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A prospective study to find the effect of antepartum depression on the outcome of pregnancy and infant growth in Chennai

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ABSTRACT

Background: Antenatal depression was observed to have negative bearing on birth outcomes. There is paucity in the evidence of antepartum depression and its influence on outcomes of pregnancy and neonatal growth from India. **Objective:** To assess the effect of antepartum depression on birth outcomes among pregnant women in their third trimester attending antenatal care in Urban Primary Health Centres of Chennai. **Methods:** A prospective cohort study was done wherein pregnant women (n=202) in their third trimester were followed up till their delivery. Edinburgh Postnatal Depression Scale (EPDS) was used to assess depression. Score of ≥ 13 was considered positive for antenatal depression. Information about the birth outcomes were extracted from the hospital records and for women who delivered elsewhere, they were followed up by making a telephone call. The birth outcomes that were assessed in this study included low birth weight (birth weight <2.5kg), prematurity (babies born <37 weeks of gestation) and any complications during delivery. **Results :** The prevalence of antenatal depression was found to be 15.8% with 95% Confidence interval of 10.68%-20.92%. After adjusting for age of mother, previous conception and other comorbid conditions during pregnancy, mothers with antenatal depression were found to have 1.565, 0.990, 1.530 times increased risk of delivering a LBW, preterm babies and developing complications during delivery. **Conclusion:** Depression is common in women especially during pregnancy. It is associated with delivery of low birth weight babies, premature deliveries, more caesarean sections and increased complications during delivery. Hence identifying antenatal depression earlier in pregnancy is recommended so that appropriate interventions could be given.

Key Words: Antenatal Depression, Birth Outcomes, Edinburgh Postnatal Depression Scale (EPDS).

INTRODUCTION

A lot of effort has been taken to improve mother's physical health with nutritional supplements, vaccines and regular antepartum check-ups. Yet according to a recent report by WHO, the rates of maternal mortality and morbidity have not reached the target 5.5% annual reduction rate¹. In addition, the rates of reduction in neonatal mortality have been slow with the current average of 19 deaths per 1000 live births globally². In India, it is as high as 34 per 1000 live births³. This shows that other factors besides nutrition and health care must play a role in determining healthy outcome of pregnancy.

In a population based study from Chennai, the occurrence of depression in urban South Indian population was observed to be 15.1% with 95% Confidence Interval of 14.7-15.6 with a slight predominance among females (16.3%)⁴. In females, pregnancy is the most vulnerable period for depression⁵. Several studies have also testified that depression predominated in low and middle income populations^{6,7}. Depression, during and after pregnancy is a major concern, the impact of which has not been well recognised. It affects 4-20% of pregnant women in India⁵. That is as high as 1 in 5 women who are pregnant. Screening and treatment of this disorder is not widely practised. Depression has a direct negative effect on pregnancy outcome and infant birth weight⁸⁻¹⁰. In addition, antepartum depression is a potential risk factor for postpartum depression¹¹⁻¹³, which impacts breast feeding and caring for the new born^{14,15}.

Several factors were found to be associated with depression both during and after pregnancy. Low socioeconomic status, lack of family support, physical violence, illiteracy, birth of daughter while son was expected, history of psychiatric illness, family history of mood disorders, complications in pregnancy, hospitalization, religious practices, Iron deficiency, number of antenatal check-up, unplanned or forced pregnancy, age, marital status, gravida, previous history of still birth, abortions, prolonged labour have been identified as risk factors for depression during antenatal period.^{5,12,13,16-20} The prevalence of antepartum depression also varies between different socioeconomic conditions of different countries. It ranges from 17% in Sweden²¹ to 25% in Pakistan⁸. The occurrence was more in low socioeconomic societies with the frequency of one in four pregnant women.⁶

Antenatal depression was observed to have negative bearing on birth outcomes. It was found to be related with

