ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 8, Dec 2022

Gender Wise Comparison Of Sitting Time And Sleep Pattern Of Obese Individuals From A Cross Sectional Study Conducted At South Kerala, India

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ABSTRACT

Introduction: Obesity is a global pandemic and south Asians are especially victims of developing unhealthy body composition. Sleep deprivation and prolonged sitting are two contributors for developing fat deposition and metabolic syndrome. The present study was conducted with an objective to analyse the between gender difference in sitting time and sleep quality of respondents with overweight and obesity. **Methodology:** This was a cross sectional survey conducted as part of research on obesity from 2015-2018 at Thiruvananthapuram, Kerala. The criteria for inclusion in the study were overweight and obese adults aged 18-65 years from both genders. Respondents who were underweight and those suffering from diseases requiring strict food restrictions were excluded from the study. A structured questionnaire was used to collect data on demographic pattern, anthropometric profile, sitting time in hours and sleep pattern. **Results:** The data of about 500 respondents were collected for the study including 217 male and 283 female respondents. Both genders shared similar age distribution (46.34±11.37 years in males vs 46.07±11.37 years in females) and demographic profile. Anthropometric profile exhibited an unhealthy body fat percentage in both the genders. Males and females had moderate sitting habits and males on average were seated more by 1.85 hours than females. The sleep duration was satisfactory for both the genders but the sleep quality was poor. Comparatively the sleep quality of males were poorer than females. **Conclusion:** The body fat percentage was unhealthy in the respondents with overweight and obesity and the detrimental influence of sitting time and sleep quality was more vivid in the case of males.

Key Words: Over weight, Obesity, Sitting time, Sleep pattern

INTRODUCTION

Obesity is a global pandemic and south Asians are especially victims of developing unhealthy body composition. Sleep deprivation and prolonged sitting are two contributors for developing fat deposition and metabolic syndrome. Johnson et al in 2019 opined on reviewing sleep studies that there are clearly racial/ethnic disparities in sleep health that persist after adjustment for demographic, behavioural, clinical, and SES factors. A Canadian general population cohort study conducted by Singh et al in 2020 revealed that differences in sleep duration, especially short

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sleep, were highly correlated with an increased risk of poor health outcomes, and may contribute to observed health disparities amongst ethnic groups. Ong et al in 2021 proposed that the association between snoring and type 2 diabetes appeared to be modified by ethnicity, and was strongest in South-Asians. The present study was conducted with an objective to analyse the between gender difference in sitting time and sleep quality of respondents with overweight and obesity.

Methodology

This was a cross sectional survey conducted as part of research on obesity from 2015-2018 at Thiruvananthapuram, Kerala. Data was collected from two hospitals in Trivandrum- one inpatient centre and one outpatient centre. Patient consent was obtained before collecting data. The criteria for inclusion in the study were overweight and obese adults aged 18-65 years from both genders. The BMI range considered were from 23.0 Kg/m^2 to 50 Kg/m^2 corresponding to the 2004 WHO recommendations for classifying overweight and obesity for South Asians. Respondents who were underweight and those suffering from diseases requiring strict food restrictions were excluded from the study.

Tools for the study

A structured questionnaire was used to collect data on demographic pattern, anthropometric profile, sitting time in hours and sleep pattern. The height or stretch stature is the maximum distance from floor to the vertex of the head, when the head is held in the Frankfort Plane and a gentle traction is applied. Bodyweight is the force of gravity acting on the mass of the body when the subject stands in the center of the scale platform in minimal clothing, usually measured to the nearest tenth of a kilogram. Waist girth is the perimeter at the level of the noticeable waist narrowing located approximately half way between the costal border and iliac crest. Gluteal girth (hip) is the perimeter at the level of the greatest posterior protuberance and at approximately the symphysion pubis level anteriorly. Waist to Hip ratio is calculated by dividing waist circumference by hip circumference. Body Mass Index is a measure of fatness and it is a weight per unit of height expression and reflects body build and body composition. Body fat percentage, visceral fat percentage, metabolic age, basal metabolic rate, and muscle mass was obtained using bioelectrical impedance (Kinanthopometry and Exercise Physiology Manual, 2009). Sleep duration and quality was derived using objective questions. Sitting time in hours was found out from the time spend in hours before television, using mobile, playing sedentary games, using computer and reading. Sitting time in hours can be grouped into low (0-4 hours), moderate (5-7 hours) and high (≥ 8 hours) Thorp et al (2011).

