

# ASSOCIATION BETWEEN ACTIVE AND PASSIVE SMOKING WITH INSUFFICIENT SLEEP IN ADULT AND AGED MALE POPULATION - A SURVEY BASED ANALYSIS

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## ABSTRACT

Sleep disturbance is one of the most commonly reported health complaints. Studies have shown that cigarette smoking is associated with sleep disorders in the general population. Many studies have shown the association of active smoking with sleep disturbances. But studies examining the association between active and passive smoking with insufficient sleep are limited. A questionnaire was created with a set of 12 questions related to active smoking, passive smoking and sleep disturbances. 100 random participants of adults and aged males by random sampling method. The participants were asked to fill the questionnaire in an online forum. The results were collected and statistically analysed. Almost half of the participants (48 %) have a smoking habit. Among the participants, employers and students have a high level of smoking habit (81%). 52 % of the participants have exposure to passive smoking. 70% of the participants have sleep disturbances. 64 % of the participants have sleep related breathing problems. 67 % of the participants have awareness on passive smoking. 78 % of the participants are willing to quit smoking and to avoid passive smoking. The present study highlighted the effects of active and passive smoking in sleep insufficiency and sleep disturbances. Thus the association of active and passive smoking with insufficient sleep in the adult and aged male population is determined.

**Key words:** Active smoking; Awareness; Breathing and respiratory problems; Passive smoking; Sleep disturbance.

## INTRODUCTION

Sleep is essential for the promotion and maintenance of health across all stages of life. Sleep is critical for health, development, and functioning. Inadequate sleep quantity and quality have been associated with mental health problems, poor sociability, behavioral problems, and the development of obesity and its accompanying comorbidities. Furthermore, sleep problems are associated with increased incidence of adulthood depression, anxiety, attention problems, and aggressive behaviors, thereby indicating a long-term

effect of poor sleep on mental health (Samuel and Thenmozhi, 2015; Choudhari and Thenmozhi, 2016; Hafeez, 2016; Kannan and Thenmozhi, 2016; Keerthana and Thenmozhi, 2016; Menon and Thenmozhi, 2016) .

Smoking tobacco is well known to be harmful to overall health and is a major cause of death and disease. The relationship between smoking and sleep disturbance has been investigated in many previous studies and it has been reported that active smokers compared with non - smokers more often experience sleep disturbance such as difficulty in initiating sleep ( Janson *e t al.*, 1995) (Ohida, Yokoyama and Kaneita, 2005), difficulty in maintaining sleep( Phillips and Danner, 1995), early morning awakening ( Ohida, Yokoyama and Kaneita, 2005) and difficulty awakening in the morning ( Åkerstedt *e t al.*, 2002)as well as short sleep duration( Ohida, Yokoyama and Kaneita, 2005) , excessive daytime sleepiness ( Tagaya *e t al.*, 2004) , snoring( Pescatello *e t al.*, 2004) , sleep disordered breathing(Alp, McAteer and Khoo, 2004) (Johnson *e t al.*, 2020) & poor sleep hygiene( Thomas Jefferson Foundation, 2005) ( Krishna, Nivesh Krishna and Yuvaraj Babu, 2016; Pratha and Thenmozhi, 2016; Subashri and Thenmozhi, 2016; Nandhini *e t al.*, 2018)). In contrast , some studies found no relationship between smoking and insomnia symptoms and other sleep related disturbances and insufficiency (Ohida, Yokoyama and Kaneita, 2005).

Active and passive smoking also have various other effects other than sleep disturbances. A major concern related to these studies was that they did not take into account the contribution of passive smoking to sleep disturbance even though exposure to passive smoking is prevalent in many developed and developing countries. A number of studies have shown that passive as well as active smoking are adversely related to various health problems( Janson *e t al.*, 1995) ( Seppan *et al.*, 2018; Sekar *e t al.*, 2019).

Therefore, we designed this study to examine the association of active and passive smoking with sleep disturbances and sleep duration among 100 adult and aged male populations by questionnaire through an online forum ( Sriram, Thenmozhi and Yuvaraj, 2015; Thejeswar and Thenmozhi, 2015). Through this study , we can conclude the contribution of active and passive smoking in sleep disturbances. The aim of this study is to assess the association of active smoking and passive smoking with sleep insufficiency and disturbances.

