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A RETROSPECTIVE STUDY ON THE PREVALENCE OF OBSTRUCTIVE SLEEP APNEA IN STROKE PATIENTS IN A TERTIARY CARE HOSPITAL

Jonnalagadda divya[1], Niroshini, Tirumala, Vamsi[2]

1.Asst.Professor, Department of Pharmacology, 9XH+FPP, Guntur Mandal, Near Hosanna Mandir Nallapadu, Andhra Pradesh 522005.

2. Department of Pharmacology, 9XH+FPP, Guntur Mandal, Near Hosanna Mandir Nallapadu, Andhra Pradesh 522005.

Abstract:

PURPOSE:

The aim of the study is to determine the occurrence of sleep disorders in stroke patients and their prevalence in relation to stroke.

INTRODUCTION:

Stroke is a medical condition in which poor blood flow to the brain results in cell death. Stroke is one of the most common neurological disorders in clinical practice. According to WHO, it is the second commonest cause of death worldwide. It is forecasted that the deaths because the of stroke will rise to 6.5 million by 2015 and by 2020, stroke and coronary artery disease are expected to be the leading causes of losing life. Earlier Surveys on stroke indifferent parts of India shown that the prevalence of stroke varies in different regions of India and ranges from 40 to 270 per 1, 00,000 populations. Stroke is responsible for around 11% of all deaths worldwide.

METHODS:

This Study was conducted in the neurology department of Lalitha Super Speciality Hospital, Guntur Andhra Pradesh. A 300 bedded multi specialty tertiary care hospital for a period of 6 months from 2020-2021.The procedure of the study was a prospective observational study was conducted in the hospitalized stroke patients.

The inclusion criteria for the study are the patients admitted in the hospital of any age, in patients who are diagnosed with stroke, patients who are willing to participate in study and patients with sleep disorders with past medical history of stroke.

RESULTS & DISCUSSION:

A sample of 202 patients were enrolled into the study. The data was taken from the patient who is admitted in the hospital. In this study the prevalence of obstructive sleep apnea, possible etiologies of obstructive sleep apnea in different types of stroke patients. In order to validate the patients having obstructive sleep apnea all the patients were advised to go through polysomnography test, however, majority of the patients did not report for polysomnography test.

Out of 202 patients 145patients were males and 57 females. The majority of the participants belonged to the age group of 30 to 79. Out of 145 males 74(51.03%) were alcoholics and 71(48.97%) are non-alcoholics. Out of 145 males 80(55.17%) are smokers and 65(44.83%) are non-smokers. Out of 145 males 79(54.48%) patients had obstructive sleep apnea. Out of 57 females 35(61.40%) patients had obstructive sleep apnea. Females are more susceptible or more likely to develop Obstructive sleep apnea compared to males. Patient counseling was provided to patients regarding proper sleeping posture, sleep time and duration of sleep for avoiding Obstructive sleep apnea.

CONCLUSION:

The results clearly show that there is clear association between Obstructive sleep apnea and Stroke in males and females. However, females are more susceptible or more likely to develop Obstructive sleep apnea compared to males. Patient counseling was provided to patients regarding proper sleeping posture, sleep time and duration of sleep for avoiding Obstructive sleep apnea.

Sleep disorders are highly prevalent in patients with stroke and in those at risk for stroke. Thus, sleep disorders screening through questionnaires such as the ESS and the Berlin Questionnaire should become a part of standard of care in stroke clinics. Finally, newer strategies to educate future health-care professionals and the public about the importance of sleep and its impact on stroke and cardiovascular disease are vital.

Key words: Stroke, obstructive sleep apnea, prevalence, chi-square test value.

Introduction:

STROKE:

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will rise to 6.5 million by 2015 and by 2020, stroke and coronary artery disease are expected to be the leading causes of losing life. Earlier Surveys on stroke in different parts of India shown that the prevalence of stroke varies in different regions of India and ranges from 40 to 270 per 1, 00,000 populations. Stroke is responsible for around 11% ofall deaths worldwide.

Methodology:

STUDY DESIGN:

The current study is a retrospective observational study performed by using Berlin questionnaire, Epworth scale and Polysomnography readings for the assessment of prevalence of sleep disorders in stroke patients.

STUDY SITE:

The study was carried out at Lalitha Super Speciality Hospital, Guntur.

