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ORIGINAL ARTICLE

Sleep Quality, Perceived Stress and Body Mass Index in Adolescent College Students- Cross- Sectional Study

SALEEM ULLAH ABRO, ADIL KHAN, M SAQIB UR REHMAN, GATI ARA, QURRATUL AIN SALEEM, FAISAL ALI BALOCH
Assistant Professors of Physiology, Baqai medical University, Karachi.
Correspondence to Dr. Saleem Ullah Abro, Email: drsaleemullah@baqai.edu.pk, Cell: 03337541063,

ABSTRACT

Aim: To assess the sleep quality, perceived stress and body mass index in adolescent college students- a cross-sectional study.
Methodology: It is a descriptive cross-sectional study, conducted in various aptitude training/Entrance test centers. The ERB of this study was taken from KM&DC in 2018 Karachi. The duration of the study was two months in 2021. The 498 students were enrolled, and intake of antipsychotic drugs was excluded from this study. The two scales (Pittsburgh Sleep Quality Index, and Perceived Stress Scale) and Body Mass Index were calculated as weight divided by height [kg/ m2]. For analysis, all qualitative variables were expressed as counts with percentages. Pearson Chi-Square test was used to check the association of perceived stress levels concerning studied baseline qualitative data sets. A P-value < 0.05 was considered statistically significant.
Results: Mean values of sleep, perceived stress, body mass index, and age were 10.74±4.03, 21±10, 15.53±3.5 and 18±0.83 respectively. Poor sleep (96.3%), moderate level of stress (42.1%), and underweight (79.6%) were present in participants. Duration of sleep did not show a significant (>0.05) association with perceived stress and also mean perceived stress did not show a significant association ($\geq$0.05) with Sleeping Habits.
Practical Implication: This study would be helpful for early diagnosing and early prevention of the effects of poor sleep and higher perceived stress levels on body mass index (underweight or obesity) in college students.
Conclusion: Sleep disturbances, stress, and obesity can be predicted early and prevented or coped with early in students.
Keywords: Adolescent, Body Mass Index, College Students, Obesity, Perceived Stress, Sleep Quality,sleep duration.

INTRODUCTION

Adolescence is a period of life in which specific developmental changes or hormonal changes or biological transitions or psychosocial changes occur in the human body and so in their health. They have particular needs (physical as well as mental) and concerns about the fulfillment of their rights with respect. It is considered a critical time for mental and physical well-being to achieve a better future via striving hard in daily life. During this stage of life, many issues (physical, mental, and health-wise) develop in students, among them sleep deprivation, distress, and obesity are very common.[1] Sleep is essential and plays a vital role in the healthy developmental growth of adolescents, including cognition, learning, and memory enhancement. Sleep disturbance is responsible for exerting negative effects on the human body, including physical and psychological or mental. Sleep disturbances or sleep deprivation or sleepiness or poor sleep affect approximately 15-42% of the general population, and these are associated with age, gender, or sex, overuse or misuse of smartphones, socioeconomic standards, daily life habits or activities, and psychological disturbances. Poor sleep or sleep disturbance or inadequate sleep is responsible for the development of Ischemic heart disease (IHD), high blood pressure (HTN), hyperglycemia, obesity or dyslipidemia, metabolic alterations, inattentiveness, loss of consolidation or loss of memory, decreased performance in studies, or decreased grades achievement in exams, altered behavior, neurocognitive decline, attention deficit and distress in the human body[2,3].

Distress is one negative form of stress, which is associated with disturbed sleep, or lack of sleep or insomnia, altered behavior or anger or irritability, suicidal attempts, and headache.[4] In adolescents, the first symptom of mental illness (anxiety, stress, and depression) appears before 18 years of age, and also 85 to 90% of this young population did not seek help or treatment to cope with these psychiatric problems[1].