## **MATERIALS AND METHODS**

The study was done in an online setting among the Chennai population. Institutional review board approval is obtained for this survey based analysis. 2 reviewers [Primary investigator & guide] are involved in this study. The study size of 100 participants of adults and aged male population were selected by a simple random sampling method. Randomisation [include all variables] is followed to minimise the bias. Pre tested questionnaires were the internal validity and homogenisation & replication of experiment and cross verification with existing studies were the external validity of this study. The age of the male participants were divided into adults and aged. The adult population age were categorised into early and late adults ranging from 25-35 years and 36-45 years old respectively. The aged population were categorised into middle and old aged ranging from 46-55 years and 56-65 years old respectively.

The set of questionnaires which includes occupation, habit of smoking, exposure to passive smoking, sleep duration, sleep disturbances, awareness was circulated among the participants through an online forum. The results were collected and tabulated and represented as pie charts.

Then the results were imported for statistical analysis using SPSS statistical software. Student unpaired T test was the statistical test used, keeping Age, Gender, Sleep related breathing problems as dependent variables and Height, BMI, etc., as independent variables. Correlation analysis and Chi - square tests were done and the results were statistically analysed.

## RESULTS AND DISCUSSION

In this, we observed almost half of the participants (48 %) have the habit of smoking (Figure 2). Among the participants, employers and students have a high level of smoking habit (81 %) (Figure 1). 52 % of the participants were exposed to passive smoking (Figure 3). 70 % of the participants have sleep related breathing problems and sleep disturbances (Figure 5 & Figure 7). 67 % of them have awareness of passive smoking (Figure 9) and 78 % of the participants are willing to quit smoking and to avoid passive smoking (Figure 11).

In the present study population, 81 % were students and employers. 11 % were daily wagers and 8 % were in other occupations (Figure 1). 48 % of the participants are having the habit of smoking & 52 % were non-smokers (Figure 2). 52 % of the participants have exposure to passive smoking & 48 % of the participants don't have the exposure (Figure 3). More than half (58 %) of the participants have 5 to 8 hrs of sleep a day . 27 % have 2 to 5 hrs, 6 % have less than 2 hrs & 9 % have greater than 8 hrs of sleep per day (Figure 4). 37 % of the participants have mild disturbances in sleep , 33 % have moderate & 25 % have severe and 5 % have very severe disturbances in sleep (Figure 5). 46 % of the participants have the medical history of respiratory problems & 54 % have no such respiratory problems (Figure 6). 36 % of the participants have sleep related breathing problems and 64 % were not having such sleep related breathing problems (Figure 7). 77 % of the participants were strongly agreeing that passive smoking is as effective as active smoking & 33 % were not agreeing (Figure 8).

67 % of the participants were aware of the effects of active & passive smoking in sleep (Figure 9) and 61 % of them have the knowledge on minimum sleep requirement per day for healthy life i.e) 7 to 9 hrs (Figure 10). 33 % of the participants were not aware of the effects of active and passive smoking in sleep. 78 % of the participants were willing to quit active smoking and to avoid passive smoking (Figure 11).

In this survey based analysis, we found the various relation of association of active and passive smoking with insufficient and disturbances in sleep. In this study, the employers and students were more prompt to the habit of active smoking. The study of ( Marcotte *e t al.*, no date) has similar findings with our result that concludes students and employers smoke more.

From the present study, we conclude that active and passive smoking reduces the hours of sleep. The previous studies ( Kales, Scharf and Soldatos, 1980) have similar findings that active and passive smoking causes reduced total sleep time. On the other hand , the study of ( Hammond, Selikoff and Seidman, 1979) has opposing findings. This may be due to body metabolism of the individual and medications.

In the present study, we concluded that active and passive smoking leads to disturbances in sleep. The study of ( Lexcen and Hicks, 1993) have similar findings like effects such as sleep disturbances and waking up tired. The study ( Åkerstedt *e t al.*, 2002) was opposing the finding that neither disturbed sleep nor not rested was observed.

Respiratory problems were reported among the active and passive smokers in this present study. The study (Leynaert *e t al.*, 1997) had similar findings such as development of bronchial hyperresponsiveness and respiratory symptoms in active and passive smokers. In the present study, we reported sleep related breathing problems in active and passive smokers. The previous studies (Cisternas *e t al.*, 2002), (Janson *e t al.*, 1995) have similar findings that non-smokers exposing to passive smoking may have uncomfortable manifestations.