Statistical analysis

The assimilated data was tabulated and analysed. Mean distribution was the statistical tool used to analyse the data. Gender wise difference was investigated.

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Results and Discussions

The data of about 500 respondents were collected for the study including 217 male and 283 female respondents. Table 1 describes basic demographic profile of the respondents.

Table 1. Demographic profile of the Respondents

Parameters	Variables	Males (n=217)	Females (n=283)
Age in years	Range	18-65	20-65
	Mean ± SD	46.34±11.37	46.07±11.37
Education level (in percentage)	Illiterate	0.5%	1.8%
	Primary school	0.5%	3.5%
	Middle school	7.4%	8.8%
	High school	34.5%	29.3%
	Higher secondary	18.9%	21.9%
	Graduate or post graduate	20.7%	20.9%
	Profession/Honors	17.5%	13.8%
Activity level (In percentage)	Sedentary	65.4%	65.4%
	Moderate	30.4%	34.6%
	Heavy	4.2%	-

Both genders shared similar age distribution (46.34±11.37 years in males vs 46.07±11.37 years in females) and about a third of each gender was educated up to high school level (34.5% of males and 29.3% females). Among both the genders 65.4% each were sedentary. Thus it is clear that both the genders shared similar demographic pattern. A 2007 study conducted by Singh, et al in 5 cities of India had revealed that the prevalence of obesity and sedentary behaviour was significantly greater in Trivandrum, Calcutta and Bombay compared to Nagpur and Moradabad. The next table 2 throws light on the anthropometric profile of the respondents.

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Table 2. Anthropometric Profile of the Respondents

Parameters	Males (n=217)		Females (n=283)		Total (n=500)	
	Range	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD
Weight in Kg	60.4-149	85.53±16.13	47.4-123.6	76.52±14.49	47.4-149	80.43±15.86
BMI in Kg/m^2	23.2-48	29.59±4.78	23.0-49.9	31.59±5.28	23.0-49.9	30.73±5.16
Body fat percentage	13.2-45	29.88±5.24	25.6->50	39.37±4.82	13.2->50	35.38±6.51
Visceral fat percentage	8-33	16.19±5.40	4->30	15.25±6.49	4->30	15.66±6.06
Metabolic age in years	34-80	57.58±8.62	30-80	63.28±10.06	30-80	60.83±9.88
BMR	1278-2564	1781.66±222.19	1058-2112	1471.63±197.76	1058-2564	1604.88±258.99
Muscle mass in percentage	14-38.5	25.06±5.39	12-29	20.94±3.47	12-38.5	22.78±4.89
Waist circumference in cm	85-141	103.41±10.84	79-137	101.85±11.12	79-141	102.53±11.02
Hip Circumference in cm	91-155	108.21±10.06	88-150	113.37±11.35	88-155	111.13±11.11
Waist to Hip ratio	0.86-1.04	0.95±0.02	0.82-1.1	0.89±0.02	0.82-1.1	0.92±0.02

The mean distribution of BMI clearly gives the picture of obese group rather than an overweight group. The normal range of body fat percentage for males is 8.0-24.9%, considering all age groups together and the mean value places the respondents in the very high fat percentage group. Similarly for females the normal body fat percentage range is 21.0-35.9% and the mean fat percentage is visibly very high. Visceral fat percentage of 0 to 9 % is considered normal, 10-14% as high and 15-30% as very high. The mean value in both the genders are falling in the high visceral fat range. The metabolic age, Basal metabolic rate and muscle mass also produced the picture of an unhealthy population.

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The waist circumference is a traditional parameter for measuring abdominal obesity and a reliable predictor of metabolic syndrome. Waist circumference value of 78 cm for men and 72 cm for women is considered normal, whereas more than 90cm for men and more than 80 cm for women is considered high risk. In both genders, the lowest value itself is falling above normal cut off and the mean values are beyond the high risk cut off. So the increase in waist circumference is more prominent than increase in weight. When the Waist to Hip ratio (WHR) is considered, a value below 1.0 is considered normal for men and value below 0.85 normal for women. If only WHR was considered for the analysis, the exact magnitude of abdominal obesity would have gone un-noticed.

If long time is spend seated that may be detrimental to health and the risk associated is often compared with the damage caused by smoking. Next table 3 depicts the gender wise comparison of sitting time.