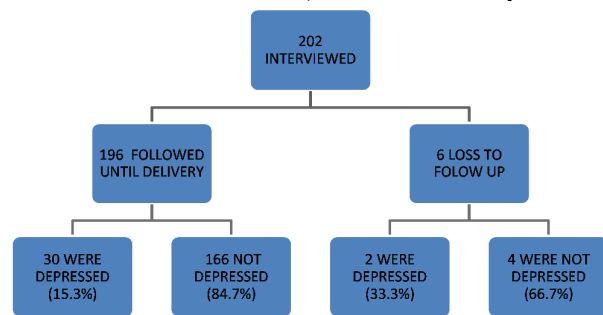
low birth weight^{8,9,22,23}, low gestational age at delivery^{23,24}, increased complications such as rising caesarean sections, prolonged labour and stillbirths²¹. Infants, born to mothers who had antenatal depression presented significant growth retardation accompanied by increased risk of diarrhoeal illness and other infections¹⁴. They exhibited four fold risk of stunting at 6 months of age. A cohort study by Onger et al from Kenya had established that depression during the antenatal period amplified the risk for postpartum depression by 6 fold¹¹. Postpartum depression is an independent risk factor for retarded growth of the child due to its impact on mother-child interactions, breastfeeding, vaccination and other safety procedures¹⁵.

Because of the hazardous effects of antepartum depression on the health of both the mother and the infant, immediate action is needed for safeguarding the health of the child. There is paucity in the evidence of antepartum depression and its influence on outcomes of pregnancy and neonatal growth from India, although its effect on morbidity and mortality of the mother has been studied. Hence this study was done to assess the effect of antepartum depression on birth outcomes among pregnant women in their third trimester attending antenatal care in Urban Primary Health Centres of Chennai.

METHODS

A prospective cohort study was done wherein pregnant women in their third trimester were followed up till their delivery. Ethical clearance for the study was obtained from the Institutional Ethics Committee. The study was conducted between May 2018 and August 2018 in three government maternity hospitals of Chennai Corporation, Tamil Nadu, which caters to low middle income populations. These maternity hospitals are situated in an urban zone of Saidapet, Shenoy nagar, and Perumalpet. Permission was obtained from Deputy Commissioner of Health, from City Medical Officer and from the Zonal Medical Officers of the three maternity hospitals. These maternity hospitals attending to a large population had operation theatre facility in them. Pregnant women in the vicinity go to the EDD clinic for their regular check-up from their 7th month of gestation. Up to 7 months of pregnancy, the women visit Primary Health Centre near their houses. From 7th month, they are referred to these maternity hospitals where they receive antenatal care and delivery services. They have their weight and blood pressures checked, and are tested for haemoglobin, blood sugar, urine sugar and albumin during every check-up along with ultrasound scanning of their abdomen.

Figure 1. Distribution of antenatal depression among study participants



All the pregnant women in their third trimester attending EDD clinic between May 2018 and July 2018 in these three maternity hospitals were included in the study excluding those who refused to participate and those who had previously diagnosed psychiatric illness. During the study period, 202 women were included and interviewed in the study. They were described about the purpose of the study and were informed about the follow-up procedures. Informed written consent was obtained from the participating women. Consent was also obtained for acquiring information about the new born from the hospital records. Their phone numbers were received after informing them that they would be followed up for the data of their new born through telephone in case they deliver in other places.

After their routine check-up, women in third trimester were interviewed using a semi-structured questionnaire for collecting their demographic details. The expected date of delivery was recorded from their maternal and child protection card. Apart from participant details, obstetric history, medical history, questions regarding risk factors of depression were asked and recorded on Epicollect mobile application.

Edinburg Postnatal Depression Scale (EPDS) was used to assess depression. This scale was initially developed for screening postnatal depression but this has been later validated for screening antenatal depression and widely used. The sensitivity of the scale to identify antenatal depression is 100% and specificity is 85%²⁵. EPDS is a 10 item questionnaire. Each question has 4 options with scores ranging from 0 to 3. Validated Tamil translated version of the scale was used in this study²⁶. Score of ≥ 13 was considered positive for antenatal depression.

Totally 202 participants were interviewed in their antenatal period of whom only 122 delivered in the same maternity hospital. Information about their birth outcomes were extracted from the hospital records. Of the eighty women who delivered elsewhere, 74 women were followed up by making a telephone call. Date and place of delivery, birth weight and gender of the baby, mode of delivery and complications during delivery were enquired for and recorded in Epicollect application. The birth outcomes that were assessed in this study included low birth weight (birth weight $< 2.5\text{kg}$), prematurity (babies born < 37 weeks of gestation) and any complications during delivery.

