

# Excessive day time sleepiness and its associated factors among adult population in an urban area of southern Rajasthan



Nitesh Mangal<sup>1</sup>, Mansi Sharma<sup>2</sup>, Mehul Patel<sup>3</sup>, Dilip Kumar L<sup>4</sup>, Varghese KA<sup>5</sup>, Rajkumar Patil<sup>6</sup>

<sup>1,4</sup>Professor, <sup>2,3</sup>Assistant Professor, <sup>5</sup>Statistician, Department of Community Medicine, Pacific Institute of Medical Sciences, Udaipur, Rajasthan, <sup>6</sup>Professor, Department of Community and Family Medicine, All India Institute of Medical Sciences, Bhopal, Madhya Pradesh, India

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## ABSTRACT

**Background:** Sleep problems have been considered as an unmet public health problem. Sleep problems are mostly under reported and neglected by the Indian population. Very limited studies have been conducted in India on this aspect. **Aims and Objectives:** The aim of the study was to estimate the prevalence of excessive day time sleepiness (EDS) and its associated factors among urban adult population. **Materials and Methods:** A community based cross-sectional study was conducted among 409 adults of 20–60 years age group in urban Udaipur. Socio-demographic and other details were obtained using a semi structured questionnaire. Using Epworth Sleepiness Scale, assessment of EDS was assessed. **Results:** In the present study, mean age of the participants was  $40.8 \pm 11.3$  years. Considering the ESS score of 10 or more, EDS was observed in 60.2% subjects. EDS was associated with age, gender, milk consumption, and mobile use. No significant association was found between EDS with central obesity, body mass index, marital status, literacy, occupation, exercise, smoking, and consumption of alcohol. **Conclusion:** In the present study, the prevalence of EDS was high. Therefore, early identification of excessive sleep problems and appropriate intervention that address the various determinants of the sleep problems is of prime importance.

**Key words:** Epworth sleepiness scale; Excessive day time sleepiness; Attributable factors for sleepiness; Body mass index

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## INTRODUCTION

Sleep related disorders form an important problem in factors associated with modern lifestyle. It impairs the quality of life and has been considered as “an unmet public health problem.”<sup>1</sup> The prevalence of sleep problems varies from 3.9% to 40%, in different African and Asian countries.<sup>2</sup> In India, sleep problems among population varies from 5% to 40%.<sup>3</sup>

Individuals with excessive day time sleepiness (EDS) experience reduced alertness, impaired mood, and compromised daytime functioning.<sup>4</sup> It may be present as reduced wakefulness, feeling of abnormal daytime tiredness and lack of vigilance.<sup>5</sup> EDS is observed in narcolepsy,

idiopathic hypersomnia and moderate to severe Obstructive Sleep Apnoea Syndrome.<sup>6</sup>

The prevalence of EDS among the adult Chinese population was reported as 22.1%.<sup>7</sup> In another study in Iran, the prevalence of EDS was 34.3%.<sup>8</sup> In a study conducted at Delhi (India), the prevalence of EDS was 48.6%.<sup>9</sup>

One of the widely used methods for subjective assessment of sleep is by assessment of EDS using Epworth Sleepiness Scale (ESS).<sup>6</sup>

Even though the problem is of immense magnitude, there is paucity of studies related to daytime sleepiness in India.

### Address for Correspondence:

Dr. Dilip Kumar L, Professor, Department of Community Medicine, Pacific Institute of Medical Sciences, Udaipur - 313 015, Rajasthan, India. **Mobile:** +91-7742903102. **E-mail:** dilippareek27@gmail.com

The EDS not only reduces the work productivity but also causes many health-related problems. As the life is becoming more and more competitive one has to remain alert, dynamic and responsive to emerging challenges in the society.

### Aims and objectives

The study was conducted to estimate the prevalence of excessive day time sleepiness and its associated factors among urban adult population.

## MATERIALS AND METHODS

A community based cross-sectional study was planned and conducted in urban field practice area of Department of Community Medicine of Pacific Institute of Medical Sciences, Udaipur. The study was conducted from September 2022 to December 2022. A sample size of 409 was calculated on the basis of previously reported prevalence of 20% sleep disorders<sup>3</sup> and design effect of 1.5.

