

Original Research Article

A cross-sectional, multi-centric, epidemiology study to determine the prevalence of insomnia and related sleep habits in Indian hypertensive patients

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ABSTRACT

Background: Hypertension is a leading risk factor affecting mortality and disability-adjusted life years worldwide. The objective of the study was to determine the prevalence of insomnia, co-morbid medical conditions, lifestyle attributes, related sleep habits and sleep quality among Indian hypertensive patients.

Methods: Adults (≥ 18 years) with newly diagnosed or known history of hypertension, willing to participate were enrolled in this cross-sectional, epidemiological study. Several variables including lifestyle attributes, sleep habits, quality, medications, demographics, medical/surgical history and other details pertaining to hypertension were analyzed. Insomnia was assessed by Athens Insomnia Scale (AIS) in patients not identified in the past one month.

Results: All the 657 enrolled patients completed the study (mean age: 55.4 ± 11.61 years; men: 53.7%; women: 46.3%). Prevalence of insomnia among hypertensive population was approximately 47.2% ($n=310$; 95% CI: 43.4, 51.0). Number of patients newly diagnosed with insomnia by AIS scale was higher compared with patients already diagnosed with insomnia (34.9% [95% CI: 31.2, 38.5] vs. 12.3% [95% CI: 9.81, 14.8]). Common medical conditions associated with hypertension were diabetes mellitus (61.1%) and dyslipidemia (28.3%). More than half of the hypertensive patients with insomnia had sleep-related problems once or twice a week. Further, the daytime impact of insufficient sleep on wellbeing and functioning was markedly decreased in insomniac patients.

Conclusions: Prevalence of insomnia among patients suffering from hypertension was higher than that reported in general Indian population in various studies. Present study shows that about 75% insomniac cases were undiagnosed, indicating that insomnia diagnosis may have been missed in a large proportion of hypertensive patients.

Keywords: AIS, Hypertension, India, Insomnia

INTRODUCTION

Hypertension is a leading risk factor affecting mortality and disability-adjusted life years worldwide.¹ It is considered to be the third major cause of disease burden, globally.² Regardless of the advancement in medical science, reports have shown a rising trend in hypertension prevalence among Indians.^{3,4} Hypertension is seen to be directly responsible for 57% of all stroke related deaths

and 24% of all coronary heart disease deaths in India.⁴ Reports have shown that approximately 31.5 million urban and 34 million rural population in India are hypertensive.⁴

Insomnia, defined as difficulty in initiating or maintaining sleep or non-restorative sleep accompanied by day time consequences, is considered a major public health problem. While one-fourth to one-third of the general

population reports a complaint of difficulty falling and / or staying asleep, only about 10% present with chronic complaints and seek medical help for insomnia.⁵⁻⁷ In India, the prevalence of insomnia is found to vary between 14 to 18.7% in general population.⁸⁻¹⁰

Earlier studies have indicated that there is an association between insomnia and hypertension incidence.¹¹⁻¹³ In a study in Chinese population, the prevalence of hypertension in those with no insomnia, occasional insomnia and frequent insomnia was reported to be 37.3%, 43.0% and 48.0% respectively.¹⁴ It has been proposed that the pathophysiological mechanisms underlying the association between short sleep duration, insomnia and hypertension might be related to inappropriate physiological arousal due to an alteration in stress system functions.¹⁵ Conversely, activation of the hypothalamic-pituitary-adrenal axis and the sympathetic nervous system as seen in insomnia may predispose to hypertension development.¹⁶ Hence it is imperative to consider insomnia and related sleep habits during hypertension management.

There are many factors which contribute towards insomnia in hypertensive patients. These include smoking, lifestyle attributes, irregular working shifts, sleep habits, antihypertensive medications (e.g. β -blockers) etc. However, there is sparse data available reporting the prevalence of insomnia and its clinical relevance in Indian hypertensive patients. In this cross-sectional, epidemiological study, we evaluated the prevalence of insomnia and related sleep habits among Indian hypertensive patients. We also aimed to determine the co-morbid medical conditions, lifestyle attributes and the impact of insufficient sleep on day-to-day activities in these patients.