STUDY PERIOD:

The retrospective observational study was conducted over a period of six months fromJanuary 2021 to August 2021.

STUDY CRITERIA:

Table.2.1: Study Criteria

INCLUSION CRITERIA	EXCLUSION CRITERIA
Patients have confirmed the existence of stroke by computerized tomography, sleep disorders would be verified according to the General Curriculum of sleep, the Berlin questionnaire and Epworth scale.	Children less than 8 years of age pregnan tfemales.

SOURCES OF DATA:

All necessary data was collected from the following sources

- Patient data collection form
- Patient case history
- Patient prescription
- Laboratory data sources
- Treatment chart
- Communication with other healthcare professionals
- Questionnaire
- Polysomnography reports of the patients

QUESTIONNAIRE VALIDATION:

Dr.P.Vijaya, Dr.N.Srinivasarao of the neurology department validated the clarity, relevance and conciseness of items included in the questionnaire. The observation and comments of the questionnaire were taken into account.

STATISTICAL TOOL:

Appropriate statistical analysis tool would be employed to analyse the data obtained.

STUDY PROCEDURE:

➢ First of all the ethical clearance was obtained to conduct this study from Institutional Human Ethical Committee A.M Reddy Memorial College of Pharmacy, Narasaraopet, Lalitha super speciality Hospital, Guntur;

➢ Informed consent was obtained from the patients both orally and by written forms. The demographic details, social habits, physical functioning, symptom clusters andmedication adherence were collected from the patients.

➢ The prevalence of obstructive sleep apnea would be assessed by Epworth scale andBerlin questionnaire

➢ Then after obtaining required details and necessary aspects, patients would becounselled regarding:

- About the disease.
- Occurrence of sleep apnoea.
- How to improve quality of sleep in stroke patients.
- Importance of medication adherence.
- Consequences of sleep apnoea related problems.
- About life style modifications which majorly include diet and exercise (in case of fatigue) and also importance of avoiding smoking and alcohol.

After one month the patients would be then followed up for adherence.

