

PREVALENCE OF OBSTRUCTIVE SLEEP APNEA IN ALLERGIC RHINITIS PATIENTS

¹Chandra Vamsi. S, ²Dhanaraj. S, ³Deepak Raj

¹final year postgraduate, ²M.B.B.S final year part 1 undergraduate, ³Senior resident

¹Department of otorhinolaryngology

¹Saveetha medical college and hospital, Chennai, India

Abstract – Introduction: Rhinitis in general can be said as stuffy nose, which includes conditions like nasal obstruction, runny nose, postnasal drip, itchy nose, sneezing, watery red eyes, etc. It is mainly of allergic type or the non-allergic type. Allergic rhinitis is an IgE mediated immunological response of nasal mucosa to any airborne allergens which is characterized by typical features of rhinitis. Apnea is defined as the absence of breathing, which is obstructive, Central or mixed. Apnea during sleep causes hypoxia and retention of carbon dioxide causing pulmonary constriction which leads to congestive heart failure, bradycardia or cardiac hypoxia. Our study was an effort to establish the prevalence of Obstructive sleep apnea in allergic rhinitis patients. **Objective:** To assess the allergic rhinitis patient and find the prevalence of obstructive sleep apnea in allergic rhinitis patients using questionnaires. **Methodology:** It is a retrospective study done on allergic rhinitis patients using questionnaires. The study is done at ENT OP in a Tertiary health care center. A total of 100 allergic rhinitis patients is taken into consideration. First, they were assessed using audit allergic rhinitis questionnaire. Then using Berlin questionnaire, the patients were evaluated for the risk of developing Obstructive sleep apnea. **Result:** There is a statistical significance between allergic rhinitis and obstructive sleep apnea. The allergic patients having the troublesome score of 6 – 10 have significant association of developing obstructive sleep apnea with the p value of 0.002641098. There is significant association between obesity and development of Obstructive sleep apnea with the p value of 0.000798056. But there is no significant association between gender and the development of Obstructive sleep apnea with the p value of 0.094815092. **Conclusion:** The statistical significance between severity of allergic rhinitis and risk of developing obstructive sleep apnea has been proven by the p value. There is significant relationship between obesity and development of Obstructive sleep apnea. Furthermore, studies have to be done in the future to confirm its practical correlations and its applications.

Keywords: Allergic rhinitis, Obstructive sleep apnea, Snoring, Obesity, Berlin questionnaire.

INTRODUCTION:

Rhinitis in general can be said as stuffy nose, which includes conditions like nasal obstruction, runny nose, postnasal drip, itchy nose, sneezing, watery red eyes, etc. It is mainly of allergic type or the non-allergic type. Allergic rhinitis is an IgE mediated immunological response of nasal mucosa to any airborne allergens which is characterized by typical features of rhinitis[1]. It is clinically divided as seasonal or perennial. The major cause of it being the inhalant allergens includes pollens from trees, flowers or grasses, molds, furred animals and dusty places. Genetic predisposition also plays an evident role being 20- 47% of child developing allergies. The main pathology being that the inhaled allergens producing specific IgE antibody in the individuals which becomes fixed to the blood basophils or the mast cells at its Fc end. On subsequent exposure, antigen combines with the IgE antibody at its Fab end, producing degranulation of basophils or the mast cells, releasing several chemical mediators. These mediators being responsible for the symptoms of the allergic rhinitis, also produce vasodilation, mucosal oedema, Infiltration into the tissues along with eosinophils, secretion from nasal glands and the smooth muscle contractions. There occurs increased nasal reactivity resulting in sneezing, rhinorrhea and nasal congestion. Based on the duration, it is intermittent or persistent. Based on the severity, it is mild, moderate or severe [2-4].