From the present study, we also concluded that passive smoking is as effective as active smoking. The previous studies (Emmons *e t al.*, 1994) have similar findings that passive smoking is associated with health problems. On the other hand, the study (Yu *e t al.*, 2002) has opposing findings. We considered that 7 to 9 hrs was the minimum requirement of sleep per day for healthy life and the study (Tagaya *e t al.*, 2004) has a similar finding of 8 to 9 hrs of sleep per day was healthy.

### **Limitations**

The present study is limited to less sample size and it is a single centered study. It does not represent all ethnic groups or populations.

### **Future scope**

Study for a large population should be done. Awareness on the effects of active smoking and passive smoking should be created among the population. The association of smoking [Active & Passive] with insomnia should be determined.

### **CONCLUSION**

The present study highlighted the effects of active and passive smoking with sleep insufficiency and sleep disturbances. The survey created a basic awareness on the association between active and passive smoking with insufficient sleep in the adult and aged male population. But it is understood that a large number of the population smoke due to work related circumstances and may become a habit of sleeplessness in their life in time. Though this chronic exposure may damage their vital organs and can impair their function leading to several life threatening health problems. This point needs to be made more aware among the people which are lacking in this scenario. Though the government takes several measures and rules it must be an individual responsibility to avoid these habits which not only affects them but also their surrounding people. Thus, more awareness should be created among the population about the effects of active and passive smoking in common and also on sleep. Public health programmes should be conducted to increase the awareness and Rehabilitation centers should be created.

### **AUTHOR'S CONTRIBUTION**

Vigneshwaran Ravichandran contributed in the conception, acquisition of data, analysis, interpretation of data and also in drafting the article and revising it critically for important intellectual content.

Dr. M. Karthik Ganesh contributed in the study design, formatting, other alignment corrections, supervision and guidance.

Dr. Manjari Chaudhary contributed in supervision and final approval of the submitted version of the manuscript.

### **CONFLICT OF INTEREST**

The authors declare that there is no conflict of interest.

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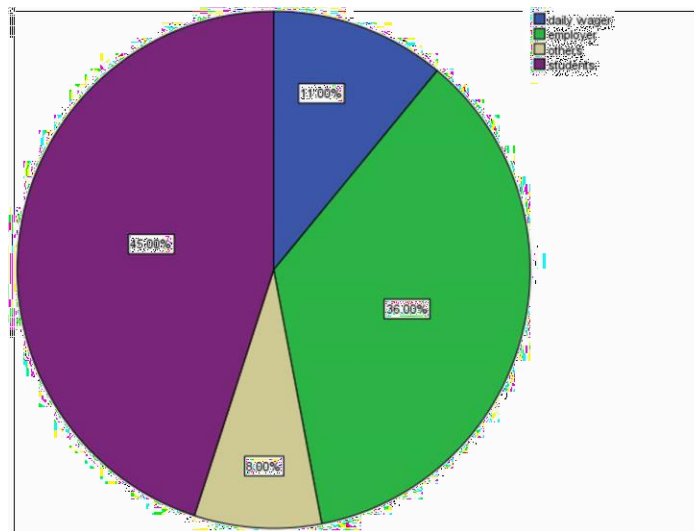


Figure 1: Pie chart showing percentage distribution of the occupations of the survey participants. 11% (Blue) of the participants were daily wagers, 36% (Green) of the participants were employers, 8% (Tan grey) were in other occupations and 45% (Purple) of the participants were students. N = 100. Among the survey participants students were more

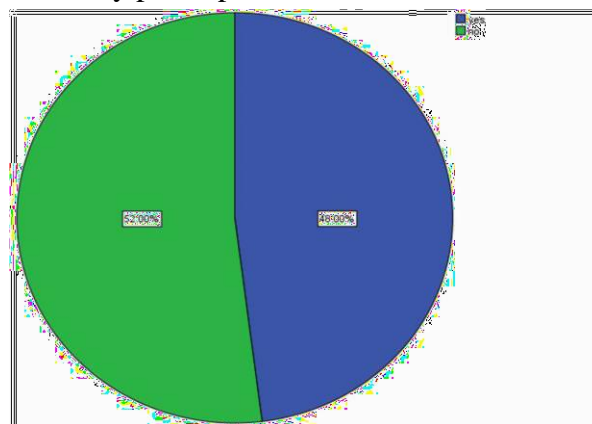


Figure 2: The pie chart showing percentage distribution of smoking habits of the survey participants . 48 % (Blue) answered yes and 52 % (Green) answered No. N = 100. Males without the habit of smoking were more among the survey participants.