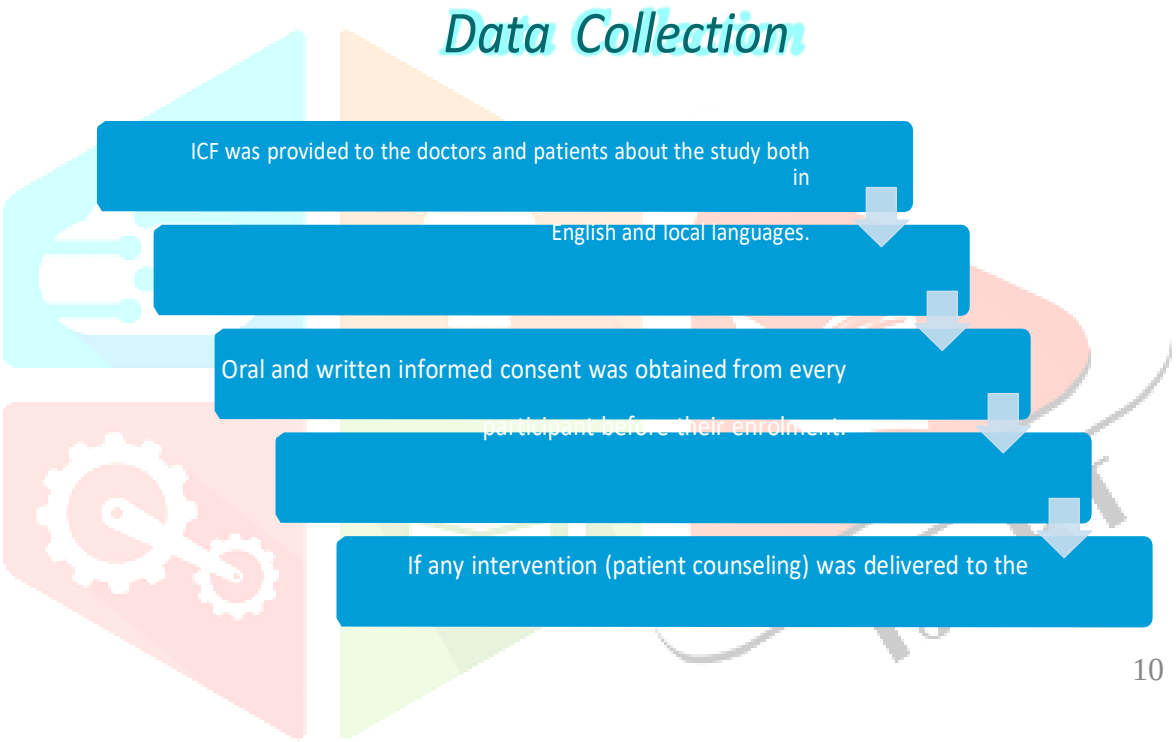


Figure 11.Data collection methodology

DATA ANALYSIS:

The filled questionnaires would be analysed as per the study objectives. The various parameters such as age, gender, smoker, alcoholic, function scales, symptom scales, severity and prevalence would be calculated and then analysed. The data would beanalysed using chi- square test.

Chi-square test

The Chi-Square statistic is most commonly used to evaluate Tests of Independence when using a cross tabulation (also known as a bivariate table). Cross tabulation presents the distributions of two

categorical variables simultaneously, with the intersections of the categories of the variables appearing in the cells of the table. The Test of Independence assesses the Chi-Square distribution allows the researcher to assess whether the observed cell counts are significantly different from the expected cell counts.

The calculation of the whether an association exists between the two variables by comparing the observed pattern of responses in the cells to the pattern that would be expected if the variables would be truly independent of each other. Calculating the Chi-Square statistic and comparing it against a critical value from Chi-Square statistic is quite straight-forward and intuitive:

$$\chi^2 = \sum \left[\frac{(fo - fe)^2}{fe} \right]$$

This formula says that chi-square is the sum we will get if we,

1. Subtract *fe* from *fo* for each of the values in the table.
2. Square each of the differences
3. Divide each squared differences by *fe*
4. Sum all eight of the answers.

Wheref_o = the observed frequency (the observed counts in the cells) andf_e = the expected frequency if NO relationship existed between the variables

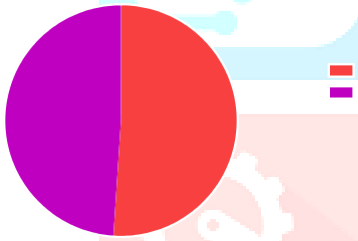
RESULTS AND DISCUSSION

A total of 202 patients' data was included taken for the study. Among the 202 patients, 145 patients were males and 57 females. The majority of the participants belonged to the age group of 30 to 79. The details of the participants as shown in Table 1. The participants included in the study were from the patients visiting Lalitha Super Speciality Hospitals. The patient data was collected from the database of patient profile form of Lalitha Super Speciality Hospitals and were

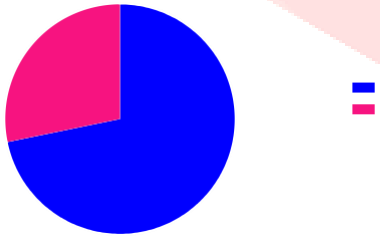
periodically contacted over phone for counselling and face to face interview for filling the questionnaire form for the patients.

Table 1. Age and Sex of the Participants

Age Range	Males	Females	TOTAL
10-19	1	0	1
20-29	2	1	3
30-39	12	6	18
40-49	31	9	40
50-59	34	15	49
60-69	36	13	49
70-79	25	13	38
80-89	3	0	3
90-99	1	0	1
TOTAL	145	57	202



