



## SLEEP PATTERN AS A RISK FACTOR FOR DIABETES MELLITUS AND HYPERTENSION IN GERIATRIC POPULATION

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**ABSTRACT** **Introduction:** Due to changes in circadian rhythm geriatric population struggles to get enough sleep. Also there is increase in risk of diabetes and hypertension with increasing age. **Objectives:** To find out correlation between 'duration and quality' of sleep and incidence of 'diabetes mellitus (DM) and hypertension' in geriatric population staying at old age home and home. To compare geriatric population staying at old age home with geriatric population staying at home. **Materials And Methods:** It was an analytical observational study done in 50 subjects of geriatric age group of 65-75years, 25 subjects staying at old age home (Group A) and 25 subjects staying at home (Group B) were examined by using sleep questionnaire. **Results:** DM was reported in 76% with short duration and 84% with disturbed sleep in total geriatric population. For Group A DM was reported in 75% with short duration and 82% with disturbed sleep. For Group B DM was reported in 77% with short duration and 85% with disturbed sleep. Hypertension was reported in 75% with short duration and 81% with disturbed sleep in total geriatric population. For Group A hypertension was reported in 71% with short duration and 79% with disturbed sleep. For Group B hypertension was reported in 79% with short duration and 85% with disturbed sleep. **Discussion:** Due to sympathovagal imbalance there is insulin resistance, impaired glucose metabolism and obesity which manifests into DM in short duration disturbed sleep. Also insufficient sleep causes increased sympathetic activity, increased stress hormones and lack of nocturnal dipping in blood pressure which is responsible for prevalence of hypertension. **Conclusion:** Prevalence of DM and Hypertension is more in geriatric population with short disturbed sleep. There is no significant difference in prevalence of DM and hypertension in Group A and Group B

**KEYWORDS :** sleep, diabetes mellitus, hypertension, geriatric population

### INTRODUCTION:

In geriatric population it is common to have altered sleep architecture due to process of aging. (1) One-third of the geriatric population has extreme sleep duration ( $\leq 5$  or  $\geq 10$  h) and almost a half presents difficulties in onset of sleep and maintenance. (2,3) Both extreme duration and poor quality of sleep are associated with important health outcome like cardiovascular disorders, rheumatism, arthritis, arthrosis, osteoporosis, hypertension, diabetes mellitus, cognitive disorders, mood changes, memory impairment and higher general mortality (2,4,5).

In a population-based cross-sectional survey, it has been proven that poor quality sleep of short duration is associated with diabetes.(6) The Massachusetts Male Ageing Study recruited more than 1100 men, and those reporting shorter sleep duration were two times as likely to develop diabetes over the period of follow-up.(7) Hayashino *et al* confirmed that difficulty initiating sleep were associated with a higher incidence of diabetes .(8)

Also, it has been found that with deprivation of sleep there is acute increase in blood pressure due to sympathetic nervous system activity.(9) Sleep deprivation studies of both normotensive and hypertensive subjects have shown significant increases in blood pressure after nights where sleep was restricted to 3.6 to 4.5 hours.(10) Whereas long-term treatment with melatonin, has been shown to reduce blood pressure in hypertensive subjects.(11)

Thus, a better knowledge of this sleep pattern would be helpful to understand the relations between duration and quality of sleep and different diseases like hypertension and diabetes in geriatric population. Our study investigates that is there any difference in prevalence of hypertension and diabetes mellitus in geriatric population with altered duration and quality of sleep living at home and old age home?

### MATERIALS AND METHODS

This was an analytical observational study. 50 geriatric subjects of age group 65-75yrs both males and females were selected. Sample size was divided into two groups, 25 subjects staying at old age home (Group A) and 25 subjects staying at home (Group B). After explaining procedure informed consent was taken. A sleep questionnaire about

duration and quality of sleep has been used to get information from the subjects required for study. Also questions were asked about prevalence of diabetes mellitus and hypertension.

### Statistical Analysis

Excel software was used for data analysis. After data was tested for normal distribution, binary logistic regression test was applied to draw the results.

