

# Evaluation of Work-Related Musculoskeletal Pain and Work Posture in Ultrasonologists Working in Mumbai

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## ABSTRACT

**Background:** Work-related musculoskeletal disorders (WRMDs) are common occupational problem observed in jobs which involves repetitive motion and assuming awkward positions for prolonged period of time. Ultrasonologists job activities involve holding the transducer head in a proper plane of scanning, one-sided static working position, prolonged pinch gripping of the ultrasound transducer, abduction at the shoulder during transducer placement and insufficient recovery time. Maintaining these awkward postures for a prolonged period of time increases their risk of having work related musculoskeletal disorders.

**Objective:** To assess musculoskeletal pain, work posture and level of risk of injury during the work.

**Method:** A sample of 60 ultrasonologists working in urban area fulfilling the selection criteria were screened for work related musculoskeletal pain using The Short form McGill Pain Questionnaire (SFMPQ) and for work posture and level of risk of injury using Rapid Entire Body Assessment (REBA).

**Results:** Majority of the ultrasonologists complained of upper back pain (27%) followed by low back pain (19%), shoulders (16%), neck (16%), wrist (11%) and knees (11%). 93.3% of the study population fall under medium risk, 3.30% fall under low risk, and 3.30 % fall under high risk of injury related to work..

**Conclusion:** This study concludes that most of the ultrasonologists had upper back pain and moderate risk of musculoskeletal injuries related to work.

**KEYWORDS:** Rapid Entire Body Assessment, Work Related Musculoskeletal Disorders, Short form McGill Questionnaire, ultrasonologist.

## INTRODUCTION

Work related musculoskeletal disorders (WRMDs) are a group of disorders which affects the muscles, nerves, tendons, joints, cartilages, and spinal discs. These disorders occur due to the risk factors present in the workplace and work posture and it accounts for 60% of all the workplace illness. They are characterized by pain, limitations in mobility and for performing tasks, increase in the level and difficulty of functioning by reducing people's ability to work. The primary risk factors include awkward work postures and movements, vibrations, temperature, increase pressure, repetitiveness, pace of work and monotonous work. It has been reported that among the ultrasonologists, 82-88% showed occurrence of WRMSDs all over the world. [1] Work posture is the attitude and condition of the body or body parts while performing any kind of work. Maintaining proper work posture is an important aspect for performing tasks as it promotes health and minimizes stress and discomfort during work. Repetitive motions, forceful or awkward movements, duration of pressure, overuse, poor posture or improper positioning, excessive force and strain and vibrations can lead to WRMSDs

contributing to symptoms of discomforts and risk of injury.

Ultrasonography is a diagnostic medical procedure that uses high frequency sound waves to produce dynamic visual images of organs, tissues, or blood flow inside the body. It involves an activity of operating ultrasound equipment which is applied on a body part or specific region while making repetitive and constant movements. These movements involve specific parts of the musculoskeletal system especially the wrist MCP and interphalangeal joints thereby subjecting to constant wearing and tearing and degenerative changes.<sup>[1]</sup> A diagnostic medical sonographer is a highly skilled professional who uses specialized equipment to create images of structures inside the human body that are then used by physicians to make a medical diagnosis. There are various types of sonographers: Diagnostic medical sonographer, Diagnostic cardiovascular sonographer, Abdominal sonographer, Obstetric sonographer, Musculoskeletal sonographer, Breast sonographer, Neurosonology sonographer. While performing sonography, the primary physical risks factors for ultrasonologists includes:

- Force – Sonography force is often associated with downward pressure applied with the transducer to obtain an image and grip force is used to hold the transducer.
- • Repetition - Performing the similar tasks either continually or frequently for an extended period without adequate recovery time.
- Awkward or Sustained Postures – It includes flexion/extension of the wrist, excessive abduction of the shoulders ,forward flexion of the shoulders ,bending and twisting of at waist ,rotating the neck .
- Contact Pressure - Resting of the hip or forearm against the table while performing scanning.