Total= 145



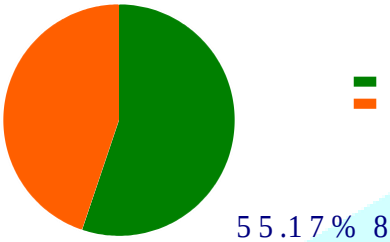
Total= 202

51.03% 74 Alcoholic

48.97% 71 Non-alcoholic

71.78% 145 Males

28.22% 57 Females



55.17% 80 Smokers

44.83% 65 Non smokers

Total= 145

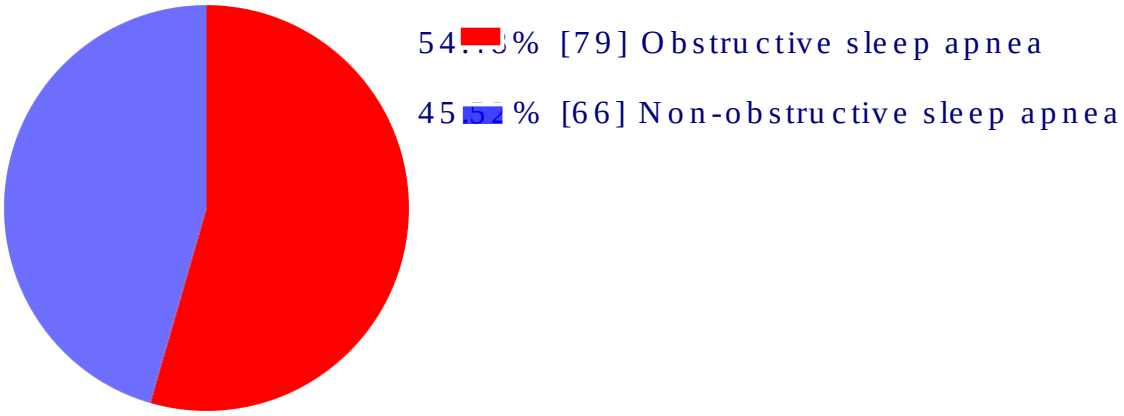
Figure 13. Smokers and Alcoholics present among the Male patients.

Among the male patients 74 patience profound to be alcoholic and 80 patients werefound to be smokers. Both smoking consumption of alcohol are risk factors for development

of stroke. Hence, consumption of alcohol and smoking is very closely observed with stroke patients.

Sleep disorders are very closely associated with stroke hence, based on questionnaire forms we identified the patients having obstructive sleep apnea. In order to validate the patients having obstructive sleep apnea all the patients were advised to go through polysomnography test, however, majority of the patients did not report for polysomnography test. It seems the high cost of the test resulted in less number of participants for polysomnography test. Among the male patients 79 patients were observed to have sleep related disorder (Obstructive sleep apnea).

MALES



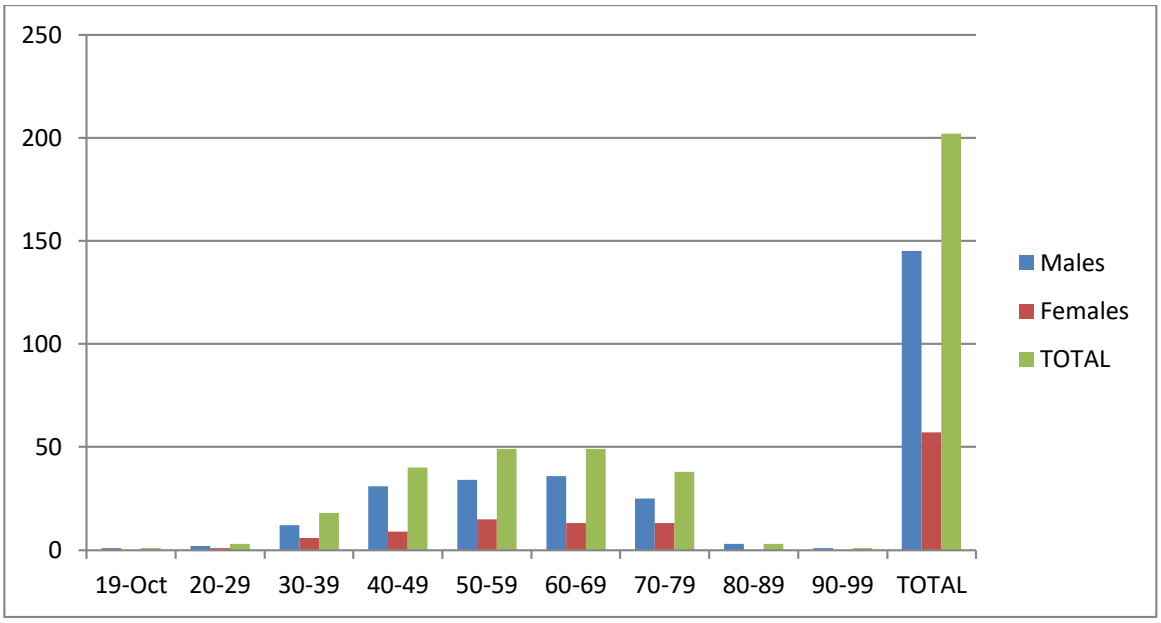
Total= 145

Figure 14. Male patients with Obstructive Sleep Apnea

Among the female patients 35 patients had sleep disorders (Obstructive sleep apnea) as shown in Figure 11 and 12.

