Binge eating and sitting behavior as a risk cluster in obesity among software employees

Yenuganti VV[1], Sivakumar RK[1], Darimisetty SR[2], P J S[4]

[1] Department of Community Medicine, Chettinad Hospital & Research Institute, Chennai, India. [2] Department of Community Medicine, Anantapur Government Medical College, Anantapur, India, [3] Department of Community Medicine, Narayana Medical College, Nellore, India

ABSTRACT

Introduction: Binge eating disorder (BED) was underdiagnosed, underestimated eating disorder known to be responsible for obesity in both children and adults. Sedentary behavior estimated by measuring the sitting time was one of the major contributing factors in the development of metabolic syndrome in adults. People working in Information Technology (IT) sector possess both of these determinants in a significant capacity and thereby might be at risk for obesity, which in turn can be responsible for various cardio-metabolic events in their life.

Methods: A cross-sectional study was conducted on 513 working adults belonging to the IT sector, using a face-to-face interview with a pre-tested questionnaire along with anthropometric measurements to measure BMI for obesity. Binge-eating disorder screener-7 for adults was adopted to assess the disorder, and the Marshall Sitting Questionnaire was used to evaluate their sitting behavior.

Results: The study found that the prevalence of BED (23%) was higher in unmarried individuals, and moderate BED is significantly associated with higher BMI among them. Conversely, sitting time (Mean=8.83 hours/day) was seen mostly in unmarried adults, and is also associated with higher BMI. As a risk cluster, both BED and sitting time combined had higher odds of resulting in Obesity than existing separately.

Conclusion: Several lifestyle factors such as binge-watching TV, late working hours, higher salaries, etc., have contributed to developing Binge eating disorder and higher sitting time, which pose a significant risk for metabolic disorders like obesity.

Key words: Binge-eating disorder, BMI, Obesity, Risk cluster, Sedentary, Sitting behavior

Introduction

Binge Eating Disorder (BED) is classified by the Diagnostic Statistics Manual- Version 5 (DSM-5) as the recurrent, periodic, and uncontrolled consumption of large quantities of food without compensatory behaviors (e.g., purging, laxative use) to control weight.[1] Associated features include eating until uncomfortably full, eating even though not hungry, eating alone and associated psychopathology having feelings of depression, guilt, or personality disorders.

Even though BED is more commonly seen compared with other eating disorders, there is limited understanding of BED by physicians, and the lack of established physician-patient communication regarding BED may result in its underdiagnosis. Obese persons with BED have compromised functioning mostly in psycho-social aspects of Health-Related Quality of Life (HRQoL) as poor physical functioning is related to obesity.[2]

Corresponding Author

Dr. Rajesh Kannan Sivakumar,
Associate Professor, Department of Community Medicine,
Chettinad Hospital & Research Institute, Chennai, India.
Tel. : 9003067846
E-mail: drkannan121@gmail.com
ORCID ID: https://orcid.org/0000-0002-4014-8400

BED is most commonly seen in students and also in working teenagers, who were employed at a very young age, typically seen in Information Technology (IT sector). Software employees, either due to their working hours until midnight or working from home during the pandemic, would fall prey to eating disorders from the stress of their working conditions. Binge eating was also found to be associated with Binge-watching TV, as "Eating for pleasure, Not for hunger" is a condition commonly seen in this population. In a study conducted in the US, there were 1.2 times higher odds of developing BED in children with more screen time.[3] All these factors are predominantly found in software employees, whose lifestyle poses a significant risk in the development of obesity.

Studies have shown that a higher prevalence of BED was seen in overweight and obese individuals, and also that in the presence of BED, obesity-related psychopathology was found in them.[4] There is a positive relationship between BED levels and obesity. When obese people with BED and without BED were compared, it was shown that obesity in BED started at earlier ages, and weight changes and seeking treatment were more.[5]

Sedentary behavior or sitting behavior, defined as participation in non-physical activities that do not require significant energy expenditure above that required for rest or for sedentary activities such as sitting, lying down, watching television, reading books, and using computers; which have recently been identified as an underestimated public health issue.[2,6]

In addition, several epidemiologic studies have suggested a relationship between sedentary behavior, and adverse health outcomes such as obesity, diabetes, insulin resistance, Metabolic Syndrome (MS), cardiovascular diseases, cancer, and death.[6] Currently, working adults spend approximately one-third to a half of their workday in a seated position and spend hours of leisure time on activities such as watching TV, using computers, participating in screen-based recreation, and driving.[7-9] Previous studies conducted in 20 countries worldwide found that all participants except those in Africa sat for 5.8 h/day, adults in the USA were sedentary for 7.3–7.9 h/ day, and in Australia, adults spend 57% of their waking time in the workplace by being physically inactive.[10]