Table 3. Gender wise comparison of Sitting time in hours

Parameters	**Variables**	**Males (n=217)**	**Females (n=283)**
Watching television	Range	0-6	0-8
	Mean	1.37±1.26	1.71±1.46
Playing sedentary games	Range	0-5	0-2
	Mean	0.12±0.49	0.04±0.19
Using computer	Range	0-8	0-9
	Mean	1.38±2.40	0.58±1.68
Using mobile phone	Range	0-4	0-8
	Mean	0.99±0.89	0.72±0.93
Reading	Range	0-4	0-6
	Mean	0.53±0.65	0.89±0.88
Total Sitting time	**Range**	**0-19.5**	**0-16.5**
	Mean	**4.73±3.71**	**3.94±2.65**

The analysis of sitting time indicated that males remain seated more than females by 1.85 hours on average. In the case of male respondents television and computer are the main contributors in the sitting time and the mean sitting time corresponds to moderate sitting behaviour. For female respondents, time spent before television is the most

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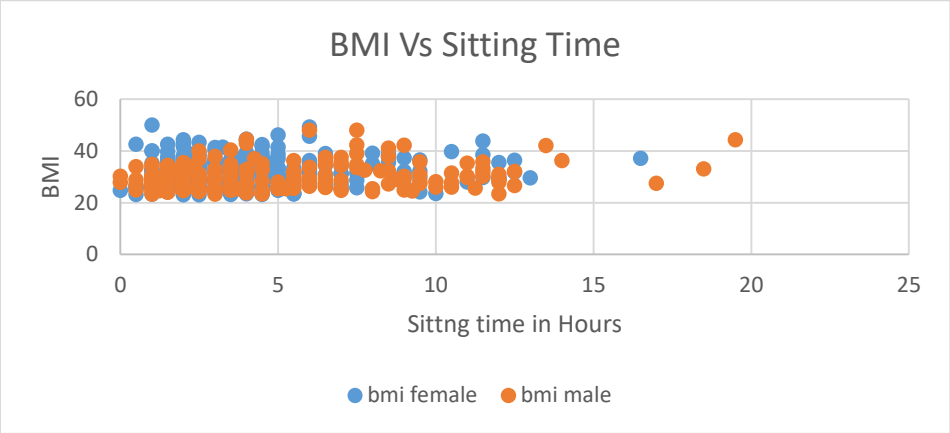
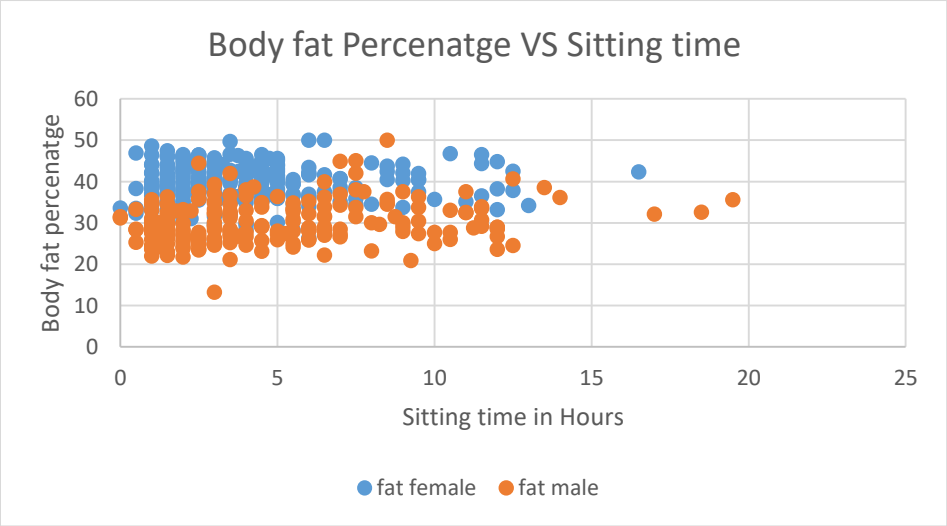
contributing component of sitting time and reading was second. On average, female respondents can also be considered in the moderate sitting group, though lesser than males.

An attempt was made to analyse the relation between BMI, Body fat percentage, visceral fat percentage, and waist circumference to the sitting time. The obtained results are represented as plots.