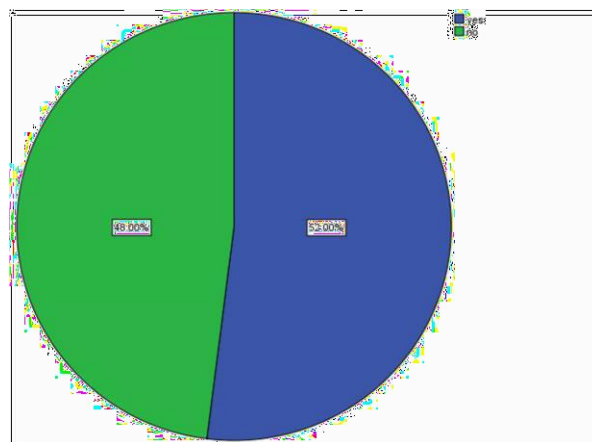


Figure 3 : The pie chart showing the percentage distribution of exposure of the survey participants to passive smoking. 52 % (Blue) answered Yes and 48% (Green) answered No. N = 100. More participants have exposure to passive smoking among the survey participants .

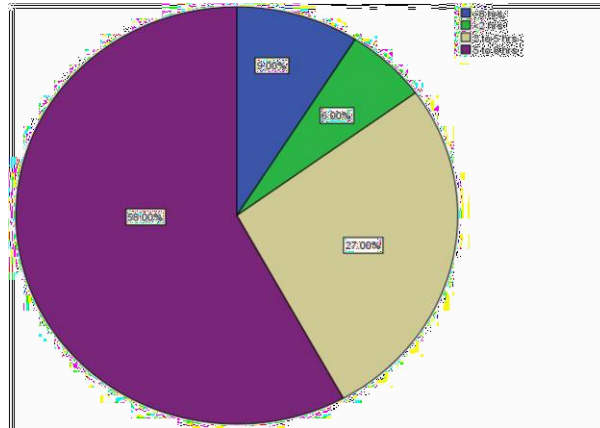


Figure 4 : The pie chart showing the percentage distribution of hours of sleep a day of the survey participants. 9 % (Blue) answered > 8 hrs, 6 % (Green) answered < 2 hrs, 27 % (Tan grey) answered 2 to 5 hrs and 58 % (Violet) answered 5 to 8 hrs. N = 100. Majority of the survey participants take 5 to 8 hrs of sleep a day.

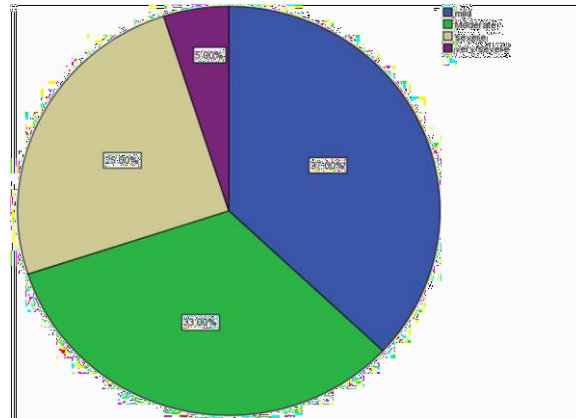


Figure 5 : The pie chart showing the percentage distribution of insufficiency or disturbances of the survey participants in sleep . 37 % (Blue) answered Mild , 33 % (Green) answered Moderate, 25 % (Tan grey) answered severe and 5 % (Violet) answered very severe. N = 100. Majority of the participants have mild insufficiency / disturbances in sleep.