As a risk cluster, it was known that sedentary behavior which meant doing activities with very low energy expenditure (1.0–1.8 metabolic equivalents), was performed mainly in a sitting or supine position. It was found to be associated with the consumption of unhealthy foods in youth and was linked to an increase in obesity as well as to a higher probability of developing chronic diseases.[11]

So, it was deduced that sitting behavior combined with eating disorders, can have an exaggerated effect on the development of obesity. This study was planned on software employees, who are more prone to developing these risk factors, owing to their lifestyle.

Methods

This is a cross-sectional study conducted on the software employees of Chennai, to understand the impact of binge-eating and sedentary lifestyles on obesity among working adults. The sample size was calculated to be 513, using Cochran's formula, by taking maximum variance in the subjects, which is 50%, at 95% confidence levels, and a margin of error of 5%. A list of all software companies in the Chennai region, employing more than a hundred people was prepared and then using the random number table, eleven companies were selected randomly. The Project team contacted the Human Resource Person (HR) of the selected companies and collected the list of the employees in the company. Fifty employees from each company were selected randomly until we reached the desired number, and then the employees were contacted for a face-to-face interview. People who were not willing to participate, or who gave incomplete interviews were excluded from the final sample.

Demographic information was assessed through 8 items and included information on gender, age, marital status, designation, postcode, the highest level of education, height, and weight, which was converted into body mass index (BMI) using standardized equations. BMI was classified according to World Health Organisation- Asia pacific classifications to differentiate normal-weight individuals from overweight and obese individuals.[8] Data collection was done for two months, by visiting eleven different companies located in the Chennai region.

Binge eating disorder was assessed using a slightly modified version of Binge eating disorder Screener-7 for adults, developed by the American Psychiatric Association.[12] The 7-point scale has a two-factor structure, and the factors related to (1) behavioral

manifestations (including factors such as eating large amounts of food), and (2) feelings and cognitions (eight items) surrounding a binge eating episode including guilt, fear of not being able to stop eating, and preoccupation with eating. Based on the overall score(1-25), BED was classified into No disorder (1-5), Mild disorder,(6-10) Moderate disorder(11-15), Severe disorder(16-20), and Extreme disorder (21-25).

Marshall Sitting Questionnaire (MSQ), modified by simplifying a 16-item Workforce Sitting Questionnaire, was adapted to identify the pattern of Sitting behavior among the study participants. Originally, the questionnaire, which was intended to assess sedentary behavior in the workplace, has been modified to include sedentary activities at home. The MSQ was validated as an alternate tool for measuring domain-specific and total sitting behavior by many studies.[13] The questionnaire obtained data on time spent sitting on weekdays and weekend days: 1) traveling to and from places, 2) at work, 3) watching television, 4) using a computer at home, and 5) for leisure, not including television. Sitting time was calculated for each of the domains, and total sitting time was used to cluster the risk factors for Binge eating.

The data collection process involved face-to-face interviews of the study participants for collecting the questionnaire data, and then anthropometric measurements were taken to evaluate obesity. This involves minimal risk to the study participants, and informed consent was taken before enrollment into the study. Data analysis was done using SPSS version 23. Measures of association to understand the impact of various factors on the occurrence of Obesity and the relationships with other covariates were done using appropriate statistical methods.

Results

Of the 513 respondents of the study, 270 were males and 243 were females. Most of the respondents were doing entry-level jobs in software companies, which is coinciding with the fact that most of the participants were unmarried at the time of the study.

The mean age of the participants is 29.5, with a standard deviation of 3.4.

The prevalence of BED in the current study was 23% (95% CI 21.6, 25.7) (n=118), and was equally distributed in both sexes without any significant association. Most of the respondents with BED have shown moderate BED (39.8%), whereas extreme BED was seen in only 10% of them. Of the respondents having binge eating disorders, 47% (n=55) felt guilty or disgusted with themselves about their uncontrolled eating habits, and 34% (n=40) continued eating even when they had finished a meal. The study also reported that only a few of the respondents (n=4) made themselves vomit to control their weight, showing us that BED is distinct from other eating disorders like bulimia.

