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Association between smoking and obstructive sleep apnea in adult and aged male population – A survey based study

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ABSTRACT

Smoking is defined as the process where a person inhales smoke either from burnt paper or electronic cigarette with or without containing tobacco. There are various drugs and substances which can be abused in the form of smoking. In the earlier days smoking cigarettes were branded as an healthy lifestyle. One such deteriorating effect of smoking could be OSA abbreviating to obstructive sleep apnea. Obstructive sleep apnea can be defined as the obstruction of the airway either completely or partially during the sleep. India being a country with a huge population of smokers has inadequate public health awareness. The aim of the study is to analyse if there is any association between smoking and obstructive sleep apnea. Our study is a survey based study among the Indian population. No ethical approval was required from the study due to the self volunteering of the participants. Sample size of this study was n=100. Pre tested questionnaire containing questions based on smoking, sleep patterns derived from Berlin's & STOP BANG questionnaire. Questionnaire was circulated online among 100 participants above the age of 18 using Google Forms. The results were first imported to Excel then to SPSS software for further analysis. The present study population had male participation of 57%, and female participation of 43%, 59% of the study population were not aware of obstructive sleep apnea, 75% of the participants declared that they are not addicted to smoking yet 25% are addicted, 96% of the participants population found the study to be useful.



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INTRODUCTION

Smoking is defined as the process where a person inhales smoke either from burnt paper or an electronic cigarette with or without containing tobacco (Kyriakoudes, 2006; Proctor, 2012; Kannan and Thenmozhi, 2016). Smoking has been practiced since 3000-5000 BC. There are various drugs and substances which can be abused in the form of smoking. In the earlier days smoking cigarettes were branded as an healthy lifestyle (Behera and Malik, 1987; Neufeld, 2005; Jindal, 2006; Choudhari and Thenmozhi, 2016). As the generation

progressed the various harmful effects of smoking was discovered yet the need for smoking kept on increasing and became an addiction worldwide (Rani, 2003; Benowitz, 2010; Hafeez and Thenmozhi, 2016; Baumeister, 2017). All over the world, there are many chronic and acute smokers and it has reached to a point where not only smokers affect themselves but also to the people around them while smoking turning others into a passive smoker (Cao, 2015; Samuel and Thenmozhi, 2015; Menon and Thenmozhi, 2016).

GENDER
100 responses

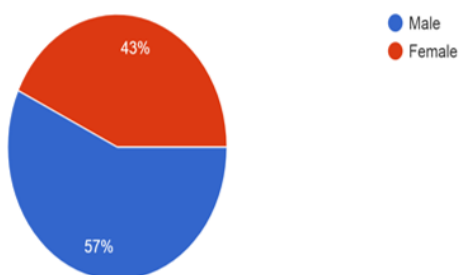


Figure 1: Pie Chart depicting the frequency distribution of gender

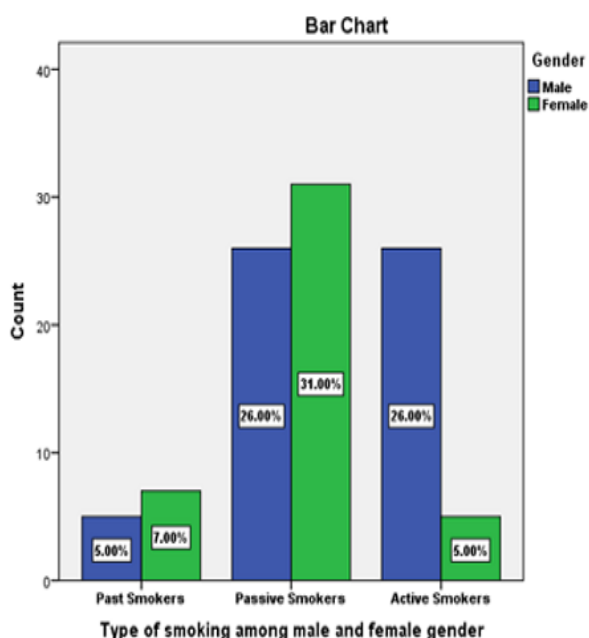


Figure 2: X axis shows different types of smoking and y axis shows the number of participants