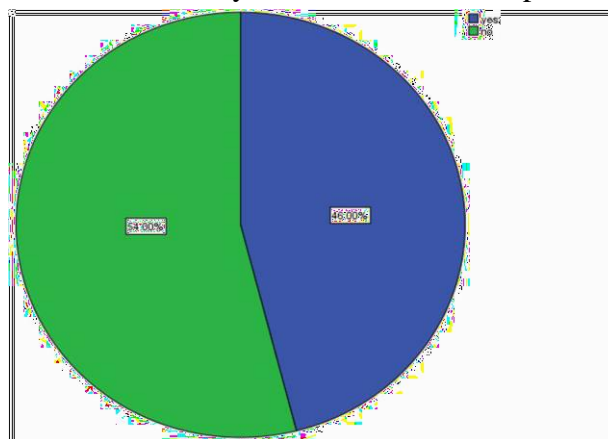


Figure 6 : The pie chart showing the percentage distribution of respiratory problems among the survey participants. 46% (Blue) answered Yes and 54 % (Green) answered No. N = 100. Participants with respiratory problems were more among the survey participants.



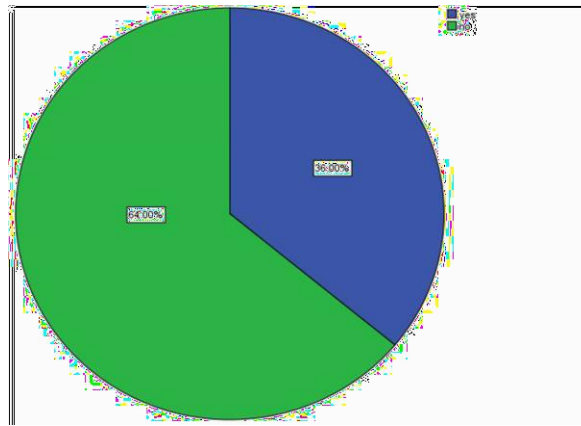


Figure 7: The pie chart showing the percentage distribution of sleep related breathing problems of the survey participants. 36 % (Blue) answered yes and 64 % (Green) answered No. N = 100. Majority of the participants don't have any sleep related breathing problems.

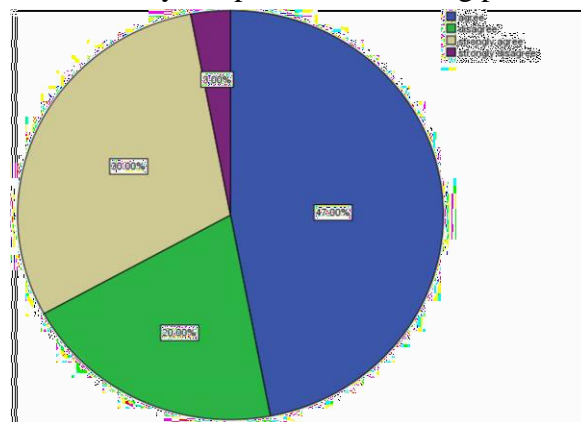


Figure 8: The pie chart showing the percentage distribution of agreement of passive smoking is as effective as active smoking . 47 % (Blue) answered Agree , 20 % (Green) answered Disagree, 30 % (Tan grey) answered Strongly agreed and 3 % (Violet) answered Strongly disagreed. N = 100. Majority of the survey participants were agreeing that passive smoking is as effective as active smoking .

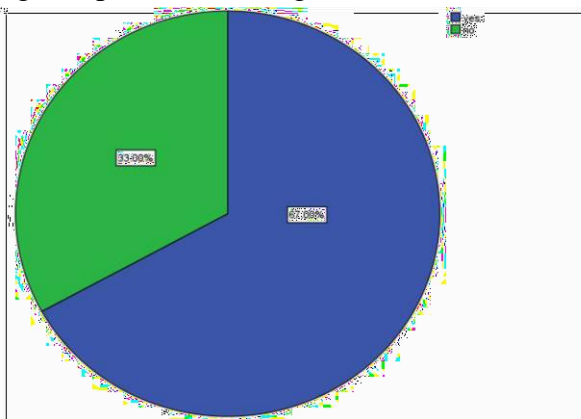


Figure 9: The pie chart showing the percentage distribution of participants responses on awareness of smoking. 67 % (Blue) answered Yes and 33 % (Green) answered No. N = 100. Majority of the survey participants are aware of the effects of active and passive smoking.