METHODS

Study population

Adults (≥ 18 years of age) with newly diagnosed or known history of hypertension and willing to participate were enrolled in this study. Patients with history of bipolar disorder, psychosis, major depression, unstable anxiety disorders/panic attacks, patients on psychiatric medications, complications of diabetes mellitus, elderly patients having symptoms of urinary obstructions, ongoing alcohol or substance abuse and patients with symptoms of chronic/incapacitating pain were excluded from this study. Pregnant or lactating women were also not included in this study.

The study protocol was approved by local independent ethics committees. The study was conducted in accordance with the principles of Declaration of Helsinki, International Conference on Harmonization Good Clinical Practice (ICH GCP) guidelines, and Indian regulatory guidelines (Indian Council of Medical Research and Indian GCP guidelines). All patients

provided written consent in the patient authorization form to participate in the study.

Study design

This cross-sectional, multicenter, epidemiological study enrolled patients across 25 centers in India, between September 2015 and January 2016. Eligible patients were interviewed for details on sleep quality, lifestyle, sleep habits and intake of sleep inducing medications. Patients' demographics, medical/surgical history, details pertaining to hypertension and concomitant medications were extracted from medical records.

Insomnia was assessed in patients not identified in the past one month by means of the Athens Insomnia Scale (AIS).¹⁷ The AIS is a self-assessment psychometric instrument designed for quantifying sleep difficulty based on the ICD-10 criteria. It consists of eight items: the first five pertain to sleep induction, awakenings during the night, final awakening, total sleep duration, and sleep quality; while the last three refer to well-being, functioning capacity, and sleepiness during the day (Supplementary Table 1). Rights were procured for using the questionnaire in this study.

Study endpoints

The primary endpoint was the prevalence of insomnia among hypertensive patients. Other endpoints included proportion of newly diagnosed hypertensive patients with insomnia; various lifestyle attributes and sleep habits associated with them; proportion of patients on benzodiazepine therapy; sleep quality; daytime impact of insufficient sleep on wellbeing, functioning and daytime sleepiness in insomniac patients; association between insomnia and the number of antihypertensive drugs; association between insomnia and specific antihypertensive drug/regimen; and the proportion of hypertensive patients using sleep inducing medications.

Statistical methods

In various studies, the prevalence of insomnia in hypertensive patients have been documented as 19%.¹⁸ The sample size required to construct a 95% confidence interval (CI) around the estimated prevalence rate with 3% margin of error was found to be 657. The data was descriptively analyzed; continuous variables by mean \pm SD, median, range, and 95% CI and categorical variables by number and percentages. Percentage of hypertensive patients with various lifestyle attributes and sleep habits were presented and association between each of these lifestyle attributes, sleep habits and presence of insomnia was assessed through Chi-square tests. Further, logistic regression model was also fitted to explore dependency of insomnia on all lifestyle attributes and sleep habits and the corresponding odds ratios along with their confidence intervals were calculated. Number and percentage of insomniac patients having daytime impact

of insufficient sleep on wellbeing, functioning capacity and daytime sleepiness (as per AIS) were calculated and compared to the corresponding percentages in non-insomniacs using normal approximation to binomial proportions method. Statistical association between presence of insomnia and the number of antihypertensive drugs consumed were assessed through Chi-square test. Further, statistical association between presence of insomnia with duration of hypertension and consumption of various specific anti-hypertensive regimens were also explored through Chi-square test.

RESULTS

Hypertensive patients

Demographics and baseline characteristics

All the 657 enrolled patients completed the study. The study included 353 (53.7%) men and 304 (46.3%) women with mean age (SD) of 55.4±11.61 years, mean weight of 70.8±10.98Kg and mean BMI of 27.1±4.20 kg/m². Around 50% of the patients were more than 56 years of age. Majority of the patients were married (95.7% [n=629]). About 48.1% (n=316) of the patients were unemployed (women: 75.3%; men: 24.7%); 39.7% (n=261) of the patients were graduates/post graduates or above. Demographic characteristics are provided in Table 1. Of the enrolled patients, 198 (30.1%) patients had significant medical history other than hypertension (Figure 1).

