

## **POSTURE ANALYSIS OF DENTISTS PERFORMING VARIOUS DENTISTRY JOBS**

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**Abstract**—*Inspite of the efforts made through Ergonomics, the work of dentists had not been eased to fullest. The objective of present study was to introduce the chest rest to ease the work of dentists and thereby decrease musculoskeletal disorders (MSDs) in dentists. This experiment was conducted on dentists during their working time by studying the postures of dentists using different positions.*

**Keywords**— *MSDs, Postures, Dentists, Positions, Pain*

### **I. INTRODUCTION**

Ergonomics had helped to design the dentistry equipment very carefully for easing the work of dentists but still many dentists complain of pain in neck, shoulder and lower back. Therefore, there is still the need for analysing the equipment in detail. The objective of present study was to avoid musculoskeletal problems which arise due to stressful postures of the dentists. So, the study undertook introduction of chest rest as one of the possible solutions for a supported leaning forward sitting position and thus to decrease the musculoskeletal disorders. For the purpose, the postures of 30 dentists using different positions in various private colleges and clinics was observed and recorded in the form of pictures and subjective readings of pain.

### **II. METHODOLOGY**

#### **2.1 Methodology**

##### **Step 1: Selection of sample**

The data was collected by taking a sample of 30 dentists from private dental colleges and clinics.

##### **Step 2: Experimental set up**

Markers are applied on the body of dentists i.e head side, shoulder joint, mid back and lower hip joint.

##### **Step 3: Observation of doctors at various jobs and positions**

Each of the dentist was observed while they performed different jobs with different positions.

##### **Step 4: Recording readings for pain**

A subjective reading of the pain experienced by them was asked after every ten minutes for 1 hour.

##### **Step 5: Capturing photographs**

Photographs of individual dentists were taken for each of the jobs performed in different positions.

##### **Step 6: Analysis body angles from photographs**

Photographs were analysed through LAB-View to obtain three body angles.

##### **Step 7: Results**

Values of neck pain, shoulder pain and lower back pain were obtained at different jobs.

#### **2.2 Study Design**

The study was conducted on 30 Doctors (Dentists) from private colleges and clinics. All thirty doctors were made to perform different types of jobs in different positions as described in the chapter. The subjective reading of the pain

experienced by each of the dentist was recorded after every ten minutes for one hour. So, in total 6 reading were taken from each doctor in each position and doing each job. The doctors had to say a number between 0 to 10 (where 10 represents maximum and 0 represents minimum pain) representing their pain or fatigue.

**2.3 Types of doctor jobs and positions**

There were seven different jobs taken

- RCT Treatment.
- Restoration of Upper Jaw Teeth.
- Restoration of Lower Jaw Teeth.
- Extraction of Upper Jaw Teeth.
- Extraction of Lower Jaw Teeth.
- Scaling.
- Rubbing.

**There were four different positions**

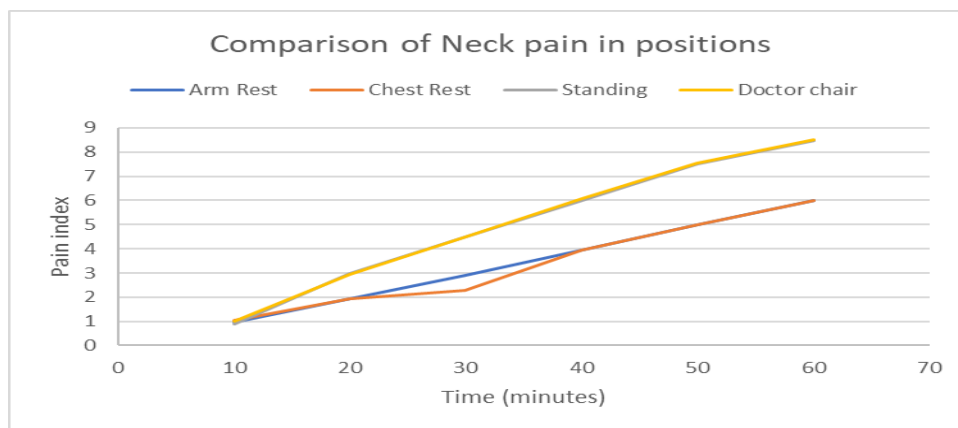
- Standing.
- Sitting on doctor’s chair without arm rest.
- Sitting on chair with arm rest use in between jobs.
- Sitting on chair with chest rest.

