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Occupational Stress Index of Indian Footwear Factory Workers

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ABSTRACT

Stress can be defined as a process where environmental stimuli place undue strain on a human being, resulting in physical and psychological changes that increase the risk of disease. Nowadays, almost a fifth of the worldwide workforce is engaged in shift. Working for long working hour and late night shifts is one of the most common reasons for stress among the workers. Working environment and wages in India are different from the ones in western countries. Lack of control over work, workplace, and employment status is also among the one of the major sources of stress and a critical health risk for some workers. Considering all these factors a need was felt to assess the Occupational Stress Index of Indian Footwear Factory Workers

A convenience sample of 530 workers was taken from footwear factory in West Delhi, India. Both male and female (between 30-45 years) working in footwear factories were included. The mean age of the male workers was 39.78±4.44 years and the mean age of the female workers was 35.88±4.74. The workers were assessed on Generic Occupational Stress Index. At last they were given a patient education booklet explaining occupational therapy program for safe, healthy, and efficient physical and mental health status. The Total OSI Score of Male workers was (M±SD) 77.02 ± 20.28 while that of Female workers was (M±SD) 79.72 ± 18.13, (t=2.39, p=0.009). Results also showed that the Occupational stress of the female workers was more as compared to male workers. From the results we concluded that Working environment, Work schedule, Work load, Work pressure, Workplace design, Work posture are the factors that causes significant occupational stress among the factory workers and workers must be screened out for Occupational health risk on the regular basis. There is a need for improvement in work environment, work design, and working conditions in the factory.

KEYWORDS: *Footwear factory workers, Occupational Stress, Work Pressure, High demand, Avoidance, Workplace design*

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INTRODUCTION

Workers represent half the world's population and are major contributors to economic and social development. The world has become 24 hours society, eliciting the need for flexible hours and night working hours. Nowadays, almost a fifth of the worldwide workforce is engaged in shift. Working for long working hour and late night shifts is one of the most common reasons for significant alterations of sleep and biological functions, which in turn can affect the physical and psychological well-being and negatively condition work performance. It can also alter the daily levels of alertness and job performance, favouring fatigue [1] Lack of control over work, workplace, and employment status is also among the one of the major sources of stress and a critical health risk for some workers [2]

Work plays a very important role in person's lives. It can either exert an important influence on their well-being but at the same time can also be a tremendous source of stress.

Stress can be defined as a process where environmental stimuli place undue strain on a human being, resulting in physical and psychological changes that increase the risk of disease [3] Job stress arising from perceived imbalances between work effort and rewards, protracted working hours and job insecurities is also very common now a days. There is strong relationship between the occupational stress of workers and their productivity. The occupational stress is an unavoidable part of working life [4]

Stress is an emotional and physical reaction to change. Day to day life is full of stress- both on the personal and professional fronts. Stress is associated with constraints and demands. Stress becomes a problem when body is constantly under pressure, and does not return, to normal. At this stage, the brain and its coordinating assistance are overwhelmed and worn out. As a result of that stressed people are constantly in what scientists call a state of arousal or alertness. This can lead to long term physical, psychological or behavioural problems like alcoholism, depression, sleep disturbances, skin rashes. Stress in the workplace has been a topical problem among blue collar workers, like construction workers, maintenance workers, manufacturing workers. Majority of them belong to the lower strata of economic groups and are highly stressed. Stress may be due to unsafe and uncomfortable work environments, lack of employ participation in organizational policies [5]

Working environment and wages in India are different from the ones in western countries. The working days for factory workers in India usually runs six days a week. Long work shifts and changes in working schedules are the common reasons for different health related problems. [6, 7]

The ability to control or influence various work factors (e.g., speed and pacing of production) linked to the incidence of cardiovascular disease as well as to psychological disorders, job dissatisfaction, and depression. If the stress is unresolved it may lead to low motivation, absenteeism and health problem which may lead to low productivity

Lack of control over work, workplace, and employment status is also among the one of the major sources of stress and a critical health risk for some workers. [2]

Musculoskeletal disorders and symptoms in a working population is becoming very common now a days, occurring predominantly in the low back, neck and upper limbs. To help define the problem and its relationship to work factors, increasing interest has been directed in many countries to the development of methods to estimate and record musculoskeletal symptoms [8]

Research on the health impact of job conditions has long been a concern of occupational medicine, and attention has focused on physical and chemical hazards. It has been established that industrialization and urbanization give rise to various mental health problems in industrial employees and that these problems adversely affect the mental health of individual employees and thereby may negatively interfere with productivity and economy [5]

Objectives

This study was conducted to evaluate varying stress levels experienced by Indian Footwear Factory workers by using OSI as a measurement tool, in order to help the workers to redefine their process and to overcome or minimize their stress level.