Table 1: Baseline demographic characteristics.

Characteristics	All enrolled(N=657)
Age (years)	
Mean (SD)	55.4 (11.61)
Gender, n (%)	
Men	353 (53.7)
Women	304 (46.3)
BMI (kg/m²)	
Mean (SD)	27.1 (4.20)

BMI= body mass index; min= minimum; max= maximum; SD= standard deviation

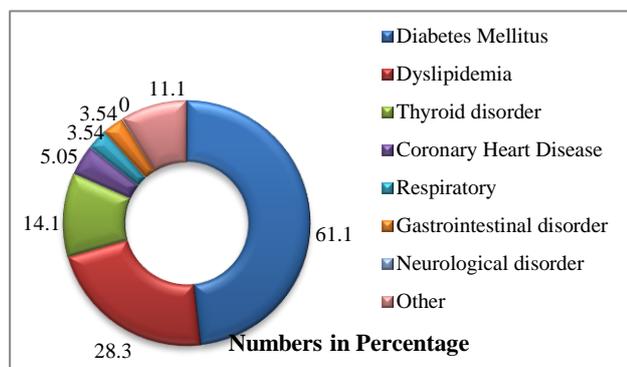


Figure 1: Medical history of hypertensive patients.

Lifestyle attributes

Overall, 83.9 % of the patients in the hypertensive population had never smoked compared with 9.28% who were smokers. Around 6.85% (n=45) patients were current smokers. Among these current smokers, 41 patients took cigarettes and 6 patients took bidis. The average consumption of cigarettes per day was 10; maximum number of cigarettes consumed in a day was 30. The average consumption of bidi per day was 9; maximum number of bidi consumed was 55. The minimum age at which patient had started smoking was 15 years; average age of starting smoking was 27.2 years. Only 9.13% of the hypertensive populations had tobacco chewing habits. The average age of patient when they started chewing tobacco was 26.1±9.18 years; minimum age of starting tobacco chewing was 8 years.

Alcohol was consumed by only 11.4% patients among which 66.7% were social/occasional drinkers. The average years of alcohol abuse was 19.5±9.48 years (minimum: 2 years; maximum: 45 years).

Tea was consumed daily by 85.5% of the patients with an average of 3 cups per day and maximum limit of 15 cups per day. Coffee was consumed daily by only 19.2% of the patients with an average of 1 cup per day and maximum limit of 6 cups per day. The average working hours for hypertensive patients was 6 hours per day (±3.62) and at a stretch of maximum 15 hours per day. Among the hypertensive population, 39.4% of the patients went for daily exercise. Brisk walking was the most preferred exercise (48.6%) followed by yoga (20.1%); heavy weights was the least preferred exercise (1.16%). Details of baseline lifestyle attributes wise distribution of hypertensive patients are included in Supplementary Table 2.

Sleep habits

Majority of patients in the hypertensive population had sleep-related problem once or twice a week (Supplementary Table 3). Around 51.6% of patients woke up during the night with trouble getting back to sleep; 49.5% of patients woke up too early in the morning and were not able to get back to sleep; 43.2% of patients felt un-rested during the day regardless of hours of sleep; 50.8% of patients felt excessively or overly sleepy during the day; 41.4% of patients felt that they were not getting enough sleep once or twice a week. Also, only 4.41% of the patients preferred to take sleeping pills or other medications once or twice week to help with sleep whereas 92.5% of the patients never took any sleeping pills.

Sleep quality

The sleep quality of the hypertensive patients was found satisfactory for 249 (37.9%) patients, slightly unsatisfactory for 199 (30.3%); markedly unsatisfactory

for 208 (31.7%) and very unsatisfactory for 1 (0.15%) patient.

Patients on sleep inducing medication

Most of the hypertensive patients (n=482 [73.4%]) were not on any sleep-inducing medication. A total of 122 (18.6%) patients were on benzodiazepine therapy whereas 54 (8.22%) patients were on non-benzodiazepine therapy. Among the patients on benzodiazepine therapy, 75 (61.5%) patients were on clonazepam followed by alprazolam (n=45 [36.9%]). Among the patients on non-benzodiazepine therapy, 52 (96.3%) patients were on zolpidem.

