

ORIGINAL ARTICLE

Effect of sleep on blood pressure among adults of urban slums: A Cross sectional study

Saurabh Verma¹, Arun Kumar¹, Neelam Gautam¹, Chhaya Mittal²

¹Department of Community Medicine, Lala Lajpat Rai Memorial Medical College Meerut, Uttar Pradesh

²Department of Community Medicine, Shaikh-UI-Hind Maulana Mahmood Hasan Medical College, Uttar Pradesh

CORRESPONDING AUTHOR

Dr Saurabh Verma, Department of Community Medicine, Lala Lajpat Rai Memorial Medical College Meerut, Uttar Pradesh 250004

Email: saurav.verma530@gmail.com

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ABSTRACT

Introduction: Hypertension, the “Silent, Invisible killer” - is a modern day’s universal epidemic. The adult populations in slum area are more vulnerable for hypertension as they are so busy in the fulfilment of even day to day basic needs and care, family commitments and economic stress. **Aim and objectives:** To estimate the prevalence of hypertension among the adults (25-44 years) and to study the effect of sleep on blood pressure levels. **Methodology:** The present cross-sectional study was carried among adults aged between 25 to 44 years residing in the slums of Meerut District. 30 Cluster Sampling technique was used. The slum was selected as a cluster unit. During the visit by house-to-house survey, members of the family were listed and eligible person were interviewed and examined. Data collected on a structured and pretested questionnaire. **Results:** Prevalence of hypertension among those who had sleep duration of >8 hours per day was 44.8% followed by 20.1% and 17.5% among those who had 7-8 hours and less than 7 hours of sleep time respectively. It was found that 24.2% monophasic sleep pattern follower were hypertensives while the prevalence was 19.4% in biphasic pattern. **Conclusion:** Majority (55.4%) had a sleep duration between 7-8 hours, followed by 33.9% and 10.7% with <7 hours and >8 hours of sleep time respectively. Majority (61.3%) of the study population were having monophasic sleep pattern, while 36.3% were biphasic and 2.4% were multiphasic.

KEYWORDS

Humans; Cross-Sectional Studies; Poverty Areas; Blood Pressure; Prevalence; Sleep Duration; Hypertension; Sleep; Surveys and Questionnaires

INTRODUCTION

Hypertension, the “Silent, Invisible killer” - is a modern day’s universal epidemic affecting more than one-third adults or one billion people and causes an estimated 9.4 million

deaths per year. It is one of the major causes of the global burden of disease (1)

Lack of basic necessities, unhealthy living conditions, hazardous locations, insecure tenure, irregular or informal settlements, poverty, social exclusion and high density has

been associated with a low space per person living in an area, high occupancy rates, cohabitation by different families and a high number of single-room units.

The adult populations in slum area are more vulnerable for hypertension as they are so busy in the fulfilment of even day to day basic needs and care, family commitments, economic stress etc. The people in this age group also likely to have addictions that adds to the risk factors. Due to their ignorant, poor health seeking behaviour and lack of awareness they don't approach to health facility for regular health check-ups which leads to delay in timely diagnosis and management of non-communicable disease specifically hypertension (1)

Prevalence of hypertension in Meerut district among men and women (of 15 years and above) is 26.2% and 20% respectively. (2)

Realising the importance of this "silent" easily manageable and preventable disease and fewer number of studies among adults in slum area it was decided to conduct an epidemiological study of hypertension among them to know the various aspects of the disease.

Aim and Objectives

1. To estimate the prevalence of hypertension among the adults (25-44 years) of slum.
2. To study the effect of sleep on blood pressure levels.

MATERIAL & METHODS

Study Type: Cross-sectional study.

Study Population: Adults aged 25-44 years.

Study Area: Slums of Meerut District.

Study Duration: September 2021 to July 2022.

Sample Size Calculation: Taking anticipated proportion of Hypertension in the population of Meerut as 26% (3) and absolute precision 5 % at 95% confidence interval, the sample size for the study is calculated as follows:

$$n = DEFF \times (1.96)^2 p (1-p) / d^2$$

where DEFF = Design effect, p = anticipated value of proportion in the population, q = (1-p), d = allowable error, n = sample size

$$n = 1.8 \times 3.84 \times 0.26 \times (1-0.26) / (0.05)^2 \\ = 532$$

Thus, minimum sample size is calculated to be 532. As we have to study subjects from 30 clusters, so 18 subjects will be taken from each cluster making sample size 540.

Sampling Technique: 30 Cluster sampling technique.

Inclusion Criteria: All adults in the age group 25-44 years who gave consent for participation.

Exclusion Criteria: More than one eligible study subject from a single household, adults who are not willing or who will be too sick to participate.

Strategy for collection: Slum dwellers are not only markedly prone to communicable diseases because of poor socio-economic and environmental condition but also to non-communicable diseases such as hypertension. The present study was conducted in slum areas of Meerut city by house-to-house survey. All the slums of were listed and tabulated with their population. The slum was selected as a cluster unit and 30 clusters were drawn out of 185 listed slum areas.

The sampling interval was determined by dividing the total cumulative population by 30. The selection of the first cluster was done by drawing a currency note. Subsequent clusters were selected by adding random numbers with the sampling interval and this was continued till 30 clusters were selected. 18 study subjects were taken from each cluster. A total of 540 subjects had been selected for the study by cluster-sampling.