MATERIAL AND METHODS

Subjects

Cross-sectional survey was conducted in small scale labour-intensive footwear factory of West Delhi, India for the period January 2020 to February 2020. In this study a convenience sample of 530 workers, both male and female (between 30-45 years) working in footwear factory and willing to participate were included. Workers who are mentally and physically challenged, with a background of cardiac, respiratory diseases or accidents affecting musculoskeletal system, unable to respond to the questions (due to hearing problems or any other reason) and not willing to participate were excluded.

The mean age of the male workers was 39.78±4.44 years and the mean age of the female workers was 35.88±4.74. Overall 371 (70%) Male and 160 (30%) Female participated in the study.

Procedure

Necessary permission was obtained from the head of factory for the survey. The purpose of study was explained to all the eligible participants in their local language. Verbal consent and written consent were obtained from all who elected for the participation in the survey. Data was collected by face to face interview method using Generic OSI questionnaires. Questionnaires were filled by the investigators at the time of interview. Following completion of the questionnaire all participants were explained about the Occupational stress. At last they were given a patient education booklet explaining occupational therapy program for safe, healthy, and efficient physical and mental health status.

Outcome Measures/Scales

Generic Occupational Stress Index (OSI) Questionnaire

The Occupational Stress Index (OSI) is an additive burden model, which includes key aspects of sociological work stress model: Job-Strain and Effort-Reward imbalance but it was an approach derived from cognitive ergonomics. The General OSI Questionnaire is applicable to workers of any occupational profile. General OSI has good face validity, that working people consider the questions relevant to their daily life on-the-job. The internal consistency of the total general OSI is within the desired range (Cronbach alpha = 0.81), as are most, but not all of the scales.[16]

Within OSI, the work environment is viewed as a whole including task level issues, work schedule, physical and chemical, and other broader organizational factors that contribute to the total burden. OSI is arranged as a two-dimensional matrix, the vertical axis being composed of level of information transmission and consists of *four* levels and the *horizontal axis* involves *seven* stressor aspects. Each aspect has a different number of elements: Underload has 11, High Demand involves 20, Strictness has 11, Extrinsic Time Pressure involves 5, Aversiveness/ Noxious Exposures has 7, Avoidance (Symbolic Aversiveness/Disaster Potential) involves 9, and Conflict/ Uncertainty has 15. The aspect scores are then summed to generate the total OSI score, which reflects the overall burden from work stressors

We weighted the elements equally and summed them to yield aspects of either under load, high demand, strictness, external time pressure, aversive physical exposures, symbolic of aversive and conflict or uncertainty [2, 3, 12]

Data Analysis

Complete data was gathered in the form of a master chart made on Microsoft Excel 2010. The statistical analysis was conducted using Statistical Package for the Social Sciences 21 (SPSS v.21). All OSI aspects were entered together and the enter model was used (Table-2). The total OSI was analysed separately. Descriptive analysis included percentages, means, and SD.