Hypertensive patients with insomnia

A total of 534 (81.3%) patients were already diagnosed cases of hypertension out of which of 248 (80.0%) patients were insomniacs. A total of 123 (18.7%) patients were newly diagnosed cases of hypertension of which of 62 (50.4%) patients were insomniacs. Among the known cases of hypertension, 532 patients (99.6%) were on antihypertensive medication. Amongst these newly diagnosed hypertensive cases, 122 (99.2%) patients were on antihypertensive medication. Prevalence of insomnia among hypertensive population was approximately 47.2% (n=310; 95% CI: 43.4, 51.0).

The prevalence of already established insomnia among hypertensive patients was 12.3% (n=81; 95% CI: 9.81,14.8). The prevalence of insomnia diagnosed with AIS scale among hypertensive patients was 34.9% (n=229; 95% CI: 31.2,38.5). The prevalence of newly diagnosed hypertensive population with insomnia from the overall study population was 9.44% (n=62; 95% CI: 7.20, 11.7).

The number of patients newly diagnosed with insomnia by AIS scale was higher compared with patients already

diagnosed with insomnia (34.9% [95% CI: 31.2, 38.5] vs 12.3% [95% CI: 9.81, 14.8]). This indicates that the insomnia diagnosis may have been missed in a large proportion of hypertensive patients.

Prevalence of insomnia was significantly higher among women compared to men (53% vs. 42.2%, p=0.0059). However, no significant association with weight (p=0.0503), body mass index (BMI; p=0.1889) or cardiovascular event (p=0.1810) was reported.

Lifestyle attributes of hypertensive patients with insomnia

About 62.5% of the hypertensive patients who exercised daily did not report insomnia. (insomniacs: 62.5% vs. non-insomniacs: 37.5%; p=0.0001). A total of 55.5% patients who consumed tea reported no insomnia vs. 44.5% patients with insomnia (p=0.0089). Insomnia was reported in only 34.7% patients who consumed alcohol (p=0.0079). Furthermore, insomnia was reported in 75.0% of patients who were using tobacco.

Insomnia was also seen to be associated with smoking for current smokers (insomniac: 62.2% vs. non-insomniac: 37.8%) compared to non-smokers (never smoked) (insomniac: 45.4% vs. non-insomniac: 54.6%) (Table 2).

Sleep Habits of hypertensive patients with insomnia

Approximately half of the hypertensive population with insomnia had sleep-related problems once or twice a week: around 62.9% of the patients had a problem of waking up in the night with trouble getting back to sleep (midnight awakening); 64.8% of the patients had problem of waking up too early in the morning and not able to get back to sleep (early morning awakening); 57.1% of patients felt unrested during the day regardless of hours of sleep); and 61.6% patients felt excessively or overly sleepy during the day (p<0.0001 for all sleep related habits) (Table 3).

Table 2: Association between insomnia and life style attributes.

Life style attributes	Presence of insomnia n (%)			P-value*
	Yes	No	Total	
Tobacco chewing	45 (75.0)	15 (25.0)	60 (9.13)	0.0001
Alcohol consumption	26 (34.7)	49 (65.3)	75 (11.4)	0.0079
Tea consumption	250 (44.5)	312 (55.5)	562 (85.5)	0.0089
Coffee consumption	55 (43.7)	71 (56.3)	126 (19.2)	0.1540
Daily exercise	97 (37.5)	162 (62.5)	259 (39.4)	0.0001
Smoking habits				
• Never smoked	250 (45.4)	301 (54.6)	551 (83.9)	-
• Former smoker	32 (52.5)	29 (47.5)	61 (9.28)	0.7009
• Current smoker	28 (62.2)	17 (37.8)	45 (6.85)	0.1011
Total	310 (47.2)	347 (52.8)	657 (100)	-

*Two sided Chi-square/Fisher test was used at 5% level of significance

Table 3: Sleep habits in hypertensive patients with insomnia.