The prevalence of mental illness or psychiatric illness globally is depression (28%), anxiety (26.9%), stress (36.5%) and psychological distress (50%), and sleep disturbances (27.6%) respectively. Students are a unique group of individuals belonging to this age group of adolescents, who are facing many stressors or pressures like academic or educational, socioeconomic, familial (paternal and maternal), physical, emotional, cultural, and financial, which impairs the cognition or learning process in the achievements of best grades in class or exams.[5] Endocrine system is one of the main regulator of the homeostasis of the human body, so sleep (melatonin and cortisol), and stress (catecholamines, antidiuretic hormone or desmopressin and cortisol) are mainly controlled by this system, as they are working in the human body as a bidirectional pathway, affecting every system like the central nervous system and body metabolism (anabolism or catabolism). Human body metabolism is associated with variations in body mass index (BMI). As the cycle (sleep-wake) is modulated by hypothalami–pituitary–adrenal axis (HPA) in the Human Body[6]. College students, who are exposed repeatedly to stressors or pressures during studies, that lead to increased secretion of cortical hormones (glucocorticoids), which leads to maladaptive changes affecting the occurrence of puberty and composition of body, height, or stature, obesity, metabolic syndrome, hyperglycemia or type II diabetes and decreased adiponectin levels by alteration in food intake, suggesting the hypersecretion or hyperactivation of hypothalami–pituitary–adrenal axis in Human Body[7,8,9].

The current study aimed to assess sleep, perceived stress, and body mass index in college students as an early prediction for/or to cope. Our research will help to fill the gap about this public health problem and its comorbid effects on mental and physical well-being in college students, to cope early.

METHODOLOGY

It is a cross-sectional study, with the study duration being two months in 2021 (August & September). The Ethical Review Board (ERB) was taken from Karachi Medical and Dental College, Karachi & Abbasi Shaheed Hospital (ethical & scientific review committee) with written permission (reference no: 029/18, date 10 November 2018), was conducted in students of intermediate class or A level class, belonging to the pre-medical or pre-engineering groups. The Rao soft calculator was used for sample size with 377(5% level of significance and 95% confidence level) [10] were calculated, and non-probability convenience sampling was used. The data were gathered from 498 students, after taking written consent. The Students having a history of intake of anxiolytic or antidepressants or sedative drugs or steroids intake, or use of anabolic hormones, insomnia, and anorexia nervosa were excluded from this study. The questionnaire was distributed to all

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students for filling and asked to submit a research questionnaire during class time on the same day. The quality of sleep has two components, i-e expressed quantitatively and qualitatively. Students' sleep quality was analyzed by a scale known as Pittsburgh Sleep Quality Index (PSQI). This scale assesses or evaluates the prior month's sleep quality with an indication of sleep problems. This index is a global sleep quality measuring tool, based on an evaluation that includes the components of sleep (duration, latency, habitual sleep efficiency, disturbances, use of pills, and daytime dysfunction) among retrospectives in normal and poor sleepers. The questionnaire was subjective and consisted of 19 items, coded on a scale i-e 0-3 and zero (none) to three (three times a week). The sum of all scores expresses the score of sleep quality in between the range of 0-21, with higher scores expressing insomnia or poor (scores>5) sleep quality, and good sleep quality (scores<5) in students, the reliability and the validity of Cronbach'sα vary from 0.83 - 0.85, according to various studies.[11-13] Stress was assessed by the scale i-e Cohen's scale, the validity and reliability of this scale (Cronbach'sα) varies from 0.78-0.98. This Cohen's scale has 10 items with 5 points Likert rating scale ranging from "0" never to "4" very often and 4, 5, 7, and 8 items are reversed with sum across and all 10 items with results of range 0 to 40. The higher the results of Cohen's scale will be the degree or level of perceived stress with the level of mental well-being. [14-16] Body mass index (BMI) was assessed and grouped into normal with a range of 18 to 24.9 kg/m2, overweight with a range of 25 to 29.9 kg/m2, and obese were having body mass index in the range of 30 to 34.9 kg/m2.[17] The Students demographic, sleep quality/and quantity, perceived stress and body mass index were assessed. The questionnaire of this study was filled out, and data was collected and gathered. Data was double-checked and entered into the computer for analysis. The statistical Analysis was done by using IBM-SPSS version 23.0. All qualitative variables were expressed as counts with percentages. Pearson Chi-Square test was used to check the association of perceived stress levels concerning studied baseline qualitative data sets. A P-value less than 0.05 (≤0.05) was considered statistically significant.