The list of houses in the study area was obtained from the urban health center of the medical college at Udaipur. Simple random sampling method was used to select the houses in the respective areas. All the individual persons of 20–60 years age group residing in selected household were included in the study. Those adults having night duty in workplace, senior citizen, females with newborn babies were excluded from the study. The adult members who were available and fulfilling the criteria were included in the study. Individuals who gave written informed consent were included in the study.

Pre-designed questionnaire after pretesting was administered to all the selected adult participants. The questionnaire included information related to the socio-demographic details such as age, sex, education, occupation, income, and family type and the excessive daytime sleepiness were measured using modified ESS.<sup>3,10</sup> ESS contain 8 situations where a person can rate sleepiness on a 4-point Likert scale. An ESS score of 10 and more was suggestive of significant day time sleepiness and those over 15 had severe day time sleepiness. A modified version of ESS was used keeping in mind of the Indian scenario. Total ESS score was calculated for each individual based on scores in different conditions for dozing off. Information related to consumption of tea/milk before sleep, history of smoking, and alcohol and mobile usage was included in the questionnaire. Various anthropometric measurements such as waist circumference, height, and weight for each participant were measured.

Study was conducted after getting ethical clearance from Institutional Ethics Committee. Data entry and analysis

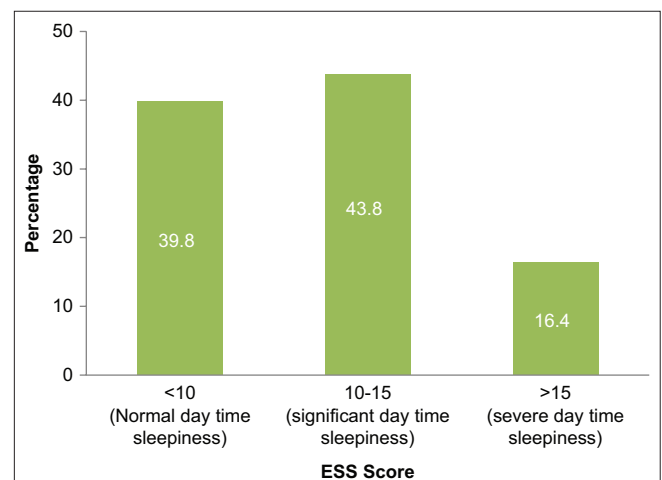
were done using Microsoft Excel and Epi info 7. The results were presented in tables as frequency and percentages and appropriate statistical test like Chi-square test for association was applied.

## RESULTS

All 409 adults between 20 and 60 years were participated in the study. The mean age of the participants was found to be  $40.8 \pm 11.3$  years. The mean ESS score was  $1.76 \pm 0.71$ . Nearly 60.2% subjects were having excessive daytime sleepiness (ESS score >10) (Figure 1).

Table 1 shows how likely it was for the respondent to doze off or fall asleep in different situations. Most of participants (93.4%) told that during watching television they tend to fall asleep (slight, moderate, and high chance together) during daytime followed by during work when taking short break (92.4%). Most common situation for high chance of sleeping was during travel in a vehicle (8.1%) as a passenger followed by after lunch (7.6%). Least common situation for high chance of sleeping was sitting or talking to someone (2.4%) followed by during work when taking short break (2.7%).

It was observed that EDS was higher in the age group 51–60 years as compared to 20–30 years. There was increasing EDS as the age increased which was significant. EDS was significantly higher among females (64.8%) compared to males (49.2%). There was significant association between gender and EDS. There was no association between EDS with other factors such as type of family, occupation, marital status, and literacy (Table 2).



