041	1.076793	34.52247
4	(empty)					

Table 9 shows adjusted effect of effective variables for fifth period of pregnancy cares on the PTB, The results show that under the same conditions in terms of age, job, BMI, Smoking and Alcohol drinking, the odds of PTB in pregnant women with mild symptoms of general health problems, against women with normal PHQ was OR=2.56(95% CI: 0.97-6.70), and on the same terms of variables in the model, the odds of PTB in women with moderate and severe symptoms of general health problems against women with normal PHQ was OR=1.63(95% CI: 0.20-13.39) and 15.15(CI: 1-228.75) respectively, odds of PTB in pregnant women with severe symptoms of general health problems, compared to those with normal health status has a significant difference (P = 0.05).

DISCUSSION

Today by changing the diseases epidemiology from Communicable to non-communicable, researchers more about to explore the relationship between these groups of diseases and health indicators, recently mothers psychological condition during pregnancy is considered as an impact on pregnancy outcomes and comprehensive studies such as Systematic Reviews did not report constant trend of the association between depression and anxiety during pregnancy and negative outcomes [21, 29, 30].Therefore, studies with authentic methods needed about the cause-effect relationship to be clearer this hypothesis.

Table9: Logistic regression for PTB and PHQ3, by Confounding factors

Logistic regression — Number of obs = 457; LR chi2(8) = 9.93; Prob > chi2 = 0.2700; Log likelihood = -83.237319; Pseudo R2 = 0.0563

PTB	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Age	.4391209	.2914049	-1.24	0.215	.1195965	1.612315
Job	1.114224	.3356982	0.36	0.720	.6173323	2.011065
BMI	.5928437	.3114894	-1.00	0.320	.2116925	1.660255
Smoking	1.815179	1.037271	1.04	0.297	.5922523	5.563299
Alcohol	.633508	.6606287	-0.44	0.662	.082056	4.890958
PHQ3						
2	2.555	1.257109	1.91	0.057	.9740544	6.701907
3	1.625258	1.748951	0.45	0.652	.1972146	13.39386
4	15.14574	20.97965	1.96	0.050	1.002811	228.7504

The frequency of PHQ ≥23 over the three time points was 16.54%, 17.22%, 23.72% respectively, this finding is consistent with other studies that reported that common mental disorders (including depression) were more prevalent during the perinatal period [29, 31] compared with non-pregnancy periods. In a crude estimate between PHQ and PHQ3 with LBW There was a significant statistical correlation, by applying multiple logistic regression to adjusted estimates the Odds ratios between PHQ and LBW were considerable, but only about mild PHQ(PHQ Score= 23-40; in the first stage) and LBW this association was significant.

Odds ratios between smoking and PTB in three stages were considerable too, but in adjusted model this correlation was not significant. Also, a crude estimate of relationship between PTB andPHQ over the three time points was quite significant. And in adjusted logistic regression analysis, in three sub-scale of PHQ (mild, moderate and severe) respectively, in PHQ, PHQ2 and PHQ3 these associations were significantly with PTB.In a study by Andersson *et al* [1] in Sudan, there is no association has been shown between mental disorders during pregnancy and PT7B. Researchers used PRIME-MD scale to measure mental disorders, the prevalence of depressive disorders have been realized 11.6%in this study, in our study, on average Prevalence has been higher than this study, it can be effective over the difference between results, also difference between the results may be due to differences in population structure of two studies and questionnaires. Well as Chang *et al* [18] in South Korea to examine the association between mental disorders and negative results conducted a study. They used (CESD-10) scale to measure mental disorders prevalence of psychiatric disorders in pregnant women was 22%.Chang et al.'s Results are similar to our results, the odds ratio of LBW in pregnant women who had symptoms of mental health problems, were significantly higher in crude model(P=0.02)that with applying mother gestational ages in the model, this effect was neutralized.

Diego et al.'s(32) reported odds ratios for low birth weight and PTB in pregnant women with psychiatric disorders has been OR=4.75, OR=2.61 against pregnant women without symptoms of mental disorder respectively. Rondo and colleagues [33] used PHQ, State Trait Anxiety inventories (STAI) scales, results of this study showed that mental health problems (maternal distress) was associated with LBW (RR=1.97, P=0.019) and PTB (RR=2.32, P=0.015), prevalence of mental disorders has been reported between 22.1 to 52.9%. Alder *et al* [34] concluded that women experiencing depression and anxiety in general had more pregnancy and birth complications, Dayan *et al* [35] revealed that depression was associated with the outcome among underweight women, OR=6.9, (95% CI: 1.8- 26.2). These findings show that anxiety and depression, when combined with specific biomedical factors, are associated with spontaneous preterm labor. A systematic review [30] revealed that significant interactions between depression, anxiety and stress, risk factors and preterm birth were indicated in both direct and indirect ways. The effects of pregnancy distress were associated with spontaneous but not with medically indicated preterm birth. In a study in Ethiopia [15] who conducted by Wado and colleagues, Incidence of LBW was 17.9%, Results of this research showed that unwanted pregnancy, prenatal depression and social support were associated with LBW. In systematic reviews [11, 21, 30] the prevalence of mental disorders in low and middle income countries, is high.Correlation between the abnormalities and adverse pregnancy outcomes are evidence. SoA broader guideline by WHO suggests integrating mental health services into primary care as the most viable way of closing the treatment gap for mental health in low-income and middle-income countries [36].

CONCLUSION

In this study, the crude odds ratio for the relationship between low birth weight and premature birth in pregnant women with general health status were significant, however LBW association with maternal health status is ambiguous, but the PTB can be said that there is a positive correlation. Considering the result of previous studies and our estimates in this study seems to maternal health status during pregnancy is a risk factor for adverse outcomesand it is suggested that to improve maternal health during pregnancy be given more importance.

CONFLICT OF INTEREST

The authors have no conflicts of interest to disclose.

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