Sleep related habits in hypertensive patients with insomnia	N = 657		
	Never n (%)	Once or twice a week n (%)	More than twice a week n (%)
Do you wake up during the night with trouble getting back to sleep?	12(3.87)	195(62.9)	103(33.2)
Do you wake up too early in the morning and not able to get back to sleep?	29(9.35%)	201(64.8)	80(25.8)
Do you feel un-rested during the day regardless of hours of sleep?	35(11.3)	177(57.1)	98(31.6)
Do you feel excessively or overly sleepy during the day?	46(14.8)	191(61.6)	73(23.5)
Do you feel that you are not getting enough sleep?	21(6.77)	167(53.9)	122(39.4)
Do you take sleeping pills or other medications to help with sleep?	270(87.1)	24(7.74)	16(5.16)

* Two sided Chi-square/Fisher test will be used at 5% level of significance.

Day time impact of insufficient sleep, functioning capacity and day time sleepiness of hypertensive patients with insomnia

There was a significant impact of insomnia on functioning capacity and daytime sleepiness. The daytime impact

of insufficient sleep on wellbeing was 'slightly' decreased in 77.8% and very decreased in 100 % hypertensive patients with insomnia. Furthermore, daytime functioning (physical and mental) capacity was markedly decreased for 100% insomniac patients where as it was slightly decreased for 82.9% insomniacs.

Table 4: Association between insomnia and various anti-hypertensive treatments.

Anti-hypertensive treatment	Presence of insomnia n (%)			P-value*
	Yes	No	(N=657)	
Diuretics	47 (49.0)	49 (51.0)	96 (14.6)	0.8383
ACE inhibitor	17 (45.9)	20 (54.1)	37 (5.63)	0.6219
Angiotensin II receptor blockers	102 (30.5)	232 (69.5)	334 (50.8)	0.0000
Beta blocker	50 (46.7)	57 (53.3)	107 (16.3)	0.4986
• Cardio-selective	47 (45.6)	56 (54.4)	103 (15.7)	0.3752
• Non-cardio-selective	3 (75.0)	1 (25.0)	4 (0.61)	0.3173
Alpha blocker	7 (63.6)	4 (36.4)	11 (1.67)	0.3657
Calcium channel blocker	162 (61.1)	103 (38.9)	265 (40.3)	0.0003

*Two sided Chi-square/Fisher test will be used at 5% level of significance.

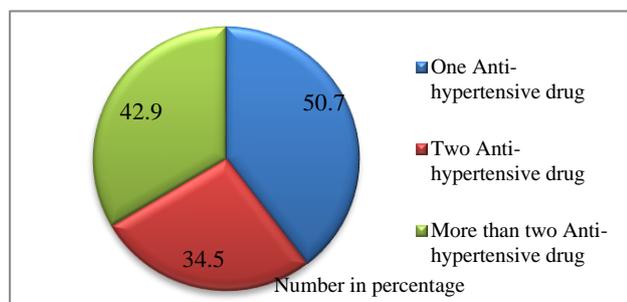


Figure 2A: Antihypertensive treatment and insomnia.

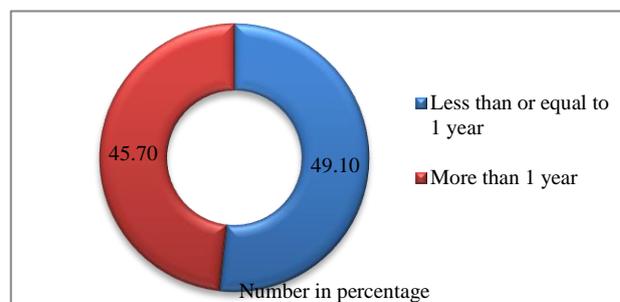


Figure 2B: Duration of hypertension and insomnia.

Antihypertensive treatment

A total of 50.7% of hypertensive patients with insomnia were on one antihypertensive drug; 34.5% on two drugs; and 42.9% of patients were on more than two antihypertensive drugs (Figure 2). About 75.0% patients on non-cardio-selective treatment, 63.6% patients on alpha blocker and 61.1% of patients on calcium channel blocker reported insomnia (Table 4).

