

# Periodic Research

## Comparative Study of Discomfort among The Government and Nongovernment Office Workers



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### Abstract

Today work has become life, man has to work for 10-12 hours in a specific built environment. To focus upon maximizing comfort and safety for environment we should know about the factors which are causing discomfort to the workers. Various studies proved that discomfort directly affects the performance of the worker. It is in this context that present study was under taken. The objective was to assess the level of discomfort felt while sitting by the office workers, working in government and non government offices. 100 male and female working as executives and Clerks in government and non government offices, having normal height and weight with no complaints of chronic ailments were selected as samples. The information regarding age, occupation, income and feeling of body part discomfort was collected through a questionnaire using corlett's body part discomfort scale. The feeling of discomfort is easily noticeable by the workers if it is measured with respect to the discomfort felt in the various body parts, because most of the persons consider absence of the discomfort as a measure of comfort. It was found that the discomfort felt was more among the government office workers than among the office worker working in non government offices. In all the levels of the discomfort, scores of government office workers were high as compared to non government office workers. This discomfort felt was higher in the legs and the back. The Gender wise distribution of discomfort revealed that female office workers felt more discomfort. They felt tired legs and numbness in the legs more than the male office workers, because they have to perform household jobs also for which they normally remain standing. Executives had more discomfort than the clerks even though they sit on comfortable and esthetically beautiful chair. Executives and clerks both have more discomfort in legs and back. Investigator found that most office workers are unaware of the importance of sitting in proper posture. They never bother about the seat height, angle and dimensions of the work seat. Even where the workers are provided with adjustable seat height, they never try to adjust the seat according to their requirements. This shows how we neglect the small and easy adjustments and suffer in the long run. There is an urgent need to make all the office workers aware about the proper seat and posture while sitting for long time. For prevention of back pain it is important that the back muscles should not be strained for prolonged periods. The worker should change the task after few hours. He/she should try to do reading, writing and typing or data entry alternately. The paper suggests some measures to reduce body part discomfort.

**Keywords:** Body Part Discomfort, Posture, Office Workers.

### Introduction

In the modern world work is life and life is work. Life today has become very fast and hectic. Man has to work like a machine for 8-10 hours or more since with greater state of civilization being achieved, human being is now confined to a specific built environment for stay and work both. This built environment consists of installed equipments, instruments, machines and furniture. To focus upon maximizing comfort and safety for the users of such built environment we should know about the factors which are causing discomfort to the workers. It is in this context that the present study was undertaken.

### Review of Literature

In recent years there has been an increase in recognition of health consequences associated with lack of movement, the use of comfort as the criterion in the design of seating can be justified by giving the argument that the orthopedically unsuitable and unsatisfactory postures are

uncomfortable Excessive muscular strain brings on fatigue where as a greater degree of comfort in a restful posture with relaxed muscles must accompany a natural attitude of the spine.

Lecorpen-tier (1969) found that comfort diminishes with the time the longer one sits the less comfort he feels. Shacked chidsey and Shipley (1969) divided the degree of seating comfort into 11 different steps from completely relaxed to unbearable painful. They suggested that a multipurpose seat should be designed that would be acceptable for several users. Oshim M (1970) studied comfort in relation to seat dimensions on an experimental seat. Grand jean et. al. (1973) devised a chair for the research and experiments related with sitting they called it a "sitting machine" and studied the comfort in relation to the profile of a chair. Troupe (1978) made a detailed study of back pain among bus drivers and found that majority of them suffered from back pain, which can be prevented by redesigning the driver seat. Many studies have been done related to the discomfort felt by the user of the sitting furniture depending upon the design of furniture, but Grandjean et al (1969) made the first scientifically detailed assessment of the chair comfort and discomfort in various sitting postures. They characterized various kinds of chairs on which subjects were made to sit for 1/2 an hour to 3 hours after that they expressed their feelings of comfort or discomfort into 11 degrees from completely relaxed to unbearable pain. They found comfort depends on postures and the time for seating and suggested a compromise chair. Bendix et al (1985) studied the sitting comfort in various types of seats. Various studies proved that discomfort directly affects the performance of the worker it is in this context that the present study was undertaken. Reineckers et. al. (1985) studied tolerance time in various postures on chairs of conventional design for elderly people and concluded that low back pain can be eliminated by redesigning their chair and table. Winkle and oxen burgh (1990) have the opinion that comfort and movement may sometimes conflict and that movement is more important than comfort. M.H. Liao and C. Cr Drury (2000) studied the relationship between Postural discomfort and performance in a VDT task. The ratting of general discomfort and body part discomfort was calculated, the result indicated

that there was positive interrelationship between postural comfort and performance.