**There were three angles to be measured**

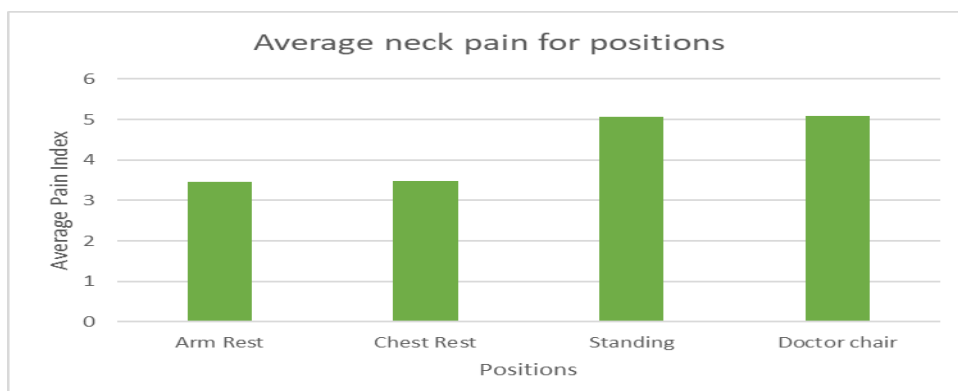
- Back (back to horizontal hip angle) (Angle 1 or A1)
- Neck (Shoulder to neck angle) (Angle 2 or A2)
- Shoulder (Shoulder to hip alignment) (Angle 3 or A3)

**III. RESULTS**

The following results were concluded for neck pain, shoulder pain and lower back pain in various performing jobs (RCT Treatment, Restoration of Upper Jaw Teeth, Restoration of Lower Jaw Teeth, Extraction of Upper Jaw Teeth, Extraction of Lower Jaw Teeth, Scaling, Rubbing) and body angles. These results are represented for various positions (arm rest, chest rest, standing and doctor chair)