DISCUSSION

Hypertension and insomnia are common and often coexist. There is evidence to suggest that the increasing prevalence of hypertension in past decade might be related both to an increased prevalence of insomnia and to the decline of sleep duration due to modern lifestyle.¹⁵ However, insomnia has always been and still is an under-recognized and therefore an under-treated problem, since about 60% of the people suffering from insomnia never talk to their physicians about their sleeping difficulties.⁵ Also, many diagnoses are missed as there is a lack of relevance given by healthcare professionals. Hence there is a recognized need to improve the management of sleep problem co-morbidity through education of evidence-based treatment approaches for clinicians and patients.

To the best of our knowledge, this is the first of its kind study in Indian context to understand the prevalence of insomnia among hypertensive patients reaching out to physicians for management. There are only limited studies available to compare the rate of insomnia in patients with hypertension with that of our data.^{19,20} In this study, the prevalence of insomnia among hypertensive population was found to be 47.2%. This observation corroborated with the prevalence reported in a European population.²⁰ However, in another study (POL-MONICA BIS) in Warsaw metropolitan population, prevalence of insomnia was found to be low (30.7%).¹⁹ Nevertheless, it should be noted that the prevalence of insomnia reported in this study among patients who reached out to physicians for the management of hypertension was higher than reported in general Indian population, indicating the lack of relevance given by healthcare professionals towards the condition. Furthermore, about 50.4% of the newly diagnosed hypertensive patients were insomniac, indicating a greater trend towards insomnia in newly diagnosed hypertensive patients.

The AIS was used to screen patients with hypertension for insomnia. The AIS was designed concurrently to measure the severity of insomnia and to establish its diagnosis based on commonly accepted criteria. In this study we found that the number of patients diagnosed with insomnia by AIS was higher compared to patients with already established insomnia. That is about 75% insomniac cases were undiagnosed, indicating that insomnia diagnosis may have been missed in a large proportion of hypertensive patients.

Around 50% of the hypertensive population was more than 56 years old. Also, women had an elevated likelihood of insomnia compared with men. This result is in accord with prior research which suggests that women are more likely to have insomnia.^{20,21} There could be a possibility that variations in estrogen contribute to these differences in the expression of insomnia.²² Greater BMI and obesity has also been linked with the diagnosis of insomnia.²³ Nonetheless in this study, no significant association of weight ($p=0.0503$), BMI ($p=0.1889$) or cardiovascular event ($p=0.1810$) with insomnia was reported.

The lifestyle attributes contribute to insomnia in hypertensive patients were also supported by the present study. In this study, insomnia was found to be associated with smoking for current smokers in comparison to the patients who never smoked. Moreover, insomnia was reported in 75.0% of patients who were using tobacco. Consistent with our results, several investigators have reported that current smokers were more likely to have symptoms of insomnia, including shorter sleep time, longer sleep latency, higher rapid eye movement, sleep density, more episodes of sleep apnea, and more leg movements during sleep.²⁴⁻²⁷ Sabanayagam and Shankar found that current cigarette smokers were nearly twice as likely to report insufficient sleep and rest as compared to non-smokers.²⁸ Prior research has suggested that nicotine has adverse pathophysiological effects on the brain and the central nervous system.²⁹ As a stimulant, nicotine may interfere with sleep by elevating blood levels of nicotine, which may affect the amount of time it takes for smokers to fall asleep. In addition, nicotine stimulates neurotransmitters that are responsible for the release of dopamine and serotonin, thereby affecting the normal patterns of sleep.²² However, further research is needed to investigate the biochemical relationship between smoking and insomnia.