**Objective**

To assess the level of discomfort felt while sitting by the office workers, working in government and non government offices.

**Hypothesis**

There shall be no significant association between the level of discomfort and the type of organization, gender and status of the office workers.

**Methodology**

100 Male and female working as executives and Clarks in government and non government offices having normal height and weight with no complaints of chronic ailments were selected for the study as samples.

**Tools and Techniques**

The information regarding age, occupation, income and feeling of body part discomfort was collected through a questionnaire using corlett's body part discomfort scale. This scale was developed by corlett (1976) it was modified by Kuorinka et. al (1981) and Kroemer et. al. (2001). This scale uses a drawing of human figure to indicate the body part discomfort in 9 stage from not at ease to crumbed legs.

**Results**

The feeling of discomfort is easily noticeable by the workers if it is measured with respect to the discomfort felt in the various body parts, because most of the persons consider absence of the discomfort as a measure of comfort. The discomfort was measured in nine gradually increasing stages. Each stage was again expressed as score 1 to 9 depending upon the intensity of the feeling. The respondents expressed their feeling by tick marking column of that number depending upon the severity of the feeling. The results are presented in the form of table and the figures -

**Organization wise Feeling of Discomfort**

Table 1 & Fig. 1 presents the chi-square values of the various stages of discomfort felt by the office workers of government and non-government offices. The below table expresses the percentage of the office workers feeling that stage and that particular score. The 0 indicates that no of person who do not feel discomfort of that stage. From one to nine there are nine stages of severity of discomfort. The worker had to put a tick mark in the column of that number.

**Table 1**  
**Organization wise Chi value (x) and Percentage Distribution of the Discomfort Felt by the Office Workers**

| Code           | Group     | 0  | 1  | 2  | 3 | 4  | 5  | 6 | 7 | 8 | 9  | Total | Chi  | Signi. |
|----------------|-----------|----|----|----|---|----|----|---|---|---|----|-------|------|--------|
| E <sub>1</sub> | Govt.     | 29 | 23 | 9  | 7 | 7  | 10 | 2 | 4 | 1 | 8  | 71    | 9.05 | 0.43   |
|                | Non-govt. | 39 | 27 | 3  | 8 | 5  | 9  | - | 3 | 2 | 4  | 61    |      |        |
| E <sub>2</sub> | Govt.     | 31 | 12 | 14 | 7 | 13 | 8  | 1 | 4 | 3 | 7  | 69    | 6.41 | 0.698  |
|                | Non-govt. | 32 | 19 | 15 | 9 | 9  | 5  | 2 | 4 | 3 | 2  | 68    |      |        |
| E <sub>3</sub> | Govt.     | 36 | 21 | 13 | 5 | 6  | 7  | 2 | 2 | 4 | 4  | 64    | 13.3 | 0.146  |
|                | Non-govt. | 48 | 25 | 5  | 5 | 2  | 5  | 5 | 2 | - | 3  | 52    |      |        |
| E <sub>4</sub> | Govt.     | 32 | 20 | 6  | 9 | 5  | 8  | 4 | 4 | 5 | 7  | 68    | 13.6 | 0.136  |
|                | Non-govt. | 45 | 24 | 10 | 4 | 5  | 2  | 3 | 3 | 1 | 3  | 55    |      |        |
| E <sub>5</sub> | Govt.     | 29 | 21 | 8  | 7 | 10 | 8  | 1 | 2 | 6 | 8  | 71    | 13.9 | 0.123  |
|                | Non-govt. | 46 | 23 | 9  | 6 | 3  | 6  | 1 | 2 | 1 | 3  | 74    |      |        |
| E <sub>6</sub> | Govt.     | 29 | 24 | 7  | 5 | 6  | 5  | 4 | 2 | 6 | 12 | 71    | 4.78 | 0.852  |
|                | Non-govt. | 38 | 22 | 6  | 3 | 5  | 2  | 7 | 3 | 5 | 9  | 62    |      |        |
| E <sub>7</sub> | Govt.     | 34 | 24 | 9  | 6 | 6  | 3  | 3 | 2 | 4 | 9  | 66    | 8.38 | 0.500  |

