Original Article

Long Working Hours and Short Sleep Associated with Obesity among Professional Drivers and Conductors

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Abstract

Background: The issues of long working hours and short sleep among professional drivers are increasing worldwide, making it necessary to study their health hazards. Obesity among professional drivers and conductors is becoming an equally challenge now a days. In the present study, we investigated the association between long working hours and short sleep with body mass index (BMI) among male drivers and conductors in the city of Multan, Pakistan.

Methods: The cross-sectional sample of 345 participants (197 drivers and 148 conductors) was taken using a convenient sampling technique with the help of a self-administered questionnaire. From the participants, the data were collected about their daily working hours, sleeping hours and working period. Anthropometric measurements (weight and height) of each participant were taken to calculate BMI. Along with descriptive statistics and percentages, Chi-square test was used to examine the association in the full sample and stratified by study participants (i.e. drivers and conductors).

Results: The mean (± standard deviation: SD) of age, BMI, daily working and sleeping hours of all the participants were32.98 ± 11.17 years, 24.35 ± 4.65 Kg/m^2, 9.32 ± 3.49 hours and 7.79 ± 1.69 hours, respectively. There were statistically significant association between the short sleep and long working hours with obesity (χ^2 = 17.37, p-value < 0.01 and χ^2 = 14.43, p-value 0.01, respectively).

Conclusion: The present study concludes that both short sleep and long working hours are significantly associated with obesity among professional drivers and conductors.

Key Words: Body mass index; drivers and conductors; obesity; short sleep, work hours.

Introduction

Obesity and overweight are well known health problems worldwide. Over the past few decades, evidence supporting the obesity prevalence across people of different age-group has grown alarmingly. In the research for defining the risk factors of overweight and obesity, inadequate physical activity and unhealthy dietary habits are found to be major contributors.[1,2]

Working hours and sleep duration have a trade-off relationship in various occupational groups. Adequate sleep and regular work schedule are more essential to promote the optimal health and well-being. In modern obesity pandemic, there is sound evidence that both sleeping and working disorder of people are more prone to emotional instability, cognitive dysfunction, decreased concentration, memory loss, and the most important problem of our concern here, is obesity.[3]

Globally, short sleep and long working hours both have now been bundled together everywhere. There is

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a colossal epidemiological literature available that has recognized short sleep (e.g. five to seven hours) and sleep disorders is greatly associated with body mass index (BMI) in child[4] and adult population[5-7] as well as in commercial vehicle drivers.[8,9] Perez-chada et al.,[10] also conducted a study on truck drivers and found that drivers having short sleep getting more likely to overweight and obesity.

Numerous research studies[11-13] also examined the role of work schedules and working hours on BMI and other health consequences. Escoto et al.,[14] reported a large sample study on metro transit workers in which they tried to elevate the issue of overweight and obesity with long work hours. Their findings showed that long work hours were associated with higher body mass in this occupation group. Di Lorenzo et al.,[15] confirmed that BMI was significantly greater among rotating shift workers compared to day shift workers. Thus, short sleep affects our health in a similar fashion as long working hours do.

Many professional transit workers i.e. drivers and conductors (driver's helper that collecting fares and selling tickets during traveling) also face a wide array of challenges as outlined above due to erratic work demands. Therefore, they can be more exposed to obesity and its consequences.

Although in Pakistan, the growing threat of overweight and obesity has been reported in several studies for general population.[16-18] but recently, Aslam et al.,[19] also presented the figures of overweight and obesity for professional drivers and conductors. However, they do not take different common covariates i.e. short sleep and long working hours responsible for obesity, into account. For studying the relationship between these covariates with BMI, the present study was planned. The main purpose of this study was to examine the association between short sleep and long working hours with obesity among drivers and conductors.

Materials and Methods

The present cross-sectional study was conducted in a central city Multan Pakistan. The sample size was calculated by using formula.[20]

$$n = \frac{Z^2_{1-\frac{\alpha}{2}} p(1-p)}{d^2}$$

, where p is the anticipated population proportion, $Z_{1-\frac{\alpha}{2}}$ is a two-tailed normal deviation and d is margin of error. Since, there was no previous study about the obesity prevalence among drivers and conductors in Pakistan, therefore, we used the obesity prevalence among drivers from a previous study of India.[21] With a confidence of 95% and margin of error of 5%, the sample size was computed to be 345.