A normal person sleeps for about 7-8 hours a day. It occurs in 2 phases namely non-REM and REM sleep. These cycles occur in semiregular cycles, each lasting for 90-120 minutes, hence a normal sleep has 3 or 4 cycles of sleep. Non-REM forms 75-80% of sleep and occurs in 4 stages involves transition from wakefulness to sleep, decrease in muscle tone, deep sleep and restful sleep. REM sleep forms 20-25% of total sleep characterized of rapid eye movements, increased autonomic activity combined with erratic cardiac and respiratory movements. Dreaming occurs at this stage. There are several conditions which affects the normal sleep[5]. Obstructive sleep apnea being an important factor is taken into account.

Apnea is defined as the absence of breathing, which is obstructive, Central or mixed. Apnea during sleep causes hypoxia and retention of carbon dioxide causing pulmonary constriction which leads to congestive heart failure, bradycardia or cardiac hypoxia. These conditions may cause left heart failure or cardiac arrhythmias sometimes leading to death. Consequences of OSA involves Cor pulmonale, polycythemia, hypertension, arrhythmias, attacks of angina, snoring spouse syndrome, loss of memory, decreased libido or also leads to traffic accidents[6,7].

In this research work, I would like to discuss about the allergic rhinitis and its contribution to obstructive sleep apnea[8].

OBJECTIVES:

To assess the allergic rhinitis patient and find the prevalence of obstructive sleep apnea in allergic rhinitis patients using questionnaires.

METHODOLOGY:

It is a type of retrospective study in which the data have been collected by using 2 questionnaires, Audit: allergic rhinitis and asthma, Berlin questionnaire. The subjects included in this study are already known allergic rhinitis patients or those who have diagnosed as allergic rhinitis in the ENT OPD when they present with symptoms. These subjects were provided with the first questionnaire to categorize them into mild(0 – 5) and severe(6 – 10) group based on their troublesome score. 0 stands for no trouble at all. This includes various questions regarding the causes, duration and symptoms of the allergic rhinitis patients[9].

The subjects were also provided with the second questionnaire and by which they are grouped into low risk and high-risk categories. This questionnaire includes questions about snoring, breathlessness and tiredness of the allergic rhinitis patients. The patients have been divided into 3 categories based on the scorings. Further grouping into high risk and low risk has been made[10,11].

High risk – If 2 or more categories where the score is positive.

Low risk – If only 1 or no categories where the score is positive.

Based on the collected data, BMI was calculated. The chi square test has been applied to find out whether there is any relation between the severity of allergic rhinitis and the risk of developing obstructive sleep apnea. This test has also been used in obese patients to find their contributions.

Inclusion criteria:

