



Assessment of Antepartum Depression and its Effect on Pregnancy Outcome in Two Primary Health Care Units in Qaliobia Governorate, Egypt

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Abstract

BACKGROUND: Depression during pregnancy occurs more often than most people realize. Early detection of depression during pregnancy is critical because depression can adversely affect birth outcome and neonatal health. Mental health care during pregnancy is a serious public health issue.

AIM: The objectives of the study were to estimate the prevalence of antepartum depression and its effects on pregnancy outcome; among pregnant women in the last trimester living in rural Egypt.

METHODS: The first part of the study was cross-sectional to assess the prevalence of antepartum depression. This was followed by a prospective part to detect the effects of antepartum depression on the outcome of pregnancy. The sample size was 300 consented women. A structured interview questionnaire was designed including sociodemographic and economic data, obstetric history, and neonatal information. Hamilton Rating Scale was used to detect the prevalence and level of depression.

RESULTS: About 68.7% of sampled women suffered from antepartum depression. The incidence of low birth weight was 4% and about one-fifth of babies were admitted in neonatal intensive care unit in the 1st month. Death in 1st month of life was 3%. The only significant predictor of unfavorable birth outcome using logistic regression was depression level. Females with severe depression were 9.43 at higher risk to have unfavorable birth outcome than normal ones. Furthermore, females with moderate depression had 1.4 higher risk to have unfavorable birth outcome than females without depression.

CONCLUSION: About 68.7% of women suffered from depression during pregnancy. Increasing level of depression was significantly associated with adverse birth outcome.

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Introduction

Antepartum depression is a major public health problem affecting pregnant women all over the world, imposing negative effects on mothers and birth outcome [1].

With the slogan “no health without mental health,” The World Health Organization placed mental illness at the top of its agenda about a decade ago [2].

Antepartum depression affects 10% of pregnant women worldwide, reaching up to 15.6% more in developing countries [3]. Pregnant women living in low- and middle-income countries are at high risk of antepartum depression [4].

In developing countries, including Egypt, depression is currently considered to be a major public health issue and is expected to become the most common cause of disability. It is considered a barrier to maternal health improvement [5].

Depression is the most common pregnancy psychiatric disorder and is linked to psychosocial and obstetric factors [6].

Untreated psychiatric disorders may interrupt social life and can have adverse effects on fetal and neonatal growth, so recognizing women at risk of developing psychiatric disorders during pregnancy and implementing timely management is essential [7].

Previous studies from middle-income countries and community-based research were conducted to examine the relationship of antenatal depression with adverse birth outcomes. Low birth weight (LBW) and preterm delivery were significantly associated with antepartum depression [8].

Although mental health promotion is a priority to reach the Sustainable Development Goals [9], antepartum depression is still not well known. It is a neglected component of the health care system in many low- and middle-income countries, including Egypt [8].

Health care staff delivering antenatal care (ANC) services are not qualified to provide mental health

services in the regular ANC visits, and therefore the diagnosis of antepartum depression is often missed [10].

This study aims at assessing the prevalence of antepartum depression among rural Egyptian pregnant women living in Shebien el Kanater, Qaliobia, Egypt. Moreover, to identify its effect on birth outcome such as LBW, prematurity, neonatal intensive care unit (NICU) admission, and death in 1st month of life.

Methods

Study design and setting

Study design

A prospective cohort design.

Study setting

The proposed study was carried out in Shebien el Kanater, a rural district located in Qaliobia Governorate, in the Nile Delta, North to Cairo (50 km). Qaliobia governorate is composed of seven major villages and 37 satellites. It is occupied by 473,276 inhabitants, mostly working in agriculture [11].

Study site

Two primary health care (PHC) units (out of all eight). (Nawa PHC and Alkashesh PHC).

Study participants

Eligibility criteria

Inclusion criteria

Any pregnant women in the third trimester, aged between 15 and 49 years, and attending a PHC unit in Shebein el Kanater, Qaliobia Governorate to receive her regular ANC services.

Exclusion criteria

Pregnant women with any medical complications during pregnancy, or is suffering from preexisting psychiatric disorder (as mentioned by the participant or reported in her record), and those who refused to participate in the study.