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|                |           |    |    |    |   |   |   |   |   |   |    |    |      |       |
|----------------|-----------|----|----|----|---|---|---|---|---|---|----|----|------|-------|
|                | Non-govt. | 47 | 21 | 10 | 4 | 2 | 2 | 4 | 4 | 2 | 4  | 53 |      |       |
| E <sub>8</sub> | Govt.     | 33 | 26 | 7  | 6 | 9 | 4 | 2 | 4 | 1 | 8  | 67 | 16.9 | 0.650 |
|                | Non-govt. | 48 | 28 | 4  | 5 | - | 4 | 3 | 2 | 3 | 3  | 52 | 0    |       |
| E <sub>9</sub> | Govt.     | 28 | 25 | 8  | 5 | 7 | 6 | 6 | 1 | 4 | 10 | 72 | 10.5 | 0.97  |
|                | Non-govt. | 42 | 25 | 6  | 4 | 2 | 4 | 4 | 4 | 1 | 8  | 58 | 9    |       |

E<sub>1</sub> – Not at east, E<sub>2</sub> – Tired, E<sub>3</sub> – Swollen ankles, E<sub>4</sub> – Tired legs, E<sub>5</sub> – Pain in legs, E<sub>6</sub> – Tired back, E<sub>7</sub> – Numbness in legs, E<sub>8</sub> – Cramped legs, E<sub>9</sub> – Cramped back.

From Table 1, it is evident that chi-value for the rating of discomfort among the government and non-government office workers 9.05, 6.41, 13.38, 13.63, 13.97, 4.78, 8.33 and 10.59 for the levels, E<sub>1</sub> – not at ease, E<sub>2</sub> – Tired, E<sub>3</sub> – Swollen ankles, E<sub>4</sub> – Tired legs, E<sub>5</sub> – Pain in legs, E<sub>6</sub> – Tired back, E<sub>7</sub> – Numbness in legs and E<sub>9</sub> – Cramped back are not significant at 0.05 level with df = 9. This shows that there is no association between these stages of discomfort and the type of organization. Thus, the null hypothesis that there will be no association between the discomfort felt and the type of organization is accepted for them.

The chi value 16.90 is significant at 0.05 level with df = 9. This indicates that there is a

significant association between the feeling of cramped legs and the type of organization. The government office workers feel more cramped in legs than the non-government office workers. This is because the government office workers had chairs, which are not ergonomic.

As the table shows more number of government office workers feel not at ease, tired, tired legs, tired back, numbness in the legs, cramped legs and cramped back as compared with the non-government office workers. These discomfort stages are reached due to the fact that the government office workers used old type of chairs, which are not ergonomic in design.

