



# Effect of Summer Temperature on the Work Efficiency of Dentists

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**INTRODUCTION AND AIM:** Environment is closely related to human health. While the effects of temperature on comfort are broadly recognized, the effects on worker productivity have received much less attention. Thus, this research was planned to investigate the effects of heat stress on job satisfaction, job performance, occupational stress among dentists.

**MATERIALS AND METHOD:** This research was designed to be cross-sectional in nature where a convenience sampling of 70 interns, 88 post-graduate students and 49 faculty members of IDS Bareilly were selected. Questionnaires were self-administered and contained twelve points for job satisfaction (Minnesota Satisfaction Questionnaire), thirteen points for occupational stress and twelve for job performance.

**RESULTS:** The subjects were moderately satisfied with their jobs, were less stressed and had a moderate job performance. After descriptive tests, the Chi-squared test, Pearson and Spearman Correlation Coefficient was applied to test statistical significance and p value was set to be significant at  $p < 0.5$ .

**DISCUSSION:** The present study showed that most of the dentists (60.9%) had a high sense of heat and such results may be because of the current hospital framework which includes lack of air conditioners, continuous patient workload in hospital, high sense of heat among the dentists working in top floors etc.

**CONCLUSION:** If effective prevention measures are taken in the hospitals, dentists may perform more efficiently and also the increase the job satisfaction.

**KEYWORDS:** Work Efficiency, Job satisfaction, Job Performance, Occupation Stress, Summer Temperature

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## INTRODUCTION

Climate change is one of the most fiercely debated scientific issues of the past 20 years. Environment is closely related to human health. Besides naturally occurring hot climate, the use of burners, motors, boilers, scaler, dental chair focusing light, compressor, autoclave amplify the climatic stresses as a consequence of the cumulative effect on the work efficiency of dentists. Excessive heat strain in the hospitals can lead to heat related illness like headache, nausea, vomiting and thus decreases the work efficiency of dentists. In many hospitals, thermal conditions are not well-controlled due to insufficient cooling or heating capacity, high internal or external loads, large thermal zones, improper control system design or operation, and other factors.

Job satisfaction is among the most important factors that not only influence the productivity of workers but also the quality of work within an organization.<sup>1</sup> Job satisfaction is, according to the definitions of contemporary psychology, a state of positive or negative feelings that refers to a workers professional duties which results in his/her attitude towards work. Job satisfaction is a comparison between input and output.<sup>2</sup>

Occupational stress, also known as job stress, has been defined as the experience of negative emotional states such as frustration, worry, anxiety and depression attributed to work related factors.<sup>3</sup> Performance is defined as the management or measurement refers to the on-going means by which an organization monitors, documents, corrects or rewards individual and collective employee performance in an organization, using various tools.<sup>4</sup> A hot environment is a kind of unhealthy environment and in the recent years its psychological effects on workers have increased.<sup>5</sup> Such unhealthy environment can be responsible for the occupational stress, weak performance and job dissatisfaction.

While the effects of temperature on comfort are broadly recognized, the effects on worker productivity have received much less attention. Thus this research was planned to investigate the effects of heat stress on job satisfaction, job performance, occupational stress among dentists. The results of this research can present some suggestions related to improvement of environment heat condition in order to decrease occupational stress, improve job performance, and increase job satisfaction.<sup>5</sup>



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### MATERIALS AND METHODS

This research was designed to be cross-sectional in nature with a convenience sampling of 70 interns, 88 post-graduate students and 49 faculty members of IDS Bareilly. Questionnaires were self-administered to assess job satisfaction, job performance, occupational stress and heat strain score index. The Questionnaire was pre-validated and pre-tested prior to application and its Cronbach's Alpha ( $\alpha$ ) was found to be .07. Prior to commence of the study, a due ethical clearance was obtained from the Institutional Ethical Committee and a written consent from the study subjects were obtained.

#### Instruments:

1. Twelve points for job satisfaction (Minnesota Satisfaction Questionnaire), thirteen points for occupational stress and twelve for job performance<sup>4</sup> were selected. The respondents were asked to rate each of the items on the 5-point Likert scale: Strongly agree, Agree, Neutral, Disagree, Strongly disagree. Responses were scored as follows: Strongly agree = 1, agree=2, neutral=3, disagree=4, strongly disagree=5.

2. Heat strain score index (HSSI) was determined by HSSI questionnaire. The scores were determined by three levels, where level one is Green Zone or mild level, level two is Yellow Zone or moderate level, level three is Red Zone or severe level.

Both questionnaires and method of filling them was explained to the subjects and were completed simultaneously. In the next stage, the distributed and completed questionnaires were collected and the obtained data was entered in MS Excel sheet and further transferred to SPSS version 20.0 for statistical analysis. After descriptive tests, the Chi-squared test, Pearson and Spearman Correlation Coefficient was applied to test statistical significance and p value was set to be significant at  $p < 0.5$ .

### RESULTS

The subjects (n=207) were moderately satisfied with their jobs, were less stressed and had a moderate job performance. The result of table 1 reveal that most people (60.9%) had a high sense of heat, 29.0% people had moderate and 10.1% had low sense of heat.