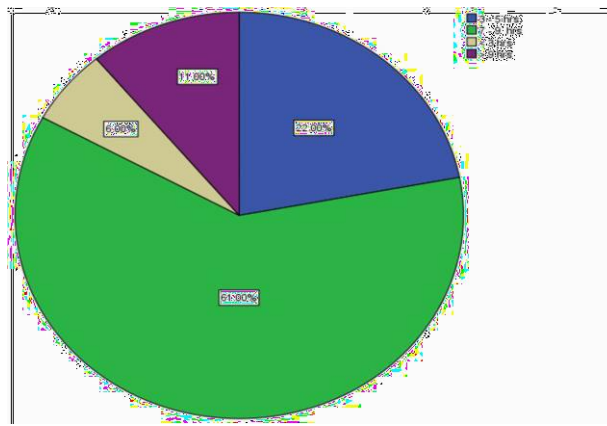


Figure 10 : The pie chart showing the percentage distribution of responses of participants' knowledge on the minimum requirement of sleep a day for healthy life. 22 % (Blue) answered 3 to 5 hrs , 61 % (Green) answered 7 to 9 hrs , 6 % (Tan grey) answered < 3 hrs and 11 % (Violet) answered > 9 hrs. N = 100. Majority of the participants have the knowledge on the minimum requirement of sleep a day and preferred 7 to 9 hrs sleep per day.

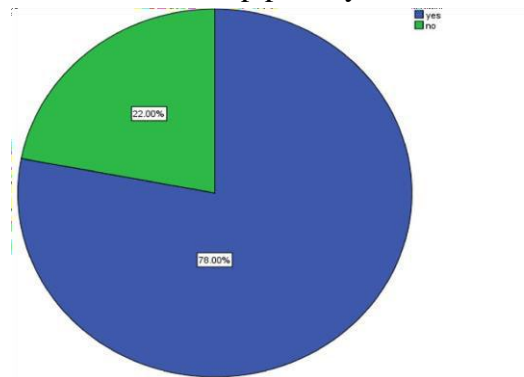


Figure 11: The pie chart showing the percentage distribution of responses on willingness of the survey participants to quit smoking. 78 % (Blue) answered Yes and 22 % (Green) answered No. N = 100. Majority of the survey participants were willing to quit active smoking and to avoid passive smoking.

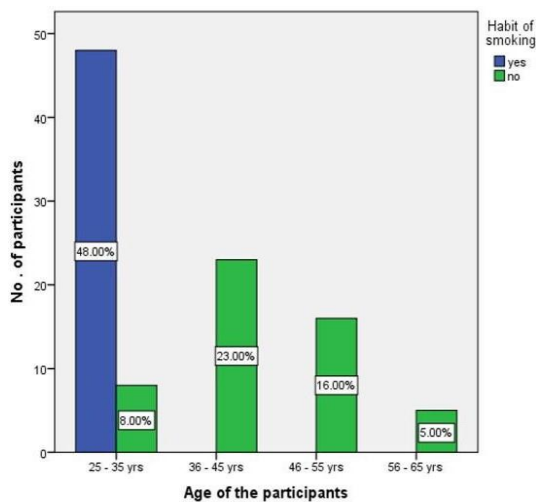


Figure 12 : The bar graph represents the association of Age and Smoking habits of the participants. The X - axis represents the Age groups and the Y - axis represents the number of participants with the habit of smoking. Yes (Blue) and No (Green). Among the total participants, 48% of them have the habit of smoking.

The participants of the age group 25 to 35 yrs old were more prevalent with the smoking habit. This association is statistically significant.  $p=0.01$  (Pearson Chi square  $p<0.05$ ).

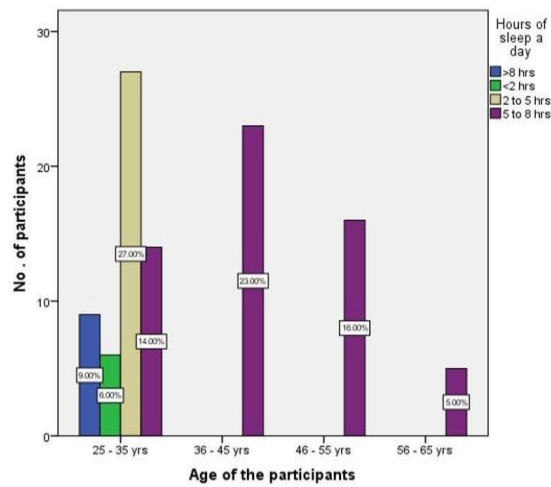


Figure 13: The bar graph represents the association of age and hours of sleep a day of the participants. The X - axis represents the Age groups and the Y - axis represents the hours of sleep a day of the participants. > 8 hrs (Blue), < 2 hrs (Green), 2 to 5 hrs (Tan gray) and 5 to 8 hrs (Violet). More than half (58%) of the participants had 5 to 8 hrs of sleep a day. The participants of the age group 25 to 35 yrs old predominantly have 2 to 5 hrs of sleep a day which is the minimum time of sleep and other age groups have 5 to 8 hrs of sleep which is the maximum sleeping time. This association is statistically significant,  $p=0.01$  (Pearson Chi square  $p<0.05$ ).