Further results have indicated a significant association (p=0.001) between Marital status and BED, with unmarried individuals having more risk of developing BED than married individuals. Moreover, a significant association (p<0.001) was also found between the disorder and the development of Obesity. (Table 1)

Total sitting time seen in the participants averaged 8.83 hours per day (mean= 533 minutes/day, SD =78 minutes/day). As seen in Table 2, most of the sitting time was spent during office hours, working at the desk (>5 hours/day), and also using a computer at home for non-work-related activities (>1 hour/day). It was also reported that in the participants who sat for more than 9 hours a day, a higher prevalence of overweight and obesity was found, and this was statistically significant.

Age and gender have not shown any significant association with the sitting behavior of the participants. Like in BED, more sitting time per day was associated with unmarried respondents. BED, even though not a directly influencing factor for sitting behavior, has shown a statistically significant relationship, emphasizing that those who sat for more than 9 hours per day are also those with the Binge eating disorder.

To find out the risk for developing obesity, various socio-demographic factors, the presence of Binge eating disorder, and their sitting behavior were analyzed with the prevalence of obese and pre-obese states (overweight, n=110) adjusting for confounders. Multinomial logistic regression of all the factors with BMI with Adjusted Odds Ratio (AOR) was given in Table 4.

Table 1: Association of variables with the level of BED (n=513)

	BED					P value
	No Disorder	Mild BED	Moderate BED	Severe BED	Extreme BED	
SEX						
Male	213	12	24	15	6	
Female	182	18	23	14	6	0.686
MARITAL STATUS						
Married	129	5	16	20	2	
Unmarried	266	25	31	9	10	0.001*
AGE						
<20 years	114	9	11	8	8	
20-25 years	102	9	18	8	1	0.236
26-30 years	107	6	10	5	1	
>30 years	72	6	8	8	2	
BMI						
Underweight	14	3	0	0	0	
Normal	265	9	20	6	2	0.001*
Overweight	76	2	19	12	1	
Obese	40	16	8	11	9	
TOTAL SITTING TIME						
<9 hours/day	219	6	14	2	11	0.000*
>9 hours/day	176	24	33	27	1	
LEISURE SITTING TIME						
>3 hrs/day	373	10	26	7	12	0.000*
<3 hrs/day	22	20	21	22	0	

p<0.05 is considered significant*

Table 2: Sitting behavior and Sitting time of the participants.

Type of Sitting Behaviour		Normal BMI (n=319)	Overweight/ Obese (n=194)		p-Value
		Time in Minutes		Total time	
Sitting time while Travelling	Mean	57.2	56.5	56.9	0.001*
	SD	27.2	31.1		
Sitting time at work	Mean	301.7	299.2	300.7	0.976
	SD	55.02	54.46		
Sitting time watching TV	Mean	54.5	45.8	51.2	0.001*
	SD	28.8	30.9		
Sitting time using computer at home	Mean	75.5	47.3	64.8	0.001*
	SD	31.4	39.8		
Sitting time doing other leisure activities	Mean	52.8	69.3	59.07	0.000*
	SD	43.4	49.6		

p<0.05 is considered significant*

Table 3: Relationship between Sitting time and other factors

	Sitting Time/ Day			
	<7hrs/day	7-10hrs/day	>10hrs/day	P value
AGE				
18-25	14	112	24	0.729
26-30	13	96	29	
31-35	7	99	23	
36-40	7	69	20	
GENDER				
Male	25	186	59	0.059
Female	16	190	37	
MARITAL STATUS				
Married	17	138	17	0.001*
Unmarried	24	238	79	
BED				
No Disorder	18	296	81	
Mild BED	0	28	2	0.000*
Moderate BED	10	25	12	
Severe BED	13	15	1	
Extreme BED	0	12	0	

p<0.05 is considered significant*

Table 4: Logistic Regression for Obesity with the variables in the study

	Underweight	Normal	Overweight	Obesity		
AGE					AOR**	p-value
18-25	7	73	40	30	Ref	
26-30	1	91	26	20	0.98	0.007
31-35	6	78	28	17	1.24	0.847
36-40	3	60	16	17	1.72	0.481
GENDER						
Male	5	169	55	41	0.78	0.239
Female	12	133	55	43	Ref	
MARITAL STATUS						
Married	5	105	40	22	0.722	0.143
Unmarried	12	197	70	62	Ref	
BED						
No disorder	14	265	76	40	Ref	
Disorder	3	37	34	44	3.15	0.000*
SITTING TIME						
<7 hrs/day	0	23	10	8	Ref	
7-10 hrs/day	17	210	90	59	1.33	0.061
>10 hrs/day	0	69	10	17	4.37	0.001*
LEISURE SITTING TIME						
<3 hrs/day	15	277	92	44	Ref	
>3 hrs/day	2	25	18	40	2.49	0.000*

*p<0.05 is considered significant.

