

Original Research Article

Sleep apnea risk, cognitive and functional impairment: hidden trio's among elderly: an exploratory study in Mysore, Karnataka, India

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Received: 14 September 2016

Accepted: 10 October 2016

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ABSTRACT

Background: Advancement in medical sciences with socioeconomic improvement across the country have led to increased life expectancy among Indians, which has resulted in increased old age dependency ratio. Indian health care delivery system is more deviant towards productive age groups and has side lined the veterans who constitute about 7-8% of our population. Morbidities among elderly are largely preventable and treatable if detected at early stages. Sleep disturbances, cognitive impairment and functional limitation are commonly neglected by elderly and often overlooked, whereas these conditions can severely impair the living status and quality of life among elderly.

Methods: This cross sectional study was conducted in the Urban field practice area of Department of Community Medicine, JSS Medical College, Mysore for a period of three months. Details regarding Sociodemographic characteristics, sleep disturbance using STOP-BANG tool, Functional status using IADL Scale and cognitive impairment using MINICOG tool were collected in a pretested structured survey schedule by interview technique.

Results: Among 102 of Geriatric subjects included in the present study, majority were in the age group 60-69 years-72 (70.6%) and least 7 (6.9%) were 80 and above. 48 (49.1%) were males and 54 (52.9%) were females. Majority 43 (42.1%) were having Intermediate risk of sleep apnoea and 27 (26.4%) were having high risk. 44 (43.2%) were found to have subclinical cognitive impairments. Functional status scores will significantly lower among subjects with sleep and cognitive disturbances compared to their normal counterparts.

Conclusions: There is a higher burden of sleep apnea, cognitive impairment among elderly which have significant influence on their functional status. Thus there is a need for evolving a strategy to include these screening procedures in the regular health check-up among elderly.

Keywords: Cognitive function, Dementia, Functional status, Geriatrics, Instrumental daily living skills

INTRODUCTION

India has acquired the label of an ageing nation with 7.7% of its population being more than 60 years old. The demographic transition is attributed to the decreasing fertility and mortality rates due to the availability of better health care services. Aging is a universal process. In the words of Seneca "old age is an incurable disease". Sir James Sterling Ross commented on aging as "you do not heal old age, you protect it, you promote it and you

extend it".¹ Advancement in medical sciences with socioeconomic improvement across the country have led to increased life expectancy among Indians, which has resulted in increased old age dependency ratio. Indian health care delivery system is more deviant towards productive age groups and has side lined the veterans. Morbidities among elderly are largely preventable and treatable if detected at early stages. Elderly people frequently report the presence of chronically disturbed sleep.²

Sleep disturbances in the elderly population have multiple etiologies; the most important among these are chronic medical illnesses, psychological influences, and changes in sleep physiology.³⁻⁵ Older persons are at a risk of developing cognitive impairment, which is often considered a precursor to more serious conditions, such as dementia, depression or even Alzheimer's disease. Cognitive impairments have a slower rate of progression and can be detected in subclinical stages by several screening tools. Prompt intervention following its detection can prevent serious consequences in future.

Functional impairment in elderly may be due to several causes ranging from domestic accidents and injuries to serious physical, neurological and mental disorders. Elderly consider these as common changes due to aging and neglect them. Among all the causes of functional impairment, those due to sleep disturbances and cognitive deficiencies can be easily prevented. Thus talking in nutshell, sleep disturbances, cognitive impairment and functional limitation are commonly neglected by elderly and often overlooked, whereas these conditions can severely impair the living status and quality of life among elderly.

The present study aims at studying the prevalence of sleep apnea, cognitive impairment and functional status among elderly and the factors influencing the above mentioned morbidities.

METHODS

This cross sectional community based study was conducted in the Urban field practice area of Department of Community Medicine, JSS Medical College, Mysore for a period of three months. Sample size was calculated based on reported prevalence of cognitive deficiencies among elderly to be 31% with 10% absolute allowable error and 5% level of confidence to be 86. Considering the non-response rate of 15%, 102 elderly were included in the study. From the database of Urban Health Centre 102 subjects above 60 year and above were selected by simple random sampling method from and were traced to their homes for data collection. The houses where the selected elderly were out of station/not available at the time of data collection were revisited three consecutive times before selecting next elderly subject from database.

Institutional Ethics Committee approval was obtained. Details regarding Sociodemographic characteristics, sleep disturbance using STOP-BANG tool, Functional status using IADL Scale and cognitive impairment using MINICOG tool were collected in a pretested structured survey schedule by interview technique.