RESULTS

A total of 489 participants filled out the survey form. The mean values of sleep, perceived stress scale (PSS), body mass index (BMI), and age were 10.74±4.03, 21±10, 15.53±3.5 and 18±0.83 respectively. Poor sleep (96.3%), moderate level of stress (42.1%), and underweight (79.6%) were present in participants respectively (Table- 1). There were 44% of samples found with 5–6 hours' sleep out of 8 hours, 42.5% were taking power naps or daytime sleep, and 32.9% were found with 1– 2 hours day time sleep (Table 2). Duration of sleep (Sleeping Habits), taking of power naps, daytime sleep duration did not show a significant (>0.05) association with perceived stress levels i-e The low stress 48.4% were found with 7–8 hours of sleep out of 8 hours, 35.7% where take power naps or daytime sleep, 30.2% were found with 1 -2 hours of daytime sleep. The moderate stress 43.7% were found with 7 – 8 hours of sleep out of 8 hours, 43.4% where take power naps or daytime sleep, 34% were found with 1 -2 hours of daytime sleep, whereas among the samples with high perceived stress 40.8% were found with 7–8 hours of sleep out of 8 hours, 46.8% where take power naps or daytime sleep, 33.8% were found with 1 -2 hours of daytime sleep (Table 3). The mean perceived stress did not show significant association (>0.05) with sleep duration (Sleeping Habits), taking of power naps, daytime sleep duration (Table 4).

Table 1: Descriptive Statistics of Quantitative Variables.

Characteristics	Mean, SD	N	%	Interpretation
SLEEP	10.74±4.03	18	3.7%	Good sleep
		471	96.3%	Poor sleep
PSS	21±10	126	25.8%	Low stress (0-13) level
		206	42.1%	Moderate stress (14-26) level
		157	32.1%	High level of stress (27-40)
BMI	15.53±3.5	389	79.6	Underweight
		82	16.8	Normal
		18	3.7	Overweight/ obese
Age	18±0.83			

Table 2: Descriptive statistics of Duration of sleep (Sleeping Habits).

Variables		N	%
For how many hours do you sleep out of 8 hours	3-4Hours	23	4.7
	5-6Hours	215	44.0
	7-8Hours	184	37.6
	8Above	67	13.7
Do you take power Naps or day time sleep	Yes	207	42.5
	No	280	57.5
If yes, How much?	10-30min	44	9.0
	1-2Hours	161	32.9
	3-4Hours	32	6.5
	4Above	4	0.8
	Not Applicable	248	50.7

Table-3: Association of Perceived Stress Levels with Duration of Sleep (Sleeping Habits)

Variables		Description in words						p-value
		Low Stress		Moderate		High perceived Stress		
		N	%	n	%	n	%	
For how many hours do you sleep out of 8	3-4Hours	5	4.0	9	4.4	9	5.7	0.27
	5-6Hours	61	48.4	90	43.7	64	40.8	
	7-8Hours	48	38.1	82	39.8	54	34.4	
	8Above	12	9.5	25	12.1	30	19.1	
Do you take power Naps or day time sleep	Yes	45	35.7	89	43.4	73	46.8	0.16
If yes, How much?	10-30min	10	7.9	17	8.3	17	10.8	0.63
	1-2Hours	38	30.2	70	34.0	53	33.8	
	3-4Hours	8	6.3	15	7.3	9	5.7	
	4Above	0	0.0	1	0.5	3	1.9	
	Not Applicable	70	55.6	103	50.0	75	47.8	

P-value <0.05 was considered statistically significant, P-value > 0.05 was considered statistically significant.

