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Original Article

Labour profile and pregnancy outcome of pregnant women with sleep disorders in Alex Ekwueme Federal University Teaching Hospital Abakaliki, Southeast Nigeria

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ABSTRACT

Background: Sleep disorders in pregnant women are of an increasing public health concern. In pregnancy, an ample sleep is required to nurture the progress of the fetus as well as the energy reserve for labour and parturition process. **Objective**: This study assessed the labour profile and pregnancy outcome among expectant mothers with self-reported sleep disorders at the Alex Ekwueme Federal University Teaching Hospital Abakaliki (AE-FUTHA). **Methodology**: It was a cross-sectional study. Participants were recruited using a random sampling technique. A structured questionnaire was used to obtain information on their socio-demographic indices and daytime sleepiness through Epworth Sleepiness Scale for expectant mothers. Outcome measures included labour outcome, APGAR score, weight at birth and head and chest circumference at birth. Data analysis was done using International Business Machine Statistical Package for Social Sciences (IBM SPSS) version 22. Descriptive statistics was used for sociodemographic variable. Mean ± Standard deviation (SD) was used to represent continuous variables data. Analysis of variance (ANOVA) and Chi square test (X2) were used for comparison of continuous and categorical variables respectively. Significance level for this study was set at $p < 0.05$. **Results**: Maternal socio-demographic characteristics, gestational age and labour outcomes had no statistically significant association with daytime sleepiness. The incidence of spontaneous labour, emergency caesarean section, induction of labour, augmentation of labour and instrumental vaginal delivery were respectively observed to occur in subjects with self-reported daytime in decreasing order of 30.2%, 11.0%, 6.6%, 5.5% and 0.5%. Though the control group had a longer duration of labour in first and second stages of labour, there was no

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statistically significant difference between control and study groups. There was no statistically significant difference in the birth weights, APGAR scores, and length at birth between the control and study groups. However, there was a statistically significant difference in the head circumference of babies born by women in the study group compared to the control group (34.1±1.7 versus 34.7±1.6, p 0.03). We were not able to identify the casualty of this association. **Conclusion**: There was a similar labour profile at pregnancy outcome when women with self-reported sleep disorders were compared with women in the control group. We found a statistically significant difference in the head circumference of their babies. **Keywords**: Abakaliki, Daytime sleepiness, Epworth Sleepiness Scale, sleep disorders.

Introduction

Sleep is a natural, well-controlled periodic activity, which is not limited to humans, characterised by abridged awareness, contractile tissue (muscle) relaxation, as well as changed reaction to stimuli.[1] Sleep consists of two parts, which are non-rapid eye movement (NREM) and rapid eye movement (REM) sleeps.[2] While the NREM accounts for eighty percent in the periodic pattern (cycle) of sleep, the REM occupies the remaining twenty percent. As a reversible phenomenon, sleep is vital for normal biological function of all human beings.[3,4] These include restoration of immune system,[5] maintenance of cardiovascular activity,[6] and carbohydrate metabolism.[7] Several studies also demonstrated that sleep improves capability of an individual to acquire knowledge and recall information[8-11] and it helps to replenish depleted energy arising from activities in the wake state.[12] Dolatian et al.[13] opined that appropriate sleep is central to the maintenance of psychological and physical health. From the foregoing, it then implies that sleep disorders or poor quality and irregular pattern of sleep, hampers or weakens various unique body activities and subsequently general quality of life[14] even during pregnancy.

In pregnancy, an ample sleep is required to nurture the development of foetus as well as the energy reserved for labour and parturition process.[4] Hormonal variations during pregnancy, have been reported to affect the quality and pattern of sleep.[5] Findings indicate that sleep dispossession, as well as sleep disorders in expectant mothers, enhance the danger of occurrence of harmful gravidity outcomes, which include pregnancy-related hypertension, diabetes mellitus, preeclampsia, restricted fetus development, preterm and unintended caesarean deliveries and post-delivery depression.[6,7]

