A CROSS-SECTIONAL STUDY ON FEMALE CUSTOMER SERVICE ASSOCIATE'S HEALTH ISSUES, NUTRITIONAL ANTHROPOMETRIC PARAMETERS, SLEEP PATTERNS AND OCCUPATIONAL STRESS

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ABSTRACT

Professional workers especially female employees frequently experience occupational stress. Such stress negatively impacts the health status indicators, particularly sleep quality. The present study was aimed to assess the degree of work stress, health issues, sleep patterns and nutritional anthropometric parameters like body fat percentage (BF%), waist circumference (WC), waist-hip ratio (WHR) status. Female customer service associates (n = 103) working in Kolkata (India) were selected by simple random sampling method and their responses including socio-demographic, professional data were collected by using occupational stress index (OSI) scale, Pittsburgh sleep quality index (PSQI) and physical health questionnaire (PHQ). Bioelectric impedance based body composition analysis, and anthropometric measurements were also taken. The study revealed that a significant number of subjects have moderate work stress (mean OSI score 133.40 ± 19.41), sleep disturbances (mean PSQI global score 6.71 ± 3.31), including physical health problems like headache, and sleep disturbance. The subjects had significantly high body mass index of 25.0 ± 4.34 kg m⁻² and body fat% value of 33.46 ± 7.91 and 37.83 ± 5.08 among 20-39 and 40-59 year-age groups, respectively, WC of 84.43 ± 10.83 cm and WHR of 1.05 ± 1.88 indicated abdominal obesity, metabolic complications, and poor nutritional condition. Subjects had significantly high mean for BMI. The study revealed the health concerns among working females in the context of occupational stress which can prove detrimental, if no proper measures are taken.

Keywords: Female, health problem, occupational stress, sleep pattern

Abbreviations: BF% = body fat percentage; WC = waist circumference; WHR = waist-hip ratio; OSI= occupational stress index; PSQI = Pittsburgh sleep quality index; PHQ = physical health questionnaire; NPNL = non-pregnant non-lactating; BMI = body mass index; PCI = per capita income

INTRODUCTION

Stress is a threat to an individual's physiological or psychological integrity resulting in some physiological and behavioural responses. It is a subjective experience, often involving elevated adrenal glucocorticoids and catecholamines in biomedicine (McEwen, 2010). Psychological stress is a state that arises when individuals perceive a situation as significant for themselves, but also lack the ability to effectively manage those issues (Lazarus and Folkman, 1986). This type of information is somewhat subjective and can be documented through an individual's self-reports (Krohne, 2001). This is true for the workplace as well where it may lead to the occupation-related stress. This perceived

stress syndrome has its roots in the workplace. Stress at work may require more frequent interventional attention and corresponding costs (Manning *et al.,* 1996). Spielberger and Reheiser (1994) reported this kind of stress in a variety of occupations, with women having higher levels of occupational stress. Chronic stressors call for various long term health issues, out of which sleep alteration is a notably stress (Robinette *et al.,* 2016). Sleep alteration can be considered as valid indicator of stress than other method of direct evaluation of feelings (Epel *et al.,* 2018).

Stress can induce a variety of health problems, including gastrointestinal (GI) problems, asthma, diabetes, tiredness, tension, headaches, hypertension, insomnia, irritable bowel syndrome, psycho-neurosis (Padma *et al.,* 2015). Spanos *et al*. (2020) reported that obesity, occupational pressures, and a high body mass index (BMI) have significant impact on absenteeism at work. Overweighed people have more physical discomfort, health issues, and higher mortality rate. High body fat levels are also associated with poor attitudes, less exercise, smoking, junk food, and alcohol consumption, all of which impact the health of working community. Thus various related parameters *viz*., physical health parameters (sleep, GI issues, headache), anthropometric parameters like waist circumference, waist to hip ratio, body fat composition, etc. were studied in connection with the work stress. The present study focused on identifying the disturbance in vital health parameters due to work stress among working females in customer service. The study included key indicators of future detrimental health concerns of occupational stress in females, which have not been covered in earlier studies in one unit. The present study aimed to assess the occupational stress levels, sleep quality, physical health problems and anthropometric nutritional status in female customer service associates so that suitable and feasible solution can be planned to prevent negative outcome on health in working population.