There have been various studies enumerating the maleficent effects of smoking & passive smoking (Smith, 2003; Jones, 2008; Saulyte et al., 2014). One such deteriorating effect of smoking could be OSA abbreviating to obstructive sleep

apnea. Obstructive sleep apnea can be defined as the obstruction of the airway either completely or partially during the sleep (Spicuzza et al., 2015; Pratha and Thenmozhi, 2016; Osman, 2018). Obstructive sleep apnea may cause many physiological disturbances and may lead to myocardial infarction, day time sleepiness, thyroid disturbances, diabetes, gastroesophageal reflux disease (Fogel, 2004; Punjabi, 2008; Motamedi et al., 2009; Sriram et al., 2015; Keerthana and Thenmozhi, 2016). Obstructive sleep apnea may also induce depression, lack of concentration, impaired judgment & memory, increased irritability, and cognitive dysfunction (Lavie, 2000; Huang, 2018).

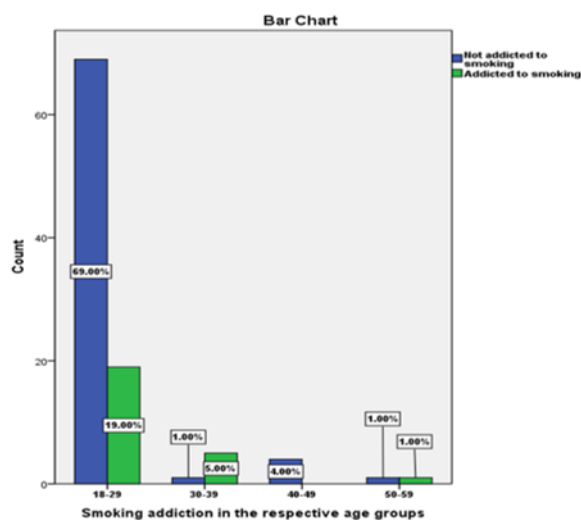


Figure 3: X axis shows different age groups and y axis shows the number of participants

There have been many studies done previously to find out the association between smoking & sleep apnea, but they had their limitations such as smaller population, self reported data from patients are not always accurate, no proper history of smoking was obtained thus leading to inconclusive evidence (Phillips, 1995; Thejeswar and Thenmozhi, 2015; Lin, 2017). India being a country with huge population of smokers has inadequate public health awareness (Garg, 2012). No study has been done in Indian population, there is a need to conduct this study to create a better awareness among the population to enumerate the various harmful effects of smoking. The aim of the study is to analyse the association between smoking and obstructive sleep apnea among adult and aged male population.

MATERIALS AND METHODS

Study setting and sampling

This survey based study evaluated the responses of participants who took part in the online based sur-

vey. This survey based study did not require any ethical approval as the participants of the survey were self willing. The study population included participants age ranging from 18-65, who were categorized based on their gender, type of smoking and their sleeping habits and pattern.

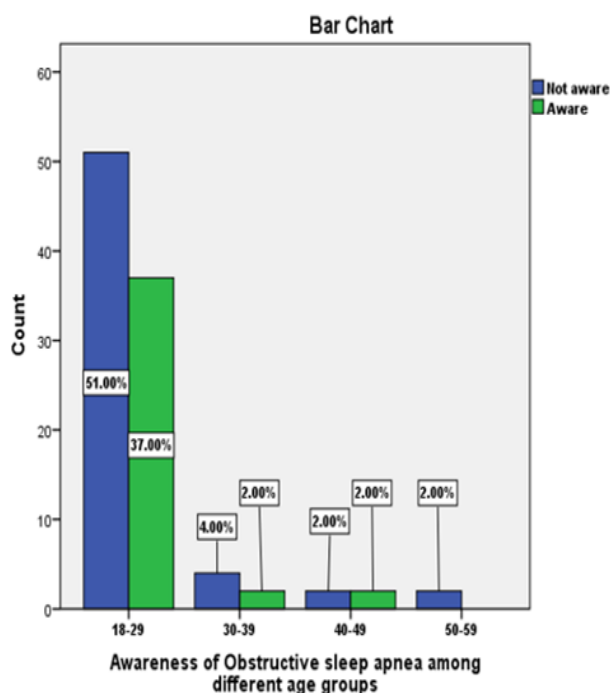


Figure 4: X axis shows different age groups and y axis shows the number of participants

Data Collection

Our study is a survey based study among the Indian population.No ethical approval was required from the study due to the self volunteering of the participants. Sample size of this study was n=100. Pre tested questionnaire containing questions based on smoking,sleep patterns derived from Berlin’s & STOP BANG abbreviating to S-snoring, T-tiredness, O-Observation of snoring by others, P-pressure related medical history, B-body mass index greater than 35, A-age older than 50, N-neck size larger and G-gender questionnaire (Thurtell, 2011; Teng et al., 2018). Questionnaire was circulated online among 100 participants above the age of 18 using Google Forms. The results were first imported to Excel then to SPSS software for further analysis.