1. Newly diagnosed allergic rhinitis patients.
2. Known allergic rhinitis patients.

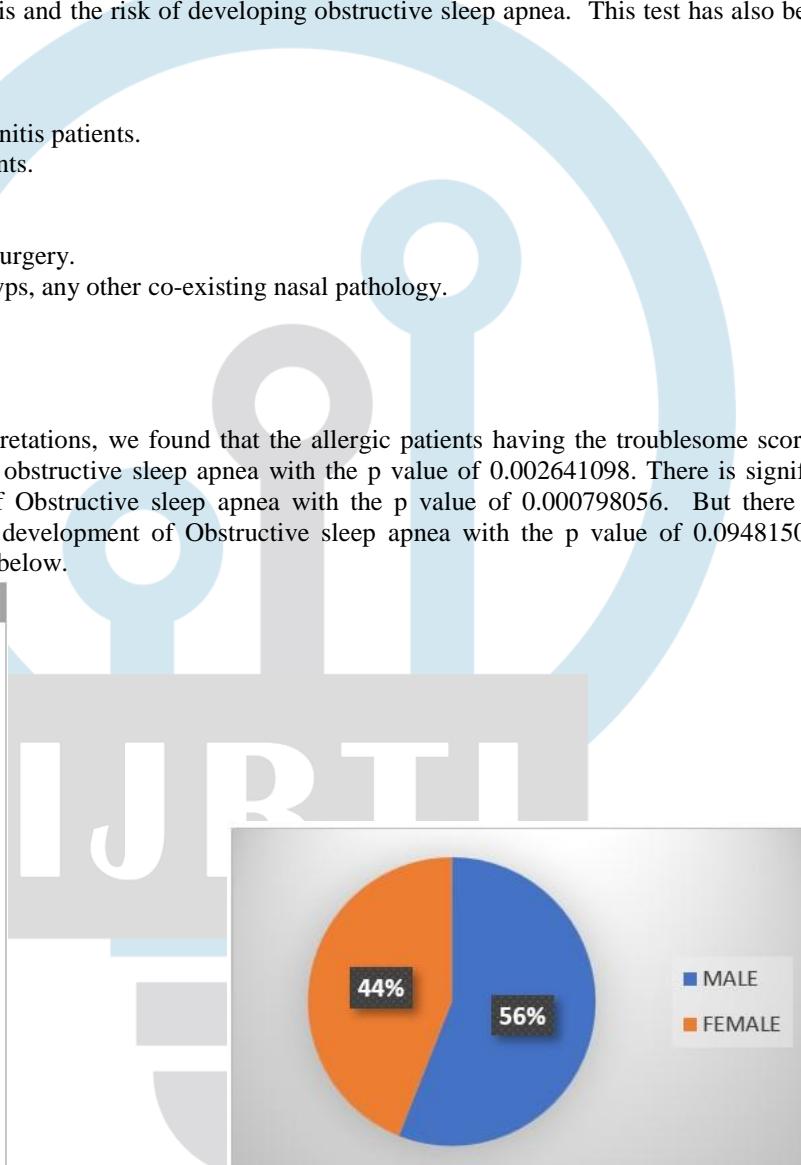
Exclusion criteria:

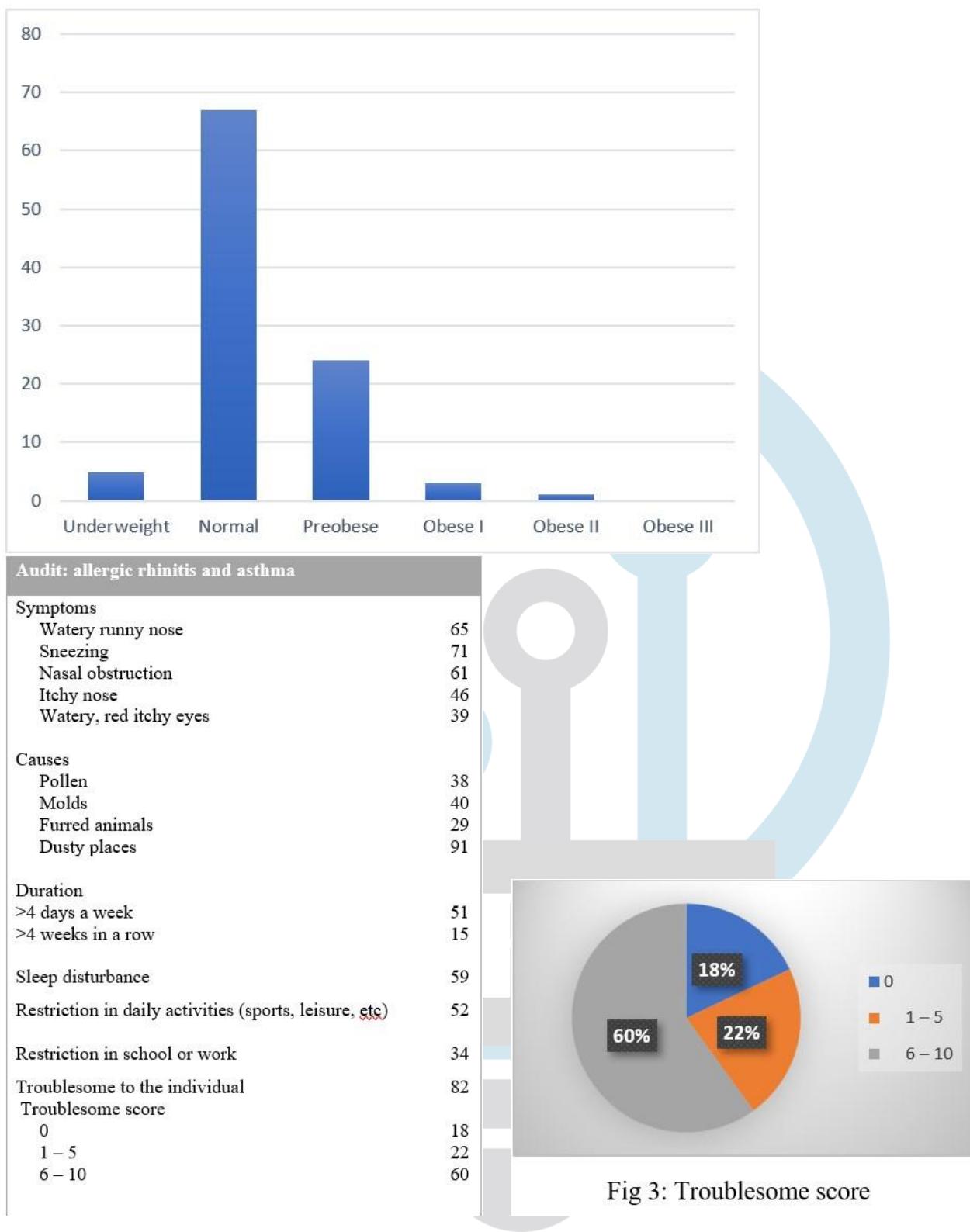
1. Patients with previous nose surgery.
2. Known case of sinusitis, polyps, any other co-existing nasal pathology.
3. History of trauma to nose.
4. Patients with URTI, TB.