Statistical analysis

Data collected was entered in MS Excel and analysed using SPSS version 22. Descriptive statistical measures like percentage, mean and standard deviation were

applied. Inferential statistical tests like chi-square test, Mann Whitney's U test and Kruskal Walli's test were applied. Association and differences were interpreted statistically significant at $P < 0.05$.

RESULTS

General characteristics of study subjects

Among 102 of Geriatric subjects included in the present study, majority were in the age group 60-69 years- 72 (70.6%) and least 7 (6.9%) were 80 and above. 48 (47.0%) were males and 54 (53.0%) were females, 44 (43.1%) were Not literates and 72 (70.6%) were married (Table 1).

Table 1: Sociodemographic characteristics of study subjects.

Category	Number	Percentage
Age in years		
60-69	72	70.6
70-79	23	22.5
80&above	07	6.9
Sex		
Male	48	47.0
Female	54	53.0
Education		
Primary	31	3.4
High school	13	12.7
PUC	14	3.9
Degree	10	9.8
Non literate	44	43.1
Marital status		
Married	72	70.6
Widow	29	28.4
Single	1	1

Prevalence and factors influencing sleep apnea risk and cognitive deficiencies

43 (42.1%) were having Intermediate risk of sleep apnoea and 27 (26.4%) were having high risk. 44 (43.2%) were found to have subclinical cognitive impairments (Table 2).

Table 2: Distribution of study subjects based on risk of sleep apnea and dementia.

Category	Number	Percentage
Sleep apnea		
Low risk	32	31.4
Intermediate risk	43	42.2
High risk	27	26.5
Cognitive deficiency		
Present	44	43.1
Absent	58	56.9

Majority of subjects with intermediate and high sleep apnea risk were in the age group of 60-69 years and were females. Most of them were non literates and married.

There was a statistically significant association between risk of sleep apnea with age and education status (Table 3).

Table 3: Factors influencing sleep apnea risk among study subjects.

Category	Sleep apnea risk			Total	P
	Low	Intermediate	High		
Age group					
60-69	22	30	20	72 (70.6)	18.94
70-79	08	10	05	23 (22.5)	
80 & above	02	03	02	7 (6.9)	
Sex					
Male	6	22	20	48 (47.1)	18.494
Female	26	21	7	54 (52.9)	
Education					
Primary	10	15	6	31 (30.4)	15.84
High	6	4	3	13 (12.7)	
PUC	0	4	0	4 (3.9)	
Degree	0	4	6	10 (9.8)	
Non literate	16	16	12	44 (43.1)	
Marital Status					
Married	21	31	20	72 (70.6)	2.51
Widow/Widower	10	12	7	29 (28.4)	
Single	1	0	0	1 (1.0)	

Table 4: Factors influencing cognitive deficiencies among study subjects.

Category	Cognitive deficiency		P
	Present	Absent	
Age group			
60-69	33	39	0.84
70-79	10	13	
80 & above	1	6	
Sex			
Male	23	25	0.84
Female	21	33	
Education			
Primary	11	20	5.93
High	3	10	
PUC	1	3	
Degree	5	5	
Non literate	24	20	
Marital status			
Married	26	46	6.45
Widow/Widower	18	11	
Single	0	1	

Majority of subjects with cognitive deficiencies were in the age group of 60-69 years and were females. Most of them were non literates and married. There was a

statistically significant association between cognitive deficiency with age and education status (Table 4).

Table 5: Comparison of functional status among subjects with sleep apnea risk and Cognitive deficiencies.

Category	Functional status		P Value
	Mean Rank	Median (IQR)	
Sleep apnea risk			
Low	55.15	7 (5-7)	0.048
Intermediate	50.56	6.5 (6-7)	
High	46.80	5 (5-7)	
Cognitive deficiencies			
Present	44.81	6 (2.75-7)	0.036
Absent	55.58	7 (5-7)	

Relationship between sleep apnea risk, cognitive deficiencies and functional status

Functional status scores as assessed by IADL were lowest in the subjects with high risk of sleep apnea and highest in subjects with low risk of sleep apnea.

The function status showed decreasing trend with increasing stages of sleep apnea risk. This difference was statistically significant.

Functional status scores were lower in subjects with cognitive deficiency compared to their normal counterparts. This difference was statistically significant (Table 5). Cognitive deficiency was high among subjects

with intermediate and high risk of sleep apnea. This association between cognitive deficiency and sleep apnea risk was statistically significant (Table 6).