Among these sleep disturbances or disorders are obstructive sleep apnoea (OSA),[3] insomnia, excessive daytime sleepiness, respiratory disorders, non-refreshing sleep, restless legs syndrome[8] and sleep disordered breathing (SDB).[9,10] The pathogenesis of sleep disorder in pregnancy is not well understood.[1-3] Weight gain and nasal congestion may lead to snoring during pregnancy which could predispose to raised blood pressure. This may lead to the development of obstructive sleep apnoea (OSA). OSA is associated with snoring and repeated lapses in breathing that ultimately interrupt the quality of sleep.[11] This may be associated with chronic hypoxia and reduced oxygen supply to the fetus. As a result there could be fetal growth restriction, preeclampsia, gestational diabetes and increased obstetric interventions.[11,12] About 20% of women are affected by OSA. With restless leg syndrome, there is a continuous cycle of crawling sensation in the legs with the irresistible urge to move the legs which could make

falling asleep extremely difficult for these women. The symptoms are worse at rest and up to one third of women could be affected in the 3rd trimester.[11]

The management of sleep disorders in pregnancy is essentially supportive. The main principle lies in optimising sleeping position and improved sleep hygiene. Also in the case of OSA, continuous positive airway pressure (CPAP) has been found to be very helpful in severe cases. Vitamins and mineral supplements have been reported to give relief in women with restless leg syndrome. The mechanism of action in this situation is not well understood.[11]

Furthermore, studies have revealed that the incidence of SDB indications rises as pregnancy develops.[12-15] There is increasing concern about the negative impact of sleep disorders on pregnancy, labour and delivery. But with few studies on labour indices of sleep disorders and outcomes, there is urgent need for more evaluation of the entity in pregnancy, especially as some studies have highlighted racial variations on sleep pattern and overarching influence of social and occupational factors in the quest for means of livelihood.[16,17]

Subjects and methods

- **Study population**
  The study population was selected from expectant mothers attending antenatal care. These were predominantly Igbo with Yoruba, Hausa, Efik and Ibibio contributing small proportions of the population. Literacy rate is low and poverty level significant, with lowest antenatal attendance rate in the South East (SE) and the least proportion of parturients delivering under care skilled birth attendance lowest in (59%).

- **Study setting**
  The Federal Teaching Hospital Abakaliki (FETHA) is a Federal government- owned tertiary health institution established in December 2011 when the Federal government acquired the then Ebonyi State University Teaching Hospital Abakaliki and merged it with the former Federal Medical Centre, Abakaliki. Federal Teaching Hospital Abakaliki is located within the centre of the state capital. It receives referral from the general hospitals, mission hospitals and primary health centres as well as privately owned hospitals and clinics. It also receives referral from neighbouring states.

- **Study design/instrument of data collection**
  The study design is a cross-sectional study. It assessed the labour profile and pregnancy outcome of expectant mothers with self-reported sleep disorders in FETHA.

  A structured questionnaire divided into four sections (A to D) was used for this study. Section A contained socio-demographic indices (name, category of residential site, occupation, age bracket, marital status, education level, awareness of sleep disorder, self-reported status of hypertension and diabetes as well as being on sleep pattern interfering drugs) of the expectant mothers. Section B was for the assessment of the DS using ESS. Section C was for labour outcome of the expectant mothers. This section was further divided into 1, 2 and 3. Section C subsection 1 was type of labour. Section B subsection 2 was for duration of labour in hours and section C subsection 3 was for type of birth. Section D was for neonatal parameters including APGAR scores, birth weight, head circumference at birth and chest circumference at birth. This implied that the Researchers followed up the participants until delivery is achieved, while applying the departmental protocol in the management of labour and delivery. Gestational age was estimated from the last menstrual period. However, in cases where the participant is not sure of her last menstrual period, the gestational age was estimated with aid of ultrasound scan done before 20 weeks of gestation. Chest and head circumference measurements were done with non-elastic, flexible measuring tape. Chest circumference was measured at the level of the nipple during expiration while

head circumference was measured by placing the tape at the most prominent part of the forehead above the eyebrow anteriorly and above the ear laterally and the prominence on the occiput posteriorly.