**Table 2**

**Gender wise Chi value (x) and Percentage Distribution of the Rating of Discomfort Felt by the Office Workers**

| Code           | Group  | 0  | 1  | 2  | 3  | 4  | 5  | 6 | 7 | 8 | 9  | Total | Chi   | Signi. |
|----------------|--------|----|----|----|----|----|----|---|---|---|----|-------|-------|--------|
| E <sub>1</sub> | Male   | 34 | 27 | 5  | 7  | 7  | 8  | 1 | 3 | 1 | 7  | 66    | 2.33  | 0.985  |
|                | Female | 34 | 23 | 7  | 8  | 5  | 11 | 1 | 4 | 2 | 5  | 66    |       |        |
| E <sub>2</sub> | Male   | 36 | 14 | 15 | 8  | 10 | 5  | 2 | 5 | 1 | 4  | 64    | 6.09  | 0.730  |
|                | Female | 27 | 17 | 14 | 8  | 12 | 8  | 1 | 3 | 5 | 5  | 73    |       |        |
| E <sub>3</sub> | Male   | 49 | 24 | 10 | 1  | 2  | 3  | 2 | 2 | 1 | 6  | 51    | 19.90 | 0.019  |
|                | Female | 35 | 22 | 8  | 9  | 6  | 9  | 5 | 2 | 3 | 1  | 65    |       |        |
| E <sub>4</sub> | Male   | 43 | 22 | 7  | 7  | 4  | 4  | 4 | 2 | - | 7  | 57    | 11.20 | 0.262  |
|                | Female | 34 | 22 | 9  | 6  | 6  | 6  | 3 | 5 | 6 | 3  | 66    |       |        |
| E <sub>5</sub> | Male   | 40 | 26 | 9  | 3  | 4  | 6  | 2 | 2 | 1 | 7  | 60    | 14.21 | 0.115  |
|                | Female | 35 | 18 | 8  | 10 | 9  | 8  | - | 2 | 6 | 4  | 65    |       |        |
| E <sub>6</sub> | Male   | 39 | 24 | 5  | 3  | 5  | 1  | 4 | 3 | 5 | 11 | 61    | 7.90  | 0.544  |
|                | Female | 28 | 22 | 8  | 5  | 6  | 6  | 7 | 2 | 6 | 10 | 72    |       |        |
| E <sub>7</sub> | Male   | 48 | 20 | 7  | 2  | 4  | 1  | 4 | 2 | 2 | 10 | 52    | 15.29 | 0.883  |
|                | Female | 33 | 25 | 12 | 8  | 4  | 4  | 3 | 4 | 4 | 3  | 67    |       |        |
| E <sub>8</sub> | Male   | 48 | 26 | 3  | 4  | 3  | 3  | 2 | 1 | 2 | 8  | 52    | 12.58 | 0.182  |
|                | Female | 33 | 28 | 8  | 7  | 6  | 5  | 3 | 5 | 2 | 3  | 67    |       |        |
| E <sub>9</sub> | Male   | 43 | 24 | 8  | 2  | 2  | 4  | 3 | 2 | 5 | 7  | 57    | 17.66 | 0.039  |
|                | Female | 27 | 26 | 6  | 7  | 7  | 6  | 7 | 3 | - | 11 | 73    |       |        |

E<sub>1</sub> – Not at east, E<sub>2</sub> – Tired, E<sub>3</sub> – Swollen ankles, E<sub>4</sub> – Tired legs, E<sub>5</sub> – Pain in legs, E<sub>6</sub> – Tired back, E<sub>7</sub> – Numbness in legs, E<sub>8</sub> – Cramped legs, E<sub>9</sub> – Cramped back.

### Gender wise Feeling of Discomfort

From the Table 2 & Fig. 2, it is evident that the chi value for the rating of discomfort felt by male and female office workers are 2.33, 6.09, 11.20, 14.21, 7.90, 15.29 and 12.58 in respect of characteristic, (1) not at ease, (2) tired, (3) tired legs, (4) pain in legs, (5) tired back, (6) numbness in legs, and (7) cramped legs, respectively are not significant. This shows that there is no significant association between gender and the respective level of discomfort. On the other hand chi square values 19.90 and 17.66 in respect with swollen ankles and cramped back respectively are significant at 0.05 level with df = 9. It shows that there is a significant association between the gender and these levels of discomfort.

The table further reveals that the discomfort scores of the males are less than the females. The discomfort level of female office worker is more.

There is a significant association between the gender and discomfort of legs and back. The female office workers feel more discomfort in back and they also face the problem of swollen ankles more than the males. Thus, the null hypothesis that there shall be no significant association between the gender and the level of discomfort felt by the office workers working in different offices is rejected in these two respects and it is not rejected for all the other levels of discomfort.

The difference in the levels of discomfort in male and female can be explained on the basis of the fact that because female have to perform the household duties also. Whether they are executives or clerks they have to perform their household duties like cooking, child care, washing cloths and cleaning also. Most of these activities are performed in a standing posture, so they feel more tired and crampedness in back muscles.

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The table further reveals that the main problem of office workers is the back pain. The percentages of the persons suffering from back pain

are increasing, as it is clear from the above table that 57% male and 73% female have the feeling of cramped back.

