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ORIGINAL RESEARCH

Prevalence of snoring in pregnancy induced hypertensive women and its maternal and fetal outcome

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Abstract

Background: Pregnancy-related hypertensive diseases account for a significant portion of maternal and newborn morbidity and have a yearly treatment budget of billions of dollars. A growing body of research using cross-sectional studies shows a link between pregnancy-related hypertension and sleep disordered breathing. The link between SDB and hypertension is especially important during pregnancy since these morbidities have a significant negative impact on both the mother's and the fetus's health.

Aim: i) To find out the prevalence of snoring in patients with pregnancy induced hypertension

ii) To observe the effect of snoring on maternal and fetal outcomes.

Methods and materials: Pregnant women in their third trimester were recruited from Kamla Raja Hospital who attended the OPD and were assessed for the presence and duration of habitual snoring, an established marker for sleep-disordered breathing. Pre-eclampsia and gestational hypertension were clinically diagnosed.After informed consent, a structured questionnaire (including several variables of interest) was filled and analysed after the end of the study.

Results: In the third trimester, 35.2% of women reported snoring; 67.1 percent were non-snorers both before becoming pregnant and during the third trimester; 25.2% began snoring during pregnancy; and 9.2% experienced chronic snoring. Snorers in general and those who started snoring during pregnancy in particular were more likely than non-snorers to have chronic hypertension, prenatal hypertension, and pre-eclampsia. In contrast, although snorers were more likely than non-snorers to have gestational hypertension, subsequent investigation showed that it was chronic, rather than pregnancy-onset, snorers, who appeared to be the driving force behind this association.

Conclusion: Pre-eclampsia and prenatal hypertension are both strongly associated with snoring during pregnancy. Simple screening of pregnant women may have clinical value due to the considerable morbidity and healthcare expenditures associated with hypertensive disorders of pregnancy.

Keywords: Snoring, pregnancy induced hypertensio

Introduction

Sleep-disordered breathing, which encompasses a variety of irregular breathing patterns while you're asleep, from persistent snoring to obstructive sleep apnea, is widespread yet frequently goes misdiagnosed, especially in women. Weight gain encourages SDB, and

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surprisingly, a weight gain of just 10% has been linked to a 6-fold increase in the occurrence of major SDB. Given that most women gain more than 10% of their body weight during pregnancy, this discovery is particularly pertinent. The defining symptom of SDB, habitual snoring, worsens during pregnancy and is more prevalent in pre-eclampsia.[1,2]

Untreated SDB has significant and intricate cardiovascular effects. An independent relationship between SDB and cardiovascular illness, particularly hypertension, has been demonstrated by a number of sizable population-based investigations, including the Sleep Heart Health Study and the Wisconsin Sleep Cohort Study.Independent of age or body mass index, the Nurses Health Study discovered that snoring increased the incidence of incident hypertension (BMI). Sympathetic overactivity, inflammation, and endothelial dysfunction are likely some of the multiple factors that contribute to the relationship between SDB and cardiovascular disease.[3]

Pregnancy-related hypertensive diseases account for a significant portion of maternal and newborn morbidity and have a yearly treatment budget of billions of dollars. A growing body of research using cross-sectional studies shows a link between pregnancy-related hypertension and sleep disordered breathing. The link between SDB and hypertension is especially important during pregnancy since these morbidities have a significant negative impact on both the mother's and the fetus's health. Furthermore, fresh onset SDB during pregnancy may have more detrimental effects on health than chronic SDB because cardiovascular systems may have more time to adjust.[4]

The health of mothers and babies may be improved if some pregnancy-specific vulnerabilities are better understood. In this study, the prevalence and incidence of snoring during pregnancy were determined, and correlations with maternal health were looked at. We predicted that snoring, particularly pregnancy-onset snoring as opposed to persistent snoring, would be linked to pre-eclampsia, and gestational hypertension.

Materials and Methods

This study was conducted at the Kamla Raj Hospital in the department of gynecology and Obstetrics. 100 pregnant woman recruited for this study. It was a prospective cross- sectional study. It was carried out during Dec 2019 toMay 2020.

Inclusion criteria

Study group: 50 pregnant women with pregnancy induced hypertension more than 28 weeks in the age group 18-35 years.

Control group: 50 normal pregnant women of 28 weeks gestation in the age group 18-35 years.

Exclusion criteria

1. Women with chronic respiratory disease.
2. Women with other underlying chronic disease as diabetes mellitus, renal disease, liver disease, essential hypertension, heart disease.
3. Women with current upper airway and respiratory infection.

The right to view medical records was granted with written informed consent. A questionnaire was given to expectant mothers asking if they snored regularly and if they ever "stopped breathing or struggled for air." They were also questioned about any complaints made by their bedmates. At least three to four snores for at least 3 nights/week were considered habitual. They were also questioned about any complaints made by their bedmates. Snoring at least three to four times a week was considered to be habitual snoring.