The first house in a cluster was selected by going to the centre of a cluster, spinning a pencil and selecting the first house in the direction of the pencil (4). Further subsequent households will be selected until we get the prespecified number of study subjects in a cluster.

During the visit by house-to-house survey members, of the family were listed and eligible person i.e., aged between 25 to 44 years were interviewed and examined; purpose of the study is explained. Data collected on a structured and pretested questionnaire. We have interviewed one of the randomly selected (lottery system method) (5) eligible members from each household. A detailed history of

sociodemographic factors and sleeping habit was taken.

Data processing and Analysis: The data thus collected, was first coded and transferred to a master chart from which tables were prepared, analysed and statistically evaluated (Epi Info 7.2.5.0).

RESULTS

Distribution of blood pressure levels in the study population can be inferred from the Table 1. The cumulative prevalence of hypertension in this study among adults residing in slums of Meerut came out to be 21.9%.

Table 1 Prevalence of hypertension among study population (JNC VIII)

Blood Pressure	Total	
	Number (n)	Percent (%)
Normotensive	259	47.9
Pre-Hypertension	163	30.2
Stage I Hypertension	96	17.8
Stage II Hypertension	22	4.1
Total	540	100

Table 2 depicts distribution of study population and relation of Hypertension with Sleep Duration. Majority (55.4%) of study population had 7 to 8 hours of sleep a day while 10.7% had sleep duration of more than 8 hours.

We can infer from the above table that prevalence of hypertension among those who

had sleep duration of more than 8 hours per day was 44.8% followed by 20.1% and 17.5% among those who had 7-8 hours and less than 7 hours of sleep time respectively. This association between hypertension and sleep duration was observed as statistically significant ($p < .05$).

Table 2 Distribution of study population and relation of Hypertension with Sleep Duration.

Sleep Duration (per day)	Hypertensive		Normotensive		Total	
	Number (n)	Percent (%)	Number (n)	Percent (%)	Number (n)	Percent (%)
< 7 hours	32	17.5	151	82.5	183	33.9
7-8 hours	60	20.1	239	79.9	299	55.4
>8 hours	26	44.8	32	55.2	58	10.7
Total	118	21.9	422	78.1	540	100

$\chi^2 = 20.52$, $df = 2$, $p < .001$

Above table shows distribution of study population and relation of Hypertension with Sleep Pattern. Majority (61.3%) of the study population were having monophasic sleep pattern, while 36.3% were biphasic and 2.4% were multiphasic.

It was found that 24.2% monophasic sleep pattern follower were hypertensives while the prevalence was 19.4% in those following biphasic pattern. Insignificant ($p > .05$) association was found between hypertension and sleep pattern.

Table 3 Distribution of study population and relation of Hypertension with Sleep Pattern

Sleep Pattern	Hypertension				Total	
	Present		Absent		Number (n)	Percent (%)
	Number (n)	Percent (%)	Number (n)	Percent (%)		
Monophasic	80	24.2	251	75.8	331	61.3
Biphasic	38	19.4	158	80.6	196	36.3
*Multiphasic	0	0	13	100	13	2.4
Total	118	21.9	422	78.1	540	100

$\chi^2 = 2.68$, $df = 1$, $p = .101$.

*Chi-square was calculated after merging cells of multiphasic pattern with biphasic pattern

DISCUSSION

Prevalence of hypertension among those who had sleep duration of more than 8 hours per day was 44.8% followed by 20.1% and 17.5% among those who had 7-8 hours and less than 7 hours of sleep time respectively. This difference was found statistically significant. Similar observations were made by Li C et al. (2021) (6) as prevalence of 40.8% and 40.7% was seen among having sleep duration of 7-9 hours and more than 9 hours. Another study by Wang, Y et al. (2015) (7) in a meta-analysis concluded that excessively longer (>9 hours) and shorter periods (<5 hours) of sleep may both be risk factors for high blood pressure.

CONCLUSION

Majority (55.4%) had a sleep duration between 7-8 hours, followed by 33.9% and 10.7% with less than 7 hours and more than 8 hours of sleep time respectively. Majority (61.3%) of the study population were having monophasic sleep pattern, while 36.3% were biphasic and 2.4% were multiphasic.

LIMITATIONS

One of the limitations of the study is that the measurement of blood pressure on a single day may not be truly representative of the prevalence of hypertension in the study participants. This is a limitation inherent in the cross-sectional study design and is present in all other studies with a similar design. Since the present study involves self-reported data for sleep pattern and duration, lack of an objective measurement of these parameters is a limitation of the study.

RECOMMENDATIONS

Screening for hypertension is very essential for early diagnosis. Measuring blood pressure is a very simple method even individuals from non-medical background can do it. All health-care workers at all level should be trained how to measure blood pressure, so that they can be utilised effectively in screening of Hypertension.

Health education regarding lifestyle, exercise, balanced diet in the schools and college.

Nutritional education regarding healthy and balanced diet should be impacted. Salt restriction: Use low sodium alternatives, avoid adding table salt. The salt intake should be restricted to <5 grams per day to all individuals and <3 grams among hypertensives.

Take adequate sleep of 7-8 hours a day timely.

AUTHORS CONTRIBUTION

All authors have contributed equally.

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Nil

CONFLICT OF INTEREST

There are no conflicts of interest.

DECLARATION OF GENERATIVE AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work, the authors have not used any AI tools or services.

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