MATERIALS AND METHODS

The females working in job role of customer service associates in Kolkata city (India) were chosen as the subjects for this study. The females who were non-pregnant non-lactating (NPNL), without any critical disease (like cancer/HIV, etc.), within the age group of 20-59 years and willing to participate voluntarily were selected for this study. The females not having the basic understanding in language of English/ Hindi/ Bengali were excluded. The data was collected from July 2021 to November 2022. The study was conducted by having informal consents (in writing) from 103 subjects as per the approval from the Institutional Human Ethical Committee. The data were collected from the subjects by simple random sampling technique by using occupational stress index (OSI) scale (Shrivastava and Singh, 1981, 1984), Pittsburgh sleep quality index (PSQI) [Daniel *et al.,* 1989], and physical health questionnaire (Schat *et al.,* 2005). The socio-demographic and professional information of female customer service associates were also recorded. The updated B.G. Prasad socioeconomic classification (2020) was used for socio-economic gradation. Bio-impedance based body composition analyser (Debnath and Kakkar, 2020) was used to record body weight and body fat%. The subjects were asked to stand straight on the designated place of machine. Anthropometric rod and non-stretchable measuring tape were used to measure the height, waist and circumferences, respectively. Standard formulas were used to measure BMI and waist-to-hip ratio. Various statistical analyses like χ^2, z test, etc. were used to test the level of significance (α) at 0.05. The statistical analysis was executed by using Statistical Package for Social Science (SPSS) version 23.

RESULTS AND DISCUSSION

The socio-demographic data of the participants revealed that the majority of participants (89.3%) were in the age group of 20-39 years and the rests (10.67%) in 40-59 years age group with mean

age ± SD value as 29.56 ± 8.33 years (Table 1). Most participants were unmarried (66.02%) and among the married participants only 18.45% had children. The average per capita income of participants per month was ₹. 11060 with SD of ₹. 4676. The majority of participants (67.97%) had monthly income of ₹. 7533 and above; whereas only 4.85% had monthly income of ₹. 1130-2259.

Table 1: Socio-demographic details of women customer service associates of Kolkata city

Study variables	No. of persons (n = 103)	Percentage	Mean ± SD
Age (years)			29.56 ± 8.33
- 20-39	92	89.33	-
- 40-59	11	10.67	
Marital status			-
- Married	33	32.04	-
- Unmarried	68	66.02	-
- Divorced	02	1.94	-
Having children			-
- Yes	19	18.45	-
- No	84	81.55	-
Per capita monthly income (₹.)			11,060 ± 4.676
- ≥ 7533	70	67.97	-
- 3766-7532	20	19.41	-
- 2260-3765	08	7.77	-
- 1130-2259	05	4.85	-

The mean working experience of participating subjects was 46.34 ± 0.80 months (Table 2). Most participants had 5 and 5-6 working days per week (46.6% each) while 2.91% of them had more than 6 days on voluntary basis for overtime. Average working hours including transportation of the study subjects per day was 10.28 ± 1.34 h. regular rotational shift and night shift were done by 22.33 and 11.65% participants, respectively. About 64.1% subjects had work from home mode in their work life.

The categorization of OSI score was done by considering 132.84 ± 20.55 (mean ± SD) as moderate level of stress; while lower and higher levels of stress were considered as below and above this mean value (Devi and Lankar, 2020). BMI, BF% and WC, WHR were categorized as per Misra *et al.* (2009), Gallagher *et al.* (2000) and IDF Consensus (2020), respectively**.**