In addition, social class was measured by means of the three-class description of the National Statistics Socioeconomic Classification (NSSEC). Conceptually, the NSSEC measures employment relations and conditions of occupations, thus aiming to show the structure of socio-economic positions in society.[18] The three-class version was assumed to form a hierarchy: category 1, managerial and professional occupations; category 2, intermediate occupations; and category 3, routine and manual occupations. In this study, the self-employed were included in category 2, and those who have never worked and the long-term unemployed were included in category 3.

- **Diagnostic criteria for sleep disorder**

According to Sahoo et al.,[19] one of the main symptoms of sleep disorder is daytime sleepiness (DS). Daytime sleepiness is defined as a propensity to fall asleep, notwithstanding the resolution to stay awake .[20] For this study, recruited patients were in their last trimester and are categorized as follows:
0-5: (Lower Normal Daytime Sleepiness),
6-10: (Higher Normal Daytime Sleepiness),
11-12: (Mild Excessive Daytime Sleepiness),
13-15: (Moderate Excessive Daytime Sleepiness) and;
16-24: (Severe Excessive Daytime Sleepiness)

This classification is based on Epworth Sleepiness Scale (ESS). The ESS is extensively used for the assessment of latest daytime sleepiness, with scores ranging from 0 to 24. Excessive daytime sleepiness is defined as a total score of >10.[21] ESS has been certified in first trimester pregnancy[68] and used in several last trimester sleep studies.[22,23]

- **Participants' recruitment**

During the study period, the study was introduced to all antenatal clinic attendees to sensitize them about the research. Those who met the inclusion criteria (women reporting sleep disorder in pregnancy) were recruited using a simple random sampling technique. To achieve this, an opaque bag containing equal number of papers labelled 'yes' were selected and 'no' corresponding to the number of women in attendance at the clinic was passed round to all eligible participant. Women who picked 'yes' was selected for the study and the paper replaced so that at all times, a participant had an equal chance of picking a 'yes' or 'no' paper and an equal chance of being recruited into the study. Those who picked 'no' were not selected. Participants' recruitment was continued until the total sample size was reached.

- **Study group**

Study group included women who reported study disorders based on their response to a questionnaire that was administered to all the recruited subjects.

- **Control group**

The control group included women who did not have self-reported sleep disorders. Women in the control group were matched with the their counterparts in the study group based on the parity and gestational age.

- **Inclusion criteria**

1. Booked pregnant women at a gestational age of 28 weeks or more to meet the criteria for the use ESS.
2. Singleton pregnancy.
3. Expectant mothers who consented for this study

- **Exclusion criteria**

1. Subjects that refuse to consent.
2. Unbooked expectant mothers.
3. Pregnant women who are on medication

that interfere with sleep pattern e.g. Benzodiazepines.
4. Pregnant women with unsure date.
5. Pregnant women with diabetes mellitus.
6. Pregnant women with hypertension.
7. Pregnant women with thyroid disorders.

- **Sample size determination**
  Since this study involved the comparison of two independent populations, Charan and Biswas formula was used.[24]

Minimum number of participants per group (N)
For 80% power, Z[] = 0.84
For 0.05 significance level, Zα = 1.96
r = 1 (equal number of cases and controls)
Standard deviation (SD) = 10
Difference = 5.0

$$N = \left(\frac{1+1}{1}\right)\frac{10^2(0.84+1.96)^2}{5^2}$$

$$N = (2)\frac{10^2 \times (7.84)}{5^2}$$

$$N = (2)\frac{100 \times (7.84)}{25}$$

N = 62.72
Number participants per group = 62.72 (approximately 63)

50% attrition rate was applied, and the final sample size rounded off to 94 for each arm of the study.

- **Data collection**
  The instrument of data collection was distributed to the recruited patients attending the maternity unit of the Federal teaching Hospital Abakaliki during the study period. The data collected was divided into two groups; the study and the control groups. The study group was made up of patients who present with self-reported sleep disorders based on their responses to the questionnaire using the diagnostic criteria while the control group was women who did not have self-reported sleep disorders. They were recruited at the antenatal clinic, matched for parity and gestational age with the study group. Patients were in their third trimester and had singleton pregnancy. Eighty-four women were recruited in the control group while 98 were recruited in the study group. This study lasted three months from October to December 2018.

