GLOBAL JOURNAL OF MEDICINE AND PUBLIC HEALTH

Prevalence of obstructive sleep apnea in pregnancy: A hospital based study

M Ismail [1], *Raj Kumar* [2], *T Masood* [*3], *G Hassan* [4], *Shalini* [2]

ABSTRACT

Objective

To assess the prevalence of obstructive sleep apnea among the hospitalized pregnant females at a tertiary care center.

Methods

A prospective, hospital-based study involving 1000 pregnant women in the age group of 18-45 years (mean 28.12+4.07 years). Diagnostic possibility of obstructive sleep apnea (OSA) was established on the basis of Berlin Questionnaire and Epworth Sleepiness Score. Random blood sugar estimation was done in every subject of the study group in addition to the baseline demographic profile.

Results

Major portion of the study group belonged to elderly age group (mean 28-12+4.07 years). Body mass index was more in subjects having OSA as evidenced by the Berlin Questionnaire and Epworth Sleepiness score. Again arterial blood pressure (146.82+12.48mmHg) was more associated with subjects having OSA that was statistically highly significant (p < 0.001).

Conclusion: A significant proportion (13.4%) of pregnant females in our study are at high risk for OSA. Keeping in view the importance of sleep disordered breathing in causing adverse maternal and fetal outcomes, as well as the mortality risk from anesthesia for cesarean section, we strongly recommend screening of all pregnant females for the presence of OSA so that treatment at the appropriate time period of pregnancy may improve the maternal and fetal outcome.

GJMEDPH 2015; Vol. 4, issue 5

[1]Assistant Professor, Post Graduate Department of Medicine, Government Medical College, Srinagar, Jammu and Kashmir, India

[2]Post Graduate Scholar, Post Graduate Department of Medicine, Government Medical College, Srinagar, Jammu and Kashmir, India

[3]Professor, Post Graduate Department of Medicine, Government Medical College, Srinagar, Jammu and Kashmir, India

[4]Lecturer, Post Graduate Department of Medicine, Government Medical College, Srinagar, Jammu and Kashmir, India

***Corresponding Author:**
Masood Tanvir
Professor
Department of Medicine, Government Medical College, Srinagar

Conflict of Interest—none

Funding—none

Keywords: Pregnancy, Sleep, Obstructive Sleep Apnea, Berlin Questionnaire, Epworth Sleepiness Score, Hypertension

INTRODUCTION

Obstructive sleep apnea (OSA), a common sleep-related breathing disorder, is characterized by collapse of upper airway during sleep, leading to intermittent episodes of decrease in air flow (hypopnea) or cessation of airflow for 10 seconds or more (apnea) leading to fall of arterial oxygen, saturation[1] that leads to pathogenesis of variety of illnesses including cardiovascular consequences and gestational diabetes.[2-4] Pregnant females have smaller mean pharyngeal areas compared to postpartum state, seated in supine and lateral postures, that could be more contributory to the occurrence of sleep apnea in pregnant state.[1] In particular, OSA affects sleep quality and duration of sleep in pregnant women.[5] There exists a great concern of public health importance that the presence of OSA in pregnancy has revealed adverse effects on maternal and fetal outcomes.[6,7] The main

adverse entities include low birth weight[8], pre-eclamptic toxemia[9,10] pre-term birth[11], small for gestational age-babies[12], low Apgar score at birth[13,14], increased need for cesarean section[15], pulmonary hypertension[16], and, exploration of many more adverse outcomes is yet to come.

To study the spectrum of adverse outcomes in pregnant women in our set up formed the basis of present research work. To our knowledge, this is the first study of its kind in Jammu and Kashmir state of India.