Highly repetitive tasks in ultrasonography results in muscle fatigue as the task does not allow sufficient recovery time of muscles

which may result in muscle fatigue which ultimately leads to loss of productivity.<sup>[1]</sup> Musculoskeletal pain is common occupational problem in healthcare workers whose job tasks involve repetitive motions and assumption of awkward positions.<sup>[1]</sup> Ultrasonography requires the sonographer to hold the transducer in a proper plane of scanning. Dynamic and repetitive movements of specific regions of the scanner's body are then needed to manipulate the transducers and to adjust the monitor. <sup>[2]</sup> During the examination, the arm is permanently contracted without the benefit of a rest period. <sup>[8,9]</sup> Sonography work is associated with one-sided static working position; prolonged pinch gripping of the ultrasound transducer; abduction at the shoulder during transducer placement; and insufficient recovery time. Maintaining these postures for a prolonged period increases their risk of having musculoskeletal problems. Hence the need of study is to assess their work posture and its associated musculoskeletal problems in ultrasonologists.

## **MATERIALS AND METHODS**

### **Materials**

Rapid Entire Body Assessment Scale [REBA], Short form of McGill pain questionnaire, Demographic data proforma, Body schema diagram, Pen/Pencil, Recording sheet.

### **Methodology**

Study design:

Type of study - Observational study.

Duration -18 months,

Location- Hospitals in urban areas

Sample population – Ultrasonologists

Sample size – 60.

Sampling type - Convenient sampling

### **Statistical Methods**

Data was collected on a data sheet and encoded for computerized analysis.

Tables were made using Microsoft word and figures were plotted using Microsoft excel windows 10. Percentage, mean and standard

deviation were calculated using Microsoft Excel Windows 10.

## RESULTS AND INTERPRETATION



Figure 4-Location of pain

**INFERENCE** – The above pie chart illustrates the location of the pain present in ultrasonologists. Maximum Population – 27% subjects have upper back pain. however, 19% of subjects showed low back pain 16% subjects had shoulder pain and 16 % subjects had neck pain. wrist pain was present in 11% of subjects, 11% subjects have knee pain.

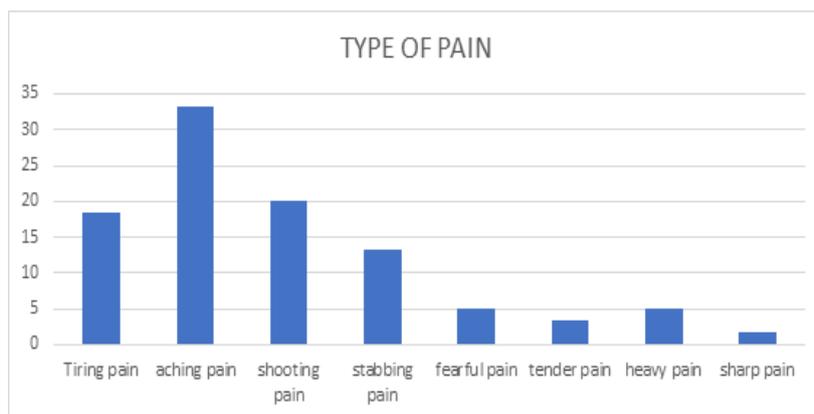
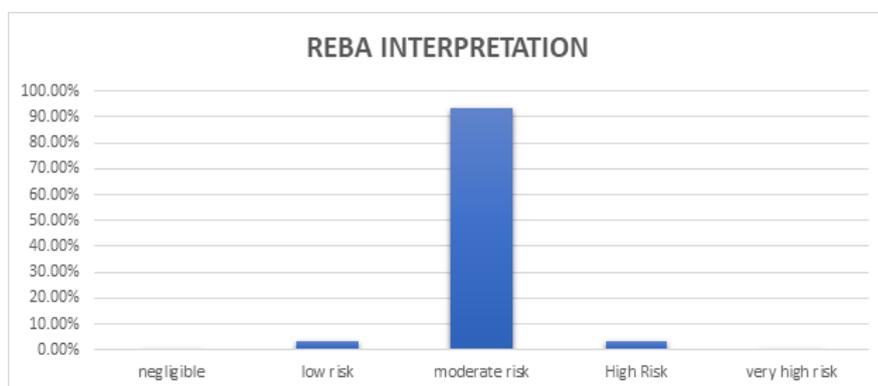


Figure 5-Type of pain

**INFERENCE** - The above bar diagram illustrates type of pain present in ultrasonologist 3.33 % subjects showed aching pain, 20% had shooting pain, tiring pain was present in 18.33% .13.33% had stabbing pain, fearful and heavy pain was present in 5% respectively .3.33% had tender pain, sharp pain was seen in 1,66 % subjects.