Data was entered in Microsoft Excel and was analysed using SPSS version 16. Appropriate descriptive and inferential statistics was used to analyse the data. Chi square test was done to find the association between categorical variables. Logistic regression analysis was done to find the association between antenatal depression and birth outcomes after adjusting for other factors.

RESULTS

Table1. Socio-demographic profile of the study participants

Age of mother	Number of women(n-202)	Percentage
≤ 19 years	4	2%
20-34 years	194	96%
≥ 35 years	4	2%
Religion		
Hindu	167	83%
Muslim	8	4%
Christian	27	13%
Occupation		
Employed	40	20%
Homemaker	162	80%
Education		
Illiterate	1	0.40%
Primary education ($\leq 5^{\text{th}}$ grade)	3	2%
Secondary education(6-10 th grade)	64	31.60%
Higher Secondary education	41	20%
Graduates	93	46%
Type of family		
Nuclear	86	42.60%
Joint	70	34.60%
Three generation	46	22.80%
Type of house		
Pucca	168	83%
Semi-pucca	29	14.50%
Kutcha	5	2.50%
Husband education		
No formal education	5	2.50%
Primary education	5	2.50%
Secondary education	89	44%
Higher Secondary education	25	12.40%
Graduates	78	38.60%

Totally 202 participants were interviewed in their antenatal period of whom 122 delivered in the same maternity hospital, 74 delivered in other places. Socio demographic profile of the study participants is given in Table 1. Six antenatal mothers were lost to follow up (3%). Thus only 196 were followed up until their delivery and were included for further analysis.

Table 2: Bivariate analysis between antenatal depression and birth outcomes

OUTCOME	No antenatal depression	Antenatal depression	Chi square value	P value	Risk Ratio	95%CI
Prematurity						
Yes	10(6%)	2(6.7%)	Fisher Exact test	0.575	1.1067	0.2551-4.8015
No	156(94%)	28(93.3%)				
Type of delivery						
Vaginal	54(32.5%)	11(36.7%)	0.196	0.658	0.9387	0.7009-1.2571
Caesarean	112(67.5%)	19(63.3%)				
Birth weight						
Normal >2.5 kg	135(82.3%)	22(73.3%)	1.3261	0.249	1.58	0.7647-2.9741
Low ≤2.5kg	29(17.6%)	8(26.6%)				
Complications during delivery						
No	152(91.6%)	27(90%)	0.079	0.779	1.1857	0.3626-3.8773
Yes	14(8.4%)	3(10%)				

Table 3: Binary Logistic Regression Analysis between Low Birth Weight and other comorbid conditions

Variables	Sig.	Adjusted Odds Ratio	95% C.I. for Adjusted Odds Ratio	
			Lower	Upper
Age of the mother	0.948	0.996	0.89	1.115
Infertility treatment	0.014	4.281	1.342	13.663
History of previous conception	0.987	0.993	0.425	2.322
Gestational diabetes mellitus	0.612	0.545	0.052	5.693
Pregnancy induced hypertension	0.999	0	0	.
Taking treatment for Thyroid illness	0.627	1.372	0.383	4.907
Anaemia in pregnancy	0.08	2.148	0.913	5.051
Antenatal depression	0.349	1.565	0.614	3.99
Constant	0.192	0.17		

Table 4: Binary Logistic Regression Analysis between Complication during delivery and other comorbid conditions

Variables	B	Sig.	Adjusted Odds Ratio	95% C.I. for Adjusted Odds Ratio	
				Lower	Upper
Age of the mother	0.02	0.829	1.021	0.848	1.228
Infertility treatment	-0.196	0.834	0.822	0.133	5.098
History of previous conception	-0.334	0.61	0.716	0.199	2.582
Gestational diabetes mellitus	0.894	0.343	2.445	0.386	15.498
Pregnancy induced hypertension	3.873	0.015	48.065	2.111	1094.539
Taking treatment for Thyroid illness	-2.153	0.223	0.116	0.004	3.7
Anemia in pregnancy	0.111	0.868	1.117	0.303	4.12
Antenatal depression	0.425	0.553	1.53	0.375	6.244
Type of delivery	2.414	0.038	11.183	1.142	109.518
Constant	-7.362	0.024	0.001		

Of 196, totally 30 (15.3%) had EPDS scores ≥ 13 and classified as antenatal depression. Among the six lost to follow up in the study, two of them were found to have antenatal depression(33.3%) as shown in Figure 1.