METHODOLOGY

This prospective, hospital-based study was conducted at the Department of Gynaecology and Obstetrics of the Government Medical College Srinagar from April 2012 to February 2015. 1000 pregnant females in the age group of 18 to 45 (mean 28.12±4.07) years. Each pregnant women completed two questionnaires namely "Berlin Questionnaire" and "Epworth Sleepiness Score", - the well validated screening tools used by previous studies as well.[17,18] Beyond personal information data, details of demographic parameters including height, weight, body mass index (BMI), neck circumference and blood pressure were recorded in the prescribed proforma, and general clinical examination was performed on every patient.

On the basis of Berlin Questionnaire (BQ), the subjects were categorized into two groups: "high risk group" if two or more criteria were positive and "low risk group" in case of one or no category with positive score. Epworth Sleepiness Score (ESS) classified subjects into three groups on the basis of score: < 10, normal; ≥ 10, sleepy; and ≥ 18, very sleepy. Those subjects, who refused to furnish valid consent, those giving incomplete information, or refused clinical examination, were excluded from the study. Random plasma glucose estimation was done in studied subjects. Polysomnography – the gold standard diagnostic tool for sleep disorders was not performed on any subject of the study group.

STATISTICAL ANALYSIS

Data obtained was statistically analyzed using Statistical Package for Social Sciences (SPSS – 16) and Microsoft Excel. The data was analyzed with the help of descriptive statistics viz. mean, standard deviation (SD), percentage statistics and presented by bar and pie diagrams for quantitative data. Students 't' test was applied, and p value of < 0.05 was considered statistically significant.

RESULTS

Majority (41.7%) of subjects in the study group belonged to the age group 25-29 years (mean±SD 2.8.12±4.07), although small proportion (6.1%) where in the age range of 18-20 years (all primigravidae) because of custom of early-age marriage in rural community of Kashmir valley. Remaining of the patients were both primi- and multigravida, in different trimesters of pregnancy. As per the Berlin questionnaire, 134 (13.4%) women were high risk category for OA, whereas Epworth Sleepiness Score (ESS) demonstrated 120 (12%) women sleepy with score of ≥ 10, and only 19 (1.9%) subjects were very sleepy with ESS score of ≥ 18. BMI (31.45±4.130) was more in patients having evidence of OSA by the BQ and ESS that showed very high statistical significance (p < 0.001). Again, blood pressure (146.82±12.48mmHg) more commonly found in 134 (13.4%) patients with high score of BQ and ESS, carrying high statistical significance (p < 0.001). Mean neck circumference among pregnant women in high risk group was 17.01±0.427 inches compared to those with low risk group. This finding again proved statistically highly significant (p < 0.001).

One more striking observation was that random plasma glucose was in diabetic range (145.04±51.63mmHg) in 13% women, having high risk of OSA as per evaluation by the BQ and ESS, again of high statistical significance (p < 0.001). Comparison of BQ and ESS in our study showed that both evaluation tools are almost equally effective for screening of subjects at high risk of OSA.

DISCUSSIONS

We have found 13.4% prevalence of OSA among both obese and non-obese pregnant women, and the same is consistent with previously published studies[18-20] as well. The prevalence of OSA during pregnancy is not known because prospective large population based epidemiological studies addressing

this issue are not yet available. The first reported case series dates back to 1978 when Joel-Cohen and Schoenfeld reported 3 cases of pregnant women having clinical diagnosis of OSA with no maternal complication, but intra-uterine growth retardation in one.[21] Since then several prospective studies have appeared in literature. The relationship between pregnancy and sleep disordered breathing is complex. Paradoxically, pregnancy leads to physical and biochemical changes that lead to increased risk of sleep apnea.[6,7] Pregnancy cause anatomic, physiological and endocrinologic changes, including narrowing of the upper respiratory tract that can increase the risk of OSA or can even worsen pre-existing sleep apnea.[1,7,10] Advanced maternal age group has been found to be more involved with the risk of development of OSA in our study. In a similar way, the study conducted by Mahbouli B and co-workers demonstrated that higher age group females are at increased risk for the development of OSA.[22] Again, Ip MS and co-authors from Hong Kong found 12-fold increased risk of OSA among women from fourth to sixth decade.[23] Our study demonstrated that pregnant female with increased BMI are more at risk, compared to those whose BMI was on lower side. Similar results were found in prospective observational study of Louis and co-workers. They described the possible risk factor and outcomes of OSA among obese females with BMI over 30kg/m^2 with a linear relationship of high statistical significance.[19] Obesity is a major risk factor for sleep apnea in general, and increase of body weight is associated with occurrence of OSA.[24] Increased neck circumference and narrowed upper airway lumen is additional factor for OSA,[1,11] as has been demonstrated by our study as well.