### RESULTS

#### Table 1 Shows Correlation Between Diabetes Mellitus And Duration And Quality Of Sleep

DM				
Risk Factor	Total geriatric population	Old age Home population	Home population	P-Value
Sleep duration				> 0.95
Complete	6 (24%)	3 (25%)	3 (23%)	
Incomplete	19 (76%)	9 (75%)	10 (77%)	
Sleep quality				> 0.95
Deep	4 (16%)	2 (18%)	2 (15%)	
Disturbed	21 (84%)	10 (82%)	11 (85%)	

Table 1 shows correlation between diabetes mellitus and duration and quality of sleep. Figure 1 shows correlation between diabetes mellitus and duration of sleep. About sleep duration, DM was reported in 24% of total geriatric population, 25% of geriatric population staying at old age home (Group A) and 23% of geriatric population staying at home (Group B) with complete sleep pattern. Whereas DM was reported in 76% of total geriatric population, 75% of geriatric population staying at old age home (Group A) and 77% of geriatric population staying at home (Group B) with incomplete sleep pattern.

Figure 2 shows correlation between diabetes mellitus and quality of sleep. About sleep Quality, DM was reported in 16% of total geriatric population, 18% of geriatric population staying at old age home (Group A) and 15% of geriatric population staying at home (Group B) with deep sleep pattern. Whereas DM was reported in 84% of total geriatric population, 82% of geriatric population staying at old age

home (Group A) and 85% of geriatric population staying at home (Group B) with disturbed sleep pattern.

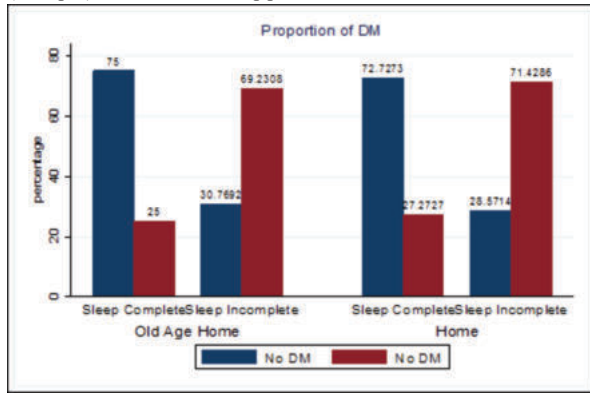


Figure 1 Shows Correlation Between Diabetes Mellitus And Duration Of Sleep

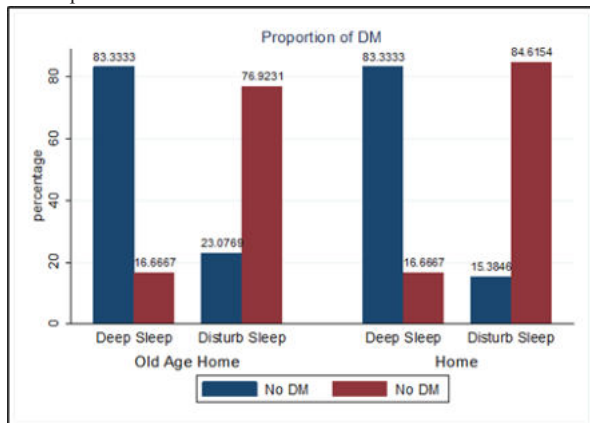


Figure 2 Shows Correlation Between Diabetes Mellitus And Quality Of Sleep

Table 2 Shows Correlation Between Hypertension And Duration And Quality Of Sleep

Hypertension				
Risk Factor	Total geriatric population	Old age Home population	Home population	P-Value
Sleep duration	Complete	4 (28%)	3 (21%)	> 0.95
	Incomplete	10 (71%)	11 (79%)	
Sleep quality	Deep	3 (21%)	2 (15%)	> 0.95
	Disturbed	11 (79%)	11 (85%)	

Table 2 shows correlation between hypertension and duration and quality of sleep. Figure 3 shows correlation between hypertension and duration of sleep.

About sleep duration, hypertension was reported in 25% of total geriatric population, 28% of geriatric population staying at old age home (Group A) and 21% of geriatric population staying at home (Group B) with complete sleep pattern. Whereas hypertension was reported in 75% of total geriatric population, 71% of geriatric population staying at old age home (Group A) and 79% of geriatric population staying at home (Group B) with incomplete sleep pattern.