** AOR given in the table is calculated for obesity/overweight and no obesity.

Discussion

This study explored the association of Binge-eating disorder and Sitting behavior with the occurrence of Obesity in working adults. Equal distribution of the risk factors in both the genders and the lower age of the participants (the Mean age is 29 years) emphasizes the importance of working conditions and stress in the workplace. Assessment of BED highlights the clinical importance of questioning patients about eating problems even when they do not feel the need to visit a hospital.

The prevalence of BED in the current study was around 23%, which was quite high compared to the studies conducted on higher age groups. Similar findings were reported from another study which reported a high prevalence of BED among students.[14] Some studies reported the increased intake of foods and drinks, especially among adolescents who are more involved in binge-watching TV, which correlated with the fact, that a higher incidence of BED was found in the unmarriedndividuals in the current study.[15]

The study also highlighted that BED is the most common eating disorder found in overweight and obese people. A study performed on obese individuals has shown that impulsiveness was higher in the obese individuals than in the normal control group and overweight group.[16] This is also in agreement with another study, where 72.7% of their study participants (in the sample of the overweight population) had reported BES scores that related to either moderate or severe bingeing.[17]

The sedentary behavior of the participants in the current study was found to be a key risk factor in the development of obesity. Those who sat for more than 10 hours a day pose a significant risk (OR-3.77) for obesity, which was confirmed by the meta-analysis of many similar studies conducted globally.[18] Furthermore, the relationship between sedentary behavior and obesity may be independent of physical activity, as demonstrated by the sensitivity analysis in a study done by Edwardson et al.[19]

Even though the current study didn't directly establish an association between Binge eating and sitting behavior, a study conducted in Poland has reported that the sitting behaviors of the adults were found to be associated with the binging of both unhealthy and healthy foods.[20]

The present study did not show much difference in the Job level stress experienced by the participants, though a study conducted on bank employees has shown that enforcement officers felt more stress than managers, and their stress was directly related to psychological issues.[21] This study highlights the need for a multidisciplinary approach to the treatment of Obesity. Treatment options like Cognitive behavior therapy (CBT), which is also the most used treatment method for BED, can be very effective in regulating the eating habits of the patients, which was reported by a study done in Turkey, as well as in preventing the sedentary behavior.[22]

Conclusion

Obesity is a complex disease that has a web of causative factors which interact with each other. This study observed that Binge eating disorders and the prolonged sitting behavior of software employees have a significant impact on the development of obesity. BED, being one of the misunderstood, undiagnosed conditions, is known to be associated with various other psychological disorders. So, unmarried, and young software employees, who were at the most risk for developing this disorder, owing to their lifestyle, must be identified and diagnosed before the onset of obesity. Similarly, assessing the sitting time among these individuals would be even more instrumental in tackling sedentary behavior. Treatment options like Cognitive behavior therapy and health education regarding obesity should be implemented earlier on the adults with risky lifestyles.

References

1. Edition F. Diagnostic and statistical manual of mental disorders. Am Psychiatric Assoc. 2013;21:591-643. Cited on February 15, 2021. Available from: https://doi.org/10.4103/0019-5545.117131

2. Lowry R., Wechsler H., Galuska D.A., Fulton J.E., Kann L. Television viewing and its associations with overweight, sedentary lifestyle, and insufficient consumption of fruits and vegetables among US high school students: Differences by race, ethnicity, and gender. J. Sch. Health. 2002;72:413–21. Available from: https://doi.org/10.1111/j.1746-1561.2002.tb03551.x.

3. Nagata J, Iyer P, Chu J, Baker F, Pettee Gabriel K, Garber A, et al. Contemporary screen time modalities among children 9–10 years old and binge-eating

disorder at one-year follow-up: A prospective cohort study. International Journal of Eating Disorders. 2021;54(5):887-92. Available from: https://doi.org/10.1002/eat.23489.

4. Sandberg R, Dahl J, Vedul-Kjelsås E, Engum B, Kulseng B, Mårvik R, et al. Health-Related Quality of Life in Obese Presurgery Patients with and without Binge Eating Disorder, and Subdiagnostic Binge Eating Disorders. Journal of Obesity. 2013;2013:1-7. Available from: https://doi.org/10.1155/2013/878310

5. de Zwaan M. Binge eating disorder and obesity. International Journal of Obesity. 2001;25(S1):S51-S55. Available from: https://doi.org/10.1038/sj.ijo.0801699

6. Katzmarzyk PT, Church TS, Craig CL, Bouchard C. Sitting time and mortality from all causes, cardiovascular disease, and cancer. Med Sci Sports Exerc. 2009;41:998–1005. Available from: https://doi.org/10.1249/MSS.0b013e3181930355

7. Van Den Bulck J, Van Mierlo J. Energy intake associated with television viewing in adolescents, a cross sectional study. Appetite. 2004;43:181–4. Available from: https://doi.org/10.1016/j.appet.2004.04.007.