Our study revealed high blood pressure more prevalent in high risk group of OSA that was statistically highly significant. Same was the observation in the study of 759 women by Yi-Haun Chen and co-workers. They found that gestational hypertension in pregnant women with OSA was 6.7% higher compared to the non-OSA pregnant group, that was statistically highly significant.[25]

Our study demonstrated statistically significant occurrence of gestation diabetes amongst the study group at high risk for OSA. Similarly several studies have come up recently favoring the same fact, one prominent study being recently published in 2012 by Bourjeily and co-authors.[26] Although there are several studies that have demonstrated adverse outcomes in pregnancy, however, fetal outcomes of OSA during pregnancy have not been fully investigated, including intrauterine growth retardation. It has been hypothesized that intermittent hypoxemia during pregnancy result in placental ischemia with adverse effects on fetal growth.[27] During the present study we have not been able to follow the pregnant women with high risk for maternal and fetal outcome. This needs large sample study to be followed longitudinally. The main limitation in the present study is that we have established the high risk population of pregnant women with OSA on the basis of Berlin and ESS questionnaires, used by previous studies as well,[17,18] but these offer only preliminary evidence of the possible relationship between OSA and fetal adverse outcomes, although polysomnography is the gold standard for the diagnosis of OSA,[19,23,28] but time and expense limitations made us to rely on the above mentioned validated screening tools.

CONCLUSION

We conclude that keeping in view the previously studied complications of pregnancy with OSA, and need of longitudinal follow up of the offsprings, it needs large sample populations studies in future. Also the specific diagnosis of sleep disorders in pregnancy using polysomnography is strongly stressed upon; and the investigation needs to be made mandatory for every pregnant women in the interest of improved maternal and fetal outcome.

Table (1) shows the experience of the judges (examiners) who participated in the (MAM). It ranged from 25-50 years (mean 35 years); 7(43.7%) and 9(56.3%) had an experience of 25-35 and >35 years respectively.