Sleep quality
The mean ± SD of PSQI was 6.71 ± 3.31 which denoted overall poor sleep quality among the subjects. About 39.8 and 60,2% subjects were good and poor sleepers, respectively. Poor sleepers were significantly more than good sleepers (P < 0.01). The χ^2 value was 4.28 with a P value < 0.05. Kageyama *et al.* (1998) have shown a link between job stress and sleep quality. A cross-sectional survey of 2116 Chinese oilfield workers in Xinjiang revealed poor sleep quality, with increased occupational stress leading to increased sleep disturbances, influenced by factors like shift work and job titles (Li *et al.*, 2019). Thus neurobiological and cognitive hyperarousal appear to influence the link between occupational pressures and sleep. The occupational factors and experiences at work-home interface function as moderators (Sonnentag *et al.,* 2016). Thus high work stress level may increase health issues including sleep quality. Sleep is essential for brain recharge, muscle restoration, memory consolidation, and many other vital body mechanisms. Chronic sleep deprivation can lead to health issues. Stress, an evolutionary response to dangerous situations, can cause changes in sleep patterns, including decreased slow-wave sleep, REM sleep, and sleep efficiency. Elevated stress hormones - cortisol and adrenaline, negatively impact sleep quality, and pattern. In such events sleep hormone melatonin secretion pattern gets altered, thus causing sleep deprivation.

Health problems
The study revealed that the participants had several health issues with special reference to headaches

Table 2: Professional work details of women customer service associates in Kolkata city

Study variables	No. of persons (n = 103)	Percentage	Mean ± SD
Total work experience (mon)	-	-	46.34 ± 0.80
Working days week^{-1}			5.26 ± 0.36
- < 5	04	3.89	-
- 5	48	46.60	-
- 5 – 6	48	46.60	-
- > 6 (weekly over-time)	03	2.91	-
Working hours including transportations			10.28 ± 1.34
- < 10	48	46.60	-
- 10-12	44	42.72	-
- > 12	11	10.68	-
Regular rotational shift			
- Yes	23	22.33	-
- No	80	77.67	-
Regular night shift			
- Yes	12	11.65	-
- No	91	88.35	-
Work from home			
- Yes	66	64.07	-
- No	37	35.92	-

(3.65 ± 1.89) and sleep disturbances (3.29 ± 1.84) than other sub-categories (Table 3). GI problems and respiratory infections had mean ± SD score of 2.95 ± 1.61 and 2.86 ± 1.73, respectively. The mean PHQ score was 43.69 ± 13.33. Cox *et al.* (2022) have demonstrated that 70.5% nursing professors were poor sleepers, with younger faculty experiencing more sleep latency, disruptions, and subjective quality using same sleep quality scale. Kumari *et al.* (2020) have indicated poor sleep quality in 66% adults and college students by using Pittsburgh sleep quality index. Banu and Gomathi (2014) reported that BPO women employees experienced stress-related physical health issues like sleep difficulties, digestive disorders, depression, and high blood pressure due to irregular shifts, extended working hours, and computer use. Various studies identified specific physical health issues like gastro-intestinal disturbance to headache to altered sleep quality to be associated with work stress which is consistent with the findings of this particular study in customer service associate settings. Chronic work stress leads to impaired sleep quality, decreased productivity, and daytime issues. High stress hormone levels peak in afternoon and early evening, affecting focus and relationships. The high stress increases the risk of heart disease, depression, and other health issues due to the release of stress hormones and subsequent stress response of the body at chronic level.

Body mass index (BMI)
The mean ± SD value for BMI was 25.00 ± 4.34 kg m^{-2}. As per height, a considerable number of people had excessive body weight (25.25% overweight; 39.8% obese) than desirable weight and 34.75% subjects had normal BMI. The Z value was 3.05 for different groups of BMI with P < 0.05. The people with overweight and obesity were significantly more than the people with normal BMI.

Waist circumference (WC)
The mean ± SD value for WC of all the subjects was 84.43 ± 10.83 cm and the higher WC revealed the potential risk of abdominal fat. About 32.03 and 67.96% participants had WC < 80 cm and ≥ 80 cm, respectively. The χ^2 value of WC was 13.29 with P < 0.01 and showed significant differences between the groups. The people who had WC ≥ 80 cm were significantly more than the people with WC < 80 cm (P < 0.01) which revealed more abdominal obesity and increased risk of metabolic complications.