Results

Table 1: Mean, SD value of Different aspect of OSI for male and female

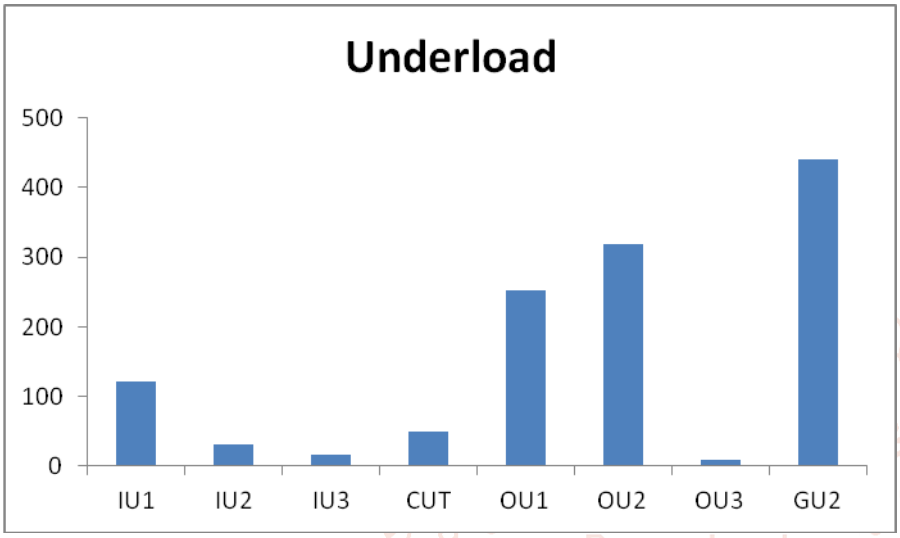
Occupational Stress index determinants	Male (M±SD)	Female (M±SD)	t-value	Significance level
Underload	11.46 ± 2.24	12.22 ± 2.06	3.86	0.000**
High demand	16.52 ± 7.50	17.36 ± 7.95	1.78	0.03*
Strictness	14.34 ± 4.93	15.80 ± 5.18	2.82	0.003**
Extrinsic time pressure	6.04 ± 1.85	6.42 ± 1.78	1.72	0.04*
Aversiveness/ noxious exposures	8.14 ± 2.12	9.04 ± 2.04	3.11	0.001**
Avoidance (symbolic aversiveness/ Disaster Potential)	9.12 ± 2.24	10.64 ± 2.76	3.62	0.000**
Conflict/ uncertainty	14.68 ± 4.59	16.02 ± 5.06	2.50	0.007**
OSI total	77.02 ± 20.28	79.72 ± 18.13	2.39	0.009**

**significant at 0.005 level; *significant at 0.05 level; NS: not significant

Table 2: Overall Occupational Stress Index Response of Factory Workers

Aspect Information Transmission Level	Under Load	High demand	Strictness	Extrinsic time pressure	Aversivenss / noxious exposures	Conflict/ uncertainty	Avoidance(symbolic aversiveness/ Disaster Potential)
INPUT	IU1 = 121 IU2 = 31 IU3 =16 Low frequency of incoming signal	IH1 =84 IH2 =53 IH3 =180 IH4 = 74 IH5= 21 IH6 =318 Communication is essential plus heavy burden on visual system	IST 1=1 There is no strict requirement for signal detection.	IEPT= 106 There is no control over speed of incoming signal	INOX1 =132 INOX2 =265 Workers exposed to both glare and noise	ICNFL2 =240 Noise conflict. Sometimes unclear instruction and information	IAVO11-13 =20 There is fair level of attention needed. There are no serious visually disturbing scenes or listen to an emotionally disturbing occurrence.
CONTROLLED DECISSION MAKING	CU3 =50 Decision automatic from input	CH1 = 80 CH2 =64 CH3 =74 CH4 =25 Complex, complicated decision and decision effect work of others	CS1 =150 CS2 =212 There is a strict requirement to define a correct decision. Also a little Help on strict problem solving strategy is required	CEPT =345 Decision cannot be postponed	-	CCNFL1 =53 CCNFL2 = 20 CCNFL3 = 25 Very little Information needed for Communication. Very few contradictory information and Unexpected events change at work place.	CAVOIT =15 Very few serious consequences of a wrong decision. Correction can always be made.
OUTPUT/TASK PERFORMANCE	OU1 = 252 Heterogeneous task OU2 = 318 OU3 = 10 Task is simple	OH1 =344 OH2 = 159 OH3 =238 OH4 =27 Tasks are heterogeneous and complex along with simultaneous task.	OST =254 Work must meet a strictly defined standard but not necessary be fined for incorrect work	OEPT = 318 Workers have full control over the rate of task performance	ONOX 1 =290 ONOX 2 =134 Workers have to do Isometric lifting. Some of the workers also exposed to vibration	OCNFL1 =344 OCNFL2 =450 OCNFL3 =25 sometimes its impossible to complete everything, and technical problems hamper the task	OAVOIT =25 Hazardous task performance is very limited.