**Table 3**  
**Status wise Chi value (x) and Percentage Distribution of the Rating of Discomfort Felt by the Office Workers**

| Code           | Category   | 0  | 1  | 2  | 3  | 4  | 5  | 6 | 7 | 8 | 9  | Total | Chi   | Signi. |
|----------------|------------|----|----|----|----|----|----|---|---|---|----|-------|-------|--------|
| E <sub>1</sub> | Executives | 31 | 26 | 5  | 7  | 7  | 9  | 1 | 6 | 2 | 6  | 69    | 5.30  | 0.807  |
|                | Clerks     | 37 | 24 | 7  | 8  | 5  | 10 | 1 | 1 | 1 | 6  | 63    |       |        |
| E <sub>2</sub> | Executives | 30 | 19 | 12 | 6  | 8  | 7  | 2 | 6 | 5 | 5  | 70    | 10.41 | 0.318  |
|                | Clerks     | 33 | 12 | 17 | 10 | 14 | 6  | 1 | 2 | 1 | 4  | 67    |       |        |
| E <sub>3</sub> | Executives | 35 | 29 | 13 | 5  | 4  | 6  | - | 2 | 3 | 3  | 65    | 17.16 | 0.046  |
|                | Clerks     | 49 | 17 | 5  | 5  | 4  | 6  | 7 | 2 | 1 | 4  | 51    |       |        |
| E <sub>4</sub> | Executives | 35 | 25 | 8  | 8  | 3  | 7  | 2 | 3 | 2 | 7  | 65    | 9.04  | 0.433  |
|                | Clerks     | 42 | 19 | 8  | 5  | 7  | 3  | 5 | 4 | 4 | 3  | 58    |       |        |
| E <sub>5</sub> | Executives | 35 | 23 | 10 | 5  | 7  | 6  | 1 | 2 | 4 | 7  | 65    | 2.97  | 0.965  |
|                | Clerks     | 40 | 21 | 7  | 8  | 6  | 8  | 1 | 2 | 3 | 4  | 60    |       |        |
| E <sub>6</sub> | Executives | 31 | 22 | 8  | 7  | 6  | 3  | 3 | 3 | 4 | 13 | 69    | 10.36 | 0.322  |
|                | Clerks     | 36 | 24 | 5  | 1  | 5  | 4  | 8 | 2 | 7 | 8  | 64    |       |        |
| E <sub>7</sub> | Executives | 36 | 26 | 9  | 6  | 4  | 2  | 3 | 4 | 2 | 8  | 64    | 4.91  | 0.842  |
|                | Clerks     | 45 | 19 | 10 | 4  | 4  | 3  | 4 | 2 | 4 | 5  | 55    |       |        |
| E <sub>8</sub> | Executives | 38 | 31 | 4  | 8  | 5  | 3  | 2 | 2 | 1 | 6  | 62    | 7.15  | 0.621  |
|                | Clerks     | 43 | 23 | 7  | 3  | 4  | 5  | 3 | 4 | 3 | 5  | 57    |       |        |
| E <sub>9</sub> | Executives | 30 | 30 | 8  | 4  | 5  | 6  | 3 | 3 | 3 | 8  | 70    | 6.559 | 0.683  |
|                | Clerks     | 40 | 20 | 6  | 5  | 4  | 4  | 7 | 2 | 2 | 10 | 60    |       |        |

E<sub>1</sub> – Not at all, E<sub>2</sub> – Tired, E<sub>3</sub> – Swollen ankles, E<sub>4</sub> – Tired legs, E<sub>5</sub> – Pain in legs, E<sub>6</sub> – Tired back, E<sub>7</sub> – Numbness in legs, E<sub>8</sub> – Cramped legs, E<sub>9</sub> – Cramped back.