Plot 1. Distribution of anthropometric parameters against sitting time





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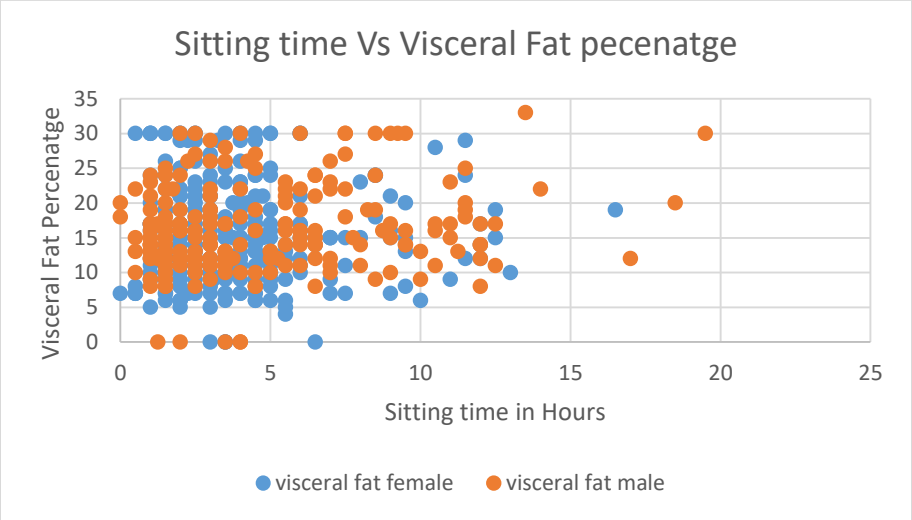

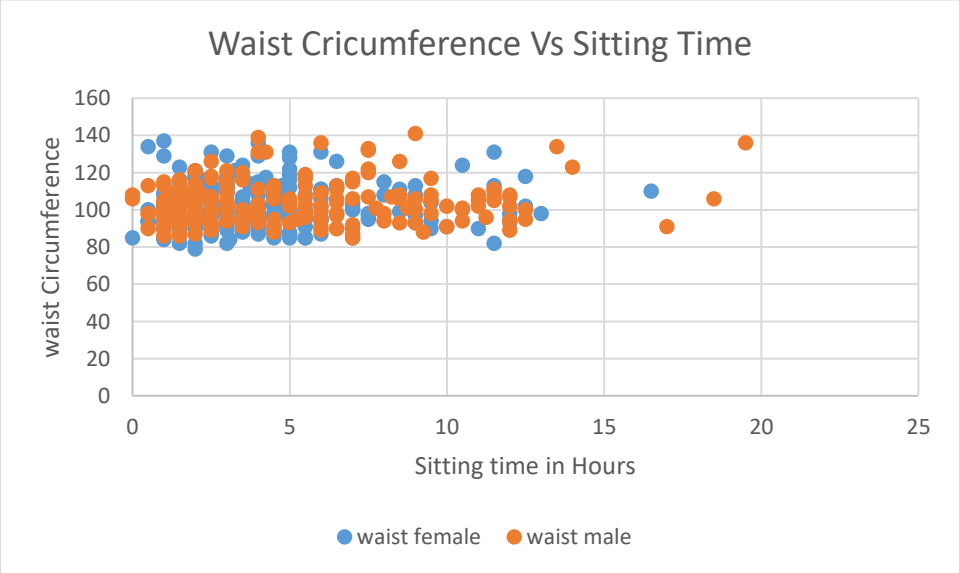

On examining the plots, it can be understood that the anthropometric parameters are not linearly related to the sitting time. As more respondents were in the low to medium sitting group, more values were scattered within this range. Notably, moderate to higher sitting time individuals had high body fat percentage, visceral fat percentage and waist circumference. Few of the lower sitting time individuals had near normal BMI, body fat percentage, visceral fat percentage and waist circumference. This relation was more vivid in the case of males. Though the sitting time is not linearly related to anthropometric domains, there exists some degree of relation.

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According to Buman et al (2015), sitting while watching television was associated with relatively poor sleep quality and OSA risk and may be an important risk factor for sleep disturbance and apnea risk. Prolonged sitting time and decreased physical activity level were positively associated with the prevalence of NAFLD in a large sample of middle-aged Koreans (Ryu et al, 2015). Similarly, Chair et al (2017) observed that poor sleep quality might increase the CVD risk in post-menopausal Chinese women. A Japanese study by Katagiri et al (2014) in middle aged female workers revealed that low intake of vegetables and fish, high intake of confectionary and noodles and unhealthy eating habits were independently associated with poor sleep quality.

