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Sleep As Preamble of Optimal Health Among Elderly Hypertensive Adults

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ABSTRACT

Introduction: Healthy Aging is for everyone, not just those who are currently disease-free. Many factors influence the health of the elderly, including underlying physiological and psychological changes, health-related behaviour, disease status and also environments in which people are living strongly influence their health.

Methodology: The 240 elderlies between the age group of 60-75 years from Primary Health Centre, Muthukur, Nellore, Andhra Pradesh, India was selected as study participants by simple random sampling technique and excluded those who were mentally and physically sick at the time of data collection**.** The Pittsburgh Sleep Quality Index (PSQI) scale was used to collect and Sleep promoting measures were taught and followed to experimental group for the period of six months**.**

Results: In this study, the posttest mean PSQI sleep score among experimental group was 6.16 and control group was 7.95, with the mean difference was 1.79, as it was large and it was statistically significant difference at the value of t=3.34 at p≤ 0.001 level which indicate sleep promoting measures was effective to enhance sleep quality and to maintain normal blood pressure.

Conclusion: Compared to the control group, the experimental group's elderly had better sleep quality; hence healthy sleep promoting measures are effective to manage and to maintain normal blood pressure.

Keywords: Sleep**,** Optimal Health, Elderly**,** Adults

INTRODUCTION

Globally, populations are ageing faster than ever. Healthy Aging is for everyone, not just those who are currently disease-free. Many factors influence the health of the elderly, including underlying physiological and psychological changes, health-related behaviour, disease status and also the environments in which people live strongly influence their health.[1] The older population of India (aged 60 years and older) is envisaged in contact with 194 million in 2031 from 138 million in 2021. An increase of 41%, for more than a decade {National statistical office (NSO) in the report in India 2021}.[2] According to New World Syndrome (NWS) 2018 reports 75 of the world population are affected with lifestyle diseases. Diabetes mellitus (DM) and hypertension (HTN) have emerged as major medical and public health issues worldwide.[3]

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The risk factors of hypertension include the major modifiable risk factors such as unhealthy diets, physical inactivity, obesity or overweight, high cholesterol, heavy alcohol use, psychological stress, unhealthy sleep habits, high consumption of sugar and low consumption of fibre. Non-modifiable risk factors are advanced age, family history/genetics.[3] Hypertension is the biggest single contributor to the global burden of cardiovascular disease. Sleep plays an important role in maintaining nocturnal BP control through autonomic control of heart rate and peripheral vascular resistance.[4] (Giuseppe Maiolino et.al 2020).People who work long hours in high-stress jobs and people with other risk factors for hypertension are more likely to have raised blood pressure after chronic poor sleep.[5] (Eric Suni, Ealena Callendar (2020)

Blood pressure (BP) varies over 24 hours, during normal sleep, BP typically decreases by 10% or more; sleep deprivation and obstructive sleep apnea, is associated with increased BP and risk of hypertension.[6] (Thomas, S. J. & Calhoun, D. (2017). Sleeping six to seven hours a night is associated with more favourable heart health."[6] (American College of Cardiology. (2021, May 5).) Tan et al.[7] found that better sleep quality predicted psychological well-being of older people, while fewer physical and somatic symptoms predicted better sleep quality.[7]This article attempts to highlight some of the issues that an ageing population might bring. The elderly was given special attention, and issues that would impair their quality of sleep were highlighted.

A study to assess the effectiveness of sleep promoting behaviour among elderly with hypertension at Muthukur, Nellore, AP, India.

The study's objectives are to evaluate the effectiveness of sleep promoting measures and link sleep quality among the elderly in rural setting to demographic factors

MATERIALS AND METHODS

Setting and sample: A broad review and community based evaluative study was performed involving sleep pattern in aging democrats causes the alteration in the blood pressure level. The study was performed in rural part of Nellore district, Andhra Pradesh state, India. The rural section of the study was preceded in Muthukur Primary Health Centre, it covers 86 villages,11 sub centres with the total population of 61304 and an approximately a month 190 adults with hypertension and 250 adults with diabetes mellitus are attending the outpatient department. The 240 elderlies from Muthukur Primary Health Centre, Nellore district were selected as study participants by simple random sampling technique; elderly between the age group of 60-75 years of age were included and excluded those who were mentally and physically sick at the time of data collection.