Sample size and type

Based on the study performed by Apter *et al.*, 2013, the prevalence of antepartum depression was 20% (precision $\pm 5\%$), and the target population

susceptible to suffer antepartum depression in the study area was about 1500 pregnant women in the reproductive age (15–49 years). Using OpenEpi sample size calculator [12], the required sample size was estimated to be 212 women within the same age group, with power of 95% and design effect of 1.0. An additional 10% was added to compensate for the non-response and dropouts; hence, the total sample size was calculated to be 232 pregnant women in the reproductive age (15–49 years).

Sample type

A multistage random technique was employed for selecting pregnant women. In the first stage, 2 PHC units (out of all 8) were selected by cluster random sample; the number of women recruited from each unit was determined in relation to number of registered women within the age group. Within each unit, women were selected using a simple random sample. The selected women were interviewed and this interview lasted for 25–30 min.

Procedures and data collection

Preparatory phase

Pilot study

The data collection tools were tested on 30 pregnant women to assess comprehension, practicability, and reliability of the questionnaires. The required modifications were added to the study tools, which were mainly the simplification of Hamilton questions. They were not included in the study sample.

Data collection phase

- Eligible women (examined by obstetrician, healthy, and free from complications) were invited for an interview using a structured questionnaire form. The interview took place at the ANC room within the unit. Collection of data was performed twice weekly, interviewing 10 pregnant women per day. The data collection form gathered the following data using closed-ended question format:
 1. Sociodemographic and economic status of the interviewees using previously validated socioeconomic status (SES) scale and most commonly used in health research, proposed by Fahmy and El-Sherbini. It was originally published in 1983 [13] and updated in 2015 [14]. This scale covers seven domains with a total score of 48 points, namely 1 – wife/husband education, 2 – wife/husband employment, 3 – family number, 4 – crowding index, 5 – home sanitation, 6 – economic level,

and 7 – computer use. The total score of SES was calculated and the cutoff points to be used for SES classification, where a high level was indicated as at least 70% (33.6–48), a medium level as 40–<70% (19.2–>33.6), and a low level as <40% (>19.2).

2. Obstetric history: To gather information about previous pregnancies, abortion, number of children, and mode of delivery.
3. The Hamilton Rating Scale for Depression (HRSD) [15]: Which is considered the gold standard among existing instruments for assessing depressive symptoms [16].

HRSD is the most frequently used measure of depression severity in clinical trials [17] and depression studies [18]. In addition to that, it has been used as a reference for the development of new scales for assessing depression severity [19]. Furthermore, it has been a favored scale in the evaluation of depression treatment [15].

The scale comprises altogether 17 items; items are scored on a continuum of 0–4, so the higher the score, the more severe the depression.

The cutoff points for the score were as follows:

- 0–7: Normal,
 - 8–13: Mild depression,
 - 14–18: Moderate depression,
 - 19–22: Severe depression.
 - ≥ 23 : Severe depression [20].
4. Neonatal information
The baby was examined twice in the PHC unit with the help of a well-trained nurse.
 - The first examination was performed within 1 week after delivery, where the neonate was brought by a relative for:
 - Measurement of weight, length, and head circumference. These measurements were taken and recorded according to the WHO instruction [21].
 - Collecting data about time of delivery; full-term or pre-term, and breastfeeding.
 - The second follow-up contact was 1 month later for collection of the following data:
 - Neonatal morbidities, NICU admission and its reasons, and neonatal mortalities in 1st month.
 - Unfavorable birth outcome was assessed including preterm and LBW.

There were no dropouts due to the researchers' continuous contact with the mothers. Furthermore, nurses encouraged mothers to participate in the study, and sometimes they made home visits to reach them.

Data management and analysis

Data entry was carried out using Statistical Package for the Social Science (SPSS) version 21.0 (IBM,

SPSS, USA). Variables were examined for normality. Data were presented in simple, cross-tabulation, and graphs. Categorical variables were expressed as proportions and percentage; Chi-square and Fisher's exact tests were applied. ANOVA test was used to compare depression among groups such as age groups. Continuous variables were expressed using mean \pm standard deviation, median, and interquartile range; tests of significance were used appropriately for comparison.

Different adverse birth outcomes were tested versus different confounding variables. Birth outcome was dichotomized into favorable (0) and unfavorable (1). Unfavorable birth outcome included LBW, premature, NICU admission, and neonatal mortality in 1st month. Significant predictors at the bivariate level were used for the generation of multivariate logistic regression model. $P < 0.05$ was considered statistically significant.

Possible risk to participants

None.