**Figure 1:** Distribution of Epworth sleepiness scale scores among the study subjects

**Table 1: Situation and day time sleepiness under modified ESS**

Various situations that may cause dozing or sleeping	Chance of dozing off or sleeping			
	Never n (%)	Slight chance n (%)	Moderate chance n (%)	High chance n (%)
Sit/Read	62 (15.2)	158 (38.6)	161 (39.4)	28 (6.8)
Watching TV	27 (6.6)	183 (44.7)	170 (41.6)	29 (7.1)
Public place	58 (14.2)	153 (37.4)	170 (41.6)	28 (6.8)
Vehicle passenger	54 (13.2)	164 (40.1)	158 (38.6)	33 (8.1)
Afternoon	51 (12.5)	190 (46.5)	143 (35)	25 (6.0)
Sit/Talk to someone	71 (17.4)	173 (42.3)	155 (37.9)	10 (2.4)
After lunch	44 (10.8)	184 (45)	150 (36.7)	31 (7.6)
During work when taking short break	31 (7.6)	151 (36.9)	216 (52.8)	11 (2.7)

ESS: Epworth sleepiness scale

**Table 2: Association of socio-demographic factors with day time sleepiness**

Characteristics	Normal day time sleepiness (ESS<10) (n=163) n (%)	Excessive day time sleepiness			Chi-square value	P-value
		Significant 10-15 (n=179) n (%)	Severe>15 (n=67) n (%)	Total (n=246) n (%)		
Age group (years)*						
20-30 (n-92)	50 (54.3)	36 (39.2)	6 (6.5)	42 (45.7)	13.36	0.003*
31-40 (n-122)	49 (40.1)	50 (41)	23 (18.9)	73 (59.9)		
41-50 (n-101)	37 (36.6)	47 (46.6)	17 (16.8)	64 (63.4)		
51-60 (n-94)	27 (28.7)	46 (48.9)	21 (22.3)	67 (71.2)		
Gender						
Male (n-122)	62 (50.8)	46 (37.7)	14 (11.5)	60 (49.2)	8.72	0.003*
Female (n-287)	101 (35.0)	133 (46.3)	53 (18.5)	186 (64.8)		
Family type						
Nuclear (n-294)	116 (39.5)	128 (43.5)	50 (17.0)	178 (60.5)	0.06	0.79
Joint (n-115)	47 (40.9)	51 (44.3)	17 (14.8)	68 (59.1)		
Marital status						
Married (n-331)	132 (39.8)	146 (44.1)	53 (16.1)	199 (60.2)	5.82	0.05*
Single (n-30)	17 (56.7)	9 (30.0)	4 (13.3)	13 (43.3)		
Others (n-48)	14 (30.6)	24 (49.0)	10 (20.4)	34 (69.4)		
Literacy						
Illiterate (n-76)	22 (28.9)	41 (53.9)	13 (17.2)	54 (71.1)	4.77	0.09
Up to middle (n-200)	83 (41.5)	86 (43.0)	31 (15.5)	117 (58.5)		
Above high school (n-133)	58 (43.6)	52 (39.1)	23 (17.3)	75 (56.4)		
Occupation						
Employed (n-181)	77 (42.5)	77 (42.5)	27 (15.0)	104 (57.5)	1.80	0.40
Unemployed (n-31)	14 (45.2)	11 (35.5)	6 (19.3)	17 (54.8)		
Housewife (n-197)	72 (36.5)	91 (46.2)	34 (17.3)	125 (63.5)		

\*P&lt;0.05: Significant. ESS: Epworth sleepiness scale

Milk consumption and mobile use were found to have significant association with daytime sleepiness. However, habits such as smoking and alcohol consumption were found to have non-significant association with daytime sleepiness (Table 3).

The body mass index (BMI) and central obesity were found to have weak association with daytime sleepiness (Table 4).

Table 5 shows the correlation analysis of age, waist circumference, mobile usage, BMI, systolic blood pressure, and diastolic blood pressure with ESS score. Positive correlation was found between the ESS score with age. Negative correlation was found between the usage of mobile phone, body mass index with ESS score. There is no correlation of ESS with diastolic pressure.

## DISCUSSION

In India, there is paucity of community-based studies on EDS using ESS Score. Numbers of females were more compared to males (70.2% females and 29.2% males) in this study, as most of the females were housewife and they were present in the house during the house-to-house survey while man goes out to work.