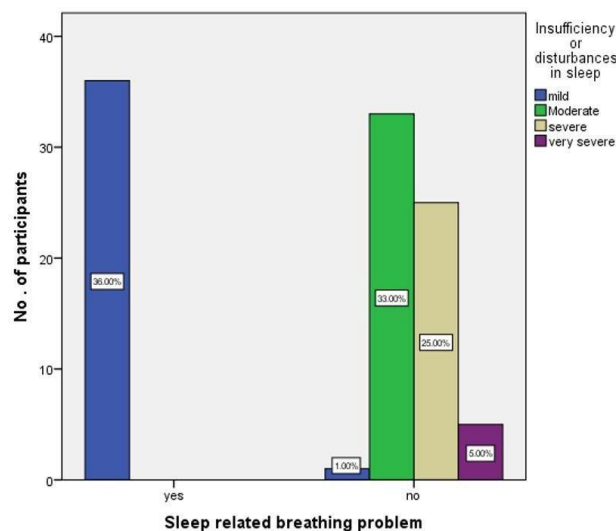


Figure 14: The bar graph represents the association of sleep related breathing problems and insufficiency/disturbances in sleep. The X-axis represents the presence of sleep related breathing problems and the Y-axis represents the number of participants with insufficiency/disturbances in sleep. Mild (Blue), Moderate (Green), Severe (Tan gray) and Very severe (Violet). 36% of the participants with sleep related breathing problems have mild insufficiency/disturbances in their sleep and depicting this association is statistically significant.  $p=0.01$  (Pearson Chi square,  $p<0.05$ ).

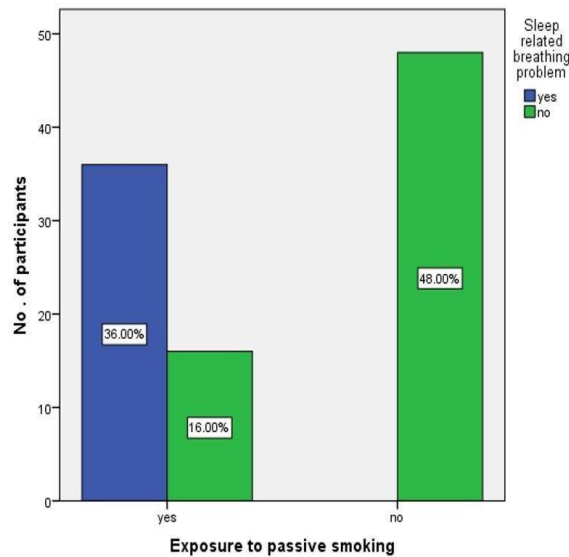


Figure 15: The bar graph represents the association of exposure to passive smoking and sleep related breathing problems . The X - axis represents the exposure to passive smoking and the Y - axis represents the number of participants with sleep related breathing problems . Yes (Blue) and No (Green) . 48 % of the participants with no exposure to passive smoking don't have any sleep related breathing problems . This association is statistically significant .  $p = 0.01$  (Pearson Chi - square ;  $p < 0.05$ ) .