8. World Health Organization. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet. 2004;363:157-63. Available from: https://doi.org/10.1016/S0140-6736(03)15268-3.

9. Proper K, et al. Sitting time and socio-economic differences in overweight and obesity. Int J Obes. 2007;31(1):169–76. Available from: https://doi.org/ https://doi.org/10.1038/sj.ijo.0803357

10. Bauman A, et al. The descriptive epidemiology of sitting: a 20-country comparison using the International Physical Activity Questionnaire (IPAQ). Am J Prev Med. 2011;41(2):228–35. Available from: https://doi.org/10.1016/j.amepre.2011.05.003

11. Tremblay MS, Aubert S, Barnes JD, et al. Sedentary Behavior Research Network (SBRN) - Terminology Consensus Project process and outcome. Int J Behav Nutr Phys Act. 2017;14(1):75. Published 2017 Jun 10. Available from: https://doi.org/10.1186/s12966-017-0525-8

12. Herman BK, Deal LS, DiBenedetti DB, Nelson L, Fehnel SE, Brown TM. Development of the 7-Item Binge-Eating Disorder Screener (BEDS-7). Prim Care Companion CNS Disord. 2016;18(2):10.4088/PCC.15m01896. Published 2016 Apr 28. Available from: https://doi.org/10.4088/PCC.15m01896

13. Marshall AL, Miller YD, Burton NW, Brown WJ. Measuring total and domain-specific sitting: a study of reliability and validity. Medicine and Science in Sports and Exercise. 2010 Jun;42(6):1094-1102. Available from: https://doi.org/10.1249/mss.0b013e3181c5ec18.

14. Nivedita N, Sreenivasa G, Sathyanarayana Rao TS, Malini SS. Eating disorders: Prevalence in the student population of Mysore, South India. Indian J Psychiatry. 2018;60(4):433-37. Available from: https://doi.org/10.4103/psychiatry.IndianJPsychiatry_97_16

15. Harris JL, Bargh JA. Television viewing and unhealthy diet: implications for children and media interventions. Health Commun. 2009;24(7):660-73. Available from: https://doi.org/10.1080/10410230903242267

16. Ural C, Belli H, Akbudak M, Solmaz A, Bektas ZD, Celebi F. Relation of binge eating disorder with impulsiveness in obese individuals. World J Psychiatry. 2017;7(2):114-20. Available from: https://doi.org/10.5498/wjp.v7.i2.114.

17. Burrows T, Skinner J, McKenna R, Rollo M. Food Addiction, Binge Eating Disorder, and Obesity: Is There a Relationship?. Behav Sci (Basel). 2017;7(3):54. Published 2017 Aug 14. Available from: https://doi.org/10.3390/bs7030054

18. Pulsford RM, Stamatakis E, Britton AR, Brunner EJ, Hillsdon MM. Sitting behavior and obesity: evidence from the Whitehall II study. Am J Prev Med. 2013;44(2):132-38. Available from: https://doi.org/10.1016/j.amepre.2012.10.009

19. Edwardson CL, Gorely T, Davies MJ, et al. Association of sedentary behaviour with metabolic syndrome: a meta-analysis. PLoS One. 2012;7(4):e34916. Available from: https://doi.org/10.1371/journal.pone.0034916

20. Jezewska-Zychowicz M, Gębski J, Guzek D, et al. The Associations between Dietary Patterns and Sedentary Behaviors in Polish Adults (LifeStyle Study). Nutrients. 2018;10(8):1004. Available from: https://doi.org/10.3390/nu10081004

21. Mikponhoue R, Hinson AV, Ismaël AD, Adjobimey M, Ayelo PA. Stress Prevalence and associated Factors among Bank Employees in Niamey, Niger. International Journal of Occupational Safety and Health. 2022 Mar 13;12(2):67-74. Available Online at https://www.nepjol.info/index.php/IJOSH. Available from: https://doi.org/10.3126/ijosh.v12i2.39315

22. Bulik CM, Reichborn-Kjennerud T. Medical morbidity in binge eating disorder. International Journal of Eating Disorders. 2003;34(S1):S39-46. Available from: https://doi.org/10.1002/eat.10204.