### Status wise Feeling of Discomfort

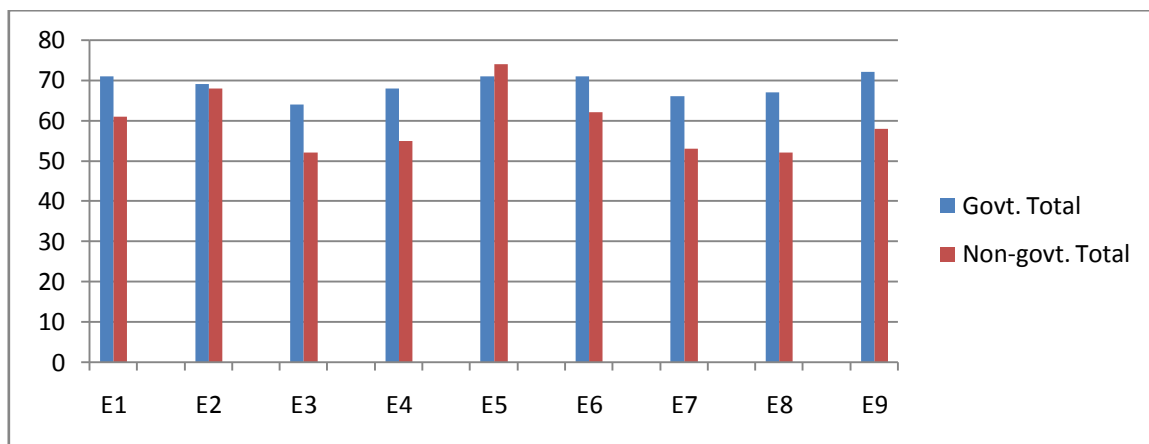
The Table 3 & Fig. 3, presents the status wise chi square values and percentage distribution of the discomfort felt by office workers of the two status i.e. executives and clerks.

It is evident that the chi value 17.16 is significant at 0.05 level with df = 9. This indicates that there is a significant association between the status of the office workers and the feeling of swollen ankles. More percentage of executive's faces the problem of swollen ankles. This is because the executives sit for longer periods and do not move from their place frequently, this cause undue pressure on the underside of thigh causing hindrance in the proper blood circulation in the feet. This results in the form of swelling of the ankles. So we can say that the hypothesis that there shall be no significant

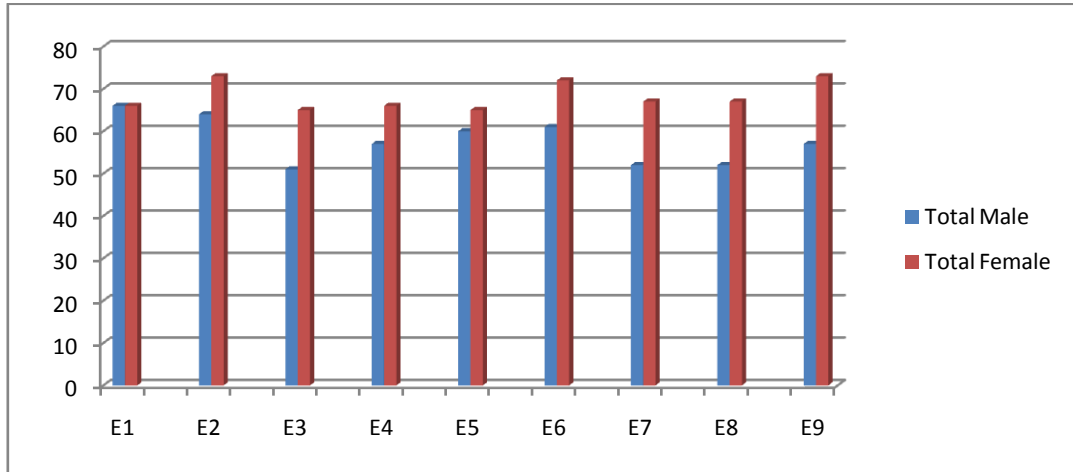
association between the status and discomfort felt was rejected for stage E-3 i.e. swollen ankles, but the chi values 5.30, 10.41, 9.04, 2.97, 10.36, 4.91, 7.15 and 6.55 for all the other stages of discomfort were not significant at 0.05 level so it is concluded that there is no association between the status of office workers and the various feelings of discomfort. It may, therefore, said that the hypothesis that there shall be no significant association between the status and discomfort felt was not rejected for.

The percentages of discomfort in general are higher for the executives than the clerks though they sit on ergonomically better chairs.