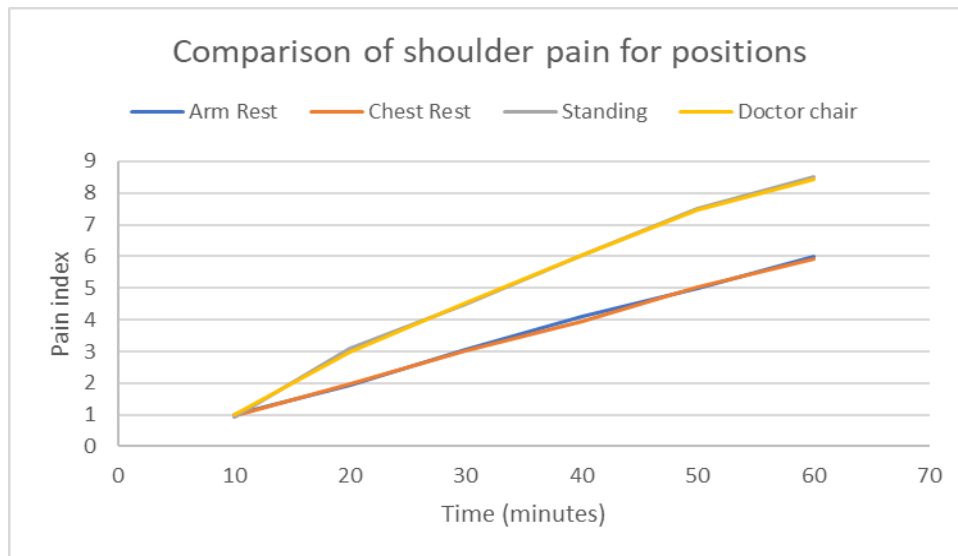


*Figure 1 Comparison of Neck pain at different positions*

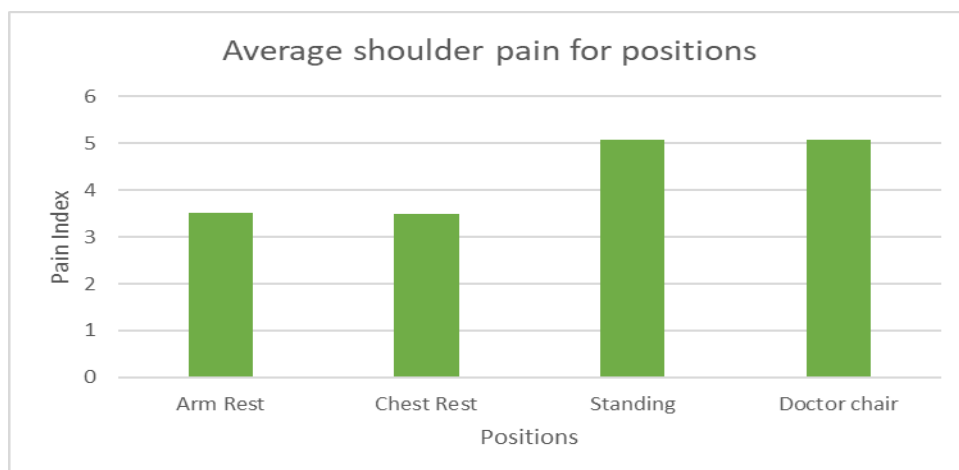


*Figure 2 Average Neck pain at different positions*

In case of neck pain, the average pain index for arm rest and chest rest are 3.45 and 3.48 respectively, and, in standing and sitting on doctor's chair are 5.06 and 5.09 respectively which is more than earlier showing reduction in neck pain with the proposed equipment. The neck pain was significantly much lower from 20 minutes to 40 minutes in case of chest rest positions.

