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Effectiveness of selected nursing interventions on obstructive sleep apnea syndrome (OSAS) among employees who are at risk in selected institutions, Mangalore

Abstract

Background of the study: Sleep is a physiological and behavioral process that is essential for the proper functioning of the human body. The measurement of sleep quality has become an important clinical tool to identify health problems. Sleep disturbances may be associated with fatigue, mood changes, and decreased pain tolerance. Impaired sleep may lead to metabolic dysfunctions because hormones, which play a vital role in the functioning of the body, are produced and released during the sleep cycle. Obstructive sleep apnea was clinically recognized more than 30 years ago, but awareness of this condition outside the field of sleep medicine was slow to develop. The situation changed drastically when population-based studies uncovered an unexpectedly high prevalence of OSA in adults Health care systems around the world.

Aim: The aim of this study was to find out the effectiveness of selected nursing interventions on Obstructive Sleep Apnea Syndrome (OSAS) among employees who are at risk in selected institutions.

The objectives of the study are to

i. Assess the risk factors among employees who are at risk for developing obstructive sleep apnea syndrome.

ii. Assess pre-test and post-test problems of employees who are at risk for OSAS in experimental and control group.

iii. Determine effectiveness of selected nursing interventions on OSAS among employees who are at risk.

iv. Find an association between pre-test problems and selected socio demographic variables of employees who are at risk.

Methods: A true-experimental pre-test post-test design was used for this study. The conceptual frame work used in this study was Roy's Adaptation Model (1984) which views the individual as an adaptive system, who functions as a whole through the inter-dependence of sub-parts. Employees who were at risk for Obstructive Sleep Apnea Syndrome screened with Sleep Apnea Clinical Scoring scale were selected by non-probability purposive sampling technique and randomly allocated into experimental and control group (twenty employees in the experimental group and twenty employees in control group). Employees who were in the age group of 20-60 years and had risk score of 15 and above in Sleep Apnea Clinical Scoring scale, were included in the study and employees who had neurovascular problems, severe cardiovascular problems, exercise induced asthma and syncope and deviated nasal septum were excluded from the study. Pre-test assessment of the employees was done with Sleep Apnea Risk questionnaire and Numerical sleep Scale. Experimental group received interventions such as positional therapy, breathing exercises, brisk walking, nasal strips and education on Continuous Positive Airway Pressure (CPAP) mask, avoidance of alcohol or sedatives before bed time and oral appliances continuously for ten days. Post-test assessment was done on tenth day with Sleep apnea risk Questionnaire and Numerical Sleep Scale. The tool for data collection consists of Demographic Proforma, Sleep Apnea Clinical Scoring scale, Sleep Apnea Risk Questionnaire and Numerical Sleep Scale.

Tool:

Section 1: Demographic proforma: Demographic Proforma consists of five items that includes age, gender, occupation, habit of smoking, and habit of alcoholism.

Section 2: sleep apnea clinical scoring scale for assessing the risk for

Obstructive sleep apnea syndrome: The investigators selected this standardized scale in order to find out employees who were at risk for OSAS. The scale consists of items that includes loud and habitual snoring, interrupted breathing pattern, Epworth Sleepiness Scale, Body Mass Index >25 and use of antihypertensive medications and those who got score 15 and above were selected as study subjects.

Section 3: Sleep apnea risk questionnaire: The investigator selected this standardized scale in order to find out the problems of employees who were at risk for OSAS. The scale consists of four items that includes frequency of snoring, frequency of interrupted breathing, overweight of employees and Epworth Sleepiness Score. Each component had scores ranging from 0 to 4 and the total score was 12.

Section 4: Numerical sleep scale on subjective perception of degree of sleep: The investigator developed this tool to assess the subjective perception of quality of night time sleep of employees who were at risk for OSAS. The scale consists of five items that include, quality of sleep, duration of sleep, activeness during morning, time needed to get sleep after getting to bed, and frequency of awakening during night time. The least score of the scale was 5 and maximum score was 45. The data was analyzed using descriptive and inferential statistics.