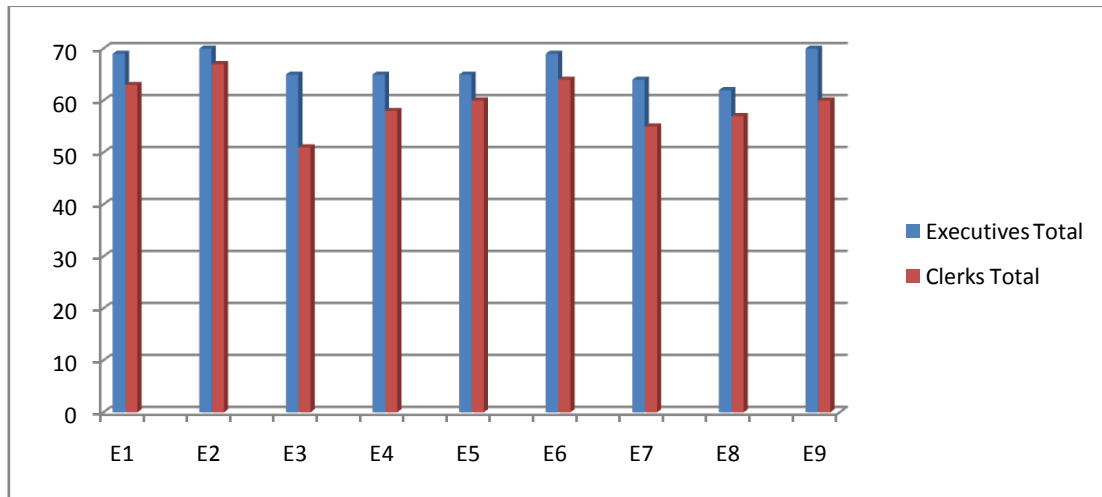
The feeling of tiredness in the back is also more prevalent among executives, while the feeling of cramped back was higher among the clerks.



**Fig - 1 Organization wise Discomfort Felt by the Office Workers**



**Fig- 2 Gender wise Discomfort Felt by the Office Workers**



**Fig-3 Status wise Discomfort Felt by the Office Workers**

### Conclusion

1. It was found that the discomfort felt was more among the government office workers than among the office worker working in non government offices. In all the levels of the discomfort, scores of government office workers were high as compared to non government office workers. This discomfort felt was higher in the legs and the back.
2. The Gender wise distribution of discomfort revealed that female office workers felt more discomfort. They felt tired legs and numbness in the legs more than the male office workers, because they have to perform household jobs also for which they normally remain standing.
3. Executives had more discomfort than the clerks even though they sit on comfortable and esthetically beautiful chair. Executives and clerks both have more discomfort in legs and back.

### Suggestion

#### Increase Awareness about Proper Posture

Investigator found that most office worker are unaware of the importance of sitting in posture. They never bother about the seat height, angle and dimensions of the work seat. Even where the workers

are provided with adjustable seat height, they never try to adjust the seat according to their requirements. This shows how we neglect the small and easy adjustments and suffer in the long run. There is an urgent need to make all the office workers aware about the proper seat and Good posture while sitting for long time.

#### Change in the Task

For prevention of back pain it is important that the back muscles should not be strained for prolonged periods. The worker should change the task after few hours. He/she should try to do reading, writing, typing or data entry alternately.

#### Change the Posture

The worker should change posture after every 45 minutes or one hour so that the same muscles are not strained for long time period. Ideally a worker should be provided to do the work in sitting as well as standing postures. This will really help in relieving the back muscles from strain. If it is not possible the worker should get up after every 1 or 2 hours and move around for 10-15 minutes to give relaxation to the back muscle.

## Frequent Breaks During the Long Working Hours

Investigator found that non-government office workers work for very long duration (upto 10-12 hours per day). According to Kroemer and Kroemer the most easily applied remedy to this is to alternate between walking, standing and sitting, and frequent breaks between the work. They suggest short but frequent breaks in between the working hours.

## Semi Sitting

Kroemer and Kroemer have suggested a posture half way between sitting and standing with some of the upper body weight supported at the buttocks and the rest of the weight transmitted through the legs to the ground.

## Make Individual Adjustments

In offices it is not practically possible to design chair for every individual. This is possible in household furniture because household furniture is used by a particular person. Therefore, it is suggested that every individual can make adjustment of seat according to his/her own anthropometric measurement. Seat height can be improved by keeping seat cushion or a small wooden board can be kept under table to keep legs or a sloping writing pad can be used over the table to improve the posture.

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