Exercise has been shown to be effective in decreasing sleep complaints and to treat chronic insomnia. Many studies worldwide have demonstrated a significant negative association between insomnia and physical activity.³⁰⁻³² In line with these studies, about 62.5% of the hypertensive patients who exercised daily did not report insomnia

A statistically significant association between insomnia and different sleeping habits was also evident in this study. Majority of patients with hypertension has sleep related complaints at least once or twice a week. Furthermore, insomnia with negative daytime symptoms has been clearly associated with impaired wellbeing and quality of life.³³ A significant impact of insomnia on functioning capacity and daytime sleepiness was noted in this study. The daytime impact of insufficient sleep on wellbeing was very decreased for insomniac patients (100%). Furthermore, daytime functioning capacity was also markedly decreased for 100% insomniac patients.

Consensus statement on the management of insomnia by Indian Sleep Disorders Association and Indian Academy of Neurology recommends sleep hygiene education as a non-pharmacological treatment in the management of insomnia.³⁴ Sleep hygiene involves educating the patient about health practices such as diet, exercise, and substance use, and about environmental factors such as light, noise, temperature, and bedding, i.e., important personal and environmental factors that can be positive or negative for sleep. Sleep hygiene recommendations have also been listed by the National Institute of Health and many others for the treatment of insomnia.³⁵⁻³⁷

In many epidemiological studies, insomnia has been correlated with frequent use of medical resources and increased use of drugs.^{38,39} In this study, more than half of the hypertensive patients with insomnia were on at least one anti-hypertensive drug. Also, more patients were given benzodiazepine therapy as sleep inducing medications in comparison to non-benzodiazepine therapy. However notably, benzodiazepines can induce dependence with subsequent withdrawal and rebound symptoms if they are suddenly discontinued. Furthermore, these drugs are subject to abuse, particularly in patients with a history of alcohol and drug abuse.⁴⁰ Among the patients on benzodiazepine therapy, 61.5% patients had received clonazepam. However, it should be again noted that clonazepam is not an approved drug for the treatment of insomnia in India. This highlights the need for increasing awareness about appropriate treatment practices among healthcare providers.

One of the limitation of this study is that there could be certain unmeasured confounding variables in a cross-sectional, observational study that might impact the investigation on causality. Also, the prevalence of insomnia was high among hypertensive patients those who reached out to physicians for management of hypertension. However, lack of health-seeking behavior coupled with a lack of awareness could have possibly understated the disease prevalence.

CONCLUSION

The present study reveals that the prevalence of insomnia among patients who reached out to physicians for the management of hypertension was higher than reported in general Indian population. Despite being the most common sleep related problem, insomnia remains largely undiagnosed in the general population. This study thus shed light on the lack of relevance given by healthcare professionals towards the condition as well as the lack of awareness amongst patients, in Indian context. This necessitates an approach targeting awareness of insomnia and provision of services among healthcare providers/policy makers. For the better and complete management of insomnia, it is necessary to take into consideration the perceptions and interactions of patients and healthcare professionals. Further studies are warranted to assess the

influence of confounding factors and the degree of insomnia which is associated to hypertension, to derive measures for early detection and treatment.

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ANNEXURE

Annexure 1

Table 1: Athens insomnia scale

A. Sleep induction (time it takes you to fall asleep after turning-off the lights)

0. No problem 1.Slightly delayed 2.Markedly delayed 3. Very delayed or did not sleep at all

B. Awakenings during the night

0. No problem 1.Minor problem 2.Considerable problem 3. Serious problem or did not sleep at all

C. Final awakening earlier than desired

0. Not earlier 1.A little earlier 2.Markedly earlier 3. Much earlier or did not sleep at all

D. Total sleep duration

0. Sufficient 1. Slightly insufficient 2.Markedly insufficient 3.Very insufficient or did not sleep at all

E. Overall quality of sleep (no matter how long you slept)

0. Satisfactory 1.Slightly unsatisfactory 2.Markedly unsatisfactory

3. Very unsatisfactory or did not sleep at all

F. Sense of well-being during the day

0. Normal 1.Slightly decreased 2.Markedly decreased 3. Very decreased

G. Functioning (physical and mental) during the day

0. Normal 1.Slightly decreased 2.Markedly decreased 3. Very decreased

H. Sleepiness during the day

0. None 1.Mild 2.Considerable 3. Intense

Athens score: __ __

Is the patient diagnosed with insomnia? Yes No

Annexure 2**Table 2: Lifestyle attribute wise distribution of hypertensive patients.**