Ethical clearance: The study procedure was accepted by the Narayana College of Nursing's Institutional Ethics Committee in Nellore, Andhra Pradesh, India (File no. 04/PhD(N) /LU/2019 dated as 07th February 2019).

Data collection: Obtained written informed consent from elderly prior to data collection. Base line data such as Age, Religion, Occupation, Marital Status, Education, Gender, Income, Residential Status, Habits, Number of children, Duration of medication and Family history of hypertension were collected. The Pittsburgh Sleep Quality Index (PSQI) scale was used to collect data on sleep quality and disturbances, it contains 19- Individual self-report items are grouped into 7 equally-weighted component scores: 1) Subjective Sleep Quality (1 item) usual sleep wake patterns, duration of sleep; 2) Sleep Latency (2 items) time to fall into sleep, factors of trouble sleeping;3) Sleep Duration (1 item)hours of sleep per night; 4) Habitual Sleep Efficiency (3 items) usual bed time, getting up time and hours of sleep per night ; 5) Sleep Disturbances (9 items) wake of in the middle of night or early morning, get up to use bath room, cannot breath comfortably, cough or snore loudly, feel to cold, and hot, had bad dreams, have pain and other reasons; 6) Use of Sleeping Medication (1 item)how often have you taken medicine; and 7) Daytime Dysfunction (2 items) had trouble staying awake while eating, driving or engaging in social activity and how much of problems has it been for you to keep up enough enthusiasm to get things done.

The PSQI instrument Responses are categorized as items 1–4 is free entry of: usual bed and wake times, minutes of total sleep time, and sleep latency (minutes). Items 5–18 are 4-point Likert scale responses pertaining to problem frequency: “not during the past month (0)”; “less than once a week (1)”; “once or twice a week (2)”; and “three or more times a week (3).” Item 19 is a 4-point Likert scale rating of overall sleep quality: “Very good (0)”; “Fairly Good (1)”; “Fairly Bad (2)”; “Very Bad (3).” The Global Score ranges from 0 to 21. All component scores range from 0 to 3. The 7 component scores are summed to yield a single Global Score. Finally, the score Interpreted as higher Global Scores indicate poorer sleep quality. An empirically derived cut-off score of > 5 distinguishes poor sleepers from good sleepers. A Global Score >5indicates that a subject reports severe difficulty in at least 2 domains, or moderate difficulties in more than 3 areas.

Educative interventional programme taught to the experimental group and regular follow up made for the period of six months. It includes Stick to a regular bedtime, Taking a warm bath before bed time, Take time to calm down before you turn out the lights, Drinking less fluids at night, Include physical activity in your daily routine, Don’t consume caffeine late in the day, Reduce irregular or long daytime naps, Optimizes your bedroom environment, Relax and clear your mind in the evening, Doesn’t eat late in the evening, Increases bright light exposure during the day, Reduce blue light exposure in the evening, Turn off your electronic devices and TV an hour before

bed. The cursory instructions were given to the control group at the end of 6 month.

Data analysis: SPSS v18 was used to analyse the data, which was entered into an MS Excel sheet. 1) Subjective Sleep Quality 2) Sleep Latency 3) Sleep Duration 4) Habitual Sleep Efficiency 5) Sleep Disturbances 6) Use of Sleeping Medication 7) Daytime Dysfunction were all used to determine sleep quality. The average and standard deviation of the scores have been calculated (SD). The significance of the mean difference score was tested using a student paired t-test, P value of *P*=0.001 has been considered for statistical significance. The mean and standard deviation scores in each domain were also calculated. McNemar's test was used to find the significance of sleep quality. Mean Difference of sleep reduction score was tested with 95% Confidence interval. Component wise PSQI sleep score was compared with Mann Whitney u-test.

RESULTS

Considering age group, in experimental group out of 120 elderlies, majority of 45 (37.50%) were in the age group of 60-63years, 33 (27.50%) were in 64-67years, 20 (16.67%) were in 68-71years and 22 (18.33%) were in 72-75years. Whereas in the control group out of 120 elderly, 35 (29.17%) were in 60-63years, 35 (29.17%) were in 64-67years, 22 (18.33%) were in 68-71years and 28 (23.33%) were in 72-75years.In gender wise distribution of elderly, in the experimental group, 68 (56.67%) were male and 52 (43.33%) were female. In the control group, 65 (54.17%) were male and55 (45.83%) were female. Identifying habit of elderly reveals that in the experimental group, 18 (15.00%) were taking alcohol, 36 (30.00%) were smokers, 28 (23.33%) were tobacco chewers and 38 (31.66%) were not having any habit. In the control group, 24 (20.00%) were taking alcohol, 41 (34.17%) were smokers, 23 (19.17%) were tobacco chewers and 32 (26.66%) were not having any habit. Considering family history HT of elderly, in the experimental group, 70 (58.33%) had family history and 50 (41.67%) were not having family history, whereas in control group 62 (51.67%) had family history and 58 (48.33%) were not having family history.

