Epidemiology of adult obstructive sleep apnoea syndrome in India

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There is a paucity of published Indian studies on the prevalence and risk factors of obstructive sleep apnoea (OSA) in adults. The limited published literature, however, does not suggest significant differences in the prevalence and risk factors for OSA and obstructive sleep apnoea syndrome (OSAS) as compared to western studies. Well designed studies are required from all parts of India. Patients should be screened carefully before referring them to costly investigations such as overnight polysomnography. With the background of increasing urbanization, fast growing economy and changes in lifestyle, India will have an epidemic of obesity. Therefore, future studies on the association of OSA and metabolic syndrome should carefully evaluate confounding effect of obesity on metabolic abnormalities in patients with OSA.

Key words Obesity - obstructive sleep apnoea - OSAS - prevalence - risk factors

In India, the obesity epidemic will propel obstructive sleep apnoea syndrome (OSAS) to an increasingly important public health issue over the next few years. The future areas of sleep research in our country will have to focus on the cause and effect relationship of OSAS with obesity related co-morbid diseases like type 2 diabetes mellitus, coronary artery disease, congestive heart failure, hypertension, chronic kidney disease, dyslipidaemias and metabolic syndrome as applicable to the Indian population.

In a resource limited setting like India, there is a paucity of health care facilities with multi-channel polysomnography equipment, thereby further limiting the evaluation of OSAS patients. In spite of the constraints, researchers in India and its neighbouring countries in the last decade have made a preliminary attempt to study OSAS and co-morbid conditions.

Prevalence in Indian subcontinent

In 2006, a population-based survey from north India had estimated the prevalence of OSAS at 3.6 per cent (males and females being 4.9 and 2.1% respectively). The prevalence of OSA in the same study was 13.7 per cent. However, this prevalence study was conducted in a semi-urban Indian population with a small sample size without adequately studying different socio-economic strata.

In India, no epidemiological research can be representative of its population until it includes subjects with diverse economic background. Recently, prevalence and risk factors of OSAS in different socio-economic classes in an urban Indian population have been reported from South Delhi. The authors observed a prevalence of OSA to be 9.3 per cent and OSAS to be 2.8 per cent. The prevalence rates of OSA and OSAS in
males were 13.4 and 4 per cent respectively whereas in females, these were 5.6 and 1.5 per cent respectively. Another hospital-based study from north India revealed an estimated prevalence of OSA and OSAS to be 4.4 and 2.4 per cent in males, whereas it was 2.5 and 1 per cent in females.

In a hospital-based study of urban men between 35 and 65 yr from western India, the prevalence of OSA was 19.5 per cent and of OSAS was 7.5 per cent. This study was performed only in men belonging to a higher socio-economic status with a home-based polysomnography (PSG) study, which introduced an

<table>
<thead>
<tr>
<th>Author (Reference)</th>
<th>Hospital- or community-based study</th>
<th>Study design</th>
<th>OSA (%)</th>
<th>OSAS (%)</th>
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<td>Fully supervised PSG in lab (n)</td>
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OSA, obstructive sleep apnoea; OSAS, obstructive sleep apnoea syndrome; PSG, polysomnography; M, males; F, females; n-number of subjects.
element of selection bias. The Table provides worldwide prevalence of obstructive sleep apnoea. It can be concluded that prevalence of OSAS in community-based Indian epidemiological studies is similar to those reported in the western population. In preliminary studies from Pakistan based on Berlin questionnaire, overall prevalence of individuals who had high risk for sleep apnoea, was observed between 10 to 12.4 per cent. These observations are not surprising due to the increasing sedentary lifestyle in both urban and rural communities in the oriental population resulting in similar lifestyle-related diseases which till now were a burden of the economically developed nations only. The craniofacial anatomy in the oriental population also predisposes individuals to OSA.

The prevalence of OSA in the Indian population is three-fold higher in men as compared to women. The prevalence of OSA increases with age, though age is not an independent risk factor for the OSA.

**Risk factor association vis-à-vis causation in Indian population**

In India, obese individuals have nearly four times higher risk of having OSA as compared to non obese individuals independent of age and gender. Syndrome Z is defined as co-occurrence of OSA and metabolic syndrome. The estimated population prevalence of syndrome Z in north India was about 4.5 per cent (95% CI 3.7-5.3) and age, male gender, % body fat and nocturnal desaturation were independent risk factors.

There has been evidence from western studies that metabolic abnormalities of dyslipidaemia, insulin resistance, leptin and adiponectin levels have an independent association with OSAS. Interestingly, a well conducted study from India has not observed any independent association between OSAS and these metabolic abnormalities. Similar findings have been observed in India regarding the lack of correlation between raised serum high-sensitivity C-reactive protein and OSAS. The results of these studies suggest the important role of confounding factors like obesity causing a spurious association, which should be an important area of future research before OSAS is conclusively labelled as an independent manifestation of these metabolic abnormalities.

Hypothyroidism as a secondary cause of obesity also predisposes to OSAS. In fact, hypothyroidism and OSAS have common manifestations in the form of obesity, excessive daytime somnolence and apathy. Though hypothyroidism was considered a relatively infrequent cause of OSAS in the west, a study from India has demonstrated OSA in 30 per cent of patients with primary hypothyroidism. Moreover, this study has also shown that OSAS was completely reversible with adequate thyroxine replacement therapy.

The consequences of OSAS include hypertension, coronary artery disease, atrial fibrillation, cerebrovascular accidents, sudden death and neuropsychiatric manifestations. However, in Indian population, hypertension did not have an independent association with OSA, though it was significantly more common in patients with OSA.

In recent times, the relationship between sleep apnoea and traffic accidents has assumed great importance. India has possibly the largest number of road traffic accidents in the world. Rates of traffic accidents were two to three times higher in individuals with sleep apnoea compared to the general population in the studies from the West, and the association remains significant even after adjustment for many potential confounding factors for accidents including alcohol consumption, age, driving experience, sleep schedule and use of drugs causing drowsiness. Further longitudinal studies are required to elucidate the complex relationship of these factors in Indian subjects. The quantum of the problem in a resource-limited setting like India should be even more dismal as OSAS related daytime somnolence is further compounded by poor road infrastructure, lenient implementation of traffic rules and substandard vehicle maintenance as a cause of road accidents.

In north Indian subjects, the combination of male gender, waist-hip ratio and neck circumference has been incorporated in a diagnostic model for predicting OSA and screening subjects for PSG. The sensitivity, specificity, positive and negative predictive value of this model were 89, 90, 87 and 91 per cent respectively. Another diagnostic model by the same group incorporated body mass index, male gender, relative-reported snoring index and choking index with a sensitivity, specificity, positive and negative predictive value of 82, 91, 89 and 84.5 per cent respectively. In fact, a modified Berlin questionnaire has been designed by the investigators from New Delhi to screen patients prior to polysomnography in a resource limited setting like India. This questionnaire is being validated by several researchers in different ethnic populations all over the world.
Current ongoing research and economic issues in India

The therapeutic strategy for management of OSAS includes nasal continuous positive airway pressure (nCPAP), besides other measures including a methodical weight loss programme for the patient. In fact, two prospective intervention studies are being conducted in north India to study the cause and effect relationship of CPAP, metabolic syndrome and OSAS.

However, in a resource-limited setting in India, the cost of CPAP machine needs to be subsidized. Moreover, reimbursement policy by the health insurance companies or employee health coverage programme is another important issue which needs to be addressed by the national policy makers.

References

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