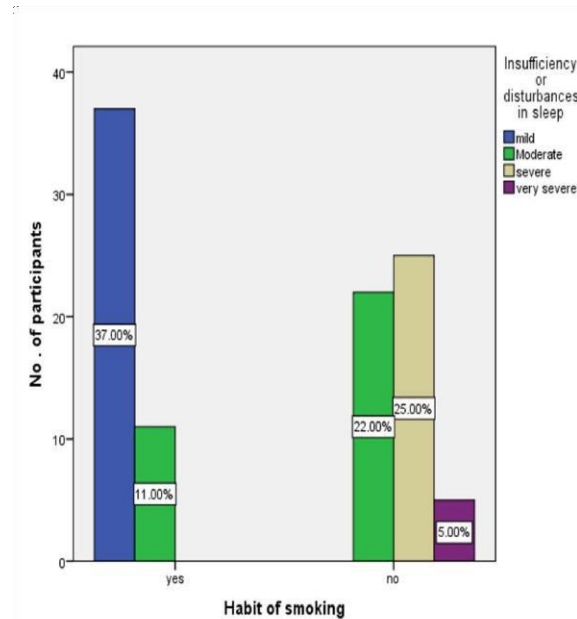


Figure 16: The bar graph represents the association of habit of smoking and insufficiency and disturbances in sleep. The X - axis represents the habit of smoking and the Y - axis represents the number of participants with insufficiency / disturbances in sleep. Mild (Blue), Moderate (Green), Severe (Tan grey) and Very severe (Violet). 37 % of the participants with the habit of smoking have insufficiency and disturbances in sleep indicating this association is statistically significant.  $p = 0.01$  (Pearson Chi square  $p < 0.05$ ).

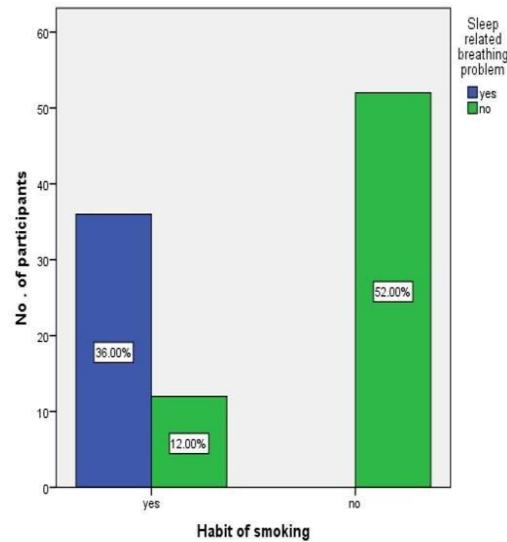


Figure 17: The bar graph represents the association of habit of smoking and sleep related breathing problems. The X - axis represents the habit of smoking and the Y - axis represents the number of participants with sleep related breathing problems. Yes (Blue) and No (Green). 52 % of the participants with no smoking habit don't have any sleep related breathing problems indicating this association is statistically significant,  $p = 0.01$  (Pearson Chi square  $p < 0.05$ ).

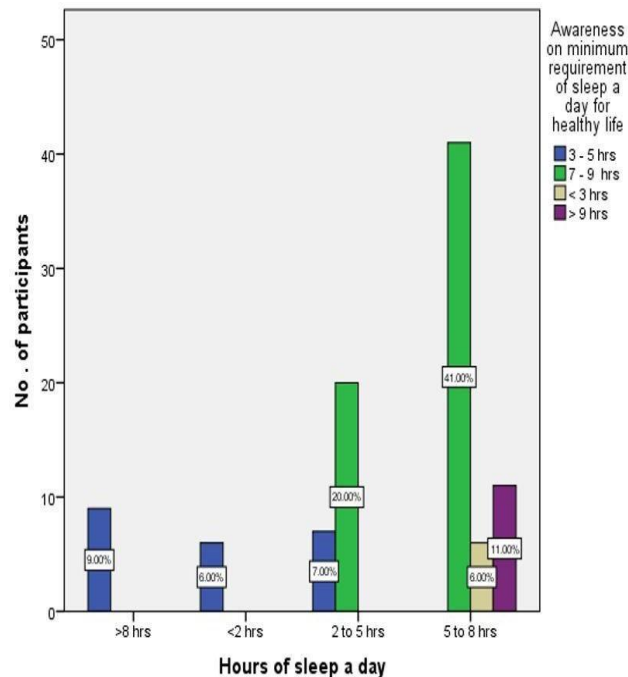


Figure 18: The bar graph represents the association of hours of sleep a day of the participants and the knowledge on minimum requirement of sleep a day of the participants. The X - axis represents the hours of sleep a day of the participants and the Y - axis represents the knowledge of total number of the participants on minimum requirement of sleep a day. > 8 hrs (Blue), < 2 hrs (Green), 2 to 5 hrs (Tan gray) and 5 to 8 hrs (Violet). 41 % of the participants preferred 5 to 8 hrs of sleep a day which was considered as the sufficient minimum requirement of sleep a day for a healthy life indicating the association is statistically significant,  $p = 0.01$  (Pearson Chi square,  $p < 0.05$ ).