Reveals that pre and post level of blood pressure among elderly with hypertension in both groups**.** Considering the pretest level of blood pressure, there is no significant difference between experiment group and Control group. whereas in posttest, the experimental group got marked reduction in the level of blood pressure with the help of Educative interventional programme on sleep promoting behavior than control group. (Table 1)

The posttest sleep score, experimental group mean PSQI was 6.16 and control group mean PSQI was 7.95, with the mean difference was 1.79, as it was large and it was statistically significant difference at the value of t=3.34 at p≤ 0.001 level which indicated highly significant difference.

Table 4: Illustrates that the effectiveness of sleep hygiene on sleep reduction score among elderly. In experimental group, an average, in posttest, after following the proper sleep hygiene measures among elderly sleep reduction score are reduced 11.33% than pretest score. Whereas in Control group, 1.28% sleep score than pretest score. This difference presents that experimental group elderly had healthy and good quality of sleep pattern than the control group.

Table 1: Frequency and percentage distribution of level of blood pressure between experimental and control group

	Group	
	Experimental (n=120) (%)	**Control (n=120) (%)**
Pre test*		
Normal	6 (5)	4 (3.33)
High normal	30 (25)	38 (31.67)
HT stage 1	44 (36.67)	45 (37.5)
HT stage 2	30 (25)	24 (20)
HT stage 3	10 (8.33)	9 (7.5)
IS HT grade 1	0 (0)	0 (0)
IS HT grade 2	0 (0)	0 (0)
Post test**		
Normal	18 (15)	6 (5)
High normal	47 (39.17)	40 (33.33)
HT stage 1	40 (33.33)	42 (35)
HT stage 2	15 (12.5)	24 (20)
HT stage 3	0 (0)	8 (6.67)
IS HT grade 1	0 (0)	0 (0)
IS HT grade 2	0 (0)	0 (0)

*P value 0.72 (NS); **P value 0.01 (S)

Table 2: Mean and standard deviation of pre-test and post-test level of blood pressure in experimental group and control group

BP Assessment	Group		Mean difference	Student paired t-test
	Pre-test (Mean ± SD)	Post-test (Mean ± SD)		
SBP				
Experimental	168.98 ± 19.61	141.87 ± 11.93	-27.11	**t=15.46 p=0.001(S)**
Control	166.00 ± 19.46	164.68 ± 18.18	-1.32	t=1.94 p=0.06 (NS)
DBP				
Experimental	100.86 ± 11.34	90.93 ± 6.92	-9.93	**t=10.39 p=0.001 (S)**
Control	99.72 ± 12.13	99.23 ± 11.83	-0.49	t=1.86 p=0.07 (NS)

Table 3: Frequency and percentage distribution of Pre-test and Post-test level of sleep pattern

PSQI	Group		P value*
	Pretest (n=120) (%)	Posttest (n=120) (%)	
Experiment			
Normal	32 (26.67)	59 (49.16)	**0.001(S)**
Disturbed	88 (73.33)	61 (50.84)	
Control			
Normal	35 (29.16)	42 (35)	0.14 (NS)
Disturbed	85 (70.83)	78 (65)	

* (McNamar's test)

Portrays that mean, standard deviation and mean difference of blood pressure in experimental and control group. It denotes that marked improvement in reduction of Systolic blood pressure and Diastolic blood pressure in experimental group than the control group. (Table 2)

Depicts that sleep pattern in both groups, regards to it interprets that the marked improvement in quality of sleep throughout the study period among experimental group than control group as it proves that sleep promoting behavior and habits are effective in sustaining normal range of blood pressure. (Table 3)

Presents that each component wise PSQI sleep quality shows, statistically there is no significant difference between experiment and control group of elderly in pre-test and significant in post-test. (Table 5)