Table 6: Relation between sleep apnea risk and cognitive deficiencies.

Sleep apnea risk	Cognitive deficiency		Total	P
	Present	Absent		
Low	8 (25.0)	24 (75.0)	32 (31.4)	8.637 0.014
Medium	19 (44.2)	24 (55.8)	43 (42.2)	
High	17 (63.0)	10 (37.0)	27 (26.5)	
Total	44 (43.1)	58 (56.9)	102 (100.0)	

Thus, there was significant association between cognitive deficiency and sleep apnea risk. There were significantly lower functional status scores among subjects with cognitive deficiency and sleep apnea risk. Thus an evident triangular relationship between sleep apnea risk, cognitive deficiency and functional status is established.

DISCUSSION

Older age group are more likely than younger age group to have unrecognized comorbidities and impairments that increase their risk of medical morbidity, functional decline, and mortality. Sleep apnea is a common disorder affecting the adult population. It is estimated that nearly 80% of men and 93% of women with moderate to severe sleep apnea are undiagnosed. Elderly people frequently report the presence of chronically disturbed sleep.

Older persons are at a risk of developing cognitive impairment, which is often considered a precursor to more serious conditions, such as dementia, depression or even Alzheimer's disease. Functional impairments and cognitive and affective problems are particularly prevalent among older patients, and can be improved with early recognition and treatment.

Prevalence of Sleep apnea and Cognitive Impairment was higher in our study which was 68.6% and 43.2% respectively and Functional status scores will significantly lower among subjects with sleep and cognitive disturbances compared to their normal counterparts. The reason for the higher burden of these conditions could be that, majority of study subjects were belonging to the urban slum and were not having adequate health facilities to screen the population for these unrevealed, often neglected, health problems.

"Age" itself is actually a universal risk factor to nearly every disease. However, family structure, marriage status and a healthy life style with enough exercise, frequent coffee drinking along with active interventions against chronic diseases might help to prevent the onset or slow

down the progress of Cognitive impairment, According to the risk factor ranking, the prevalence of CI might be reduced by encouraging elder people living with their spouse or offsprings.⁶⁻⁹

In the present study Functional status scores will significantly lower among subjects with sleep and cognitive disturbances compared to their normal counterparts. Comparable prevalence was reported in a study by Swami *et al.* in India.¹⁰

This data is in concordance with the results of studies done among elderly in Spain.¹¹ In different studies conducted by Kuptniratsaikul V and Spector et al the dependency in IADL activities ranged from 7 to 30% and 10 to 63% respectively.^{7,12} Elderly people were more likely to be dependent in majority of IADL activities (15.4%) as compared with the various PADL activities (2.7%).

The present study determined the prevalence and correlates of sleep disturbances in a population of elderly. Obstructive apnea in this study correlated strongly with cognitive deficiencies. The association between psychiatric complaints and sleep disturbances has been previously observed.^{13,14}

Insomnia was found to coexist with depression in 21% (18) and 14% (17) in these two series. Sleep disturbances may be an epiphenomenon or an integral part of the process leading to major depression. If the latter is true, treatment of sleep disorders may have implications in preventing the development of major depressive episodes.

A few studies have previously suggested that increased severity of OSA and excessive daytime sleepiness are associated with decreased physical activity by self-report. The study clearly acts as an eye opener for early detection of cognitive deficiencies and sleep apnea risk among elderly and clearly establishes a triangular relationship between cognitive deficiencies, sleep apnea risk and

functional status. Early diagnosis of these problems and prompt intervention can bring about significant changes in functional abilities and quality of life among elderly.

CONCLUSION

There is a higher burden of sleep apnea, cognitive impairment among elderly which have significant influence on their functional status. Thus there is a need for evolving a strategy to include these screening procedures in the regular health check-up among elderly. We recommend use of specific screening tools in regular Geriatric clinics, so that a larger hidden part of iceberg can be explored and efficient Geriatric health care services are provided.

ACKNOWLEDGEMENTS

Authors would like to acknowledge the support extended by JSS Mahavidyapeetha, Medical officer and staff, JSS Urban health centre, study subjects and their family members.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Rani SBB, Kulkarni P, Kumar SD, Renuka M, Ashok NC. Sleep apnea risk, cognitive and functional impairment: hidden trio's among elderly: an exploratory study in Mysore, Karnataka, India. Int J Community Med Public Health 2016;3:3261-5.