Statistical analysis

Data was obtained using Google Forms (An online survey application) and was then exported to (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.) for further statistical analysis, With the obtained data frequency & descriptive tests were done.

How often do you feel tired or fatigued after your sleep?
100 responses

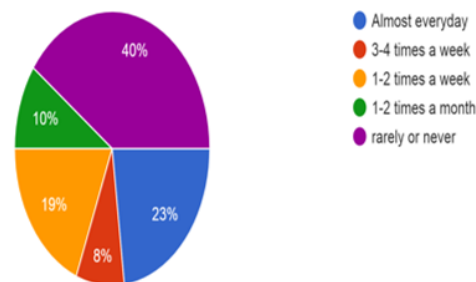


Figure 5: Majority of the participation (40%) never felt fatigued after sleep followed by 23% of the participants who felt fatigued almost everyday

Do you snore ?
100 responses

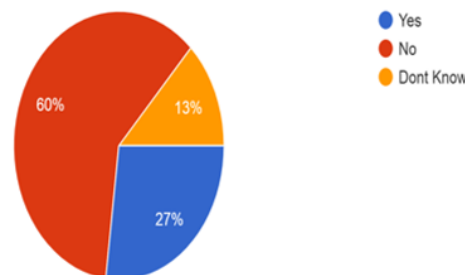


Figure 6: Majority of the participants (60%) responded that they do not score followed by (27%) who accepted that they snore and 13% were not aware whether they snore or not

RESULTS AND DISCUSSION

The present study population had male participation of 57%, and female participation of 43% [Figure 1], 59% of the study population were not aware of obstructive sleep apnea, 75% of the participants declared that they are not addicted to smoking yet 25% are addicted, 96% of the participants population found the study to be useful. Majority of the participants were male 57% and female participation 43%.

It is evident that the smoking population is high in India (Mini and Thankappan, 2016). From the results of the survey the gender distribution was 57% Male and 43% Female [Figure 1]. Out of which when asked about the type of smoking 31% were Active smokers, 12% Past smokers and 57% Passive smokers, females were found to be the most passively smoking population and the results were significant when chi square test was performed [Figure 2]. This shows that in the given population the

Have you ever avoided smoking ?

100 responses

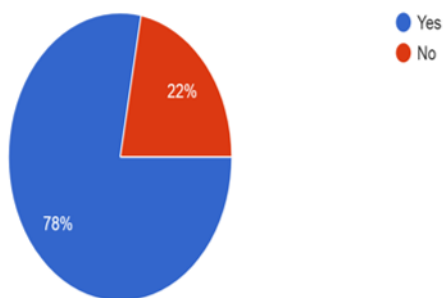


Figure 7: Majority of the participants (78%) have tried to avoid smoking followed by 22% who haven't tried smoking

percentage of passive smokers is almost double that of Active smokers in India. Using chi square analysis $p=0.007$ ($p < 0.05$ considered statistically significant) (Priya and Lando, 2014) also did studies and found similar findings.

Do you think you sleep better if you avoid smoking?

100 responses

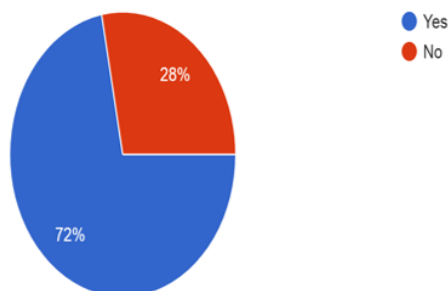


Figure 8: (72%) of the participants felt they slept better if they avoided smoking followed by 28% who did not feel better when they avoided smoking

When the age of the participants were assessed it is evident that 86% of them belonged to the 18-29 Age group followed by 30-34 age group and 40-49 age group both of the latter were 6% [Table 1], This represents the increased smoking habits in young adults this finding is similar to (N Breslau et al.) whose study were based on the perception of smoking in young adults (Breslau and Peterson, 1996).