A representative sample comprised of 345 professional participants aged 15 to 68 years, was collected using convenient sampling approach with the help ofa self-administered questionnaire. The questionnaire included information regarding age (years) of the participant; participant profession i.e. drivers or conductors; anthropometric characteristics i.e. height (in inches) and weight (in kg) taken with light clothing and without shoes; working characteristics i.e. daily working time (in hours) and working period (years) and sleeping characteristics i.e. daily sleeping hours and sleeping schedule (whether they sleep in night or day or day & night both). Drivers and conductors, working at vehicle as a profession, were included. Those having experience less than 1 year in this profession or did not give complete information, were not included in the study. Those who were not willing to participate in the study were also excluded. The data were collected from different local bus stands of Multan city.An oral informed consent was taken from each of the participant.

Definitions of normal and short sleep duration vary substantially across studies. Following the study of Moreno et al.,[22] we created three groups based on the daily sleep hours of the participant (< 8 hours/day, 8 hours/day, and > 8 hours/day). Daily working hours were also grouped into three categories (≤ 6 hours/day, 7 – 12 hours/day, and > 12 hours/day).

Adequate sleep is a crucial health indicator for the well-being of an individual. Normal (average) sleep duration has fallen from 8.5 hours per night in 1959[23, 24] to 7.3 hours per night in 2002.[25] Recent studies recommend that adults, aged 18 to 60 years, should sleep at least 7 hours each nightregularly to promote the optimal health.[26]

BMI of each participant was calculated as weight divided by height meter squared (Kg/m^2). Overweight and obesity of a participant was signified as (25 ≤ BMI < 30) and (BMI ≥ 30), respectively according to the standards established by the World Health Organization (WHO).[27] Frequency along with percentage, means and standard deviation were estimated for descriptive display, while the relationship between working, sleeping characteristics and BMI categories was determined by using the Chi-square test. The t-test and one-way ANOVA was used for mean comparison between-

groups where appropriate.A p-value < 0.10 (two-tailed) was considered to be significant. All the data analysis was performed using SPSS (version 19.0).

Results

In the present study, overall 345 professionals participated among whom 197 (57.1%) were drivers and 148 (42.9%) were conductors. The mean age (± s.d) of the total participants was 32.98 (± 11.17) years. The mean comparison of age between drivers (with mean 36.53 ± 10.46 years) and conductors (with mean 28.26 ± 10.34 years) was carried out with the t-test that indicated (with p< 0.01) that the drivers were relatively older as compared to the conductors. The percentages of overweight and obesity for the participants were 41.7% and 9.6%, respectively. The descriptive measures of the variables: daily working hours, working period (years), daily sleeping hours and BMI were 9.32 (± 3.49) hours, 11.84 (± 9.79) years, 7.79(± 1.69) hours and 24.35 (± 4.65) Kg/m^2, respectively.

Table 1 summarized the relationship between working characteristics and various BMI groups of all the participants. The results revealed that majority (72.75%) of the participants used to work 7 hours or more in a day and a higher proportion of these participants was reported to be overweight or obese than those whose working hours were 6 or less. The results from a series of the Chi-square tests indicated that the daily working hours and working period (years) were significantly associated with BMI (χ^2 = 17.37, p-value < 0.01 and χ^2 = 14.43, p-value < 0.01).

Mean BMI of all the participants was compared across various groups of daily working hours and working period (years). The results from a one-way ANOVA indicated that mean BMI was significantly (p < 0.10) higher for the participants with long working hours. Mean BMI was also significantly different for different categories of working period (years) and BMI increases as working period increases (Table 3).

Individual's sleeping hours were also observed in the present study. Out of 345, 140 (40.58%) of the total participants were having short sleep (i.e., less than 8 hours) per day. Overall 68 (19.7%) of these participants with short sleep (less than 8 hours) were reported to be overweight or obese (i.e. BMI ≥ 25). Whereas, 171 (49.56%) of the total participantsused to sleep at night time and 135 (39.13%) at both, day and nighttime. Moreover, the results after applying the Chi-square tests indicated that the daily sleeping hours and sleeping schedule were significantly associated with BMI categories (Table2).

Mean BMI of all the participants was also computed for the three groups of daily sleeping hours. After applying one-way ANOVA, the results indicated that the participant's group that used to sleep for less than 8 hours daily were having more BMI i.e. 24.91 ± 4.93 when compared with the other groups but the results werenot statistically significant (Table 3).

