Prevalence of Obstructive Sleep Apnea in Type 2 Diabetes patient

Author :
Dr. Sushil Dohare,
Associate Professor, Jazan University College of Public Health and Tropical Medicine,
Department of Epidemiology,
Jazan University,
Jazan- 45142,
Saudi Arabia mail id: sdohare@jazanu.edu.sa

Abstract—When we set out to perform this systematic review, our major goal was to determine the overall prevalence of obstructive sleep apnea (OSA) in individuals and to determine whether or not there were any significant variations in the frequency of OSA across the various demographic groupings. This review includes 24 of the 3807 papers that were identified by a comprehensive search of the PubMed and Embase databases. The stated prevalence, although is often high, varies greatly due to substantial methodological variability in population prevalence studies. Males had the greatest rates of obstructive sleep apnea, with occurrence at an apnea-hypopnea index (AHI) of 5 events/h affecting between 9 to 38% of the population. This index measures the number of times an individual stops breathing during sleep. It approached 90% for males in some groups of the elderly and 78% for females in the same categories. There was a significant age-related difference in the prevalence of AHI at 15 events per hour, ranging from 6% in young persons to 49% in older individuals. There was shown to be a higher frequency of OSA in both men and women who were obese. The prevalence of OSA is shown to rise with age, male sex, as well as body mass index in this meta-analysis. It is crucial to a) acknowledge that OSA occurs on a continuum in the general population and b) create consensus on methodology and diagnostic criteria to diagnose OSA in order to accurately compare the incidence of OSA across regions and countries, and within age-/sex-specific subgroups.

Keywords— Obstructive Sleep Apnea, Global Prevalence, Public Health, Diagnostic Criteria, Type 2 Diabetes.

I. INTRODUCTION

People with type 2 diabetes have elevated blood glucose levels because their bodies are unable to use the glucose they generate for energy. With a sharp increase over the last two decades, the estimated worldwide prevalence of diabetes is 4.6%. (Tamar, 2017) In addition, 24% of Iranians are said to have type 2 diabetes, a growth of 4% every year over the previous 20 years. Preventing the worsening of diabetes-related complications requires a better understanding of the risk variables involved. It is still a clinical and public health priority to identify modifiable risk factors for diabetes. Because of their high prevalence and shared risk factors including obesity, diabetes and obstructive sleep apnea (OSA) are often treated together. In addition to diabetes being a risk factor for OSA, OSA also increases the likelihood of developing diabetes. The incidence of OSA varies across research. The prevalence of type 2 diabetes in China was estimated to be 38.0% in recent research. Another survey conducted in the United States puts the figure at 86%. Furthermore, two Iranian investigations indicated that the frequency of OSA among those with type 2 diabetes was 74.0 and 54.0%. Unfortunately, we were unable to find any meta-analyses that looked at the incidence of OSA in patients with type 2 diabetes. By

2660

performing meta-analyses and systematic reviews, this research attempts to synthesize the available evidence on obstructive sleep apnea (OSA) in people with type 2 diabetes. Those in charge of healthcare policy should implement the research's conclusions to better serve patients. (Wang, 2019)

II. OBJECTIVE

The research aimed to fulfill the following objectives:
- Obstructive sleep apnea
- Establishing the comprehensive study and meta-analysis estimated OSA in type 2 diabetics
- Treatment

III. METHODOLOGY

The examination of the data was carried out with the use of comprehensive meta-analysis (CMA) programmes. The publications were analysed to determine the OSA prevalence rate. The binomial distribution was then used to calculate each study's variance in order to get the results. When combining the prevalence of many research, the weighted mean was the method that was used. The inverse of the variance of each study was used to calculate its weighting. Cochran's Q test for heterogeneity and the I2 index were used to analyse the degree of variation across studies. When estimating the frequency, we used a model with random effects so that we could take into consideration the variety of investigations that were conducted. It was determined by doing a sensitivity analysis, in which the effect of leaving out each research was evaluated. The funnel plot as well as the rank correlation test developed by Beg and Mazumdar were used in order to analyse the publication bias. Two different sets of questionnaires and devices were compared in order to investigate the impact that OSA assessment tools have on the prevalence of the condition. The influence of quantitative factors such as age, year of study, sample size, body mass index, and gender proportion was also investigated using meta-regression. These variables were included in the research. All of the tests were carried out with a confidence level of 95%.