Sound sleep for 6-8 hours is essential for good health. Obesity can affect breathing pathways and the incidence of sleep disturbances and sleep apnoea could be more. Lack of adequate sleep and disturbances in circadian rhythm is often thought as a contributing factor in weight gain. The sleep history of the respondents was evaluated to find out whether their sleep pattern was healthy.

Waking and sleeping are actively generated by neuronal systems distributed through the brainstem and forebrain with different projections, discharge patterns, neurotransmitters, and receptors. Specific ascending systems stimulate cortical activation, characterized by fast, particularly gamma, activity which occurs during waking and REM sleep (Jones, 2011). Sleep deprivation decreases insulin sensitivity without adequate compensation in beta cell function resulting in impaired glucose tolerance. Lack of sleep down regulates satiety hormone Leptin and up regulates appetite stimulating hormone Ghrelin, thereby increasing hunger and food intake. (Morselli, et al 2010). Shivashankar, et al (2017) studied the relation of sleep duration with hypertension in south Asians and concluded that self-reported snoring and insomnia were associated with hypertension in South Asia. Priyanka, et al (2022) studied the eating pattern, physical activity and sleep quality of night shift workers and observed that their diet pattern and sleep quality were poor.

Table 4. Gender wise comparison of Sleep history of the Respondents

Parameters	**Variables**	**Males (n=217)**	**Females (n=283)**
Sleep Duration in hours	Range	2.5-12.5	4-11.5
	Mean	7.34±1.34	7.40±1.29
Sleep Duration Breakup	Less than 6 hours	8.3%	9.5%
	6-8 hours	70%	67.8%
	>8 hours	21.7%	22.7%
Sleep Initiation	8.00 pm-9.30 pm	9.2%	6%

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time pattern	10.00 pm -10.30 pm	38.7%	42%
	11.00 pm – 11.30 pm	36.4%	40.6%
	12.00 mn and later	15.7%	11.4%
Sleep pattern	Sound and Refreshing	74.7%	65.7%
	Sound and Non Refreshing	1.4%	1.8%
	Disturbed and Non Refreshing	23.9%	32.5%

The sleep duration was calculated by adding night hours that they slept and day naps in hours. About half of the respondents had the habit of napping in the day (43.8% males and 45.6% females). In both genders sleep duration was from 6-8 hours in most respondents (70% males and 67.8% females) and the mean value also reflected the same. Notably, one fifth from each gender (21.7% males and 22.7% females) had longer sleep duration of greater than 8 hours and few respondents had highly inadequate sleep duration of less than 6 hours. In both the extreme ends, male respondents were more than females. A good proportion of respondents (74.7% males and 65.7% females) reported they have a sound and refreshing sleep. But a significant proportion of 23.9% male and 32.5% female respondents had disturbed and Non refreshing sleep. Though many reported that they have sound sleep, 82.5% males and 61.5% females had the habit of snoring. This analysis reveals that though the sleep duration was satisfactory, the sleep quality was poor for the respondents. Comparatively the sleep quality of males were poorer than females.

Summary

This study revealed that overweight and obese males and females shared similar demographic pattern and the pattern of body fat percentage distribution was unhealthy. Though the anthropometric profile did not have a linear relation with sitting time, moderate to higher sitting time individuals had high body fat percentage, visceral fat percentage and waist circumference more in the case of males. Though the sleep duration was satisfactory, the sleep quality was poor for the respondents. Comparatively the sleep quality of males were poorer.

CONCLUSION

The body fat percentage was unhealthy in the respondents with overweight and obesity and the detrimental influence of sitting time and sleep quality was more vivid in the case of males.