REFERENCES

1. Izci B, Vennelle M, Listow WA, Dundas KC, Calder AA, Doughlas NT. Sleep-dosordered breathing and upper airway size in pregnancy and post-partum. Eur Respir J 2006; 27: 321-327.
2. Louis JM, Auckley D, Sokol RJ, Mercer BM. Maternal and neonatal morbidities associated with obstructive sleep apnea complicating pregnancy. Am J Obstet Gynecol 2010; 202: 261.e1-5.
3. Al Lawati NM, Patel SR, Ayas NT. Epidemiology, risk factors and consequences of obstructive sleep apnea, and short sleep duration. Prog Cardiovasc Dis 2009; 51: 285-293.
4. Olivarez SA, Maheshwari B, McCarthy M, et al. Prospective trial on obstructive sleep apnea in pregnancy and fetal heart rate monitoring. Am J Obstet Gynecol 2010; 202: 552: e1-7.
5. Mindell JA, Jacobson BJ. Sleep disturbances during pregnancy. J Obstet Gynecol Neonataol Nurs 2000; 29: 590-597.
6. Edwards N, Middleton PG, Blyton DM, et al. Sleep disordered breathing and pregnancy. Thorax 2002; 57: 558-561.
7. Pien GW, Schwab RJ. Sleep disorders in pregnancy. Sleep 2004; 27(7): 1405-1417.
8. Sahin FK, Koken G, Cosar E, et al. Obstructive sleep apnea in pregnancy and foetal outcomes. Int J Gynecol Obstet 2008; 100: 141-146.
9. Yinon D, Lowenstein L, Suraya S, et al. Pre-eclamptic toxemia is associated with sleep disordered breathing and endothelial dysfunction. Eur Respir J 2006; 27: 328-333.
10. Venkata C, Venkateshiah SB. Sleep disordered breathing during pregnancy. J Am Board Fam Med 2009; 22: 158-168.
11. Kapsimalis F, Kryger M. Sleep breathing disorders in the US female population. J Women Health 2009; 18: 1211-1219.
12. Roush SF, Bell L. Obstructive sleep apnea in pregnancy. J Am Board Fam Pract 2004; 17: 292-295.
13. Champagne KA, Kirnoff RJ, Barriga PC, Schwartzman K. Sleep disordered breathing in women of child bearing age and during pregnancy. Indian J Med Res 2010; 131: 285-301.
14. Lin CM, Lee PC, Teng SW, Lu TH, Mao IF, Li CY. Validation of the Taiwan birth registry using obstetric records. J Formos Med Assoc 2004; 103: 297-301.
15. Louis JM, Auckley D, Sokol RJ, Mercer BM. Maternal and neonatal morbidities associated with obstructive sleep apnea complicating pregnancy. Am J Obstet Gynecol 2010; 202: 261.e1-5.
16. Sherer DM, Caverly CB, Abramowicz JS. Obstructive sleep apnea during pregnancy resulting in pulmonary hypertension. South Med J 1988; 91(8): 761-762.
17. Facco FL, Kramer J, Ho KH, Zee PC, Grobman WA. Sleep disturbances in pregnancy. Obstet Gynecol 2010; 115(1): 77-83.
18. Olivarez SA. Obstructive sleep apnea screening in pregnancy: perinatal outcomes, and impact of maternal obesity. Am J Perinatal 2011; 28(8): 651-658.
19. Louis J, Auckley D, Miladinovic B, et al. perinatal outcomes associated with obstructive sleep apnea in obese pregnant women. Obstet Gynecol 2012; 120(5): 1-9.
20. Sahin FK, Koken G, Cosar E, et al. Obstructive sleep apnea in pregnancy and fetal outcome. Int J Gynecol Obstet 2008; 100(2): 141-146.
21. Joel-Cohen SJ, Schoenfeld A. Fetal response to periodic sleep apnea: a new syndrome in obstetrics. Eur J Obstet Gynecol Reprod Biol 1978; 8(2): 77-81.
22. Bassam Mahbouh, Basil Safarainni, Hassan Alharii, Myank Vats. Sleep breathing disorders in female population of Dubai, UAE. Health 2013; 5(12): 2091-2096.
23. Ip MS, Lam B, Tang LC, et al. A community study of sleep disordered breathing in middle aged Chinese women in Hong Kong: prevalence and gender differences. Chest 2004; 125(1): 127-134.
24. Young T, Peppard PE, Gotlieb PJ. Epidemiology of obstructive sleep apnea: a population health perspective. Am J Respir Crit Care Med 2002; 165: 1217-1239.

25. Chen YH, Kang JH, Lin CC, Wang IT, Keller JJ, Lin HC. Obstructive sleep apnea and risk of adverse pregnancy outcomes. Am J Obstet Gynecol 2012; 206: 136-e.1-5.
26. Bourjeily G, Barbara N, Lasson L, He M. Clinical manifestations of obstructive sleep apnea in pregnancy: more than snoring and witnessed apneas. J Obstet Gynecol 2012; 32(5): 434-441.
27. Schoenfeld A, Quadia Y, Neri Y, et al. Obstructive sleep apnea (OSA) – implications in maternal – fetal medicine: a hypothesis. Med Hypothesis 1989; 30(1): 51-4.
28. Prasad CN. Obstructive sleep apnea hyponea syndrome: Indian scenario. Perpsective Med Res 2013; 1(1): 22-25.