GENERA	GU2 = 440 Pay Based upon how much I myself work.	GH1 =53 GH2 =328 GH3 =2 GH4 =63 GH5 = 212 Many workers had long working hour and late night shift	GSI1 =291 GSI2 =265 Most of the workers have to work in single posture with less mobile. There is also a confined windowless work space.	GEP1 =350 GEP2 =330 Dead line pressure and speed up.	GNOX 1 =345 GNOX 2 =1 GNOX 3 =53 There is a lot of exposure to heat as compared to cold and noxious gases, fumes and dusts.	GCNFL2 =50 Very little Emotionally Charged work Atmosphere	GAVO11= 0 GAVO12=30 Never witnessed Any serious injury at work or Experienced Accident or Suicide among Co-workers.



IU1=Homogeneous information

IU2=Low Frequency of incoming signal

IU3=No need communication

CU3=Automatic Decision-making.

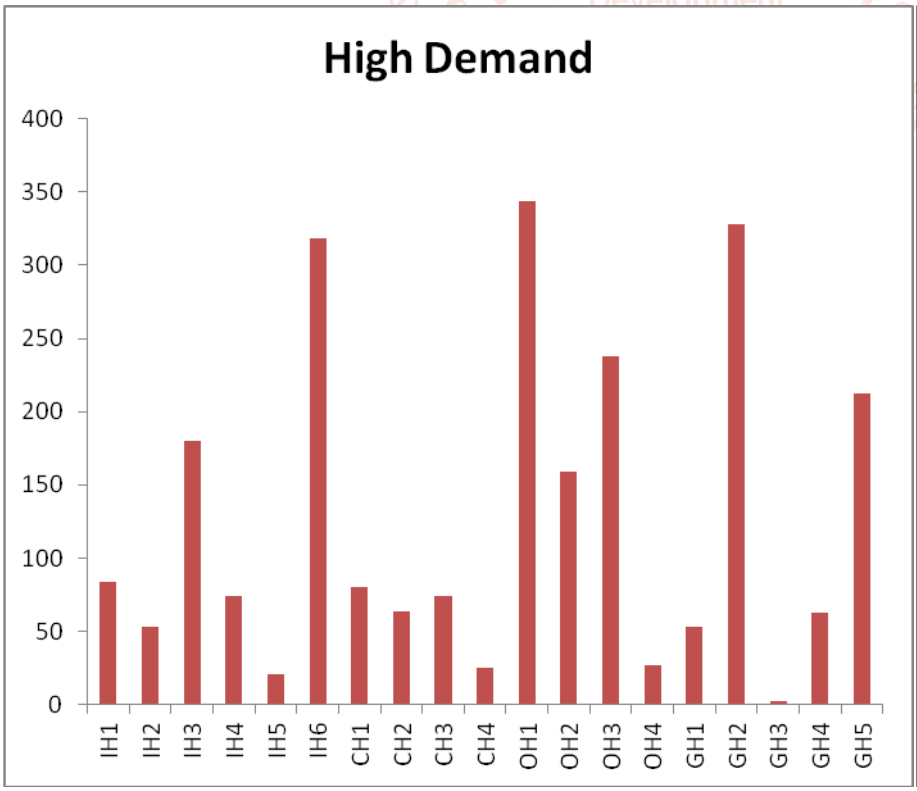
OUI=Homogeneous Tasks

OU2=Simple Tasks

OU3=Nothing to do.

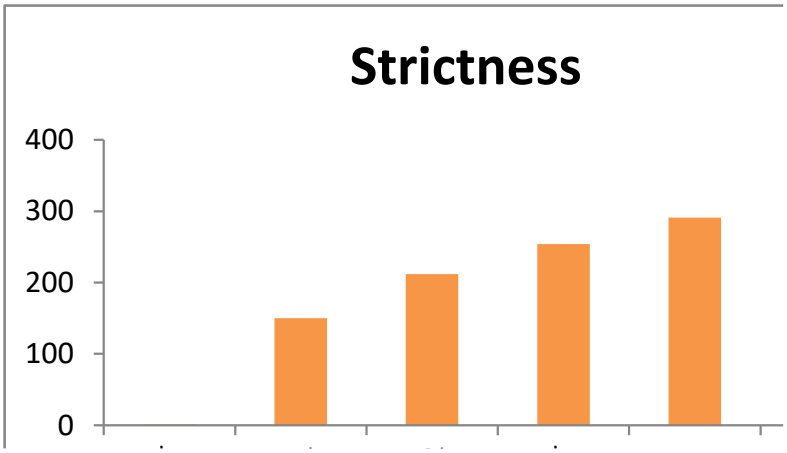
GU2= Pay Based upon how much I myself work