RESULT:

Based on the observations and interpretations, we found that the allergic patients having the troublesome score of 6 – 10 have significant association of developing obstructive sleep apnea with the p value of 0.002641098. There is significant association between obesity and development of Obstructive sleep apnea with the p value of 0.000798056. But there is no significant association between gender and the development of Obstructive sleep apnea with the p value of 0.094815092. The results obtained are represented in the tables below.

n	100
male	56
female	44
BMI	
<18.5	5
18.50 - 24.99	67
25.00 - 29.99	24
30.00 - 34.99	3
35.00 - 39.99	1
>40	Nil
Obese	28
Non obese	72
Hypertensives	15





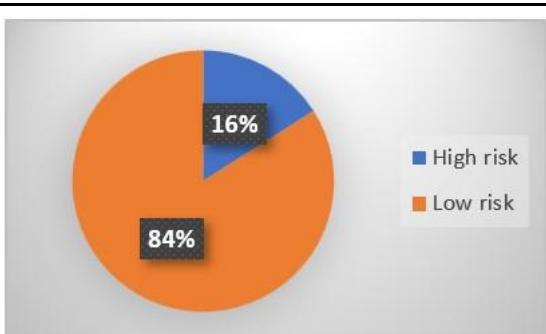
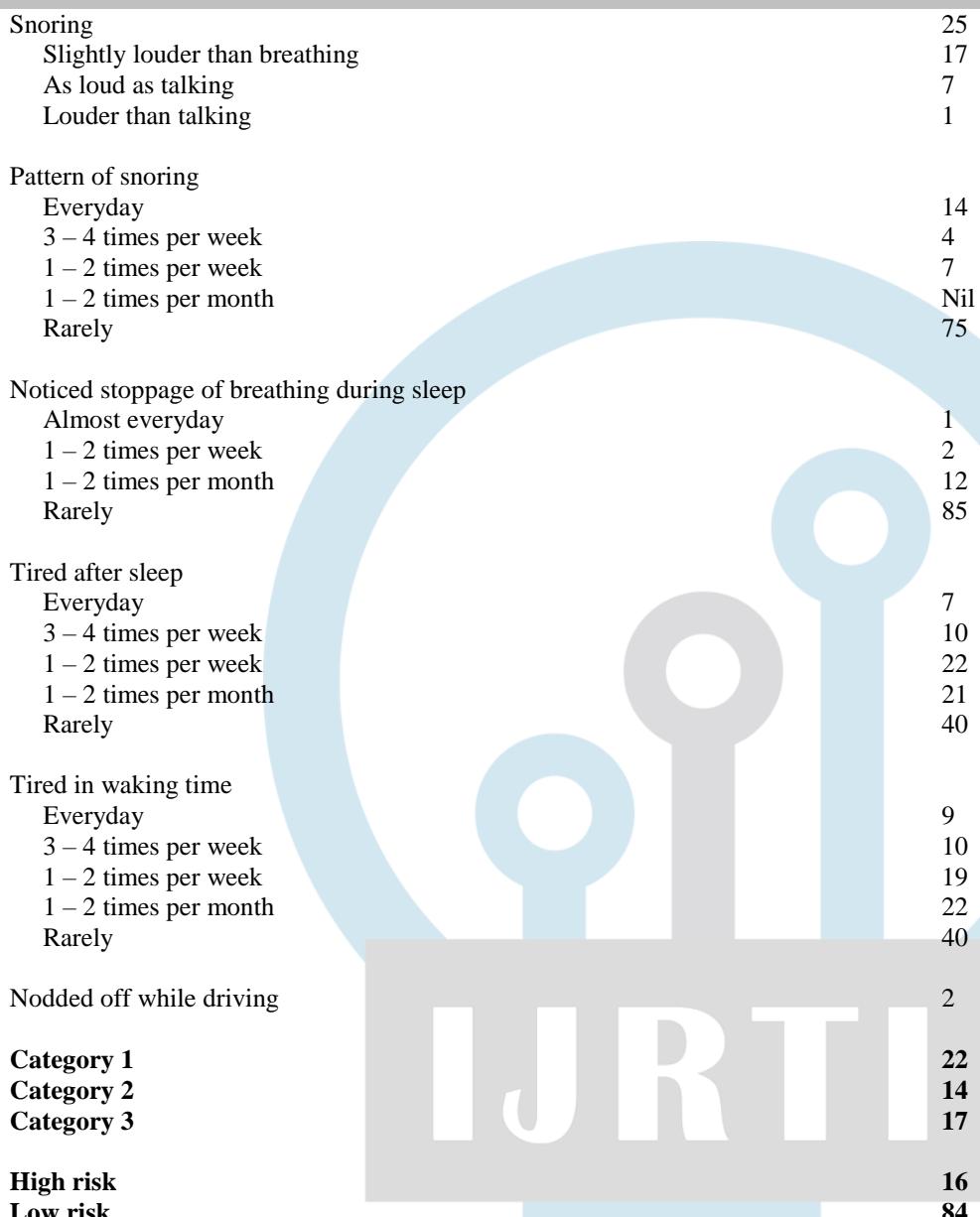
Berlin questionnaire

Fig 4: Risk of developing OSA

Condition	P value
Allergic rhinitis (mild and severe) and Obstructive sleep apnea (low and high risk)	0.002641098
Obesity and risk of Obstructive sleep apnea	0.000798056
Gender and risk of Obstructive sleep apnea	0.094815092

DISCUSSION:

Allergic rhinitis is one of the most common pathology seen in the general population. However, most of the patients are found to be asymptomatic (or) with mild symptoms and leading a regular normal life. The problem arises with the severity of the disease. This study deals with such irregularities seen with mild and severe symptomatic patients and the occurrence of Obstructive sleep apnea in them. The study has been done by collecting data using 2 of the well-known questionnaires. The total number of participants involved is 100, of which 56 are male and 44 are female. Based on the height and weight of the participants collected, BMI has been calculated, of which 28 being obese and the remaining 72 being non – obese (pre – obese is also considered as obese). The known hypertensives are 15 in number.