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REFERENCE

1. Buman, M.P., Kline, C.E., Youngstedt, S.D., Philips, B., deMello, M.T., and Hirshkowitz, M. 2015. Sitting and Television Viewing: Novel Risk Factors for Sleep Disturbance and Apnea Risk? Results from the 2013 National Sleep Foundation *Sleep in America* Poll. Chest, 2015; 147(3):728-734.
2. Chair, S.K., Wang, Q., Cheng, H.Y., Lo, S,W-S., Li, X.M., Wong, E.M-L., and Sit, J.W-H.2017. Relationship between sleep quality and cardiovascular disease risk in Chinese post-menopausal women. BMC Women's Health (2017) 17:79 DOI 10.1186/s12905-017-0436-5.
3. Jones, B.E. 2011. Neurobiology of waking and sleeping. Handb Clin Neurol. 2011 ; 98: 131–149. doi:10.1016/B978-0-444-52006-7.00009-5.
4. Katagiri, R., Asakura, K., Kobayashi, S., Suga, H., Sasaki, S., and the Three-generation Study of Women on Diets and Health Study Group. 2014. Low Intake of Vegetables, High Intake of Confectionary, and Unhealthy Eating Habits are Associated with Poor Sleep Quality among Middle-aged Female Japanese Workers. J Occup Health 2014; 56: 359–368.
5. Kinanthropometry and Exercise Physiology Laboratory Manual – Tests, Procedures and Data. Volume 1: Anthropometry. 3rd Edition. Edited by Roger Eston and Thomas Reilly.2009. pp- 16,18,21,23,46,47,56.
6. Morselli, L., Leproult, R., Balbo, M., and Spiegel, K. 2010. Role of sleep duration in the regulation of glucose metabolism and appetite. Best Pract Res Clin Endocrinol Metab. 2010; 24(5): 687–702. doi:10.1016/j.beem.2010.07.005.
7. Ong, Z.L., Chaturvedi , N., Tillin, T., Dale, C., and Garfield, V. 2021. Association between sleep quality and type 2 diabetes at 20-year follow-up in the Southall and Brent REvisited (SABRE) cohort: a triethnic analysis. J Epidemiol Community Health 2021;75:1117–1122. doi:10.1136/jech-2020-215796.
8. Priyanka, Rakhra, G., and Rakhra, G. 2022. Changes in Eating Pattern, Physical Activity and Sleep Quality among Night Shift Workers. Int J Food Nutr Sci 2022;11:13-20.
9. Ryu, S., Chang, Y., Jung, H-S., Yun, K.E., Kwon, M-J., Choi, Y., Kim,C-W., Cho, J., Suh, B-S., Cho, Y.K., Chung, E.C., Shin, H., and Kim, Y.S. 2015. Relationship of sitting time and physical activity with non-alcoholic fatty liver disease. Journal of Hepatology 2015; 63(5):1229-1237.
10. Shivashankar, R., Kondal, D., Ali, M.K., Gupta, R., Pradeepa, R.G., Mohan, V.,Kadir, M.M., Narayan, K.M.V., Tandon, N., Dorairaj, P., and Peasy, A. 2017. Associations of Sleep Duration and Disturbances With Hypertension in Metropolitan Cities of Delhi, Chennai, and Karachi in South Asia: Cross-Sectional Analysis of the CARRS Study. Sleep. 40. 10.1093/sleep/zsx119.
11. Singh, M., Hall, K.A., Reynolds, A., Palmer, L.L., and Mukherjee, S. 2020. "The Relationship of Sleep Duration with Ethnicity and Chronic Disease in a Canadian General Population Cohort". Nature and Science of Sleep 2020:12 239–251. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7167267/pdf/nss-12-239.pdf.

ISSN PRINT 2319 1775 Online 2320 7876

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12. Singh, R.B., Pella, D., Mechirova, V., Kartikey, K., Demeester, F., Tomar, R.S., et al. 2007. Prevalence of obesity, physical inactivity and undernutrition, a triple burden of diseases during transition in a developing economy. The Five City Study Group. Acta Cardiologica, 2007; 62(2):119-127.
13. Thorp, A.A., Owen, L., Neuhaus, M., and Dunstan D.W. 2011. Sedentary behaviours and subsequent health outcomes in adults a systematic review of longitudinal studies, 1996-2011. *Am J Prev Med* . 2011;41(2):207-15. doi: 10.1016/j.amepre.2011.05.004
14. WHO 2004. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *Lancet*. 2004;363(9403):157-63. doi: 10.1016/S0140-6736(03)15268-3.
15. Johnson, D.A., Jackson, C.L., Williams, N.J., and Alcántara, C. 2019. Are sleep patterns influenced by race/ethnicity – a marker of relative advantage or disadvantage? Evidence to date. Nature and Science of Sleep 2019:11 79–95. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6664254/pdf/nss-11-79.pdf.