When asked about the addiction of smoking 75% responded that they are not addicted, it a positive finding, 18-29 the young adult age group had the most addicted (69%) and as well as the the non addicted participants (19%) with respect to smoking, and this supports the findings of (M Reddy et al.), whose study assessed the willingness to quit

Bar Chart

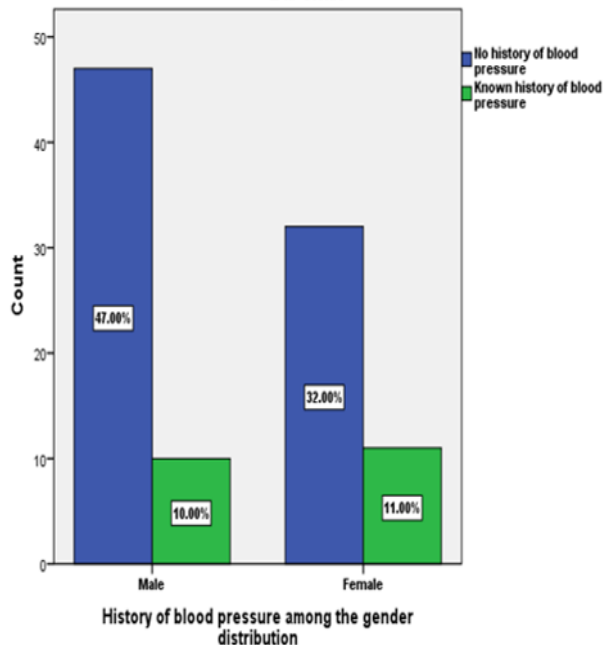


Figure 9: X axis shows different types of smoking and y axis shows the number of participants

Is your BMI more than 34kg/m²?

100 responses

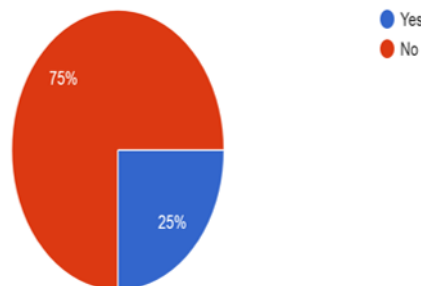


Figure 10: Pie Chart depicting Body Mass Index status of the participants

Did you find this survey useful ?

100 responses

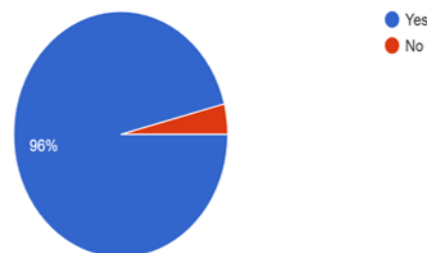


Figure 11: Vast majority of the participants(96%) found the survey to be useful followed by (4%) who did not find the survey to be useful

Table 1: Young adult population of age

Age range	Frequency	Percent	Valid Percent	Cumulative Percent
18-29	88	88.0	88.0	88.0
30-39	6	6.0	6.0	94.0
40-49	4	4.0	4.0	98.0
50-59	2	2.0	2.0	100.0
Total	100	100.0	100.0	

The age is ranging from 18-28 were the most participated age group (88%) followed by 30-39 age group (6%), 40-49 age group (4%) and the least participated age group of aged population 50-59 (2%)

smoking [Figure 3], (Reddy, 2018). Using Chi square analysis $p=0.007$ ($p < 0.05$ considered statistically significant).

When questioned regarding the awareness of obstructive sleep apnea, was asked, majority of the participants (59%) were not aware of any such term out of the 41% who were aware of obstructive sleep apnea, the young adult age group (18-29) had the highest proportion (37%). This denotes that the current overall population is not well aware of obstructive sleep apnea [Figure 4]. Using chi square analysis $p=0.006$ ($p < 0.05$ considered statistically significant).

In a study conducted by (Sohan lal solanki et al.) it was found that there was deficit of knowledge regarding obstructive sleep apnea among Anaesthesiologists and expecting from a common population is less likely to occur (Solanki et al., 2019).