In this study, EDS (ESS score >10) was more among adults with a prevalence of 60.2%, when compared with the study results obtained by Suri et al.,<sup>9</sup> (48.6%), Vata et al.,<sup>11</sup> (45.0%), Targari et al.,<sup>8</sup> (34.3%), and Wu et al.,<sup>7</sup> (22.2%), respectively. The observed variation of the prevalence of EDS may be due to difference in geographical areas, age groups, and various methods used to assess the sleep.

**Table 3: Association of personal habits with day time sleepiness**

Characteristics	Normal day time sleepiness (ESS<10) (n-163) n (%)	Excessive day time sleepiness			Chi-square value	P-value
		Significant 10-15 (n-179) n (%)	Severe>15 (n-67) n (%)	Total (n-246)		
Tea consumption						
No (n-38)	11 (28.9)	21 (55.3)	6 (15.8)	27 (71.1)	2.07	0.14
Yes (n-371)	152 (41.0)	158 (42.6)	61 (16.4)	219 (59.0)		
Milk consumption before sleep*						
Yes (n-135)	35 (25.9)	64 (47.4)	36 (26.7)	100 (74.1)	16.30	0.004
No (n-274)	128 (46.7)	115 (42.0)	31 (11.3)	146 (53.3)		
Exercise						
Yes (n-216)	93 (43.1)	81 (37.5)	42 (19.4)	123 (56.9)	1.95	0.16
No (n-193)	70 (36.3)	98 (50.8)	25 (12.9)	123 (63.7)		
Mobile*						
No (n-52)	14 (26.9)	21 (40.4)	17 (32.7)	38 (73.1)	10.39	0.004
<60 min (n-323)	128 (39.6)	146 (45.2)	49 (15.2)	192 (60.4)		
>60 min (n-34)	21 (61.8)	12 (35.3)	1 (2.9)	13 (38.2)		
Smoking						
No (n-371)	146 (39.4)	162 (43.7)	63 (16.9)	225 (60.6)	0.42	0.51
Yes (n-38)	17 (44.8)	17 (44.8)	4 (10.4)	21 (55.2)		
Alcohol						
No (n-389)	153 (39.3)	171 (44.0)	65 (16.7)	236 (60.7)	0.90	0.34
Yes (n-20)	10 (50.0)	8 (40.0)	2 (10.0)	10 (50.0)		

\*P&lt;0.05; Significant. ESS: Epworth sleepiness scale

**Table 4: Association of various factors with day time sleepiness**

Characteristics	Normal day time sleepiness (<10) n-163 n (%)	Excessive day time sleepiness			Chi-square	P-value
		Significant (10-15) n-179 n (%)	Severe (>15) n-67 n (%)	Total (n=246) n (%)		
Central obesity (>90 cm in males and >80 cm in females)						
Yes (n-176)	79 (44.9)	69 (39.2)	28 (15.9)	97 (55.1)	3.26	0.07
No (n-233)	84 (36.1)	110 (47.2)	39 (16.7)	149 (63.9)		
BMI Classification						
Normal weight/underweight (<23) (n-100)	32 (32.0)	48 (48.0)	20 (20.0)	68 (68.0)	3.40	0.06
Overweight/Obese (>23) (n-309)	131 (42.4)	131 (42.4)	47 (15.2)	178 (57.6)		

BMI: Body mass index

**Table 5: Correlation analysis of ESS with other variable**

Characteristics	Correlation coefficient with ESS	P-value
Age	0.160*	0.001
Waist circumference	0.086	0.070
Mobile usage (min)	-0.193*	0.001
BMI	-0.135*	0.006
SBP	0.13	0.008
DBP	0.038	0.448

\*P&lt;0.05 = Significant, BMI: Body mass index, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, ESS: Epworth sleepiness scale

A study conducted by Sahoo et al.,<sup>12</sup> found that 35% females had EDS with score 10–16 while 80% males were having EDS with score 10–16 and 11.6% males were dangerously sleepy with score more than 15.