Results: Paired't' test was used to determine the effectiveness of nursing interventions on OSAS in the experimental group. The computed 't' values for SARQ and NSS scores in the experimental group (8.90 and 9.68 respectively) were significant at 0.01 level (t19= 2.861; $p \leq 0.01$). These findings indicated that nursing interventions was effective in decreasing problems of OSAS among employees who were at risk for OSAS. Independent 't' test was used to compare post-test OSAS scores of the experimental and the control groups. The computed 't' value for SARQ and NSS scores (4.25 and 8.20 respectively) were significant at 0.01 level (t_{38}=2.58 $p \leq 0.01$). By comparison of mean posttest scores of both the groups, it was identified that nursing interventions were effective in reducing problems of employees who were at risk for OSAS. Chi square test was used to test the significant association between pre-test level of OSAS and selected demographic variables such as age in years, gender, occupation, habit of smoking and habit of alcoholism. The computed chi-square values shows that there was no significant association between the pre-test OSAS level(SARQ and NSS) and selected demographic variables such as age, gender, occupation, habit of smoking, and habit of alcoholism.

Interpretation and conclusion: The study findings proved that that there was a significant reduction in the mean post-test SARQ score and increase in mean post-test NSS score among employees those who received selected nursing interventions than those who do not receive. From these findings, the investigator concluded that selected nursing interventions were effective in reducing the problems of OSAS among employees who were at risk for OSAS.

Keywords: effectiveness; obstructive sleep apnea syndrome, nursing interventions, employees

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Introduction

Need for the study

Sleep medicine is obviously a challenging field, evolving with new technology. The adult prevalence rate of sleep disorders of breathing are now available in many different countries. The overall estimation across different countries is about three to seven percent for women in general population.[1]

Obstructive Sleep Apnea is being increasingly recognized as an important cause of medical morbidity and mortality. It is a relatively common sleep disorder that is characterized by recurrent episodes of partial or complete collapse of the upper airway during sleep. The ensuing reduction of airflow often leads to acute derangements in gas exchange and recurrent arousals from sleep. The health consequences of Obstructive Sleep Apnea are numerous. If left untreated, it leads to excessive daytime sleepiness, cognitive dysfunction, impaired work performance, and decrements in health-related quality of life.[2]

Observational and experimental evidence also suggested that Obstructive Sleep Apnea may contribute to the development of systemic hypertension, cardiovascular disease and abnormalities in glucose metabolism. Obstructive Sleep Apnea is insidious and patients are often unaware of the associated symptoms. Cardinal manifestations include loud snoring, witnessed breathing pauses during sleep, fitful sleep quality, and excessive daytime sleepiness. Early recognition and appropriate therapy can ameliorate the neurobehavioral consequences and may also have favorable effects on cardiovascular health.[3]

In India, a study was conducted to assess the prevalence of sleep disordered breathing and sleep apnea in middle aged urban Indian men. The study was estimated as prevalence of sleep disordered breathing (Apnea- Hypopnea Index of 5 or more) was 19.5% and that of Obstructive Sleep Apnea was 7.5%. The study concluded that, higher prevalence of Obstructive Sleep Apnea Syndrome in urban Indian men is striking and may have major public health implications in a developing country like India.[3]

Despite recent advances in diagnostic technology in the field of sleep medicine and increased awareness of Obstructive Sleep Apnea among public, a majority of affected were still undiagnosed. Therefore, it is important for primary care physicians and healthcare professionals to be competent to recognize and identify those affected subjects for early and appropriate treatment. There is accumulating evidence that Obstructive Sleep Apnea is considered as an independent risk for hypertension, diabetes mellitus, cardiovascular disease, and stroke leading to increased cardio-metabolic morbidity and mortality.[4,5]

Hypotheses (All hypotheses are tested at 0.05 level of significance)

H1: There will be significant difference between mean pre-test and post-test OSAS score after administration of selected nursing interventions among employees who are at risk for OSAS.

H2: There will be significant difference in scores of OSAS between employees who receive selected nursing interventions and those who do not receive.

H3: There will be significant association between pre-test level of OSAS and selected Socio demographic variables of employees (Table 1 & Table 8).

Table 1 Frequency and percentage distribution of employees according to their characteristics in the experimental and the control groups:-n=40

Variables	Experimental group		Control group	
	f	%	f	%
Age in Years				
20-29	6	30	4	20
30-39	5	25	2	10
40-49	7	35	9	45
d.50 and above	2	10	5	25
Gender				
Male	10	50	14	70
Female	10	50	6	30
Nature of work				
Heavy Worker	1	5	2	10
Moderate Worker	12	60	7	35
Sedentary Worker	7	35	11	55
Habit of smoking				
Yes	3	15	7	35
No	17	85	13	65
Habit of Alcoholism				
Yes	7	35	11	55
No	13	65	9	45

Table 2 Frequency and percentage distribution of employees according to risk nfactors of OSAS:- n=40