Regarding the tiredness & fatigue after sleeping 23% of the study population felt tired almost everyday & 40% felts rarely or never. In the population who felts always tired could be due to the morphological changes brought up by the obstructive sleep apnea leading to difficulty in breathing thus affecting the oxygen supply [Figure 5], (Krishna and Babu, 2016; Subashri and Thenmozhi, 2016; Nandhini et al., 2018). Figure 5, 19% who felt tired 3-4 times a week, 10% of the participants felt tired 1-2 times a week and 8% of the participants felt tired 1-2 times a month.

27% of the participants accepted that they snore, 60% responded negatively & 13% didn't know whether they snore or not [Figure 6]. 75% of the respondents have tried to avoid smoking and 72% of the participants felt they slept better if they avoided smoking. The reason could be the reduction of inflammation of the respiratory lining mucosa which changes the morphology of the airway thus enhancing the breathing of the individual [Figures 7 and 8], (Seppan et al., 2018; Johnson, 2019; Sekar, 2019)

It is depicted that the smokers sometimes feel

fatigued after sleep and when avoiding smoking they felt better. This adds to study of (Vidyakrishnan et al.) where they studied about the association of smoking with sleep apnea & Sleep disturbance. (Krishnan et al., 2014)

When asked about the high blood pressure status and the Body Mass Index (greater than 33 kg/m²) 79%, 11% females had a history of blood pressure when compared to males (10%) was slightly higher [Figure 9], Using chi square analysis $p=0.048$ (p value < 0.05 considered statistically significant) & 75% responded negatively with respect to BMI greater than 33 [Figure 10]. Majority of the participants (75%) had BMI less than 34 Kg/m² followed by (25%) who had more than 34 Kg/m² BMI.

Overall, there has been many studies such as of (Kim et al., Yaffe K et al.,) and many others where they associate smoking with narrowing of nasopharyngeal tube, association of BMI with the structural morphology, association of BMI with sleep apnea, Association of Blood pressure with sleep apnea. It is evident and coinciding with our study that smoking is no directly associated with obstructive sleep apnea. But could be an independent risk factor (Yaffe, 2011; Kim, 2012).

Sleep apnea as mentioned above could cause various impairments of physiologic & cognitive systems. Hence proper public awareness is much-needed.

Few studies such as (Wetter Dw et al., Hoffsten V) contradicts to the fact and depicts smoking is not a risk factor, this could be due to their size of the population, and better control groups (Wetter, 1994; Hoffstein, 2002).

The association of smoking and obstructive sleep apnea is inconclusive it may or may not be associated. The survey was found to be useful for 96% of the participants which denotes a positive feedback and awareness among the participants of the survey [Figure 11].

Consensus

The evidence of the present study adds to the con-

sensus and can be utilised for other confirmatory studies relating smoking and sleep apnea.

Limitations

Our study has few limitations such as smaller sample size, and the present study does not include all ethnic groups of the population and participant reported details are not always accurate.

Future scopes

Studies with larger population and well defined cohort study may be done.

CONCLUSION

The present survey study concludes that there may be an association between smoking and obstructive sleep apnea in the adult and aged population. Further public health awareness is to be implemented by the government and as well practitioners regarding smoking and is most required at this moment.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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REFERENCES