IV. OBSTRUCTIVE SLEEP APNEA

Obstructive sleep apnea, often known as OSA, affects the vast majority of individuals who snore loudly or repeatedly during the night. This disorder is characterized by cyclical episodes of upper airway blockage, which could give rise to shallow in nonexistent breathing while the individual is sleeping.. These events are called "apneas" when breathing stops completely or almost completely, and "hypopneas" when breathing slows down but not to a full halt. any a drop in blood oxygen levels or sleep disturbances (or both) might result from any of these situations. Frequent apneas or hypopneas may prevent you from getting the restful sleep you need. It's possible that this, in conjunction with issues with blood oxygenation, could potentially have a major effect on a person's health and quality of life. Co-existing with obstructive sleep apnea, obstructive sleep apnea syndrome (OSAS) with obstructive sleep apnea-hypopnea syndrome (OSAHS) is characterized by daytime symptoms such fatigue and memory loss. The symptoms of each of these illnesses are quite similar. (Mootz & Patil, 2021).

Most persons with OSA don't realize they have breathing issues while sleeping until after they get up. Some people seem to stop breathing, gasp, or choke while sleeping, which might be heard by a bed partner or family member. Those who live or sleep alone are more likely to miss warning signs. Over the years or decades that symptoms persist before being diagnosed, the individual may get used to the daily sleepiness, headaches, and exhaustion that correspond with significant levels of sleep disturbance. Snoring and neurocognitive problems have both been linked to obstructive sleep apnea, which has also been linked to neurocognitive morbidity. (Iyer & Iyer, 2017)
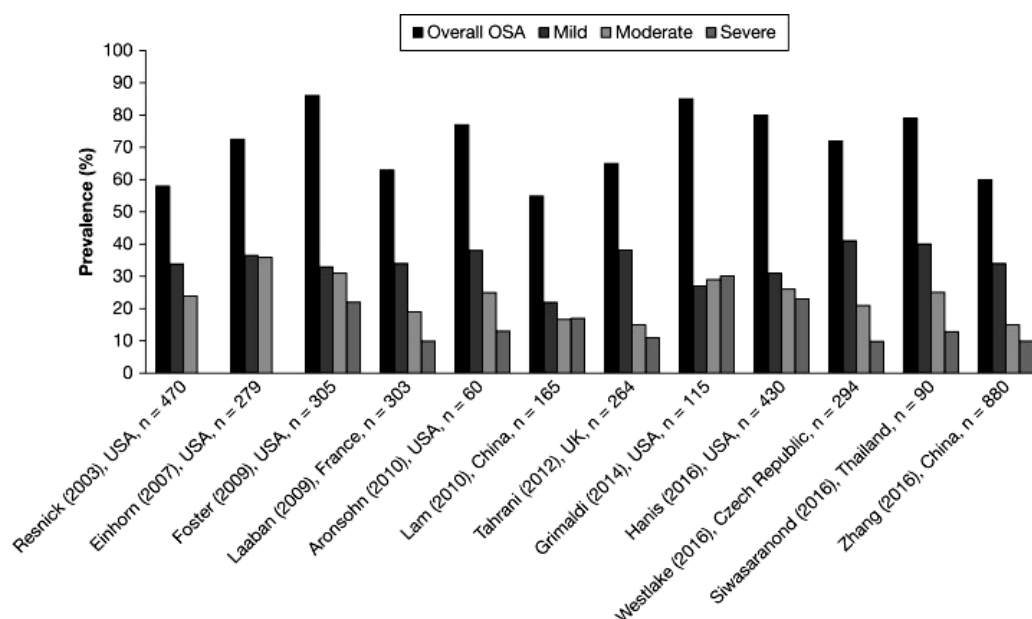
2661

Eur. Chem. Bull. 2023, 12(Special Issue 6), 2660-2665

FIGURE 1: IN PATIENTS WITH TYPE 2 DIABETES, THE PREVALENCE With OBSTRUCTIVE SLEEP APNEA IS HIGH.