Figure 4 Shows Correlation Between Hypertension And Quality Of Sleep.

About sleep Quality, hypertension was reported in 18% of total geriatric population, 21% of geriatric population staying at old age home (Group A) and 15% of geriatric population staying at home (Group B) with deep sleep pattern. Whereas hypertension was reported in 81% of total geriatric population, 79% of geriatric population staying at old age home (Group A) and 85% of geriatric population staying at home (Group B) with disturbed sleep pattern.

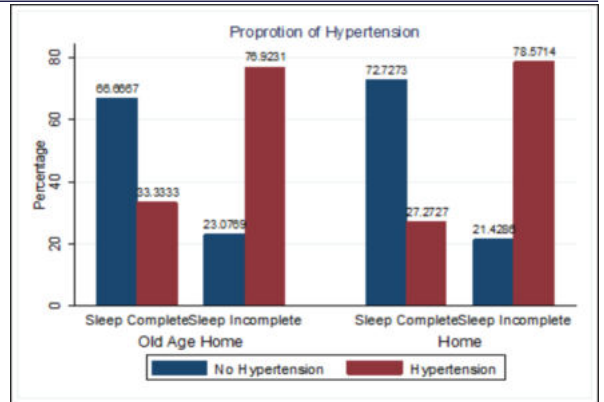


Figure 3 Shows Correlation Between Hypertension And Duration Of Sleep.

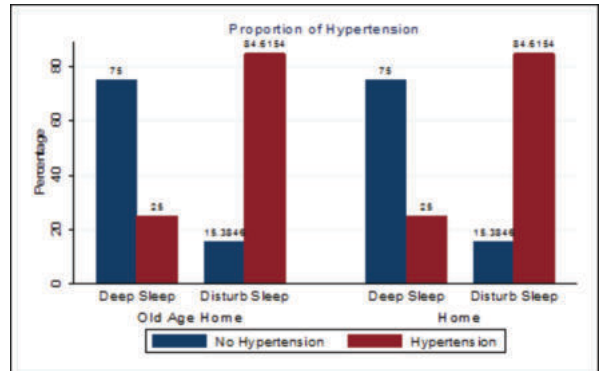


Figure 4 Shows Correlation Between Hypertension And Quality Of Sleep

**DISCUSSION**

In our study, we have investigated effect of duration and quality of sleep on prevalence of diabetes mellitus and hypertension and its correlation with population staying at old age home and home in geriatric population. Prevalence of DM and Hypertension is more in geriatric population with short disturbed sleep. There is no significant difference in prevalence of DM and hypertension in geriatric population staying at old age home (Group A) and geriatric population staying at home (Group B).

Due to process of aging, geriatric population grapple to complete sleep every night. Extreme sleep patterns in terms of duration, quality and onset are commonly seen in elderly. Possible cause of altered sleep patterns can be changes in circadian rhythm in old age. (1,2,4,5)

Insufficient duration and poor quality of sleep causes alterations in sympathovagal balance and increase in sympathetic drive. This results into insulin resistance and impaired glucose metabolism which increases risk of diabetes mellitus. Also there is upregulation of appetite due to more time to eat and lower energy expenditure resulting into weight gain as there is increase in ghrelin and decrease in leptin, which again increases risk of diabetes mellitus. (12, 13, 14)

Increased sympathetic activity and lack of melatonin are responsible for prevalence of hypertension in sleep deprived geriatric population. Disturbed sleep causes loss of nocturnal dipping pattern of blood pressure which results in hypertension. Also there is dysregulation of neuroendocrine stress system thus adrenaline, noradrenaline and cortisol level increases along with activation of pro inflammatory pathways which increases risk of hypertension. (15,16, 17, 18)

**CONCLUSION**

Prevalence of DM and Hypertension is more in geriatric population with short disturbed sleep. There is no significance difference in prevalence of DM and hypertension in Group A and Group B.

**Limitation Of The Study**

The sample size is small. Geriatric population of age group between 65-75yrs were selected. In large population with wide range of age group results can vary as there will be less confounding factors like duration of disease, day time napping and emotional stability which

needs to be studied.

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