The first questionnaire for allergic rhinitis is used to categorize them into mild group(40 in number) and the severe group(60 in number) based on their troublesome score. This score is purely based on the patient's opinion. The symptoms of the patients being noted off and the causes of which has been identified using this questionnaire. Among the symptoms, about 71% of them has been present with sneezing which being the primary allergic response. Watery runny nose and nasal obstruction being in 65% and 61% of the patients respectively. Whereas watery, red itchy eyes have been reported only in about 39% of the patients. The major cause of this allergic response is the dusty areas. About 91% of patients develop the symptoms due the dust. Other causes includes mold(40%), pollen(38%) and furred animals(29%). The duration of these symptoms lasts for more than 4 days in a week in about 51%. Whereas only 15% of the total patients continues to present with the symptoms for more than 4 weeks in a row. This prolonged duration may lead to restriction in work or schooling, seen in about 34% of the individuals. Whereas about 52% of the total patients have restriction in daily activities like sports and leisure time[12,13].

Among the collected data of allergic rhinitis patients, about 59 % of them develop sleep disturbance, which is of important concern as it may lead to Obstructive sleep apnea. Using the Berlin questionnaire, the patients have been evaluated for the risk of developing Obstructive sleep apnea. Here comes the most important concern of today's lifestyle, the snoring[14]. About 25% of the study subjects are positive for snoring. About 14% of the total patients present with the snoring everyday[15]. Of the total subjects under study, 1% experience the episodes of stoppage of breathing for almost everyday and it has been noticed by others. 2% has been noticed episodes of stoppage of breathing for about 1 – 2 times per week. Whereas about 12% has been noticed episodes of stoppage of breathing for about 1 – 2 times per month[16]. Tiredness after sleep has also been noticed in patients. About 7% develop tiredness every day after their sleep and about 10 % develop tiredness 3 – 4 times per week. Tiredness in waking time has also been noticed, about 9% presents with tiredness every day and 10% presents with tiredness 3 – 4 times per week. About 2 % of the patients seems to be nodded off while driving, which is taken into importance as it may lead to road traffic accidents. The blood pressure and BMI also seems to play an important role in categorizing the patients. Based on the collected data, the patients have been divided into 3 categories. This leads us to the final grouping of high and low risk patients being 16% and 84% respectively.

Now the statistics plays its role in identifying the connection between various criteria. Majorly 3 criteria is taken into account and it's respective p value has been calculated. The p value has been found between the allergic rhinitis and obstructive sleep apnea(0.002641098), which show significant association between severity of allergic rhinitis and the development of Obstructive sleep apnea[17,18].The other two criteria being obesity and gender. The obesity seems to be statistically significant with p value of 0.000798056 whereas gender isn't significant with the risk of developing obstructive sleep apnea[19-21].

CONCLUSION:

The statistical significance between severity of allergic rhinitis and risk of developing obstructive sleep apnea has been proven by the p value. There is significant relationship between obesity and development of Obstructive sleep apnea. Furthermore, studies has to be done in the future to confirm its practical correlations and it's applications.

REFERENCE:

- PM, Calatroni A, Gergen PJ, Hoppin JA, Sever ML, Jaramillo R, Arbes SJ Jr, Zeldin DC. Allergy-related outcomes in relation to serum IgE: results from the National Health and Nutrition Examination Survey 2005-2006. *J Allergy Clin Immunol*. 2011 May;127(5):1226-35.