Table 1: *Association between various BMI (Kg/m^2) groups and working characteristics.*

Participant Distribution	Characteristics	Normal Weight (< 25) N (%)	Overweight (25-29.99) N (%)	Obese (≥ 30) N (%)
All Drivers (n = 197)	**Daily working hours**	68 (34.5)*	107 (54.3)*	22 (11.2)*
	6 hrs or less (n = 56)	23 (11.7)	30 (15.2)	03 (1.5)
	7 – 12 (n = 110)	31 (15.7)	67 (34.0)	12 (6.1)
	More than 12 (n = 31)	14 (7.1)	10 (5.1)	7 (3.6)
	Chi-Square = 11.97	d.f = 04	p-value = 0.01	
	Working period (yrs)			
	5 or less (n = 39)	21 (10.7)	17 (8.6)	01 (0.5)
	6 – 1 (n = 75)	20 (10.2)	45 (22.8)	10 (5.1)
	16 – 25 (n = 54)	15 (7.6)	33 (16.8)	06 (3.0)
	More than 25 (n = 29)	12 (6.1)	12 (6.1)	05 (2.5)
	Chi-Square = 13.15	d.f = 06	p-value = 0.04	

All Conductors (n = 148)	**Daily working hours**	100 (67.6)**	37 (25.0) **	11 (7.4)**
	6 hrs or less (n = 38)	27 (18.2)	09 (6.1)	02 (1.4)
	7 – 12 (n = 73)	47 (31.8)	21 (14.2)	05 (3.4)
	More than 12 (n = 37)	26 (17.6)	07 (4.7)	04 (2.7)
	Chi-Square = 2.04	d.f = 04	p-value = 0.72	
	Working period (yrs)			
	5 or less (n = 81)	61 (41.2)	12 (8.1)	08 (5.4)
	6 – 15 (n = 50)	30 (20.3)	17 (11.5)	03 (2.0)
	16 – 25 (n = 06)	00 (0)	06 (4.1)	00 (0)
	More than 25 (n = 11)	09 (6.1)	02 (1.4)	00 (0)
	Chi-Square = 26.26	d.f = 06	p-value = 0.00	
Total Participants (n = 345)	**Daily working hours**	168 (48.7)***	144 (41.7)***	33 (9.6)***
	6 hrs or less (n = 94)	50 (14.5)	39 (11.3)	05 (1.4)
	7 – 12 (n = 183)	78 (22.6)	88 (25.5)	17 (4.9)
	More than 12 (n = 68)	40 (11.6)	17 (4.9)	11 (3.2)
	Chi-Square = 14.43	d.f = 04	p-value = 0.00	
	Working period (yrs)			
	5 or less (n = 120)	82 (23.8)	29 (8.4)	09 (2.6)
	6 – 15 (n = 125)	50 (14.5)	62 (18.0)	13 (3.8)
	16 – 25 (n = 60)	15 (4.3)	39 (11.3)	06 (1.7)
	More than 25 (n = 40)	21 (6.1)	14 (4.1)	05 (1.4)
	Chi-Square = 38.42	d.f = 06	p-value = 0.00	

*(%) Percentage out of total (197): ** (%) Percentage out of total (148): ***(%)Percentage out of total (345)

Table 2: *Association between various BMI (kg/m^2) groups and sleeping characteristics.*

Participant Distribution	Characteristics	Normal Weight (< 25) N (%)	Overweight (25-29.99) N (%)	Obese (≥ 30) N (%)
All Drivers (n = 197)	**Daily sleeping hours**	68 (34.5)*	107 (54.3)*	22 (11.2)*
	Less than 8 hrs (n = 77)	32 (16.2)	32 (16.2)	13 (6.6)
	8 hrs (n = 59)	16 (8.1)	39 (19.8)	04 (2.0)
	More than 8 hrs (n = 61)	20 (10.2)	36 (18.3)	05 (2.5)
	Chi-Square = 9.91	d.f = 04	p-value = 0.04	
	Sleeping schedule			
	Daily in Night (n = 107)	34 (17.3)	55 (27.9)	18 (9.1)
	Daily in Day (n=07)	02 (1.0)	05 (2.5)	00 (0)
	Daily in Day & night (n = 83)	32 (16.2)	47 (23.9)	04 (2.0)

	Chi-Square = 8.16	d.f = 04	p-value = 0.08	
All Conductors (n = 148)	**Daily sleeping hours**	100 (67.6) **	37 (25.0)**	11 (7.4)**
	Less than 8 hrs (n = 63)	40 (27.0)	13 (8.8)	10 (6.8)
	8 hrs (n = 40)	30 (20.3)	10 (6.8)	00 (0)
	More than 8 hrs (n = 45)	30 (20.3)	14 (9.5)	01 (0.7)
	Chi-Square = 12.29	d.f = 04	p-value = 0.01	
	Sleeping schedule			
	Daily in Night (n = 64)	42 (28.4)	19 (12.8)	03 (2.0)
	Daily in Day (n = 32)	22 (14.9)	04 (2.7)	06 (4.1)
	Daily in Day & night (n = 52)	36 (24.3)	14 (9.5)	02 (1.4)
	Chi-Square = 9.76	d.f = 04	p-value = 0.04	
Total Participants (n = 345)	**Daily sleeping hours**	168 (48.7)***	144 (41.7)***	33 (9.6)***
	Less than 8 hrs (n = 140)	72 (20.9)	45 (13.0)	23 (6.7)
	8 hrs (n = 99)	46 (13.3)	49 (14.2)	04 (1.2)
	More than 8 hrs (n = 106)	50 (14.5)	50 (14.5)	06 (1.7)
	Chi-Square = 17.37	d.f = 04	p-value = 0.00	
	Sleeping schedule			
	Daily in Night (n = 171)	76 (22.0)	74 (21.4)	21 (6.1)
	Daily in Day (n = 39)	24 (7.0)	09 (2.6)	06 (1.7)
	Daily in Day & night (n = 135)	68 (19.7)	61 (17.7)	06 (1.7)
	Chi-Square = 12.16	d.f = 04	p-value = 0.01	