V. ESTABLISHING THE COMPREHENSIVE STUDY AND META-ANALYSIS ESTIMATED OSA IN TYPE 2 DIABETICS

The comprehensive study and meta-analysis estimated OSA prevalence in Iranian type 2 diabetics. According to Einhorn et al. (2007), 48% of diabetic patients had OSA, whereas 54.50% of Iranian diabetic patients did. According to the Berlin Questionnaire, 50.8% of diabetic patients had significant OSA risk in Shim et al. (2011). In another Jordanian research, 48.5% of diabetics had significant OSA risk. 60% of hospitalized diabetics in China had OSA.OSA was common among diabetics in all trials. Studies also showed that diabetic neuropathy may disrupt central control respiration, and upper airway neural reflexes cause OSA. OSA-induced overnight hypoxia also causes glucose intolerance and insulin resistance. Foster found OSA in 86.6% of diabetics. Women had a greater OSA prevalence than males. SA affects males more than women. OSA prevalence differs between men and women due to hormonal variables, fat distribution, and pharyngeal structure and function. (Pataki et al., 2018) Before menopause, hormonal influences reduce OSA in women. After menopause, males and women have comparable OSA rates. Diabetes prevalence in this population ranged from 46 to 74%. The population's gender, weight, race, and OSA determination methodologies may explain this disparity. In a cross-sectional investigation, Amin et al. (2017) found 51.4% and 75.2% of South Asian and white European diabetics had OSA. The meta-regression showed that OSA prevalence rose with mean age, illness duration, and BMI (not significantly). High age and obesity promote both OSA and diabetes. Saad et al. (2019) found a significant age-OSA risk correlation in diabetics. The elderly has a high incidence of OSA due to pharynx changes, soft palate lengthening, and fat accumulation in the parapharyngeal region. Diabetics may develop underlying ailments as they age, according to research. Ageing raises the risk of diabetes complications, which might affect diabetics' sleep. OSA prevalence increased between 2012 and 2018. This rise seems to be due to greater OSCA awareness and screening tool usage by at-risk patients. Some research failed to disclose required information, which limited the study. (Coppola et al., 1996) However, the present study was unique in that it was the first to evaluate OSA in patients, and the findings might benefit the country's healthcare authorities.
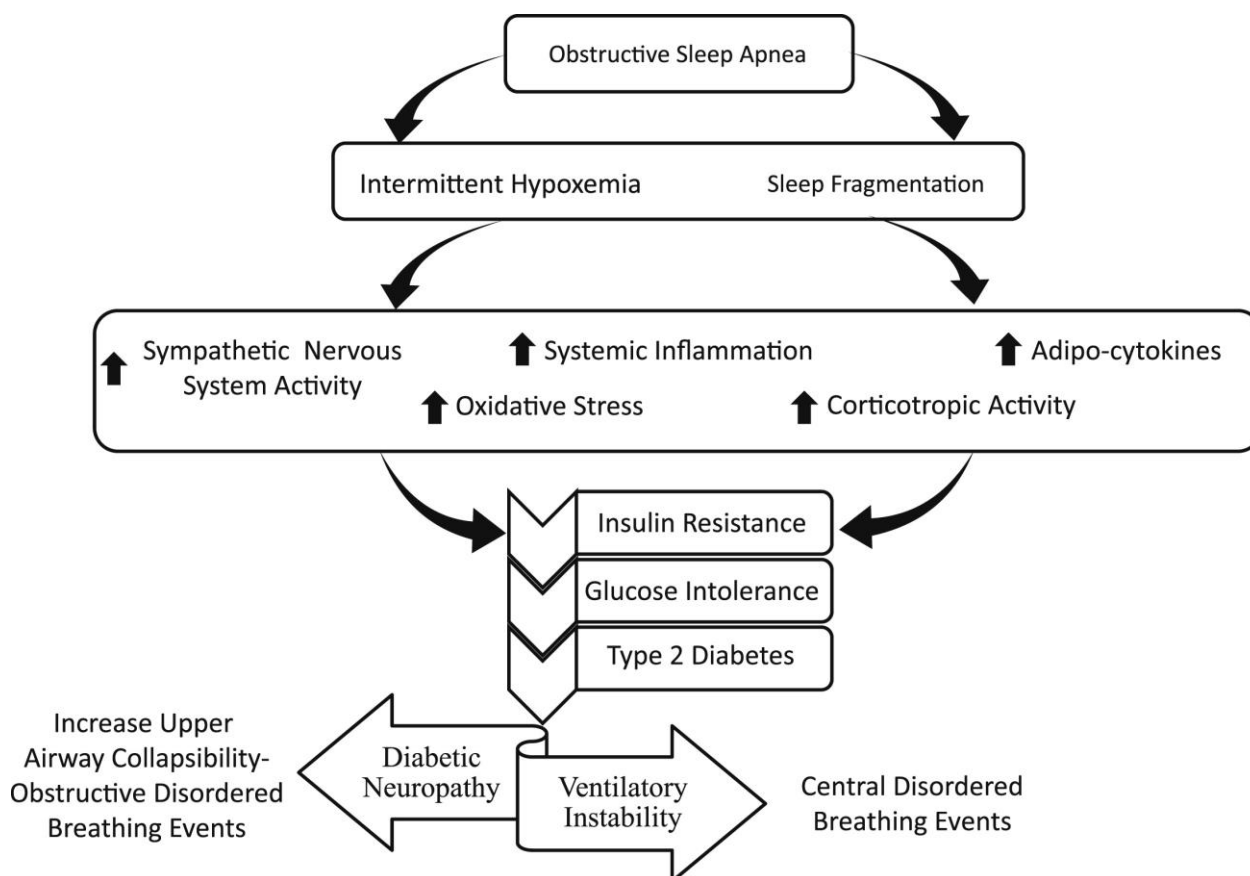
2662