Ethical considerations

- Ethical review committee approval of the study was obtained from the review board of Public Health Department, Faculty of Medicine, Cairo University. Informed consent was obtained from all participants before their enrolment in the study.
- Data confidentiality and informants' identity privacy were maintained throughout the study. Filled questionnaires were coded and accessed by the researchers only.

Results

The mean age of participant mothers was 25.9 ± 4.8 years (min is 18 and max is 40) and the mean age at marriage was 19.1 ± 2.6 years (min is 14 and max is 32).

About one-fifth of the participants were illiterate or could only read and write and about one-fifth had a college education or higher. About one-tenth of their husbands were illiterate or could only read and write and almost one-fifth had a college education or higher. The majority of participant mothers were unemployed, while four-fifths of their husbands were employed. More than three-quarters of participants reported that their family income was just enough. Little more than two-thirds of participants had a family size of <5 members and the majority have a crowding index of 2 or more. More than two-fifths of participants reported that they had never used a computer, as shown in Table 1. The vast majority of women reported having refuse disposal but no sewage disposal.

Table 1: Demographic and socioeconomic characteristics of the study participants

Characteristics	Number (300)	Percentage
Age in years (Mean ± SD)	25.9 ± 4.8	
Age at marriage in years (Mean ± SD)	19.1 ± 2.6	
Educational status of the participant mothers		
Illiterate/read and write	55	18.3
Literate Certificate/primary	45	15
Preparatory	32	10.7
Secondary	112	37.4
College or higher	56	18.6
Educational status of the husbands		
Illiterate/read and write	33	11
Literate certificate	8	2.7
Primary	40	13.3
Preparatory	28	9.3
Secondary	139	46.3
College or higher	52	17.4
Wife employment		
Employed	13	4.3
Unemployed	287	95.7
Husband employment		
Employed	267	267
Unemployed	33	33
Computer use		
Never	132	44
Sometimes	112	37.3
A lot of time	56	18.7
Per-capita income		
Not enough+loan not repaid/big loan	2	0.7
Not enough+small loan	16	5.3
Just enough	234	78
More than enough	48	16
Family size		
Equal to or more than 7	15	5
Six members	29	9.7
Five members	52	17.3
<5	204	68
Crowding index		
Equal or more than 4	68	22.7
2-	221	73.7
<2	11	3.6
Socioeconomic level		
High	28	9.3
Medium	246	82
Low	26	8.7

The vast majority of mothers had 1–5 previous pregnancies. More than four-fifths had no previous abortions. Among participant mothers, four-fifth had 1–3 living children, and a minority suffered from death of previous children (<1%). More than two-thirds of the mothers had a C-section in the last delivery, while a quarter of them had previous normal vaginal deliveries, as shown in Table 2.

Table 2: Reproductive history of the study participants

Reproductive history	Number (300)	Percentage
Number of previous pregnancies		
Primigravida	14	4.7
1–5 previous pregnancies	283	94.3
Multiparous (>5)	3	1
Number of previous abortions		
None	251	83.7
1–2	46	15.3
3 and more	3	1
Number of living girls		
None	106	35.3
1–2	170	56.7
3 and more	23	8
Number of living boys		
None	74	24.7
1–2	217	72.3
3 and more	9	3
Number of living children		
None	14	4.7
1–3	244	81.3
4 and more	42	14
Number of previous children deaths		
None	297	99.1
At birth	1	0.3
1 st month	1	0.3
1 st year	1	0.3
Type of last delivery		
None	14	4.7
Normal vaginal	78	26
C-section	208	69.3

Two-thirds of the interviewed mothers were suffering from variable degrees of depression. Table 3 and Figure 1 show the categories and the scores of HRSD of the interviewed mother.

Table 3: Hamilton Rating Scale for depression of the interviewed mothers

Hamilton categories	Number (300)	Percentage
Normal (0–7)	94	31.3
Mild depression (8–13)	121	40.3
Moderate depression (14–18)	67	22.4
Severe depression (19–22)	12	4
Very severe depression (≥23)	6	2
Hamilton score median (IQR)	10 (7–14)	

Table 4 displays the socioeconomic characters versus the outcome of pregnancy. As regards unfavorable outcome, it was found that the higher percentages of unfavorable outcome were found among mothers who had primary/preparatory/secondary education, higher education of husbands, unemployed mothers, employed husbands, divorced/widow mothers (significant association), living in husband's family's home, mothers who use a computer sometimes, those who did not have enough income, family size of 6 members, higher crowding index (equal or more than 4), and medium SE score.