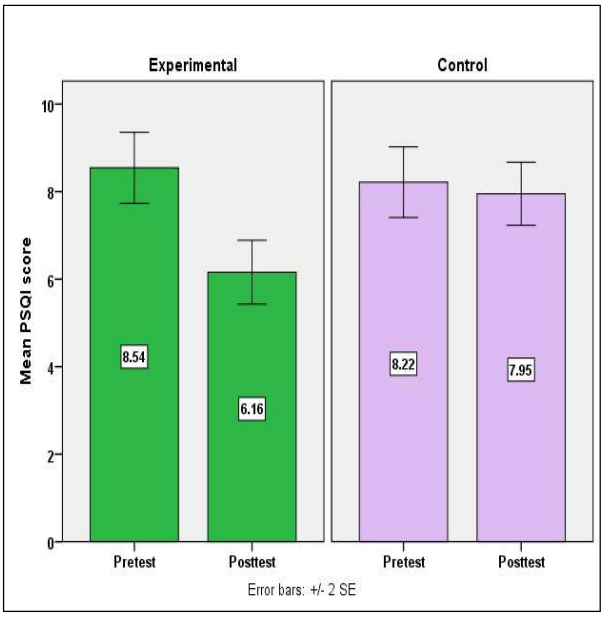

Figure 1: Simple bar diagram with 2 standard error shows the PSQI score among experimental and control group

Table4: Effectiveness of sleep hygiene on PSQI-sleep reduction score

	Max score	Mean score	% of Mean score	Mean Difference of sleep reduction score with 95% Confidence interval	Percentage of sleep Reduction score with 95% Confidence interval
Experimental					
Pretest	21	8.54	40.67%	2.38 (1.76 – 3.00)	11.33% (8.38% – 14.29%)
Posttest	21	6.16	29.33%		
Control					
Pretest	21	8.22	39.14%	0.27 (-0.02 – 0.56)	1.28% (-0.11% –2.66%)
Posttest	21	7.95	37.86%		

Table 5: Comparison of component wise PSQI sleep score between experiment and control group

Components	Group		Mean	Mann Whitney
	Experiment (Mean±SD)	Control (Mean±SD)	Difference	u-test
Pre-test				
Subjective sleep quality	1.43 ± ± 1.17	1.36 ± 1.20	0.07	z=0.41 p=0.66(NS)
Sleep Latency	1.76 ± 1.09	1.74 ± 1.18	0.02	z=0.12 p=0.90(NS)
Sleep Duration	1.28 ± 1.16	1.16 ± 1.03	0.12	z=0.77 p=0.44(NS)
Habitual Sleep Efficiency	.92 ± 1.05	.89 ± 1.05	0.03	z=0.20 p=0.84(NS)
Sleep disturbances	1.28 ± 1.14	1.22 ± 1.01	0.06	z=0.39 p=0.69(NS)
Use of sleeping medications	.71 ± .84	.57 ± .79	0.14	z=1.20 p=0.22(NS)
Daytime dysfunction	1.16 ± 1.20	1.28 ± 1.20	-0.12	z=0.70 p=0.48(NS)
Total Global PSQI score	**8.54 ± 4.31**	**8.22 ± 4.54**	**0.32**	z=0.51 p=0.61(NS)
Post-test				
Subjective sleep quality	.99 ± 1.10	1.28 ± 0.98	-0.29	**z=1.97 p=0.05(S)**
Sleep Latency	1.42 ± 1.20	1.68 ± 1.21	-0.26	z=1.58 p=0.12(NS)
Sleep Duration	1.01 ± 1.13	1.13 ± 1.04	-0.12	z=0.91 p=0.36(NS)
Habitual Sleep Efficiency	.59 ± .84	.87 ± 1.05	-0.28	**z=2.08 p=0.03(S)**
Sleep disturbances	.89 ± 1.05	1.17 ± 0.93	-0.28	**z=1.99 p=0.05(S)**
Use of sleeping medications	.37 ± .76	.57 ± .61	-0.20	**z=2.05 p=0.04(S)**
Daytime dysfunction	.89 ± 1.15	1.25 ± 1.21	-0.36	**z=2.16 p=0.03(S)**
Total Global PSQI score	**6.16 ± 4.08**	**7.95 ± 4.43**	**-1.79**	**z=2.97 p=0.01(S)**

Table 6: Association between post-test level sleep pattern and demographic variables of elderly in study group