- Baumeister, R. F. 2017. Addiction, cigarette smoking, and voluntary control of action: Do cigarette smokers lose their free will? *Addictive Behaviors Reports*, 5:67–84.
- Behera, D., Malik, S. K. 1987. Chronic respiratory disease in Chandigarh teachers. A follow-up study. *The Indian journal of chest diseases & allied sciences. pascal-francis.inist.fr*, 29(1):25–28.
- Benowitz, N. L. 2010. Nicotine Addiction. *New England Journal of Medicine*, 362(24):2295–2303.
- Breslau, N., Peterson, E. L. 1996. Smoking cessation in young adults: age at initiation of cigarette smoking and other suspected influences. *American Journal of Public Health*, 86(2):214–220.
- Cao, S. 2015. The health effects of passive smoking: an overview of systematic reviews based on observational epidemiological evidence. *PloS one. Public Library of Science*, (10):10–10.
- Choudhari, S., Thenmozhi, M. S. 2016. Occurrence and Importance of Posterior Condylar Foramen. *Research Journal of Pharmacy and Technology*, 9(8):1083–1083.
- Fogel, R. B. 2004. Sleep {middle dot} 2: Pathophysiology of obstructive sleep apnoea/hypopnoea syndrome. *Thorax*, 59(2):159–163.
- Garg, A. 2012. Prevalence and correlates of tobacco smoking, awareness of hazards, and quitting behavior among persons aged 30 years or above in a resettlement colony of Delhi. *Lung India*, pages 336–336.
- Hafeez, N., Thenmozhi 2016. Accessory foramen in the middle cranial fossa. *Research Journal of Pharmacy and Technology*, 9(11):1880–1880.
- Hoffstein, V. 2002. Relationship Between Smoking and Sleep Apnea in Clinic Population. *Sleep*, 25(5):517–522.
- Huang, T. 2018. A population-based study of the bidirectional association between obstructive sleep apnea and type 2 diabetes in three prospective US cohorts. *Diabetes care. Am Diabetes Assoc*, 41(10):2111–2119.
- Jindal, S. K. 2006. Tobacco smoking in India: prevalence, quit-rates and respiratory morbidity. *The Indian journal of chest diseases & allied sciences. Vallabhbhai Patel Chest Institute National College*, 48(1):37–37.
- Johnson, J. 2019. Computational identification of MiRNA-7110 from pulmonary arterial hypertension (PAH) ESTs: a new microRNA that links diabetes and PAH. *Hypertension research: official journal of the Japanese Society of Hypertension*, 43(4):360–362.
- Jones, D. T. 2008. Passive smoking and inflammatory bowel disease: a meta-analysis. *The American journal of gastroenterology*, 103(9):2382–2382.
- Kannan, R., Thenmozhi, M. S. 2016. Morphometric Study of Styloid Process and its Clinical Importance on Eagle's Syndrome. *Research Journal of Pharmacy and Technology*, 9(8):1137–1137.
- Keerthana, B., Thenmozhi, M. S. 2016. Occurrence of foramen of huschke and its clinical significance. *Research Journal of Pharmacy and Technology*, 9(11):1835–1835.
- Kim, K. S. 2012. Smoking Induces Oropharyngeal Narrowing and Increases the Severity of Obstructive Sleep Apnea Syndrome. *Journal of Clinical Sleep Medicine*, pages 367–374.
- Krishna, R. N., Babu, K. Y. 2016. Estimation of stature from physiognomic facial length and morphological facial length. *Research Journal of Pharmacy and Technology*, 9(11):2071–2071.
- Krishnan, V., Dixon-Williams, S., Thornton, J. D. 2014. Where There Is Smoke...There Is Sleep Apnea. *Chest*, 146(6):1673–1680.
- Kyriakoudes, L. M. 2006. Historians' testimony on "common knowledge" of the risks of tobacco