Table 5 displays the reproductive health versus the outcome of pregnancy. As regards the unfavorable outcome of pregnancy, it was found that the higher percentages of an unfavorable outcome of pregnancy were found in mothers with 1–5 pregnancies, 3 and more previous abortions, three or more living girls, no previous children's deaths, previous C- section, and no desire to current pregnancy. These differences were not statistically significant.

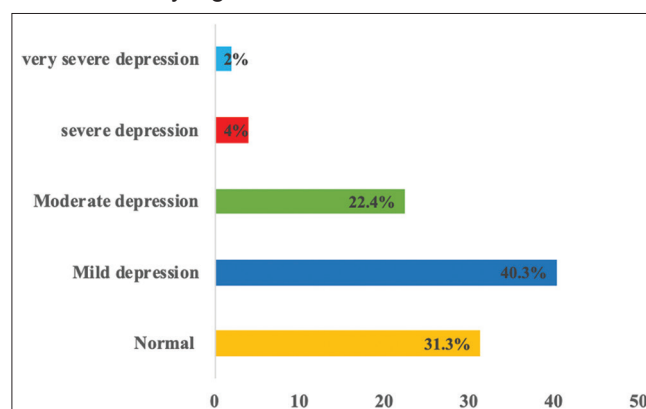
**Figure 1: Hamilton Rating Scale for depression of the interviewed mothers**

Table 6 displays antepartum depression versus different birth outcomes; it was found that the incidence of LBW babies was higher in mothers with severe depression followed by that in mothers with moderate depression. This difference was highly significant ($p < 0.001$). It was found that the higher percentages of NICU admission were found in mothers with severe depression followed by that in mothers with moderate depression, then by that in mothers with mild depression. These differences were highly statistically

Table 4: Association between socioeconomic characters and outcome of pregnancy

Variables	Favorable outcome	Unfavorable outcome	p value
Mother age (mean ± SD)	25.7 ± 4.6	26.7 ± 5.5	0.134
Mother age at marriage	19.2 ± 2.5	18.9 ± 2.9	0.469
Educational status of wife: No (%)			
Illiterate/read and write	45 (81.8)	10 (18.2)	0.379
Primary/preparatory/secondary	144 (76.2)	45 (23.8)	
College or higher	47 (83.9)	9 (16.1)	
Educational status of husband: No (%)			
Illiterate/read and write	32 (78.0)	9 (22.0)	0.93
Primary/preparatory/secondary	164 (79.2)	43 (20.8)	
College or higher	40 (76.9)	12 (23.1)	
Wife employment: No (%)			
Unemployed	224 (78.0)	63 (22.0)	0.220
Employed	12 (92.3)	1 (7.7)	
Husband employment: No (%)			
Unemployed	27 (81.8)	6 (18.2)	0.639
Employed	209 (78.3)	58 (21.7)	
Social status: No (%)			
Married	236 (79.2)	62 (20.8)	0.006*
Divorced/widow	0 (0.0)	2 (100.0)	
Living place: No (%)			
Own home/parent home	159 (79.5)	41 (20.5)	0.618
Husband family home	77 (77.0)	23 (23.0)	
Computer use: No (%)			
Never	104 (78.8)	28 (21.2)	0.487
Sometimes	85 (75.9)	27 (24.1)	
Frequently	47 (83.9)	9 (16.1)	
Per-capita income: No (%)			
Not enough	12 (66.7)	6 (33.3)	0.237
Just enough	183 (78.2)	51 (21.8)	
More than enough	41 (85.4)	7 (14.6)	
Family size: No (%)			
Equal to or more than 7	10 (66.7)	5 (33.3)	0.132
Six members	19 (65.5)	10 (34.5)	
Five members	40 (76.9)	12 (23.1)	
<5	167 (81.9)	37 (18.1)	
Crowding index: No (%)			
1-3	186 (80.2)	46 (19.8)	0.240
Equal or more than 4	50 (73.5)	18 (26.5)	
SE levels			
High	25 (89.3)	3 (10.7)	0.325
Medium	190 (77.2)	56 (22.8)	
Low	21 (80.8)	5 (19.2)	