Sl no	Risk factors	Frequency (f)	Percentage (%)
1	Hypertension	27	67.5
2	Body mass index more than 25	24	60
3	Habit of alcoholism	18	45
4	Habit of smoking	10	25

Table 3 Mean, standard deviation and 't' value of pre- test score of SARQ in both experimental and control groups n=40

Groups	Pre-test SARQ score			
	Mean	Mean difference	S.D	't' value
Experimental Group	10.1	-0.4	1.07	1.15
Control Group	9.7		1.12	

Table 4 Mean, standard deviation and 't' value of pre- test score of NSS in both experimental and control groups n=40

Groups	Pre-test NSS score			
	Mean	Mean difference	S.D	't' Value
Experimental Group	27.8	-5.45	8.13	2.34
Control Group	22.35		6.44	

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Table 5 Mean, standard deviation and 't' value of SARQ and NSS within the experimental group and the control groups n=20

Groups	OSAS Score	Mean Pre -test	Mean Post -test	Mean difference	SD Pre -test	SD Post -test	SD Difference	df	't' Value
Experimental	SARQ	10.1	7.9	-2.2	1.07	1.25	0.18	19	8.90**
	NSS	27.8	38.85	11.05	8.13	5.61	-2.52		9.68**
Control	SARQ	9.7	9.6	-1	1.12	1.27	0.44	19	1(NS)
	NSS	22.35	22.7	0.35	6.44	6.77	0.26		1.32(NS)

t_{19}, 2.861; p< 0.01 **significant at 0.01 level; NS, Not significant

Table 6 Comparison of the mean post-test OSAS scores of the experimental and control group n=40

OSAS scores	Experimental group		Control Group		df	't' value
	Mean	S.D	Mean	S.D		
SARQ	7.9	1.25	9.6	1.27	38	4.25**
NSS	38.85	5.61	22.7	6.77	38	8.20**

$t_{(38)}$, 2.58; p≤0.01; **significant at 0.01 level

Table 7 Association between pre-test level of SARQ and selected Socio demographic variables of employees. n=40

Demographic variables	Demographic variables			df	Chi Square value (χ2)
	<Median	≥Median	Total		
Age (Years)					
20-39	11	7	18	1	0.329(NS)
40-59	16	6	22		
Gender					
Male	16	8	24	1	0.585(NS)
Female	11	5	16		
Occupation					
Heavy & Moderate worker	15	7	22	1	0.592(NS)
Sedentary worker	12	6	18		
Habit of smoking					
Yes	6	4	10	1	0.414(NS)
No	21	9	30		
Habit of alcoholism					
Yes	13	5	18	1	0.408(NS)
No	14	8	22		

χ2, 3.84; p≤ 0.05; NS, Not significant

Table 8 Association between pre-test level of NSS and selected Socio demographic variables of employees. n=40

Demographic variables	Demographic variables			df	Chi square value (χ2)
	<Median	≥Median	Total		
Age (Years)					
20-39	8	10	18	1	0.273(NS)
40-59	13	9	22		
Gender					
Male	15	9	24	1	0.110(NS)
Female	6	10	16		
Occupation					
Heavy & moderate worker	11	11	22	1	0.488(NS)
Sedentary worker	10	8	18		
Habit of smoking					
Yes	5	5	10	1	0.571(NS)
No	16	14	30		
Habit of alcoholism					
Yes	10	8	18	1	0.488(NS)
No	11	11	22		

Results and discussion

In this study, 67.5% (27) of the employees had hypertension, 60% (24) had Body Mass Index more than 25, 45% (18), had the habit of alcoholism, and 25% (10) had the habit of smoking as risk factors. The present study findings was supported by a study done on relationship between sleep apnea and hypertension found that sleep apnea syndrome is profoundly increased with hypertension independent of all relevant risk factors.[6] An another study had revealed that, the reduction of weight in patients with OSAS can decrease Apnea-Hypopnea Index to <5 which is congruent with the present study findings.[7] Another study concluded the same as the present study, that both smoking and alcoholism act as risk factor for OSAS.[8]

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Independent 't' test was used for the comparison of pre-test OSAS score in both, the experimental and the control groups. The calculated 't' value for pre-test score of Sleep Apnea Risk Questionnaire (SARQ) and Numerical Sleep Scale (NSS) (1.15, 2.34 respectively) were not significant. Hence, there was no significant difference in pre-test OSAS score between both groups. Thus, before intervention problems of OSAS in both the groups were similar. Hence, both the groups were found to be homogenous in nature