The standard deviation and means of job satisfaction (28.83±7.55), performance (25.43±5.90) and occupational stress (34.14±5.70) is described in table 2.

HSSI	Frequency (%)
Low	21 (10.1%)
Moderate	60 (29.0%)
High	126 (60.9%)

**Table 1.** Frequency Distribution of Heat Stress Situation

Variables	N	Mean±SD
Job satisfaction	207	28.83±7.55
Job performance	207	25.43±5.90
Occupational stress	207	34.14±5.70

**Table 2.** Standard Deviation and Mean of Job Satisfaction, Performance and Occupational Stress

There was a negative co-relation between heat strain score index and job satisfaction as well as between HSSI and job performance (Table 3). There was a mild positive co-relation between HSSI and occupational stress. Therefore, job performance decreased as temperature increased.

Variables	HSSI	
	p value	R
Job satisfaction	0.283	-0.075
Occupational stress	0.969	0.003
Job performance	0.046	-0.025

**Table 3.** Pearson and Spearman Correlation Coefficient between Heat Strain Score Index with Job Satisfaction, Occupational stress, Job performance ( $p < 0.05$  – statistically significant, Spearman's rank correlation)

There is no difference between males and females when job satisfaction, job performance and occupational stress were considered (Table 4).

Variables	p value
Job satisfaction	0.643
Job performance	0.189
Occupational stress	0.511

**Table 4.** Gender based comparison ( $p < 0.05$ : statistically significant, Mann-Whitney test)

The comparison between all dental departments on the

basis of job satisfaction, job performance and occupational stress is given in Table 5.

Variables	p value
Job satisfaction	0.010*
Job performance	0.189
Occupational stress	0.511

**Table 5.** Department based comparison ( $p < 0.05$  - statistically significant)

When the mean value for satisfaction was calculated for all departments, the results showed that department of oral medicine and radiology (24.3+5.99) was highly satisfied and the department of oral pathology (35.75+6.25) was least satisfied. Post hoc analysis showed significant differences between the department of oral medicine and radiology (24.3+5.99) and oral pathology (mean 35.75+6.25), ( $p$  value - 0.001); orthodontics (26.80+8.03) and oral pathology (35.75+6.25), ( $p$  value - 0.019).

The comparison of job satisfaction, job performance, occupational stress between faculty, post graduate students and interns is given in Table 6. Job performance results were found significant ( $p$  value 0.008) between the faculty and interns where faculty (24.43+ 5.85) had better job performance as compared to interns (mean 26.50+ 5.85).

Variables	p value
Job satisfaction	0.094
Job performance	0.008*
Occupational stress	0.259

**Table 6.** Post based comparison [ $p < 0.05$  - statistically significant, Post hoc analysis showed significant difference between faculty and interns (0.006)]

## DISCUSSION

There are many dimensions in dentistry that can lead to satisfaction or dissatisfaction and can even affect the performance and lead to increase in stress among dental practitioners.<sup>2</sup> Increased temperature can be one such factor. The present study was done to assess the effect of temperature on job performance, satisfaction and occupational stress. When talking about job satisfaction, various factors were taken into consideration like chance of doing different things, freedom of judgement, working conditions, co-worker relationship etc. In our study, the dentists were

moderately satisfied with their jobs (Mean 28.83±7.55). For occupational stress factors, 13 questions were asked to the dentists like workload in the job, opportunity to utilize the ability and experience independently, reward for their hardwork, co-operation among the colleagues in solving various problems etc. Most of the dentists were less stressed with their jobs (mean 34.14±5.70).

Regarding job performance, 12 questions were asked to the dentists concerning dedication, seriousness and ability to take the responsibility, enjoy professional skills and technical knowledge, feel satisfied with the work in department, ability to express thoughts fluently and freely, feeling bored of repeating the same procedure in doing work etc. Most of the dentists were of the opinion that they were performing their job as per their ability (mean 25.43).

The present study showed that most of the dentists (60.9%) had a high sense of heat and such results may be because of the current hospital framework which includes lack of air conditioners, continuous patient workload in hospital, high sense of heat among the dentists working in top floors etc.

The obtained results suggested that heat has an impact on job performance but has no significant impact on job satisfaction and occupational stress.<sup>5</sup> The insignificant results for job satisfaction and occupational stress by the dentists may be because they were scared of losing their jobs. This is in accordance with a study conducted by Kobza J et al. and Pandita V et al. where the dentists were reasonably satisfied with their jobs.<sup>2,6</sup>

No significant differences were observed between males and females in the current study with regards to job performance, satisfaction and occupational stress. This finding is in accordance with a study in Yemen where no statistical differences were reported in stress among male and female dentists. However, it is in contrast with a study conducted by Rogers et al. where female Irish dentists were more stressed than males.<sup>7</sup> (MA) There is lack of further data exploring the association between the high temperature and work efficiency of dentists.

**Limitation of the Study:** As this was a questionnaire study, the responses were not always honest.

## CONCLUSION

If effective prevention measures are taken in the hospitals, dentists may perform more efficiently and also the increase the job satisfaction. The potential

impacts of high temperature at workplace are underestimated to some extent, may be due do the lack of literature.

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