2. Wheatley LM, Togias A. Clinical practice. Allergic rhinitis. *N Engl J Med.* 2015 Jan 29;372(5):456-63.
3. M. Naclerio, M.D. Allergic Rhinitis. *N Engl J Med* 1991; 325:860-869.
4. J. Varshney H. Allergic Rhinitis: an Overview. *Indian J Otolaryngol Head Neck Surg.* 2015 Jun;67(2):143-9.
5. Mary A Carskadon, William C Dement. Normal human sleep: an overview. *Principles and practice of sleep medicine* 4 (1), 13-23, 2005.
6. Susan Redline, Terry Young. Epidemiology and natural history of obstructive sleep apnea. *Ear, nose & throat journal* 72 (1), 20-26, 1993.
7. Malhotra A. White D.P. Obstructive sleep apnoea. *Lancet.* 2002; 360: 237-245.
8. Canova C.R.· Downs S.H.Knoblauch A.· Andersson M. · Tamm M. · Leuppi J.D. Increased Prevalence of Perennial Allergic Rhinitis in Patients with Obstructive Sleep Apnea. *Respiration* 2004;71:138–143.
9. P Demoly, R Jankowski, O Chassany, Y Bessah, F-A Allaert. Validation of a self-questionnaire for assessing the control of allergic rhinitis. *Clinical & Experimental Allergy* 41 (6), 860-868, 2011.
10. Nikolaus C Netzer, Riccardo A Stoohs, Cordula M Netzer, Kathryn Clark, Kingman P Strohl. Using the Berlin Questionnaire to identify patients at risk for the sleep apnea syndrome. *Annals of internal medicine* 131 (7), 485-491, 1999.
11. SK Sharma, C Vasudev, S Sinha, A Banga, RM Pandey, KK Handa. Validation of the modified Berlin questionnaire to identify patients at risk for the obstructive sleep apnoea syndrome. *Indian J Med Res* 124 (3), 281-290, 2006.
12. Cao Y, Wu S, Zhang L, Yang Y, Cao S, Li Q. Association of allergic rhinitis with obstructive sleep apnea: A meta-analysis. *Medicine (Baltimore).* 2018 Dec;97(51).
13. Walter T McNicholas, Susan Tarlo, Philip Cole, Noe Zamel, Ruth Rutherford, Darina Griffin, Eliot A Phillipson. Obstructive apneas during sleep in patients with seasonal allergic rhinitis. *American Review of Respiratory Disease* 126 (4), 625-628, 1982.
14. Veasey SC, Rosen IM. Obstructive Sleep Apnea in Adults. *N Engl J Med.* 2019 Apr 11;380(15):1442-1449. Doi: 10.1056/NEJMcp1816152. PMID: 30970189.
15. JR, Crosby JH. Predictors and prevalence of obstructive sleep apnoea and snoring in 1001 middle aged men. *Thorax* 1991;46:85-90.
16. Young, T. et al. The occurrence of sleep-disordered breathing among middle-aged adults. *N. Engl. J. Med.* 328, 1230–1235, 1993.
17. Naricha Chirakalwasan, Kiat Ruxrungtham. The linkage of allergic rhinitis and obstructive sleep apnea. *Asian Pacific journal of allergy and immunology* 32 (4), 276, 2014.
18. Vgontzas A.N. Tan T.L. Bixler E.O. Martin L.F. Shubert D. Kales A. Sleep apnea and sleep disruption in obese patients. *Arch Intern Med.* 1994; 154: 1705-1711.
19. Apoor S Gami, Sean M Caples, Virend K Somers. Obesity and obstructive sleep apnea. *Endocrinology and Metabolism Clinics* 32 (4), 869-894, 2003.
20. Endocrinology Roux. The relationship of obesity and obstructive sleep apnea. *Clinics in chest medicine* 30 (3), 455-465, 2009.
21. CHRIS O'CONNOR, Kristine S Thornley, Patrick J Hanly. Gender differences in the polysomnographic features of obstructive sleep apnea. *American journal of respiratory and critical care medicine* 161 (5), 1465-1472, 2000.