Women who "stopped breathing or gasped for air" at least 3–4 times per week were considered to have seen apneas, which were also determined to be present. To find event

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cases, it was necessary to ask about the timing of snoring. When habitual snoring started during pregnancy, it was deemed to be present. Snoring that occurs regularly both before and during pregnancy was referred to as chronic snoring. For a variety of reasons, a single snoring-related question was chosen rather than a multi-item SDB questionnaire. The overnight polysomnogram (PSG)-derived apnea/hypopnea index (AHI, number of apneic events per hour of sleep) is strongly and consistently correlated with a single question; in women, a report of "often" or "usually" The majority of SDB have an emphasis on weight, which will inevitably be high during pregnancy; other scales rely on gender or hypertensive state.

The mother's self-reported height and weight right before conception were used to determine her BMI, which was then compared to her actual BMI from the first obstetric appointment in the first trimester. Clinical visits provided serial weights throughout the pregnancy, and after birth, the overall weight gain was computed. Demographics, prior or family history of pregnant hypertension or pre-eclampsia, smoking status, and the existence of a diagnosis of chronic hypertension, gestational hypertension or pre-eclampsia were important factors extracted from medical records. The International Classification of Diseases, 9th edition, was used to code the latter diagnoses (ICD-9). STROBE's (Strengthening the Reporting of Observational Studies in Epidemiology) reporting requirements were adhered to while publishing this study..

Statistical analysis

With SPSS version 20, statistical analysis was carried out. The results are shown as a mean and a standard deviation. One way ANOVA was used to analyse the mean difference between the groups, and a p value of less than 0.05 was regarded as statistically significant.

Table 1: Comparison between pregnant women with and without snoring

	Snoring	**Chronic Snoring**	**Pregnancy-Onset Snoring**	**Non-Snoring**
Age (years)	31.4 ±6.1	30.8 ±7.3	31.7±6.9	30.5±6.9
Women ≥35 years (%)	25.7%	26.5%	26.6%	21.3%
Baseline BMI (kg/m^2)	31.4 ±9.7	32.8 ± 10.3	29.6±9.4	26.0±7.2
Obese (%)	38.9%	53.2%	33.9%	20.4%
3rd trimester BMI (kg/m^2)	38.6±7.1	36.7±9.6	37.6 ±8.9	30.1±7.3
Exceeded IOM weight gain (%)	46.2%	35.6%	49.8%	36.2%
Gravidity	2.8±1.8	3.1 ±1.3	2.8 ±1.9	2.7±1.8
Parity	0.9±1.2	1.1±1.2	0.9±1.3	0.9±1.3
Chronic Hypertension (%)	17.5%	21.1%	16.5%	7.9%
Gestational Hypertension (%)	9.9%	7.6%	11.7%	4.6%

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In the third trimester, 35.2% of women reported snoring; 67.1 percent were non-snorers both before becoming pregnant and during the third trimester; 25.2% began snoring during pregnancy; and 9.2% experienced chronic snoring. Snorers in general and those who started snoring during pregnancy in particular were more likely than non-snorers to have chronic hypertension, prenatal hypertension, and pre-eclampsia. In contrast, although snorers were more likely than non-snorers to have gestational diabetes, subsequent investigation showed that it was chronic, rather than pregnancy-onset, snorers, who appeared to be the driving force behind this association. (Table 1)

Pregnancy-onset snoring was independently linked with gestational hypertension (p=0.004) and pre-eclampsia (p=0.003) in unadjusted models, but not with chronic snoring. Pregnancy-onset snoring, but not chronic snoring, was independently associated with gestational hypertension, but neither was chronic snoring, according to a logistic regression model that controlled for potential covariates (maternal age, race, pre-pregnancy BMI, weight gain in excess of IOM recommendations, gravidity, smoking, education level, prior or family history of gestational hypertension or pre-eclampsia). In this model, going above the recommended weight increase was independently related with gestational hypertension, but not pre-pregnancy BMI, with a p-value of 0.001. (Table 2)

Table 2: Regression of gestational hypertension against snoring and other covariates

	Explanatory Variables			**Adjusted Odds Ratio (95%CI)**	
	Beta	**SE**	**p-value**		
Pregnancy-onset snoring	0.959	0.338	<0.004	2.46	1.58–3.87
Chronic snoring	0.652	0.494	0.268	1.82	0.90–3.81
Pre-pregnancy BMI	0.007	0.027	0.970	2.00	0.87–1.14
Excessive weight gain	0.995	0.237	<0.004	2.79	1.82–4.29
Maternal Age	0.001	0.001	0.909	1.11	1.11–1.11
Gravida	−0.355	0.093	0.003	0.79	0.67–0.92
History of GHTN/Pre-E	1.245	0.469	0.003	3.22	1.61–6.51
Family History of GHTN/Pre-E	0.92	1.251	0.707	1.91	0.18–18.23