Table 3: Association of different study variables regarding women customer service associates

Study variables	No. of persons (n = 103)	Percentage	Mean ± SD	S.E	P value
Sleep quality (using PSQI)	-	-	6.71. ± 3.31	0.03	
- Poor sleeper (PSQI score ≤ 5)	41	39.80	-	-	$\chi^2 = 4.28$
- Good sleeper (PSQI score >5)	62	60.20	-	-	P < 0.05
Physical health problems (using PHQ)			43.69 ± 13.33	0.12	
- Gastrointestinal problems	-	-	2.95 ± 1.61	0.01	
- Headaches	-	-	3.65 ± 1.89	0.01	
- Sleep disturbance	-	-	3.29 ± 1.84	0.01	
- Respiratory Infections	-	-	2.86 ± 1.73	0.03	
Waist circumference (cm)			84.43 ± 10.83	0.10	
- < 80	33	32.03	-	-	$\chi^2 = 13.29$
- ≥ 80	70	67.96	-	-	P < 0.05
Waist-hip ratio			1.05 ± 1.88	0.01	Z = 3.06
- ≥ 0.85	67	65.04	-	-	P < 0.05
- < 0.85	36	34.95	-	-	
Body mass index (BMI) [kg m^{-2}]	-	-	25.00 ± 4.34	0.04	
- Normal: ≥ 18.0 and < 23	36	34.75	-	-	Z = 3.05
- Overweight: ≥ 23.0 and < 25	26	25.25	-	-	P < 0.05
- Obesity: ≥ 25	41	39.80	-`	-	
Body fat% (n = 95)					
For 20-39 years age group			33.46 ± 7.91	0.08	
Low (< 21)	7	7.36	-	-	
Normal (21-32.9)	25	26.31	-	-	Z = 2.20
High (33-38.9)	30	31.57	-	-	P < 0.05
Very high (≥ 39)	22	23.15	-	-	
For 40-59 years age group			37.83 ± 5.08		
Low (< 23)	0	-	-	-	
Normal (23-33.9)	1	1.05	-	-	Z = 2.20
High (34-39.9)	6	6.31	-	-	P < 0.05
Very high (≥ 40)	4	4.21	-	-	

Waist to hip ratio (WHR)

Amongst the all participants, about 2/3rd participants had WHR ≥ 0.85 (Table 3). The mean ± SD value of WHR of participants was 1.05 ± 1.88. The Z score for two WHR groups was 3.06 with P < 0.001. This signifies abdominal obesity and substantially increased risk toward metabolic complications.

de Lira *et al.* (2023) have investigated the effect of occupational stress on BMI of hospital employees. Their findings revealed an association between work stress and variations in BMI. The occupational stress adversely affected the clinical practice, administrators and other worker health in hospital setting. Rachappa *et al.* (2020) reported that despite having high disease risk conditions, the working women in hostels of Mysore city had high knowledge about balanced diet and healthy lifestyle, which helped them to keep a normal BMI. Analysing the anthropometry methods a total of 76% respondents were under high disease risk conditions in waist-hip ratio, 13% were at elevated risk and 11% were reduced risk conditions. Stress, as a result of biological and behavioral factors, causes a rise in bodily hormones known as 'cortisol'. Stress also stimulates the production of biochemical hormones and peptides, including leptin, ghrelin, and neuropeptide Y. The increase in such

biomolecules lead to cravings for unhealthy food and causes people to consume more than they normally would (Geda *et al.,* 2022; Kumar *et al.,* 2022). Fried *et al.* (2013) studied 1949 healthy employees and found a U-shaped relationship between job enrichment and changes in stress-related indicators of abdominal obesity. Further, the abdominal obesity was reduced when job enrichment was moderate and increased when it was high or low. Britta *et al.* (2022) demonstrated that high levels of psychological stress raises the chance of developing coronary heart disease (CHD) in both men and women. Consistently high stress increases the chance of CHD occurrences in later stages. Although stress and BMI are not associated with all-cause death, the waist-to-hip ratio increases the risk. Brunner *et al.* (2007) in a 19-year analysis of Whitehall II cohort in London revealed a dose-response association between work stress and the incidence of both general and central obesity. The study showed that chronic work stress was a strong predictor of obesity, with odds ratios for BMI based obesity and abdominal obesity of 1.17, 1.41, and 1.61, respectively. The study demonstrates that continuous work stress might contribute to obesity.