Table 5: Association between reproductive health and outcome of pregnancy

Variables	Favorable outcome no (%)	Unfavorable outcome no (%)	p value
Number of previous pregnancies			
Primigravida	13 (92.9)	1 (7.1)	0.267
1-5 pregnancies	220 (77.7)	63 (22.3)	
More than 5 pregnancies	3 (100.0)	0 (0.0)	
Number of previous abortions			
None	200 (79.7)	51 (20.3)	0.135
1-2	35 (76.1)	11 (23.9)	
3 and more	1 (33.3)	2 (66.7)	
Number of living girls			
None	86 (81.1)	20 (18.9)	0.294
1-2	134 (78.8)	36 (21.2)	
3 or more	16 (66.7)	8 (33.3)	
Number of living boys			
None	63 (85.1)	11 (14.9)	0.192
1-2	165 (76.0)	52 (24.0)	
3 or more	8 (88.9)	1 (11.1)	
Number of living children			
None	13 (92.9)	1 (7.1)	0.129
1-3	194 (79.5)	50 (20.5)	
4 or more	29 (69.0)	13 (31.0)	
Number of previous child deaths			
Zero	233 (78.5)	64 (21.5)	0.844
At birth	1 (100.0)	0 (0.0)	
1 st month	1 (100.0)	0 (0.0)	
1 st year	1 (100.0)	0 (0.0)	
Type of last delivery (286)			
Normal vaginal	55 (70.5)	23 (29.5)	0.834
C-section	144 (96.2)	64 (30.8)	
Desire to current pregnancy			
Yes	218 (79.9)	55 (20.1)	0.111
No	18 (66.7)	9 (33.3)	

significant ($p < 0.001$). It was found that higher percentages of death in the 1st month of life were found in mothers with severe depression followed by those

Table 6: Association between antepartum depression and different birth outcomes

	Depression levels				p value
	Normal	Mild	Moderate	Severe	
Gestational age					
Full term No (%)	94 (100.0)	120 (99.2)	64 (95.5)	17 (94.4)	0.072
Preterm No (%)	0 (0.0)	1 (0.8)	3 (4.5)	1 (5.6)	
Birth weight					
Normal/HBW No (%)	93 (98.9)	121 (100.0)	66 (98.5)	13 (72.2)	<0.001*
LBW No (%)	1 (1.1)	0 (0.0)	1 (1.5)	5 (27.8)	
NICU admission					
No	84 (89.4)	98 (81.0)	47 (70.1)	9 (50.0)	<0.001*
Yes	10 (10.6)	23 (19.0)	20 (29.9)	9 (50.0)	
Death in 1 st month of life					
No	94 (100.0)	121 (100.0)	64 (95.5)	12 (66.7)	<0.001*
Yes	0 (0.0)	0 (0.0)	3 (4.5)	6 (33.3)	
Birth outcome					
Favorable	83 (88.3)	98 (81)	47 (70.1)	8 (44.4)	<0.001*
Unfavorable	11 (11.7)	23 (19)	20 (29.9)	10 (55.6)	

with moderate depression. On the other hand, death in the 1st month of life was not recorded in mothers who did not suffer from depression. These differences were highly statistically significant ($p < 0.001$).

Table 6 shows that NICU admission was reported in 62 infants (20.7%), death in 1st month of life were 9 infants (3%), preterm 5 infants (1.7%), and LBW 7 infants (2.3%). From Table 6 and Figure 2, one can conclude that increasing level of depression is significantly associated with the incidence of adverse birth outcome.

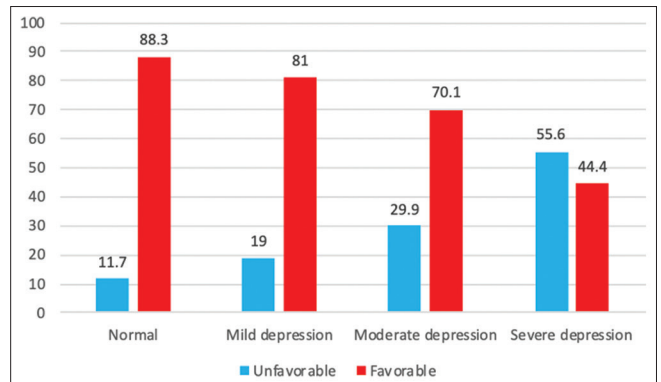


Figure 2: Level of depression and birth outcome

Table 7 shows the significant predictors of unfavorable birth outcome using logistic regression.