Figure 1 Number of workers regarding the aspect of information transmission level for under load input



1H1=Three or more information sources simultaneously.
IH2=Heterogeneous information.
IH3=Visual Input Primary.
IH4=More than five new signals per minute.
IH5=Three sensory modalities.
IH6=Communication necessary for work.
CH1=Complex Decisions/interrelated.
CH2=Complicated Decisions/many Elements.
CH3=Decision affects the work of others.
CH4=Rapid Decisions
OH1=Heterogeneous tasks
OH2=Simultaneous Task Performance
OH3=Complex tasks
OH4=Rapid Task Execution
GH2= Long Work hours.
GH5= Night shift

Figure 2 Number of workers regarding the aspect of information transmission level for high demand input



IST= Strict requirements for signal detection

CS1=Strict problem solving strategy

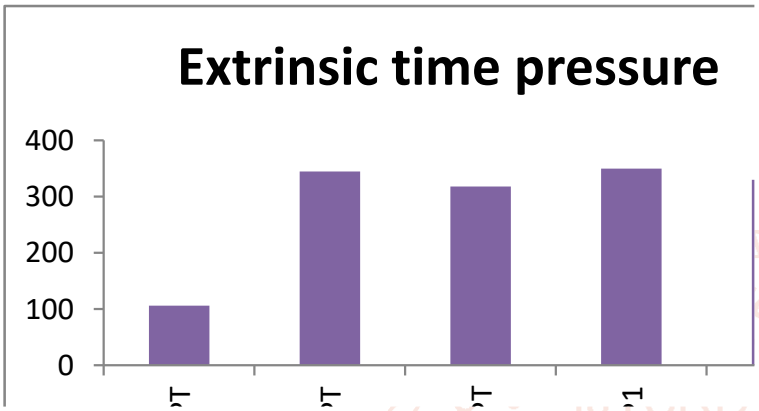
CS2= Strictly defined correct decision

OST=Strict evaluation of performance

GSI 1=Fixed posture

GSI 2= Limited workspace

Figure 3 Number of workers regarding the aspect of information transmission level for Strictness input



IEPT =Control of incoming signal.

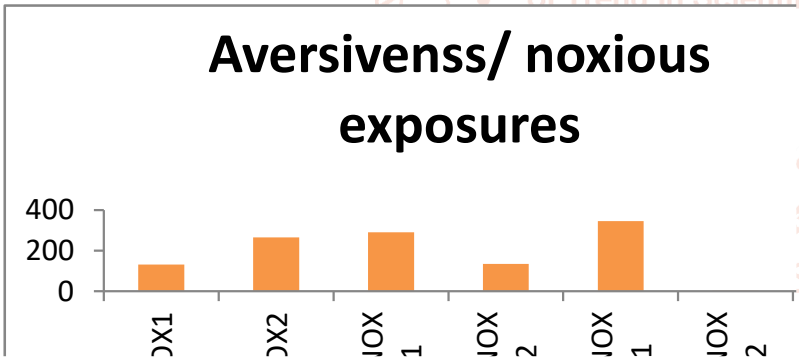
CEPT= Decisions cannot be postponed

OEPT=Control of task performance rate.

GEP 1=Deadline pressure.

GEP 2=Speed up.