Table-4: Mean Comparison of PSS with Duration of Sleep (Sleeping Habits)

Factors		Perceived Stress Scores (PSS)		p-value
		Mean	SD	
For how many hours you sleep out of 8	3-4Hours	23	10	0.14
	5-6Hours	20	9	
	7-8Hours	20	10	
	8Above	22	10	
Do you take power Naps or day time sleep	Yes	21	10	0.21
If yes, How much?	10-30min	22	10	0.21
	1-2Hours	21	10	
	3-4Hours	21	9	
	4Above	31	4	
p<0.05 was considered statistically significant, p>0.05 was considered statistically non-significant				

DISCUSSION

The average age of participants was 18±0.83, which means this the age in which transition occurs between late adolescence and early adulthood. Sleep is considered as most important ailment for achieving wellbeing of human body including physical health, physiological health, psychological health, and social health. Sleep is a period of restoration, in which the human body starts repairing and/or replacing the tissue cells or cellular organelles for achieving the normal physiology or homeostasis of the body. The quality of sleep has two components, i.e., expressed quantitatively (duration of sleep), while qualitatively is subjective use of scale for assessing the depth of sleep and restfulness after awakening. The decrease in quality and duration of sleep are associated with increased unfavorable effects on human health[18]. The mean value of the Pittsburgh Sleep Quality Index score (PSQI) of sleep quality is (10.74±4.03) in our study findings, which means that a higher number of participants have poor sleep quality, like our results, a study conducted in Saudi Arabia showed mean values of poor sleep quality (9.5 ± 3.6)[18] [Table 1].

The quantitative assessment of sleep was done by assessing the duration of sleep, according to our study results showed 44% of participants have the habit of 5-6hours sleep out of 8 hours [Table 2]. The different studies were showing same duration of sleep, in the range from 5.2 h-6.4h[19,20].

A study also, were showing a higher percentage of 85-90% of participants belonged to the group using only five hours of sleep.[21] This indicates, that students are getting less duration of sleep, than the recommended duration of sleep i.e., about 7–8 hours. Sleep has an integral part in learning and memory processes, and its deprivation seriously affects these functions. Moreover, those students who are classified as “poor sleepers” are highly likely to cause serious health issues, like emotional disturbance (anger or distress or tension or depression, or confusion) than those who get a sufficient amount of sleep[14,18]. The perceived stress was 21±10 in our study participants, like our study results, mean values of stress in students were in Saudi Arabia (25±8.66 & 16.16±5.98) and Serbia (20.43± 7.67)[18,22,23]. The mean Body mass index (of 15.53±3.5 kg/m2) in our study participants, in contrast to our study findings, Indian study was having a mean Body mass index (BMI) (of 28.52±6.36 kg/m²) in an Indian study[24]. Thus in our study most students were underweight to normal weight, as opposed to Indian study (overweight and obese). The Duration of sleep (Sleeping Habits) did not show a significant (<0.05) association with perceived stress levels (mild, moderate, and severe) in participants of our study [Table 3]. In contrast to our study finding, the Korean study showed significant association in the study[25]. The mean perceived stress did not show significant association (>0.05) with sleep duration (Sleeping Habits), taking of power naps, daytime sleep duration [Table 4].

In contrast to our study finding, American study showed significant association in their study[26]. Distress is associated with disturbed sleep or poor sleep, or lack of sleep or insomnia, decreased duration of sleep and disturbed intake of diet that leads to development of altered behavior or anger or irritability, suicidal thoughts with attempts, and persistent headache[4,26]. For early prevention of these effects in adolescents or in students, the role of family, parents, teachers, and family friends is most important, as to diagnose early and/or for early cope up.

CONCLUSION

The sleep disturbances (poor sleep), stress (moderate to severe), body mass index (underweight) and decreased sleep duration in students will be responsible for the development of altered behavior or anger or irritability, suicidal thoughts with attempts.

Conflict of interest: None.

Authors contribution: SUA: write up and final approval, A**K:** acquisition of data, interpretation of data, **MS:** design, interpretation of data

Drgatiara: concept, analysis, **QAS:** design, analysis, **FAB:** concept, and design

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