Table 7: Significant predictors of unfavorable birth outcome

Predictors	Exp (B)	95% CI		p value
Constant	0.13			<0.001
Depression level				
Mild	1.77	0.81	3.8	0.14
Moderate	3.21	1.4	7.2	0.005
Severe	9.43	3.07	28.9	<0.001
Normal (reference)				

All significant variables that resulted from bivariate analysis were entered in the model. The only significant predictor was depression level. Females with a severe level of depression had a 9.43 higher risk of incidence of unfavorable birth outcome than females without depression. Furthermore, females with a moderate level of depression had a 1.4 higher risk of incidence of unfavorable birth outcome than females without depression.

Discussion

Although antepartum depression, anxiety, and stress have serious long-term implications on both mother and baby [22], still mental health is a neglected issue in healthcare settings and remains of low priority in Egypt [23].

This study revealed that two-thirds of mothers suffered from antepartum depression. This with a cross-finding was a consistent sectional study conducted in Egypt in 2013 that included 376 pregnant women attending the ANC outpatient clinic at the largest university hospital (Kasr Alainy). That study reported that women who expressed simultaneous anxiety and depressive manifestations accounted for 63% [24].

A higher percentage of antepartum depression was reported by a study performed in Karachi, where the prevalence of antepartum depression was 81% [20].

On the other hand, lower prevalence of antepartum depression was reported in Australia (7%) [25] and in Hong Kong (4.4%) [26]. The differences in the prevalence of antepartum depression between the current study and the studies from other countries might be attributed to sociodemographic and economic differences. In addition to that, methodological differences between studies like types of screening tool used, gestational time point when screened for symptoms, sample size, and sample characteristics might explain those differences. Furthermore, there is a possibility of underestimation of antepartum depression in the other studies due to less participation of depressed mothers in research. This might be due to their fear, denial, and avoidance of stigma related to mental illness. It might be also due to a lack of seeking mental health services, probably because symptoms of depression could be mistaken for physiological and hormonal changes that occur during pregnancy.

The current study reported that unfavorable outcome of pregnancy, in the form of preterm birth (PTB), LBW, NICU admission, and death in the 1st month of life was reported with depressed pregnant mothers. This finding was consistent with a systematic review and meta-analysis conducted to investigate the burden of antepartum depression and its consequences on birth outcomes in low- and middle-income countries. It explored that the risk of adverse birth outcomes (LBW or PTB) was 1.59 times higher among pregnant mothers who had depression compared to those who did not [8].

Antepartum depression is often considered to be a predictor of increased incidence of PTB, miscarriages, retarded fetal growth, which can manifest as LBW [27].

A prospective cohort study included 799 pregnant women from health clinics of two states in east

and west coasts of Malaysia. They studied the impact of maternal antepartum depressive and anxiety symptoms on birth outcomes. That study reported that pregnant women with depressive symptoms had an increased risk of giving birth to babies with LBW (relative risk 3.58; 95% confidence interval [CI] 2.16–5.94) compared to women without depressive symptoms [28].

In Egypt, a study performed on 54 pregnant mothers explored that women with depressive and anxiety symptoms in the third trimester exhibited an increased likelihood of having oligohydramnios, diminished placental perfusion. In addition, 45.5% of them showed intrauterine growth restriction [29].

An increased PTB risk among mothers with depression was consistent with a meta-analysis published by Grigoriadis *et al.* [30]. Similarly, risk of PTB and risk of LBW were reported in a meta-analysis conducted by Grote, which is also in line with the current finding [31].

A similar finding was reported by a prospective cohort study in China, where 1377 pregnant women were recruited. It concluded that offspring born to women with antepartum depression was more likely to be of LBW than offspring born to women without antenatal depression (odds ratio 2.39, 95% CI: 1.17–4.89) [32].

A systematic review and meta-analysis were performed to study neonatal outcomes in women with untreated antepartum depression compared with women without depression. Untreated depression was found to be a significant risk of 2 perinatal outcomes; PTB and LBW [33].

Limitations of the study

The external validity of the results of the current study is limited due to including only rural women who received ANC from PHC units.

Conclusion

This prospective cohort study revealed that two-thirds of participating rural women (who were apparently healthy and free from medical problems after examination by obstetrician) suffered from variable degrees of antepartum depression as detected by HRSD. The level of depression was found to be the only significant predictor of unfavorable birth outcome in the form of preterm, LBW, NICU admission, and death in 1st month of life.

Recommendations

The policymakers should consider delivering mental health services at health facilities during ANC.

This should be associated with increase health literacy of females about the importance of mental health. Future studies are recommended to assess the impact of improving awareness of mothers about antepartum depression on pregnancy outcome in the next birth cycle.

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