Based on the above data we performed the Chi square test to analyse whether there is any association between Obstructive sleep apnea and Stroke in male patients. The results shown below clearly show that there is a sig

Stroke (P at 0.0001). The Chi-square value was found to be 33.5.The Odds ratio, Sensitivity, Specificity, Positive predictive value and Likelihood Ratio was found to be 5.519, 0.814, 0.557, 0.5448 and 1.839 respectively



Based on the above data we performed the Chi square test to analyse whether there is any association between Obstructive sleep apnea and Stroke in female patients. The results shown below clearly show that there is a significant association between Obstructive sleep apnea and Stroke (P at 0.0001). The Chi-square value was found to be 33.36.The Odds ratio, Sensitivity, Specificity, Positive predictive value and Likelihood Ratio was found to be 15.91, 0.87, 0.69, 0.614 and 2.864 respectively.

Table Analyzed	Obstructive sleep Apnea and Stroke females	
P value and statistical significanceTest	Chi-square	
Chi-square, df	33.36, 1	
Z	5.776	
P value	<0.0001	
P value	****Two-sided	
summary One- or two-sided	Yes	
Statistically significant (P < 0.05)?		
Effect size	Value	95% CI
Relative Risk	6.754	3.038 to 15.89
Reciprocal of relative risk	0.1481	0.06292 to 0.3292
Attributable risk (P1 - P2)	0.5231	0.3424 to 0.6587
NNT (reciprocal of attrib. risk)	1.912	1.518 to 2.92
Odds ratio	15.91	5.47 to 40.37
Reciprocal of odds ratio	0.06286	0.02477 to 0.1828

Sensitivity	0.875	0.7389 to 0.9454
Specificity	0.6944	0.5805 to 0.7887
Positive Predictive Value	0.614	0.4843 to 0.7294
Negative Predictive Value	0.9091	0.8042 to 0.9605
Likelihood Ratio	2.864	
Methods used to compute CIsRelative Risk	Koopman asymptotic score	
Attributable risk (P1 - P2)Odds ratio	Newcombe/Wilson with CC Baptista-PikeWilson-Brown	
Sensitivity, specificity, etc.		
Data analyzed	Obstructive Sleep Apnea	No-obstructive sleep apnea
Stroke in females	35	22
Non stroke cases	5	50
Total	40	72
Percentage of row total	Obstructive Sleep Apnea	No-obstructive sleep apnea
Stroke in females	61.40%	38.60%
Non stroke cases	9.09%	90.91%
Percentage of column total	Obstructive Sleep Apnea	No-obstructive sleep apnea
Stroke in females	87.50%	30.56%
Non stroke cases	12.50%	69.44%
Percentage of grand total	Obstructive Sleep Apnea	No-obstructive sleep apnea
Stroke in females	31.25%	19.64%
Non stroke cases	4.46%	44.64%

Conclusion:

The above results clearly show that there is clear association between Obstructive sleep apnea and stroke in males and females. However, females are more susceptible or more likely to develop Obstructive sleep apnea compared to males.

Patient Counselling was provided to patients regarding proper sleeping posture, sleep time and duration of sleep for avoiding Obstructive sleep apnea.

The results clearly show that there is clear association between Obstructive sleep apnea and Stroke in males and females. However, females are more susceptible or more likely to develop Obstructive sleep apnea compared to males. Patient Counselling was provided to patients regarding proper sleeping posture, sleep time and duration of sleep for avoiding Obstructive sleep apnea.

Sleep disorders are highly prevalent in patients with stroke and in those at risk for stroke. Thus, sleep disorders screening through questionnaires such as the ESS and the Berlin Questionnaire should become a part of standard of care in stroke clinics. Further clinical and research collaborations between stroke and sleep specialists should be encouraged to improve the knowledge, the prevention strategies, and subsequently, the clinical outcomes for stroke patients. Finally, newer strategies to educate future health-care professionals and the public about the importance of sleep and its impact on stroke and cardiovascular disease are vital.

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