Demographic variables	Post-test PSQI level		Total	Chi square test
	Normal (n=59) (%)	Disturbed sleep (n=61) (%)		
Age (yrs)				
60-63 years	30 (66.67)	15 (33.33)	45	**χ2=10.58 π=0.01****
64-67 years	15 (45.45)	18 (54.55)	33	**DF=3(S)**
68-71 years	8 (40)	12 (60)	20	
72-75 years	6 (27.27)	16 (72.73)	22	
Gender				
Male	33 (48.53)	35 (51.47)	68	χ2=0.02π=0.87
Female	26 (50)	26 (50)	52	DF=1(NS)
Marital status				
Married	37 (46.25)	43 (53.75)	80	χ2=0.82π=0.37
Widow/widower	22 (55)	18 (45)	40	DF=1(NS)
Education				
Illiterate	12 (50)	12 (50)	24	χ2=4.48π=0.21
Primary /middle education	25 (56.82)	19 (43.18)	44	DF=3(NS)
High school/intermediate	20 (47.62)	22 (52.38)	42	
Graduate or Post graduate	2 (20)	8 (80)	10	
Occupation				
Unemployed	22 (51.16)	21 (48.84)	43	χ2=1.40 π=0.84
Unskilled worker	6 (40)	9 (60)	15	DF=4(NS)
Semi-skilled worker	13 (54.17)	11 (45.83)	24	
Skilled /semi professional	6 (40)	9 (60)	15	
Clerical, shop owner/farm	12 (52.17)	11 (47.83)	23	
Family Income				
Rs.2641-7,886	5 (38.46)	8 (61.54)	13	χ2=3.75π=0.44
Rs.7,887-13,160	13 (44.83)	16 (55.17)	29	DF=4(NS)
Rs.13,161-19,758	19 (45.24)	23 (54.76)	42	
Rs.19,759-26,354	14 (66.67)	7 (33.33)	21	
26,355-52,733	8 (53.33)	7 (46.67)	15	
Type of family				
Nuclear	33 (55)	27 (45)	60	χ2=1.96π=0.38
Joint	19 (41.3)	27 (58.7)	46	DF=2(NS)
Extended	7 (50)	7 (50)	14	
Dietary pattern				
Vegetarian	15 (36.59)	26 (63.41)	41	**χ2=3.94 π=0.05***
Non-vegetarian	44 (55.7)	35 (44.3)	79	**DF=1(S)**
Nature of medicine				
Hypoglycemic drugs	6 (50)	6 (50)	12	χ2=0.55 π=0.88
Antihypertensive drugs	3 (60)	2 (40)	5	DF=2(NS)
Hypoglycemic + Antihypertensive +other drugs	50 (48.54)	53 (51.46)	103	
Duration of treatment (yrs)				
2 years	33 (53.22)	23 (46.78)	62	**χ2=7.23 π=0.03***
3 years	8 (40)	12 (60)	20	**DF=2(S)**
4 years	12 (31.58)	26 (68.42)	38	
Habits				
Alcohol	10 (55.56)	8 (44.44)	18	χ2=0.40 π=0.94
Smoking	17 (47.22)	19 (52.78)	36	DF=3(NS)
Tobacco chewing	14 (50)	14 (50)	28	
Nil	18 (47.37)	20 (52.63)	38	
Family history of DM & amp;HT				
Yes	37 (52.86)	33 (47.14)	70	χ2=0.92 π=0.33
No	22 (44)	28 (56)	50	DF=1(NS)

Table shows the association between post-test level of sleep pattern among experimental group had significantly associated with. age, dietary pattern and duration of treatment elderly people are having more disturbed sleep than others.

The association between post-test level of blood pressure and demographic variables of elderly among experimental group was statistically significant association with the age group of 68-75 years at the level of **p=0.05***, male elderly at **p=0.03*** and smoking habit at **p=0.03*** and were not associated with Marital status, Education, Occupation, Family Income, Type of family, Dietary pattern, Nature of medicine, duration of treatment (yrs) and Family history of HT Where as in control group none of the variables was a statistically significant association with blood pressure.

DISCUSSION

As the increasing older population year by year, nursing and healthcare facilities received many older adult patients with various health considerations. With the understanding of the factors that contribute to healthy aging, nurses and healthcare professionals are expected to promote exercise, mental health training, and better sleep quality for a better outcome of healthy aging.