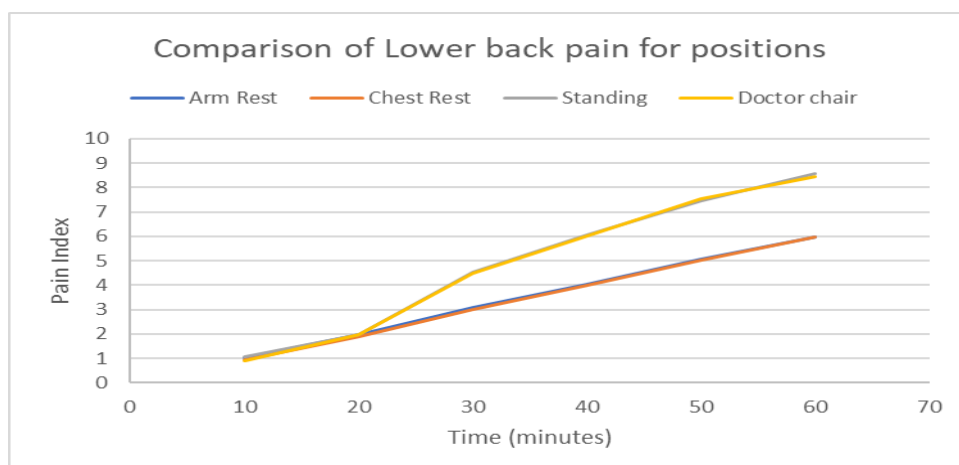


*Figure 3 Comparison of shoulder pain in different positions*

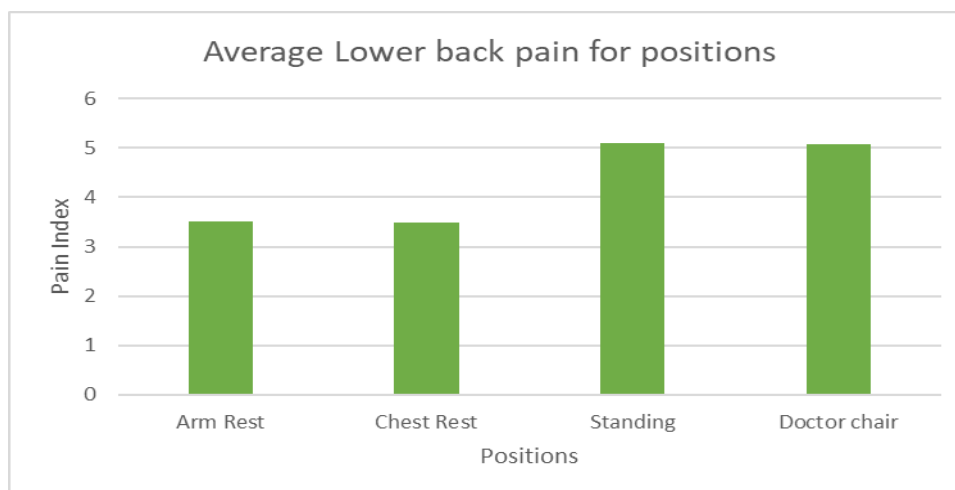


*Figure 4 Average Shoulder pain at different positions*

In case of shoulder pain, the average pain index for arm rest and chest rest are 3.52 and 3.48 respectively, and, in standing and sitting on doctor's chair are 5.08 and 5.08 respectively which is more than earlier showing reduction in arms and shoulder pain with the proposed equipment.

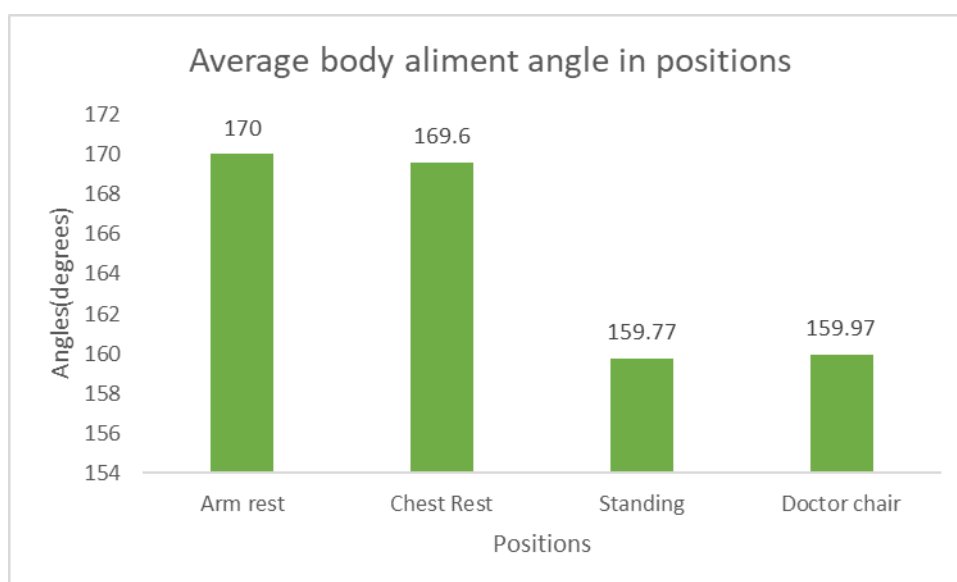


*Figure 5 Comparison of Lower back pain at different positions*



*Figure 6 Average lower back pain at different positions*

In case of lower back pain, the average pain index for arm rest and chest rest are 3.52 and 3.48 respectively, and, in standing and sitting on doctor's chair are 5.11 and 5.07 respectively which is more than earlier showing reduction in back pain with the proposed equipment.



*Figure 7 Average body alignment angle at different positions*

In analysis the average angles for body alignment are in arm rest and chest rest are 170.04 and 169.60 respectively which are well above the ISO standards mentioned, and, in standing and sitting on doctor's chair are 159.77 and 159.97 respectively which is less than the with earlier one and below the ISO recommended value of 160 for arm/ shoulder and neck. On the other hand, the showing the improvement in body posture with the proposed equipment

#### IV. CONCLUSIONS

We can draw major points out of it:

- Neck pain least average values were observed during RCT treatment, Rubbing and Restoration of upper jaw while using chest rest position.
- Shoulder pain least average values were observed during Restoration of upper jaw and Restoration of lower jaw while using chest rest position.
- Lower back pain least average values were observed during Restoration of lower jaw, Extraction of upper jaw teeth and Scaling while using chest rest position.
- The average pain index for Neck pain, shoulder pain and lower back pain using chest rest were observed lowest which showed reduction in neck pain with the proposed equipment.
- The body alignment angles in chest rest and arm rest are well above the ISO standards as compared to standing and sitting in doctor's chair. It resulted to the decrease in chest position showing that use of chest rest increase body alignment angles. Thereby decreasing pain in rest of the cases using chest rest position. Hence, it showed the improvement in body posture.

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