- **Data entry and analysis**
  Data derived from this study was entered into a 2013 Microsoft excel software. This approach apart from serving as an electronic storage of the data was also used to produce chart where required. The analysis done with International Business Machine Statistical Package for Social Sciences (IBM-SPSS) version 22, 2013. Descriptive statistics was used for socio-demographic characteristics. Mean ± Standard deviation (SD) was used to represent continuous variables data. Analysis of variance (ANOVA) was used for comparison of continuous variable. Chi square test (X2) was used to test for association between study and control groups. Statistical significance was at p-value of <0.05.

- **Ethical Consideration**
  Ethical approval for this study was obtained from the ethics and research committee of the AE-FUTHA, Ebonyi State. FETHA/REC/VOL 2/2018/067.

Results

One hundred and eighty two (182) participants were recruited into this study, 84 in the control group while the study group had ninety-eight (98). There was no statistically significant difference in the socio-demographic characteristics, gestational age and pregnancy outcomes between women in the study and control groups. (Tables 1,2,3).

The frequency of vaginal delivery, caesarean section, induction/augmentation of labour and instrumental delivery in women with sleep disorders were respectively 30.2%, 11.0%, 12.1% and

0.5%as against 20.9%, 9.3%, 15.9% and 0.0% respectively reported for women in the control group.

Although in terms of absolute value, more women in the control groups had longer duration of labour in first and second stages but this was not statistically significant (Table 4).

No statistically significant difference was observed in birth weight, APGAR scores at 1st minute and APGAR score at 5th minute, chest circumference and length of the baby at birth between the study and control groups. However, there was a statistically significant difference in the head circumference of babies born by women in the study group compared to the control group (34.1±1.7 versus 34.7±1.6, p 0.03), Table 5.

Table 1: Socio-demographic characteristics of the participants

	Control Group		Study Group		Total			
	N	%	N	%	N	%	χ2	P-value
Occupation								
Married	83	45.6	95	52.2	178	97.8	1.74	0.42
Separated	0	0.0	2	1.1	2	1.1		
Single	1	0.5	1	0.5	2	1.1		
Educational status								
Primary	1	0.5	0	0.0	1	0.5	1.20	0.55
Secondary	16	8.8	18	9.9	34	18.7		
Tertiary	67	36.8	80	44.0	147	80.8		
Age bracket								
≤19	1	0.5	0	0.0	1	0.5	4.81	0.44
20-24	8	4.4	8	4.4	16	8.8		
25-29	31	17	34	18.7	65	35.7		
30-34	27	14.8	41	22.5	68	37.4		
35-39	13	7.1	14	7.7	27	14.8		
≥40	4	2.2	1	0.5	5	2.7		

Table 2: Indicating the Social Class of the Participants

	Control Group	Study Group	Total		
	N (%)	N (%)	N (%)	χ2	P-value
Category I	26 (14.3)	26 (14.3)	52 (28.6)	0.530	0.676
Category II	33 (18.1)	39 (21.4)	72 (39.6)		
Category III	25 (13.7)	33 (18.1)	58 (31.9)		

Table 3: Comparison of Gestational Age

Parameters	Control Group N (%)	Study Group N (%)	$\chi 2$	P-value
GA at Delivery				
≤ 34	0 (0)	0 (0)	0.525	0.91
35 - 36^{+6}	6 (3.3)	5 (2.8)		
37 - 37^{+6}	8 (4.4)	8 (4.4)		
38 - 39^{+6}	40 (22.1)	50 (27.6)		
40^{+1} - 41^{+6}	29 (16.0)	35 (19.3)		

Table 4: Labour profile/outcomes

Type of Labour	Control Group (%)	Study Group (%)	$\chi 2$	P-value
Spontaneous	38 (20.9)	55 (30.2)		
Induction/ Stimulation	12 (6.6)	12 (6.6)		
Augmentation	5 (2.7)	10 (5.5)	6.388	0.172
Caesearan section	29 (15.9)	20 (11.0)		
Instrumental delivery	0 (0.0)	1 (0.5)		
Duration of Labour	**Mean ± SD**	**Mean ± SD**	**F**	
Duration of first stage labour (in minutes)	392.73±114.49	379.74±129.94	0.352	0.55
Duration of second stage labour (in minutes)	13.54±13.01	10.53±8.26	2.643	0.11