The experimental group's elderly sleep reduction scores are reduced by 11.33% more than the pretest score. Whereas in the Control group, 1.28% sleep score to pretest score, this difference presents that the experimental group elderly had a healthy and good quality of sleep pattern than the control group. The effect of Subjective sleep quality with adequate hours of sleep at night got a reduction in the level of blood pressure is supported with lower sleep efficiency on one night was associated with higher systolic (B= -0.51, SE =0.11, P<.001, R^2=0.23) and diastolic BP (B=-0.17, SE=0.065, P=0.12, R^2=.16) the following day. Lower sleep duration and efficiency are associated with higher daytime systolic BP and higher night-time BP when assessed separately.[7] (Doyle et al 2019). This was observed from the experimental group elderly quality of sleep has improved and maintained their blood pressure level thereby avoiding the complication after following the proper sleep-promoting measures like the regular practice of meditation, warm bath, warm milk before going to the bed, avoiding caffeinated drinks late in the day, Reducing irregular or long daytime naps, sleep and waking at consistent times., Optimizing the bedroom environment, whereas the control group elderly quality of sleep and blood pressure have not been maintained at a satisfactory level.

The presents study results revealed that sleep duration, daytime dysfunction, and sleep efficiency have an impact on fluctuations in Blood pressure, the similar report was observed in the first National Health and Nutrition Examination Survey of 4,810 middle-aged (32-59 years) Americans in fully adjusted models, short sleep duration (≤ 5 h/night) was associated with a 60% higher risk of self-reported incident hypertension over an 8- to 10-year follow-up period (hazard ratio, 2.10; 95% CI, 1.58-2.79).[9] Calhoun, D. A., & Harding, S. M. (2010) and Cross-sectional observational studies, in general, support a relationship between short sleep duration or insomnia and higher BP.[16.17.18]

In post-test, each component-wise PSQI sleep score shows, statistically there is a significant difference between the experiment and the control group of the elderly. Overall Global PSQI score of the experiment group is 6.16 and the control group is 7.95, so the difference is a 1.79 sleep score, this difference is large and it is a statistically significant difference. Huang *et al.* also reported that poor sleep quality is an important risk factor for hypertension possibly because of higher activation of the sympathetic nervous system.13 The present study also observed that age, diet pattern, sleep habits, and environmental factors are influencing the quality of sleep, and also the researcher felt that sleep quality is one of the essential factors to maintain blood pressure. The association between post-test level of blood pressure and demographic variables of elderly among the experimental group was a statistically significant association with the age group of 68-75 years at the level of p=0.05*, male elderly at p=0.03* and smoking habit at p=0.03*, this was supported with the result of there is mounting evidence for an association between sleep disorders and hypertension.[8] (Van Ryswyk E. et al 2018). Longer follow-up duration (relative risk 1.29 (95% confidence intervals 1.09–1.52)) tended to show a higher incidence of hypertension compared with shorter follow-up duration (1.03 (0.73–1.46))[15] This study majority of elderly 45(37.50%) were in the age group of 60-63 years with poor sleep quality, but Liu, RQ et.al observed the mean age for subjects with poor sleep quality was 56.38 years, which was significantly higher than the mean age in subjects with good sleep quality (50.58 years, *P*<0.001.[14]

In gender wise distribution of elderly, in current study, 68(56.67%), and 65(54.17%) were male and 52(43.33%) and 55(45.83%) were female the experimental and control group respectively and also the female had disturbed sleep than the male it was equal to the study Xiao, L et.al 2021 says that the older adults aged ≥ 60 years who were included in the survey included 2198 (45.5%) males and 2635 (54.5%) females developed poor quality sleep.[19,21]

The researcher observed that elderly from rural areas with illiterate (50.00%), unemployed (48.84%) and less monthly income (61.54%) have high proportionate to poor quality sleep leads to difficulty in control and maintenance of the normal range of blood pressure, it was supported by the study Peng Wang et. al 2019 says that poor sleep quality or sleep disorders are highly prevalent in a rural elderly population in China.[20.] The researcher found that sociodemographic factors are major concerns in determining the quality of sleep and hypertension.

CONCLUSION

The present study suggests that short sleep duration, poor quality sleep, and daytime dysfunction are associated with a higher risk of hypertension among elderly adults and recommend that sleep-promoting behavior and lifestyle modifications are mandatory for people with elevated blood pressure to maintain a normal range of systolic and diastolic blood pressure.

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