Body fat (BF%)

The mean ± SD value of body fat (BF%) in 20-39 and 40-59 years age group was 33.46 ± 7.91 and 37.83 ± 5.08, respectively with Z value of 2.20 with $P < 0.05$ (Table 3). For age group 20-39 years, 7.36, 26.31, 31.57 and 23.15% subjects belonged to low, normal, high, and very high, BF% categories, respectively. On the other hand, 1.05, 6.31 and 4.21% subjects in 40-59 years age group belonged to normal, high, and very high categories of BF%. Christaki *et al.* (2022) found that the stress response is made up of autonomic nervous system and hypothalamic-pituitary-adrenal axis. Cortisol, a stress hormone linked to weight gain and metabolic instability, may be over-secreted by the adrenal cortex in response to the persistent stress. Bo¨hm and Heitmann (2013) reported that bioelectrical impedance analysis (BIA) is a non-invasive method for measuring body composition, and found it strongly correlated with health outcomes like cardiovascular illnesses, but varies with age and population. Cortisol, a hormone produced by the adrenal glands, responds to stress by raising blood sugar, inhibiting the immune system, and mobilizing energy storage. Chronic stress can cause elevated cortisol levels, resulting in changes in body composition such as increased body fat and decreased muscular mass, thus leading to excessive weight.

Table 4: Distribution of occupational stress level in women customer service associates (n = 103)

Parameters	Frequency	Percentage	Mean ± SD	S.E.	P value
OSI			133.40 ± 19.41	0.19	
- High level (≥153)	17	16.50	-	-	$\chi^2 = 65.62$
- Moderate level (113-152)	73	70.87	-	-	$P < 0.01$
- Low level (≤ 112)	13	12.62	-	-	

Occupational stress by OSI

The mean ± SD value for OSI score of women customer service associates was 133.40 ± 19.41 (Table 4). The 12.62, 70.87, and 16.50% participants had low, moderate, and high OSI scores, respectively. The χ^2 value was 65.62 with $P < 0.01$, thus it significantly differed from one another. The study revealed that the people with moderate OSI score (113-152) significantly differed from the people with high and low OSI score ($P < 0.01$). Natarajan and Punitha (2017) reported that work stress causes physical and behavioral strains, including poor performance, turnover, and absenteeism, with 10.2% experiencing severe stress, 13.8% experiencing low stress, and 76% experiencing moderate stress. Prathyusha1 *et al.* (2016) found that 500 IT professionals in Hyderabad, Telangana, experienced significant stress due to long workdays, demanding schedules, intense competition, and constant use of Visual Display Units. The subjects in general suffer from occupational stress at moderate level.

Conclusions: The study revealed occupational stress manifests in the form of several physical health problems especially sleep disturbances and headache, excessive weight along with abdominal fat deposition and potential increased risk of metabolic complications in terms of high BMI, high body fat% and specifically high WHR. The women customer service associates generally suffer moderate occupational stress. The study identified health problems with special reference to nutritional health condition among working females. Steps need to be taken for proper implementation of health and nutrition plan with special reference to lifestyle and nutrition education.

Ethical consent statement: Informal consent from the subjects involved in the study was taken in writing as well as the study was undertaken after proper approval from the Institutional Human Ethical Committee vide No. MC/IEC(HS)/PHY/Ph.D.RF/01/2023 dated 05.01.2023

Financial support: This was a self-financed research study. There is no funding from outside source.

Author's contribution: Authors declare that the literature review, designing, data collection and descriptive statistics, discussion and conclusion of the study were done by Pallavi Majumder while analytical statistics were designed and executed by Suprakas Hazra.

Conflict of interest: Authors declare that there is no Conflict of Interest

Acknowledgements: We are thankful to Midnapore College, Midnapore, West Bengal for their support and appreciate the effort and time taken by the participants for the study.

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