Paired 't' test was used to determine the effectiveness of nursing interventions on OSAS in the groups. The computed 't' values for SARQ and NSS scores in experimental group (8.90 and 9.68 respectively) were significant at 0.01 level whereas the computed 't' values for SARQ and NSS scores in control group (1.00 and 1.32 respectively) were not significant. On the basis of this H01 was rejected for experimental group and H01 was accepted for control group. The mean post-test SARQ score of the experimental group (7.90±1.25) was lower than the mean pre-test SARQ (10.10±1.07) and the mean post-test NSS score of the experimental group (38.85±5.61) was higher than the mean pre-test NSS score of the experimental group (27.80±8.13). The findings indicated that nursing interventions were effective in reducing the problems of OSAS in the experimental group. The present study findings are congruent with several studies in which one concluded that positional therapy was effective for ischemic stroke patients with OSAS[9] and another study concluded that CPAP therapy can reduce interrupted breathing during sleep of OSAS patients.[10]

Independent't' test was used to compare post-test OSAS scores of the experimental and the control groups. The computed't' value for SARQ and NSS scores (4.25 and 8.20 respectively) were significant at 0.01 level. Hence, the hypotheses H02(a), H02(b) and H02 is rejected. The mean post-test SARQ score of the experimental group (7.90±1.25) was lower than the mean post-test SARQ of the control group (9.60±1.27) and the mean post-test NSS score of the experimental group (38.85±5.61) was higher than the mean post-test NSS score of the control group (22.70±6.77). Hence, the selected nursing interventions were effective in reducing problems of OSAS. Present study findings are supported by a study found that even modest weight control was very effective in the reduction of OSAS severity.[11] Present study findings are congruent with several studies in which one concluded that breathing exercises was effective to strengthen the oral, pharyngeal muscles and increase the lung capacity in patients with OSAS[12] and another study concluded that non supine posture during sleep can reduce problems in patients with OSAS.[13]

Chi-square test was computed between pre-test level of OSAS and socio demographic variables such as age in years, gender, occupation, habit of smoking and habit of alcoholism. The computed chi-square values shows that there was no significant association between the pre-test OSAS level and selected socio demographic variables such as age, gender, occupation, habit of smoking, and habit of alcoholism. The present study findings is opposed by a research study which found that Obstructive Sleep Apnea Syndrome was present in 50% of women in the age group of 20-70 years (Figure 1) (Figure 2).[14]

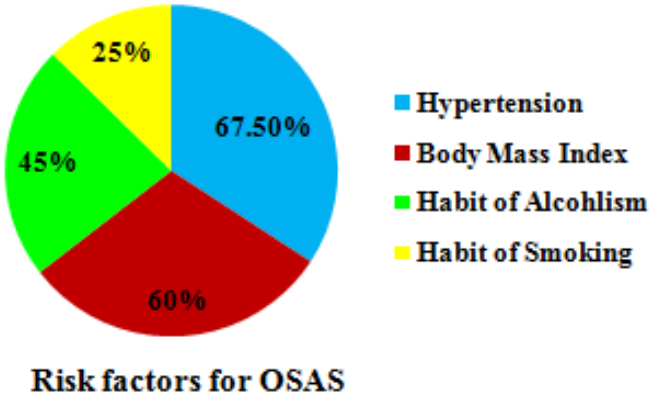

Figure 1 Pie diagram showing distribution of employees according to the risk factors for OSAS.

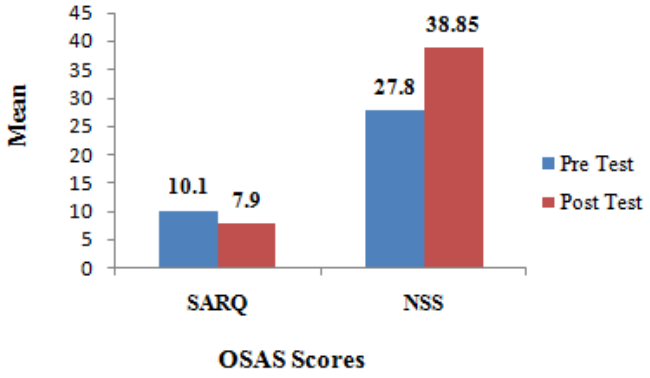

Figure 2 Clustered bar diagram showing the mean pre-test and post-test OSAS scores of the control group.

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None.

Conflict of interest

The author declares that they have no conflicts of interests.

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