Figure 4 Number of workers regarding the aspect of information transmission level for extrinsic time Pressure input



INOX 1=Glare

INOX 2=Noise

ONOX 1= Isometric Lifting

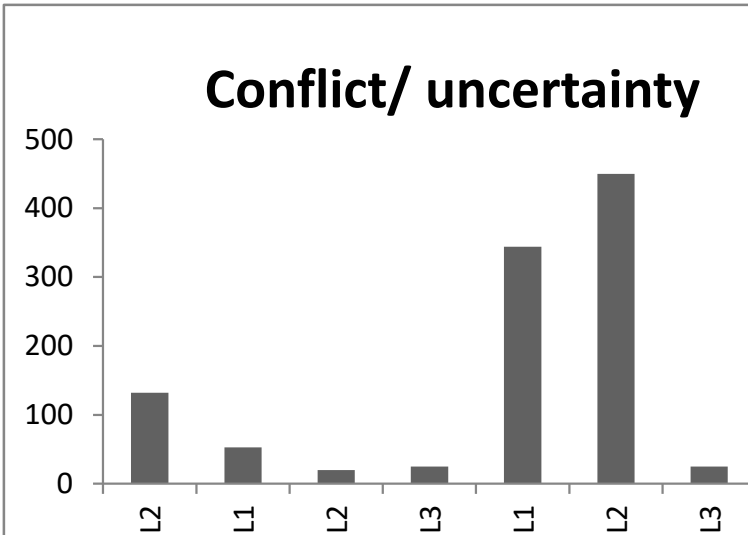
ONOX 2= Vibration Exposure

GNOX 1= Heat Exposure

GNOX 2=Cold Exposure

GNOX 3=Exposure to fumes, gases &/or dusts

Figure 5 Number of workers regarding the aspect of information transmission level for Aversive/Noxious exposure input.



ICNFL2= Signal/signal conflict

CCNFL1=Missing information needed for decision making.

CCNFL2=Contradictory information.

CCNFL3=Unforeseeable events require new plan.

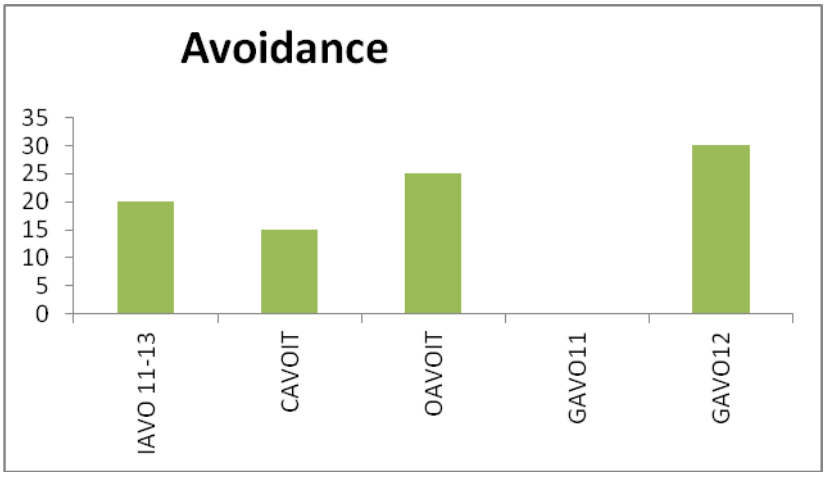
OCNFL1=Conflicting demands in time and space.

OCNFL2=Technical Problems hamper task performance.

OCNFL2=Interruption from people hamper task performance.

GCNFL1= Emotionally Charged work Atmosphere

Figure 6 Number of workers regarding the aspect of information transmission level for Conflict/ Uncertainty input.



IAVOI1 = Needed for sustained alertness to avoid serious consequences.

CAVOIT=Serious consequences of wrong decisions

OAVOIT= Hazardous task performance

GAVOI 11=Experienced Accident or Injury at work.

GAVOI 11=Witnessed Accident or Injury at work.

Figure 7 Number of workers regarding the aspect of information transmission level for Avoidance input.