Table 5: Neonatal Outcomes

Fetal Outcome	Control Group (%)	Study Group (%)	$\chi 2$	P-value
Weight at birth (kg)				
< 2.5	7 (3.8)	7 (3.8)		
2.5-3.99	73 (40.1)	90 (49.5)		
≥ 4.0	4 (2.2)	1 (0.5)	2.511	0.29
APGAR score 1st minute				
< 7	7 (3.8)	5 (2.7)		
≥ 7	77 (42.3)	93 (51.1)	0.767	0.38
APGAR score 5th minute				
< 7	0 (0.0)	1 (0.5)		
≥ 7	84 (46.2)	97 (53.3)	0.862	0.35
	Mean ± SD	**Mean ± SD**	**F**	
Head circumference at birth	34.67±1.55	34.13±1.69	4.858	0.03
Chest circumference at birth	33.69±1.74	33.48±1.65	0.704	0.40
Length of the baby at birth	48.71±2.53	48.84±2.76	0.096	0.76

Discussion

The socio-demographic indices of occupation, marital status, age and educational attainment had no statistically significant association with daytime sleepiness. This implies that the type of sleep disorders evaluated by Epworth is not influenced by any of the socio-demographic features. This same observation was reported irrespective of the woman's social class. This goes to show that the mechanism of sleep disorders in pregnancy is not clearly understood. Why some women are prone to this condition while others are not remains an area of research.[6-8]

Daytime sleepiness (EDS) showed no statistically significant association with labour outcome. In the general context of sleep disorder, this current study is not consistent with findings by Wangel et al.,[25] and Lee and Gay[26] who reported statistically significant association between daytime sleepiness and adverse outcome in labour. This may be due to the differences in study methodology. For instance, while we evaluated sleep disorders using Epworth sleepiness scale, Wangel et al.,[25] and Lee et al[26] evaluated sleep time and quality in their methodology. Bartha et al,[27] Romero et al[28] and Freeman et al[29] reported IUGR and preterm birth in women with sleep disorder but this present study found statistically significant difference in head circumference of the neonates of women with daytime sleep disorders. We are unable to comment on the causality.

In terms of absolute numbers, women in the study group had rates of 30.2%, 6.6%, 5.5% and 0.5% respectively for spontaneous labour, induction of labour, augmentation of labour and instrumental delivery, which was higher than rates for women in the control group with rates of 20.9, 6.6, 2.7 and 0.0% respectively. A lower proportion of women with daytime sleepiness had emergency Caesarean section (11%) compared to women in the control group with 15% having emergency Caesarean section. This finding contrasts with the report by Chen et al.,[30] wherein they found that 50% of women with obstructive sleep apnoea underwent Caesarean delivery.

Comparing the duration of labour between the study and control groups, there was an overall shorter duration of labour among women in the study group compared to the control group.

There was no statistically significant difference observed in weight at birth, APGAR score at 1st minute and APGAR score at 5th minute, chest circumference and length of the baby at birth. This is consistent with the findings of Osaikhuwuomwan et al.[31] However, there was a statistically significant difference in the head circumference at birth between neonates of women who reported daytime sleepiness compared to the control group. The reason for this finding is not immediately clear.

In conclusion, we found that self-reported daytime sleepiness did not result in any significant adverse outcome for the study group compared with the control group, although the babies of subjects with self-reported daytime sleepiness had significantly smaller head circumference, a finding for which there is no apparent reason. There is need for further research into the impact of daytime sleepiness pregnancy and labour outcome as this study did not find an adverse effect of daytime sleepiness on pregnancy, labour and delivery.

Limitation of the study

This study is limited by the fact that it was a hospital-based study with small population. Our findings might not reflect the general population. Our data was equally based on self-reported sleep disorder which was not scientifically validated.

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Conflict of interest. We declare none

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