*(%) Percentage out of total (197): ** (%) Percentage out of total (148): ***(%)Percentage out of total (345)

Table 3: *Mean comparison of BMI of all participants according to various groups of working and sleeping characteristics.*

Daily working hours	**6 hrs or Less (n = 94)**	**7 – 12 hrs (n = 183)**	**More than 12hrs (n = 68)**		**Total Participants (n = 345)**	**p-value**
	23.51 ± 4.50	24.88 ± 4.33	24.07 ± 5.48		24.35 ± 4.65	0.059
Working period (yrs)	5 or less (n = 120)	6 – 15 (n = 125)	16 – 25 (n = 60)	More than 25 (n=40)	Total Participants (n = 345)	
	22.74 ± 4.68	24.95 ± 4.44	25.94 ± 4.56	24.90±4.02	24.35 ± 4.65	0.000
Daily sleeping hours	Less than 8hrs (n = 140)	8 hrs (n = 99)	More than 8hrs (n = 106)		Total Participants (n = 345)	
	24.91 ± 4.93	23.99 ± 4.38	23.94 ± 4.46		24.35 ± 4.65	0.183

Discussion

Adequate sleep, scheduled working hours and light to moderate exercise all make up healthy habits for all professionals workers. Undesirably in Pakistan, these habits are not veryfrequent among transit professionals i.e. drivers and conductors, because of laborious and

erratic working schedule. Furthermore, here it is not common practice to study the relationship between short sleep and working hours with obesity for some particular community. Thus, we will try to compare our results with foreign research.

In the present study, we investigated the association between short sleep and long working hourswith overweightor obesityof 345 male drivers and conductors. In this occupational group, the prevalence of overweight and obesity was 41.7% and 9.6%, respectively. These findings pointed out that overweight or obesity is common among professional drivers and conductors and the results are consistent with a previous reported study[21] of drivers and conductors aged 25 – 57 years in an Indian city, Belgaum. This study[21] showed that 43.3% of drivers and 28.1% of conductors were either obese or overweight. In another study[28] conducted in Taiwan, the prevalence of obesity was 9.6% among the urban bus drivers which is quite less when compared with the present study. The possible reason for this difference might be reasonable scheduled working hours and health awareness. However, the stated study[28] also observed an increased prevalence of obesity among bus drivers than other skilled workers.

Ko et al.[29] reported a large sample study of the Hong Kong Chinese working population having different occupation in which they found that there was significant association between BMI and short sleep in men. Similarly, Moreno et al.[22] reported a large sample study of truck drivers on irregular work schedule and confirmed the short sleepto be associated with obesity. The findings of the present study also showed the rise in overweight or obesity associated with the reduction in sleep time. In our data set, BMI was also significantly associated with short sleep for all the participants. Furthermore, average BMI for all participants with sleep hours less than 8, was higher than that of the sleep hours more than 8 hours (i.e. 24.91 vs. 23.94 Kg/m^2). The present figures were in accordance with the previous studies[29,30] in the literature and were in favor of a link between short sleep and obesity.

Lack of leisure time physical activity and a sedentary occupation may be othergrowingrisk factors of obesity for transit professionals.In the further analysis, our study results also revealed that long working hours and working period bothwere an important associated factors of obesity. Additionally, the respondents with long working hours (i.e. more than 7 hoursin a day) had more mean BMI as compared to those with short working hours. These results were consistent with those reported in an earlier study[23] of different occupations.

The present studies has certain limitations. For instance, some potential confounders like physical activity, marital status, eating habits and age etc. have not been addressed.

Conclusion

In conclusion, the present study confirmsthat obesity is associated with longer working hours and short sleep duration among professional drivers and conductors. The findings suggest that these professionals especially drivers, who continuously keep on sitting on driving seatshould be very careful about their working and sleeping hours which may cause to have undesired weight gain. Furthermore, some awareness program should also be launched for these professionals to promote lifestyle changes and to reduce the prevalence of obesity.

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