Within the study we found that the Occupational stress of the female workers was more as compared to male workers. The Total OSI Score of Male workers was (M±SD) 77.02 ± 20.28 while that of Female workers was (M±SD) 79.72 ± 18.13, (t=2.39, p=0.009), Table-1

Underload

While measuring the load of work on underload input, the highest score was on the "simple task" and "automatic decision making". We also found that there was low frequency of the incoming signal and the decision was automatically derived from input. Tasks assigned were mostly simple and Pay Based upon how much the workers work. (Figure 1) and (Table2)

High Demand Input

On the high demand input we came to know that, most of the workers had to do "heterogeneous tasks" and "communication was necessary" as part of their work. Many workers had long working hour and had to do late night shift work. They have to make Complex, complicated decisions which can the effect work of others. A majority of workers reported the need for utilizing primary visual aids for long time as high demand input place a heavy burden on the visual system. (Figure 2) and (Table2)

Strictness

There is a strict requirement to define a correct decision for the workers; they can seek problem solving assistance to address complex issues. Works must meet a strictly defined standard. Most of the workers have to work in single posture with less mobile. There is also a confined windowless work space. (Figure 3) and (Table 2)

Extrinsic time pressure

Workers had full control over the rate of task performance but decision cannot be postponed by the workers. Deadline pressures and work speedup was experienced by most of the workers. (Figure 4) and (Table 2)

Aversive/Noxious exposure input.

Workers had the exposure of both glare and noise. Workers have to do Isometric lifting. Some of the workers also exposed to vibration. There was a lot of exposure to heat as compared to cold and noxious gases, fumes and dusts. (Figure 5) and (Table 2)

Conflict/ Uncertainty

Workers reported exposure to auditory disturbances which sometimes lead to unclear instruction and information. Sometimes it's impossible for the workers to complete everything, and technical problems usually hamper their task. (Figure 6) and (Table 2)

Avoidance

A considerable level of attention required to perform their job. There were no serious visually disturbing scenes that can affect or disturb the workers emotionally. Work environments were generally free of personal and professional conflicts. Workers reported that the High risk or hazardous tasks are uncommon and this leads to a relatively safe and accident free environment (Figure 7) and (Table 2)

Discussion

This study was set out to assess the stress level among the Indian footwear factory worker by using an Occupational Stress Index (OSI) Questionnaire. Our study showed that the work demand of the factory workers was very high. Many workers work for long period of time, even they do late night shift work as their pay based upon how much the workers work and thus they can earn much higher. Most of the workers exposed to noise, glare, and vibration and suffers from Occupational Health problems. Working in a single posture for long period of time can lead to many musculoskeletal Issues. Deadline pressures and work speedup, strict requirement to make a correct decision can cause significant mental health problems. Thus all these factors suggested that the Occupational Stress among the factory workers was very high.

Our results are supported by Kiran-et-al (2018) they did a study to assess the effectiveness of shift work on lifestyle, mental and physical health of factory workers. Their findings suggested that the workers who worked for long working hours and late night shifts, showed higher level of stress and physical problems as compared to the workers working in day shifts.

Also Syed Khalid Perwez et-al in, 2105 examined the effect of nature of job on psychiatric problems of 200 workers of Tata Motors Ltd. in Jamshedpur. Results clearly indicated that nature of job (high and low risk) played a significant role in creating psychiatric problems in workers. Workers doing high risk jobs showed a greater amount of psychiatric

problems compared to workers doing low risk jobs in both high paid and low paid categories.

Thus our result in line with these studies suggested that the Occupational stress of the footwear factory workers was very high.

Within the study we also found that the Occupational stress was more in female workers as compared to male workers. Our result was supported by Berntsson *et al*., 2006 they found the association between the female gender and occupational stress as compared to men. The possible explanation for the association found to be, as twice as much work done by the women in the house as well as the Child care on the daily basis. Thus, a woman today holds two areas of responsibility, which may explain, the greater impact on work.

Thus our result in line with this study suggested that the Occupational stress among female workers is more as compared to male workers.

Conclusion

Our study is among the few available studies on The Occupational Stress Index of Indian footwear factory workers. Our study showed that the working environment, Work load, Work pressure, Workplace design, Work posture are the factors that causes significant occupational stress among the factory workers. Thus based on the observations and analysis our study suggested that, workers must be screened out for Occupational health risk on the regular basis. There is a need for improvement in work environment, work design, and working conditions in the factory. The workers must be educated about the risks factors that can lead to physical and mental health disorder .They must be taught about the correct postural techniques and Ergonomic practices.

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Declarations

Conflicts of interest: The author reports no conflicts of interest in this work.

Funding sources: Self

Ethical clearance: Verbal consent and written consent were taken from each child's parents/guardians who participated in the study.

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