In the present study, ESS questionnaire showed that the high chances of falling asleep during daytime was more while

watching TV (93.4%), opposite to this very less number of subjects told that they can fall asleep while talking to someone. A study by Targari et al.,<sup>8</sup> showed that in ESS questionnaire, lowest score belong to the situation 6 (while talking to someone) and highest score belonged to the situation 5 (lying down to rest in the afternoon when circumstances permit).

The present study showed that as the age increased, the excessive daytime sleepiness also increased. To this opposite finding was observed in a population-based study by Suri et al.,<sup>9</sup> which showed that EDS was significantly less with increasing age. A community-based study done by Wu et al.,<sup>7</sup> showed no association between the age and EDS.

In the present study, 64.8% females were having EDS, which was higher than males (49.2%). Similar results were obtained by Doi et al.,<sup>13</sup> While in contrast, studies done by Sahoo et al.,<sup>12</sup> and Suri et al.,<sup>9</sup> found that chances of dozing off during the day time was more among males compared to females.



The present study showed that there was no significant difference between EDS and marital status. Similar finding was observed in a study done by Souza et al.,<sup>14</sup> among 408 adults, EDS was more (59.1%) among married individuals compared to unmarried, single, and divorced individuals, there was no association between the EDS and marital status. A study by Targari et al.,<sup>8</sup> showed that married individuals had more day time sleepiness compared to single and divorced, the difference was statistically significant.

The present study did not show any association between the day time sleepiness and physical activity. Opposite to our study finding, in a study by Sherrill et al.,<sup>15</sup> the individuals who were physically active had less daytime sleepiness. In a study done by Lai et al.,<sup>16</sup> showed that excessive day time was more (68.3%) among the individuals who were doing exercise compared to those individuals who were not doing exercise (31.7%). The study showed association between the excessive daytime sleepiness and exercise.

The present study did not show association between the day time sleepiness and alcohol consumption. Similar findings were observed in the study done by Lai et al.,<sup>16</sup>

In obese people, the compression of the pharynx by the cervical superficial fat mass cause air duct stricture and fat deposition in the tissues of the pharynx which leads to sleep disorders.<sup>17</sup> The obese individuals will have more sleep problems due to metabolic disturbance and chronic inflammation.<sup>18</sup> The present study did not reveal the association between the day time sleepiness and BMI.

### Limitation of the study

Questionnaire was self-reported and no sleep diary was included which may affect the accuracy of the results. Further assessment with polysomnography was needed to confirm the sleep problems which was lacking in the study.

## CONCLUSION

In this study, the prevalence of EDS was high (60.2 %). It was observed that EDS increased as the age increased. EDS was significantly higher in females (64.8%) compared to males (49.2%).

### Recommendations

Overall, the study showed that there is need to address the burden of sleep problems among the population. Proper screening of individuals for sleep problems should be done to detect sleep disorders. Sleep education program is needed to create awareness among the general population. Detection of persons at risk of sleep problems should be done at the primary health care level by using ESS. Further

studies should be done in different places to identify the burden of sleep problems in different areas.

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**Author's Contributions:**

**NM** and **MS**- Concept and design of study or acquisition of data, coordination of project activities or analysis and interpretation of data; **MP** and **DKL**- Review of Literature, Interpretation of data, manuscript preparation and revising it critically for important intellectual content; **VKA**- Interpretation of data and statistical analysis; **RP**- Manuscript preparation and revising of manuscript.

**Work attributed to:**

Pacific Institute of Medical Sciences, Umarda, Udaipur - 313 015, Rajasthan, India.

**Orcid ID:**

Dr. Nitesh Mangal - <https://orcid.org/0000-0001-8840-7662>  
Dr. Mansi Sharma - <https://orcid.org/0000-0001-7769-0546>  
Dr. Mehul Patel - <https://orcid.org/0000-0002-0873-5576>  
Dr. Dilip Kumar L - <https://orcid.org/0000-0002-8829-8790>  
Dr. Varghese KA - <https://orcid.org/0000-0002-3166-9132>  
Dr. Rajkumar Patil - <https://orcid.org/0009-0009-8961-4570>

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