Eur. Chem. Bull. 2023, 12(Special Issue 6), 2660-2665

FIGURE 2: OBSTRUCTIVE SLEEP APNEA IN TYPE 2 DIABETES

VI.   TREATMENT

Depending on the location of the blockage, such as in the nasal passages or the epiglottis, surgery may be necessary for the treatment of OSAS. Obstructive sleep apnea has several potential treatments. It is advised to abstain from alcoholic beverages and cigarettes, as well as drugs that slow down the central nervous system (such as sedatives and muscle relaxants). Those who are overweight should try to lose weight. Devices that forward the mandible and CPAP are used to treat sleep apnea. are both often utilized and have similar success rates. (Bader, 2019) It is possible to experience the beneficial effects of exercise on sleep apnea without seeing any initial weight reduction. There is an insufficient amount of data to back up the widespread usage of pharmacological treatments. Tonsillectomy is a procedure that may be suggested in certain circumstances, such as the presence of tonsillar hyperplasia. Individuals that have not shown any improvement after receiving therapy with continuous positive airway pressure (CPAP) or oral appliances may benefit from a salvage procedure known as conservative uvulopalatopharyngoplasty (UPPP). Randomized controlled studies of UPPP have shown favorable benefits on nocturnal breathing and excessive daytime sleepiness, and a comprehensive Meta-analysis has been published to provide more support for these findings.
.

Interference With the Body

The most frequent kind of therapeutic intervention is called positive airway pressure, the patient wears a mask over their nose, mouth, or both, and a breathing machine delivers a controlled flow of air into the

2663

Eur. Chem. Bull. 2023, 12(Special Issue 6), 2660-2665

mask. By making an extra effort, the slack muscles may maintain their relaxed state. There are several available options, including:

- Whether your condition is minor or severe, continuous positive airway pressure (CPAP) therapy may be beneficial. The treatment of obstructive sleep apnea with this strategy is successful for the vast majority of patients. (Daneshgar et al., 2022)
- When the patient is using VPAP (also known as BiPAP or BPAP), an electronic circuit continually monitors their breathing and alternates between two different pressure settings. One setting has a higher-pressure during inhalation, and the other setting has a lower pressure during exhalation. Patients who suffer from many respiratory conditions, those who have trouble sleeping due to difficulty exhaling against a higher pressure may find that this more costly device helps them.
- Nasal EPAP comprises a bandage-like device placed over the nostrils to create a positive airway pressure by means of the patient's own breathing to prevent airway blockage.
- In order to keep track of a patient's breathing, pressure sensors are built into automatic positive airway pressure machines.
- Those with moderate to severe OSA may get comparable symptom relief by losing only 5% of their body weight as they would from using CPAP. (Pataki et al., 2018)

CONCLUSION

It has been shown that 56% of the general population has obstructive sleep apnea (OSA). According to the findings of a meta-regression study, the incidence of obstructive sleep apnea (OSA) rises in tandem with increasing mean age, percentage of male gender, body mass index (BMI), and sample size. The results of the inquiry provide credence to this point of view. There was also a correlation between the prevalence of obstructive sleep apnea and the average age of the population. It's possible that there is a statistically significant connection between the two different factors. According to the findings of the researchers, the overall prevalence of OSA rose as the size of the sample population grew. The researchers made yet another finding when they came across this. After more investigation, the idea seems to be valid. The prevalence of obstructive sleep apnea (OSA) in people with type 2 diabetes is poorly understood, and screening for this condition is not routinely performed. As a result, screening for obstructive sleep apnea (OSA) in the USA as well as elsewhere requires more comprehensive national planning. This is because obstructive sleep apnea (OSA) screenings are not routinely performed on persons with diabetes. This is because there are currently no initiatives aimed at detecting OSA in people with diabetes. The reason for this is because people with diabetes are not routinely tested for OSA. This is because there aren't enough solid numbers demonstrating how frequent OSA is among T2D patients.

REFERENCES

1. Daneshgar, B., Anatomical, M., Soroush, A., Azizi, S. M., & Khatoon, A. (2022). The prevalence of obstructive sleep apnea in patients with type 2 diabetes: A systematic review and meta-analysis. Sleep Science and Practice, 6(1). https://doi.org/10.1186/s41606-022-00074-w
2. Bader, G. N. (2019). Obstructive sleep apnea: A risk factor for type-2 diabetes mellitus. Current Research in Diabetes & Obesity Journal, 11(3). https://doi.org/10.19080/crdoj.2019.11.555813
3. Coppola, M. P., Evitts, J. M., & Lawes, M. S. (1996). Obstructive sleep apnea in a laryngectomy patient: "External obstructive sleep apnea." Sleep & Breathing, 1(1), 32–36. https://doi.org/10.1007/bf03038944
4. Iyer, R., & Iyer, S. R. (2017). Obstructive sleep apnea and type 2 diabetes mellitus. RSSDI Update–2015, 423–423. https://doi.org/10.5005/jp/books/12963_90

2664

Eur. Chem. Bull. 2023, 12(Special Issue 6), 2660-2665

5. Mootz, K., & Patil, S. P. (2021). The prevalence and impact of obstructive sleep apnea and current Management Landscape. Upper Airway Stimulation Therapy for Obstructive Sleep Apnea, 5–26. https://doi.org/10.1093/med/9780197521625.003.0002
6. Pataki, A., Kalamatas, G., Daskalopoulou, E., & Angelopoulos, P. (2018). Sleep questionnaires for the screening of obstructive sleep apnea in patients with type 2 diabetes mellitus compared with non-diabetic patients. Journal of Diabetes, 11(3), 214–222. https://doi.org/10.1111/1753-0407.12835
7. Tamar, K. (2017). Prevalence and severity of angiopathy in type 2 diabetes patients with co-morbid obstructive sleep apnea. https://doi.org/10.26226/morressier.59d51847d462b80296ca3cde
8. Wang, D. (2019). Prevalence of obstructive sleep apnea by PSG in hospitalized patients with type 2 diabetes in Beijing, China. https://doi.org/10.26226/morressier.5d9b6235ea541d6ca8493fdc