The socio-demographic details of the study participants is given in Table 1. Mean age of mothers who participated in the study was 25 ± 3.74 years ranging between 17-38 years. Majority of them were Hindus (83%). Almost 46% of them were graduates while 38% of the husbands were graduates. Most of them were not working or were working earlier but gave up their jobs (80%). There was no out of wedlock pregnancy. Most of them (60%) were living in rented

houses. Most of them were living in nuclear families (42%).

Table 5: Binary Logistic Regression Analysis between Prematurity and other comorbid conditions

Variables	B	Sig.	Adjusted Odds Ratio	95% C.I. for Adjusted Odds Ratio	
				Lower	Upper
Age of the mother	0.052	0.552	1.054	0.887	1.251
Infertility treatment	1.095	0.184	2.989	0.594	15.051
History of previous conception	0.236	0.734	1.266	0.325	4.929
Gestational diabetes mellitus	1.33	0.175	3.782	0.552	25.918
Pregnancy induced hypertension	-18.495	0.999	0	0	.
Taking treatment for Thyroid illness	-0.072	0.95	0.931	0.099	8.76
Anemia in pregnancy	0.109	0.897	1.116	0.213	5.853
Antenatal depression	-0.01	0.99	0.99	0.184	5.317
Constant	-4.449	0.038	0.012		

Mothers with antenatal depression did not differ much from mothers without antenatal depression in terms of mean age having 25.41 years (SD- 4.41) and 25 years (SD-3.63) respectively (p value-0.581). The husbands of mothers with antenatal depression were slightly older (mean age:30.22 $\pm$ 4.51) when compared to husbands of non-depressed mothers with mean age 29.34 $\pm$ 3.93 (p value-0.259). Haemoglobin levels of mothers with antenatal depression was 10.45g/dl (SD- 0.69), while mothers without antenatal depression had mean Haemoglobin of 10.81g/dl (SD-1.02) (p value-0.056).

Birth outcomes of the deliveries of the participants are given in Table 2. Totally, 37 mothers (19.07%) gave birth to low birth weight babies (babies with weight ≤ 2.5 kg). Two (1%) women had still births. Of the 196, 12(6.12%) new born babies were born prematurely (<37 weeks of gestation) and 50 (25.51%) were born after 40 weeks of gestation. 65(33.5%) women underwent vaginal delivery and 131(66.5%) had caesarean section. 17(8.67%) of them reported complication during delivery most common being postpartum haemorrhage. 106 of the new born babies were females and 88 of them were males (excluding the stillbirths whose gender were not recorded).

Logistic regression analysis was performed to find the adjusted odds ratio of antenatal depression on birth outcomes namely low birth weight, prematurity and complications during delivery. After adjusting for age of mother, previous conception and other comorbid conditions during pregnancy, mothers with antenatal depression were found to have 1.565, 0.990, 1.530 times increased risk of delivering a LBW, preterm babies and developing complications during delivery, though they were not statistically significant as shown in Table 3, 4 and 5 respectively.

DISCUSSION

This study attempted to find the effect of antepartum depression on the birth outcomes among third trimester pregnant women attending antenatal clinics in urban government maternity hospitals. It was hypothesized that

antepartum depression in third trimester was associated with increased risk of having (i) low birth weight babies (ii) premature deliveries (iii) complications during delivery.