Discussion

This is the prospective study to show that snoring that starts during pregnancy puts the mother's cardiovascular health at serious danger. These groundbreaking discoveries strongly suggest a connection between pre-eclampsia and gestational hypertension as well as pregnancy-onset snoring and snoring in general. Furthermore, the PAR percent indicates that if snoring is a contributing factor in maternal hypertension, treating snoring and any associated SDB may help 12–19% of pregnant women who have hypertensive problems. The evidence, on the other hand, did not point to a separate function for snoring in gestational diabetes.[5]

Notably, it was discovered that weight gain over IOM recommendations—rather than pre-pregnancy BMI—played an independent impact in gestational hypertension. Excessive weight gain and pre-pregnancy BMI were both independent predictors of pre-eclampsia. This is the study to demonstrate the independent link between excessive weight gain and cardiovascular outcomes, despite the fact that it is a known risk factor for postpartum weight

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retention. This groundbreaking discovery may have significant effects on therapeutic treatment.[6]

Our results confirm and expand prior findings that snoring frequency rises throughout pregnancy, reaches a peak in the third trimester, and poses a risk for hypertension. The effect of incidental habitual snoring on maternal outcomes, however, was not examined in any of the earlier research. In comparison to non-pregnant women, 14–23% of pregnant women routinely snore, according to earlier studies; however, most recent estimates point to a far larger percentage especiallyin pre-eclampsia.[7] There are a few possible explanations for the lower frequency in older research, including the fact that only women who delivered vaginally and went to low risk clinics were included and that obesity was relatively uncommon in some regions.

Interesting preliminary data point to a relationship between new snoring and greater erythropoesis during pregnancy, which in turn is related to higher quantities of nucleated red blood cells in the umbilical cord. Erythropoesis takes place when there is hypoxia, and increased numbers are linked to diseases such uterine growth limitation and maternal hypertension. Together with our own research, these results point to snoring that starts during pregnancy as a special health risk.[8]

We found no connection between snoring and gestational diabetes, in contrast to recent studies. This variation may be partially explained by various techniques, such as the recruitment of postpartum women, the scarcity of women with the relevant variable, and the ignorance of pre-pregnancy BMI data. Nevertheless, further research is needed to fully understand how sleep affects the regulation of glucose during pregnancy.

The molecular mechanisms for pre-eclampsia include endothelial dysfunction, oxidative stress, and inflammation, with obesity being a significant risk factor. However, the pathophysiology of pre-eclampsia is not fully understood. The pathogenic process most likely starts in the placenta in the first trimester of pregnancy with aberrant implantation and vasculature development.[9] This causes oxidative stress and inflammation, which produce anti-angiogenic factors and cause widespread endothelial dysfunction. The biological pathways for pre-eclampsia and the mechanisms of sleep disruption are strikingly similar. There is strong evidence for oxidative stress, inflammation, sympathetic nervous system activation, endothelial dysfunction, dyslipidemia, and obesity as major contributors to the pathophysiology of cardiovascular morbidity in SDB. Recently, these common mechanistic pathways have been reviewed.Given these overlapping risk factors, it may come as a surprise that pregnancy-onset snoring, but not persistent snoring, was linked to gestational hypertension and pre-eclampsia.[10,11]

Although this may not fully explain our findings given that the majority of women with pregnancy-onset snoring began in their second or third trimesters, sleep disruption and the ensuing inflammatory cascade in early pregnancy may interfere with normal placental implantation. However, it's still possible that snoring that starts during pregnancy can worsen underlying inflammatory processes and cardiovascular problems.[12] Another idea is that SDB is encouraged to manifest by fluid changes or inflammation. Preliminary studies, however, indicate that treating SDB during pregnancy may lower blood pressure, indicating that SDB is more likely to produce hypertensive disease than it is to arise from it or from a third process that also causes SDB.[13]

It's probable that some recollection bias affected how long people snore. Despite the prospective nature of the data, it's possible that women were less aware of their pre-pregnancy snoring. Another drawback is the temporal correlation between the development of snoring and the time of a diagnosis of gestational diabetes, gestational hypertension, or pre-eclampsia. Although the direction of this relationship cannot be proven, the data strongly implies an independent association.

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Conclusion

In conclusion, gestational hypertension and pre-eclampsia are independently related with pregnancy-onset snoring rather than persistent snoring. In busy clinical settings, two straightforward questions about snoring and the timing of its onset could be a useful tactic to help identify pregnant women who are at high risk for hypertensive problems instead of a multi-item composite SDB test.

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