- use: a review and analysis of experts testifying on behalf of cigarette manufacturers in civil litigation. *Tobacco Control*, 15(suppl_4):iv107-iv116.
- Lavie, P. 2000. Obstructive sleep apnoea syndrome as a risk factor for hypertension: population study. *BMJ*, 320(7233):479-482.
- Lin, K. H. 2017. Obstructive sleep apnea and retinal microvascular characteristics: a brief review. *Neuropsychiatry*.
- Menon, A., Thenmozhi, M. S. 2016. Correlation between thyroid function and obesity. *Research Journal of Pharmacy and Technology*, 9(10):1568-1568.
- Mini, G. K., Thankappan, K. R. 2016. Switching to smokeless tobacco, the most common smoking cessation method: results from the Global Adult Tobacco Survey, India. *Public Health*, 136:172-174.
- Motamedi, K. K., McClary, A. C., Amedee, R. G. 2009. Obstructive sleep apnea: a growing problem. *The Ochsner journal*. *Ochsner Journal*, 9(3):149-153.
- Nandhini, J. S. T., Babu, K. Y., Mohanraj, K. G. 2018. Size, Shape, Prominence and Localization of Gerdy's Tubercle in Dry Human Tibial Bones. *Research Journal of Pharmacy and Technology*, 11(8):3604-3604.
- Neufeld, K. J. 2005. Regular use of alcohol and tobacco in India and its association with age, gender, and poverty. *Drug and alcohol dependence*, 77(3):283-291.
- Osman, A. M. 2018. Obstructive sleep apnea: current perspectives. *Nature and science of sleep*, 10:21-21.
- Phillips, B. A. 1995. Cigarette smoking and sleep disturbance. *Archives of Internal Medicine*, 155(7):734-737.
- Pratha, A. A., Thenmozhi, M. S. 2016. A Study of Occurrence and Morphometric Analysis on Meningo Orbital Foramen. *Research Journal of Pharmacy and Technology*, 9(7):880-880.
- Priya, M., Lando, H. A. 2014. Tobacco control: an issue twinned with oral cancer control. *International Dental Journal*, 64(5):229-232.
- Proctor, R. N. 2012. The history of the discovery of the cigarette-lung cancer link: evidentiary traditions, corporate denial, global toll: Table 1. *Tobacco Control*, 21(2):87-91.
- Punjabi, N. M. 2008. The Epidemiology of Adult Obstructive Sleep Apnea. *Proceedings of the American Thoracic Society*, 5(2):136-143.
- Rani, M. 2003. Tobacco use in India: prevalence and predictors of smoking and chewing in a national cross sectional household survey. *Tobacco Control*, 12(4):4e-4.
- Reddy, M. M. 2018. Willingness to quit tobacco smoking and its correlates among Indian smokers-Findings from Global Adult Tobacco Survey India. *Journal of family medicine and primary care*. *Wolters Kluwer*, 7(6):1353-1353.
- Samuel, A. R., Thenmozhi, M. S. 2015. Study of impaired vision due to Amblyopia. *Research Journal of Pharmacy and Technology*, 8(7):912-912.
- Saulyte, J., Regueira, C., Montes-Martínez, A., Khudyakov, P., Takkouche, B. 2014. Active or Passive Exposure to Tobacco Smoking and Allergic Rhinitis, Allergic Dermatitis, and Food Allergy in Adults and Children: A Systematic Review and Meta-Analysis. *PLoS Medicine*, 11(3):e1001611-e1001611.
- Sekar, D. 2019. Methylation-dependent circulating microRNA 510 in preeclampsia patients. *Hypertension research: official journal of the Japanese Society of Hypertension*, 42(10):1647-1648.
- Seppan, P., Muhammed, I., Mohanraj, K. G., Lakshmanan, G., Premavathy, D., Muthu, S. J., Shimray, K. W., Sathyanathan, S. B. 2018. Therapeutic potential of *Mucuna pruriens* (Linn.) on ageing induced damage in dorsal nerve of the penis and its implication on erectile function: an experimental study using albino rats. *The Aging Male*, pages 1-14.
- Smith, G. D. 2003. Effect of passive smoking on health. *BMJ . British Medical Journal Publishing Group*, 326(7398):1048-1049.
- Solanki, S., Karan, N., Parab, S. 2019. Obstructive sleep apnoea and its knowledge and attitude among Indian anaesthesiologists - A survey study. *Indian Journal of Anaesthesia*, 63(8):648-648.
- Spicuzza, L., Caruso, D., Maria, G. D. 2015. Obstructive sleep apnoea syndrome and its management. *Therapeutic Advances in Chronic Disease*, 6(5):273-285.
- Sriram, N., Thenmozhi, Yuvaraj, S. 2015. Effects of Mobile Phone Radiation on Brain: A questionnaire based study. *Research Journal of Pharmacy and Technology*, 8(7):867-867.
- Subashri, A., Thenmozhi, M. S. 2016. Occipital Emissary Foramina in Human Adult Skull and Their Clinical Implications. *Research Journal of Pharmacy and Technology*, 9(6):716-716.
- Teng, Y., Wang, S., Wang, N., Li, M. 2018. STOP-Bang questionnaire screening for obstructive sleep apnea among Chinese patients with type 2 diabetes mellitus. *Archives of Medical Science*, 14(5):971-978.

- Thejeswar, E. P., Thenmozhi, M. S. 2015. Educational Research-iPad System vs Textbook System. *Research Journal of Pharmacy and Technology*, 8(8):1158-1158.
- Thurtell, M. J. 2011. The Berlin Questionnaire Screens for Obstructive Sleep Apnea in Idiopathic Intracranial Hypertension. *Journal of Neuro-Ophthalmology*, pages 316-319.
- Wetter, D. W. 1994. Smoking as a risk factor for sleep-disordered breathing. *Archives of Internal Medicine*, pages 2219-2224.
- Yaffe, K. 2011. Sleep-Disordered Breathing, Hypoxia, and Risk of Mild Cognitive Impairment and Dementia in Older Women. *JAMA*.