	N=657
Smoking habit	
Never smoked, n (%)	551 (83.9)
Former smoker, n (%)	61 (9.28)
Duration after quitting smoking, n (%)*	
1-10 years	27 (44.3)
11-20 years	24 (39.3)
21-30 years	10 (16.4)
Current smoker, n (%)	45 (6.85)
Cigarettes, n (%)*	41 (91.1)
Number of cigarettes/day	
Mean (S.D)	10.1 (7.36)
Beedi, n (%)*	6 (13.3)
Number of beedi/day	
Mean (S.D)	9.2 (5.71)
Age when started smoking, n (%)	
Mean (S.D)	27.2 (6.86)
Duration of smoking, n (%)	
1-9 years	3 (6.67)
10-19 years	13 (28.9)
20-39 years	23 (51.1)
>=40 years	6 (13.3)
Tobacco habits	
Tobacco chewing habit, n (%)	60 (9.13)
Age when started tobacco chewing	
Mean (S.D)	26.1 (9.18)
Duration of tobacco chewing*, n (%)	
<=1 years	1 (1.67)
1-9 years	8 (13.3)
10-19 years	13 (21.7)
20-39 years	31 (51.7)
>=40 years	7 (11.7)
Alcohol	
Alcohol consumption, n (%)	75 (11.4%)
Details of total alcohol intake, n (%)*	
<2 drinks per day	23 (30.7)
2-4 drinks per day	2 (2.67)
> 4 drinks per day	0 (0.0)
Social/ Occasional drinker	50 (66.7)
Years of alcohol use/ abuse	
Mean (S.D)	19.5 (9.48)
Types of alcohol, n (%)*	
Vodka	12 (16.0)
Whisky	43 (57.3)
Rum	18 (24.0)
Wine	16 (21.3)
Beer	45 (60.0)
Other	0 (0.0)
Tea consumption	
Daily tea consumption, n (%)	562 (85.5)
Number of cups per day	
Mean (SD)	2.9 (1.53)

Coffee consumption	
Daily coffee consumption, n (%)	126 (19.2%)
Number of cups per day	
Mean (SD)	1.9 (0.97)
Work style	
Number of work hours per day, n	657
Mean (SD)	6.0 (3.62)
Exercise	
Daily exercise, n (%)	259 (39.4)
Type of Exercise, n (%)*	
Brisk walking	126 (48.6)
Cardio	15 (5.79)
Jogging/running	20 (7.72)
Heavy weights	3 (1.16)
Swimming	13 (5.02)
Yoga	50 (19.3)
Other	52 (20.1)
Gym	1 (0.39)
Cycling	3 (1.16)
Farming	5 (1.93)
Walking	43 (16.6)
Exercise hours per week, Mean (S.D)	5.5 (3.60)

Percentage was calculated using number of enrolled patients as the dominator; * Percentage was based on the number of subjects with available data in each group.

Annexure 3**Table 3: Sleep habits wise distribution of hypertensive patients.**

Sleep related habits, n (%)	N=657
Do you wake up during the night with trouble getting back to sleep?	
Never	189 (28.8)
Once or twice a week	339 (51.6)
More than twice a week	129 (19.6)
Do you wake up too early in the morning and not able to get back to sleep?	
Never	237 (36.1)
Once or twice a week	325 (49.5)
More than twice a week	95 (14.5)
Do you feel un-rested during the day regardless of hours of sleep?	
Never	260 (39.6)
Once or twice a week	284 (43.2)
More than twice a week	113 (17.2)
Do you feel excessively or overly sleepy during the day?	
Never	241 (36.7)
Once or twice a week	334 (50.8)
More than twice a week	82 (12.5)
Do you feel that you are not getting enough sleep?	
Never	246 (37.4)
Once or twice a week	272 (41.4)
More than twice a week	139 (21.2)
Do you take sleeping pills or other medications to help with sleep?	
Never	608 (92.5)
Once or twice a week	29 (4.41)
More than twice a week	20 (3.04)