In the present study the prevalence of antenatal depression was found to be 15.8% with 95% Confidence interval of 10.68%-20.92% which is comparable to the prevalence of antenatal depression from other studies carried out in India ranging between 9%-17%^{5,19,22,27}. The prevalence of depression among antenatal women in a south Indian state of Karnataka using the same scale and the same scores (EPDS score ≥ 13), was observed to be 14.43%. This was again comparable to a community based study from South India by George et al. using CSI questionnaire which stated the prevalence of antenatal depression to be 16.3%²⁰. The prevalence of antenatal depression as screened using EPDS score ≥ 13 is similar to other developed countries and developing countries, the values ranging between 17%-26%^{9,11-13,28,29}.

In this study, it is found that mothers with antenatal depression had 1.1, 1.58 and 1.1857 times increased odds of delivering a preterm baby, low birth weight baby and developing complications during delivery respectively. However it was not statistically significant. This finding is consistent with other studies as identified in a meta-analysis by Grote et al. which stated that antenatal depression increased the risk of prematurity by 39%, low birth weight by 49% and IUGR by 45%.²³.

The incidence of low birth weight was found to be 19% with 95% Confidence interval of 16.2% - 21.8%. The incidence is very much consistent with the national average of 20%³⁰. But this is high compared to a cohort study from a district hospital in Goa, which reported incidence of low birth weight as 10.6% which also described that mothers with antenatal depression had 1.44 times increased risk of delivering low birth weight babies²². The risk of mothers with antenatal depression to deliver a low birth weight as mentioned in various studies ranged between 1.2-2.2^{8,9,22}.

The incidence of premature delivery in our study was 6.12% with 95% Confidence interval of 4.41 to 7.83. Our study reported increased risk of having premature baby in a mother with antenatal depression. This is comparable to a cohort study done in Varanasi, India which stated that 11.6% of variance in gestational age is due to antenatal depression²⁴. Many studies have not found any relation between antepartum depression and gestational age^{21,29,31}. A meta-analysis done by Accortt et.al suggested increased risk of LBW in Antenatal Depression but no such risk for prematurity³¹.

The risk of mothers with antenatal depression developing complications due to pregnancy is 1.1857. This is comparable to a study done in China by Chung et al.²¹ and one in Sweden²⁹. In this study, 66% of the mothers had caesarean deliveries. This was higher when compared to 13.7% in a public setup done in a previous study in South India.³². It could be because of the increasing

comorbidities during pregnancy which necessitates more caesarean deliveries.

The hypothesized mechanism behind these findings is that stress in the form of depression will deregulate hypothalamic pituitary adrenal axis which will stimulate secretion of cortisol and catecholamines leading to placental hypo-perfusion, reduced nutrient and oxygen supply to the foetus causing intrauterine growth restriction and low birth weight. The proposed mechanism for prematurity is that depression leads to reduced immunity which causes in utero infections and preterm labour²³. Depression may also cause reduced health seeking behaviour leading to improper nutrition and hygiene further compromising the foetal growth^{9,23}.

This study is a cohort study with 97% follow up rate. The strength of the study is that it is done in government maternity hospitals of urban area which usually caters to almost all the low and middle income group of population. Therefore this study findings can be extrapolated to urban mothers belonging to low and middle income setting. The study was done in three different urban government maternity centres including pregnant women from different areas within Chennai.

The results of the study were not significant as the study population was small and therefore the power to detect the difference was small. There is a possibility of under reporting of complications during delivery because for some of the mothers who delivered elsewhere, the follow up was made through phone call.

In this study, it is evident that antenatal depression has an effect on poor birth outcomes though statistically not significant. The study can be further expanded to include a larger sample size to increase the power of the study. It would be strongly recommended that antenatal mothers should be screened for antenatal depression on a routine basis. Mothers identified with antenatal depression should be provided with therapies like counselling, behavioural therapy and if required appropriate referral at the earliest^{33,34}. Further studies are needed to evaluate the benefits of interventions given for the treatment of antenatal depression on its effects on birth outcomes.

CONCLUSION:

Depression is common in women especially during pregnancy. It is associated with delivery of low birth weight babies, premature deliveries, more caesarean sections and increased complications during delivery. Hence identifying antenatal depression earlier in pregnancy is recommended so that appropriate interventions could be given. To reach the goal of reducing neonatal mortality to a single digit number, mental health of the antenatal mothers should be given equal importance in antenatal care as it is done for physical health.

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