### LEVEL OF RISK

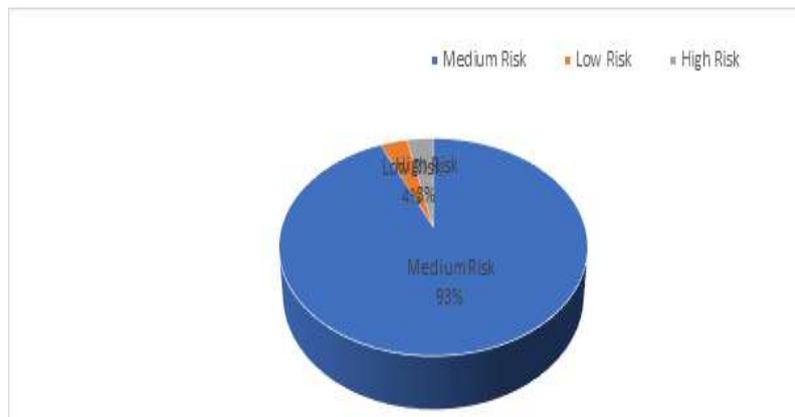


Figure 6-REBA interpretation

**INFERENCE** -The above bar diagram illustrates that 93.3% population falls in medium risk ,3.30% falls in low risk, and 3.30 % falls high risk.

## DISCUSSION

A cross sectional study was carried out for a period of 18 months to assess their work posture and WRMD in ultrasonologists of urban areas. In this study 60 subjects were taken according to inclusion and exclusion criteria. Number of females participated in study was higher than males (60:40). Among the study subjects, majority (56.66%) of the study subjects were overweight, the reason could be prolonged sitting position and lack of exercise. Obesity puts ultrasonologists at high risk for health conditions that can make them more susceptible to WRMSDs. It is also observed that overweight individuals had more pain compared to the ones having normal BMI. The commonest location of pain was upper back (27%) followed by low back (19%), shoulders (16%), neck (16%), wrist (11%) and knees (11%). The highest percentage of pain was seen in upper and lower back while performing work related task ,which can be related to static work postures which reduces the blood flow to the joints ,which ultimately increases the load on the muscles. Repetitive motions ,forceful movements ,duration of pressure lead to pain . Pushing or pulling of the shoulder region back and forth while moving the transducer head was implicated in the development of upper back and wrist pain. Abduction of the arm more than 45-degree ,height of the patient's plinth was observed which markedly increased the

static load on the muscles and lead to musculoskeletal pain .Working position involved with constant turning and bending of the cervical spine increased the load on neck and upper back significantly which contribute to risk of musculoskeletal disorder in future. A similar study conducted on prevalence of work-related musculoskeletal discomforts(WRMD) in ultrasonologists which showed that 37.27%,20%, 10.91% ,7.27% had low back ,neck ,upper back ,shoulder pain respectively .This study shows similar results having high percentage of pain in upper and lower back region. Weight and long duration of work were the risk factors involved in the development of musculoskeletal discomfort/pain amongst the participants.

For the analysis of work posture, REBA was used. It was observed that 93.30% of population was distributed under medium risk category having REBA score 4-7 which indicates that further investigation and soon changes in static work postures of ultrasonologists.3.30% population fell under low risk category having REBA score 2-3 indicating an immediate investigation and changes in the static posture .However ,3.30% population falls in high risk category having REBA score 8-10.Such differences in the REBA score was due to the altered and faulty postures of the ultrasonologists .In ultrasonography working postures ,larger

burdens on the leg and neck were found when the patient's examination site were located further away and the ultrasonologists have to stretch upper extremities while maintaining constant pressure ,trunk and neck region get twisted thereby increasing the burden on the neck. Musculoskeletal pain has been reported in ultrasonologists because it requires repetitive motion or isometric contraction.it involves specific parts of the musculoskeletal system especially the wrist thereby subjecting them to constant wearing and tearing and early degenerative changes. Ergonomic advises and corrective actions are recommended. Reorganization of the working environment and redesigning of working methods during ultrasonography and reevaluation with proper data base is necessary

## CONCLUSION

This study concludes that most of the ultrasonologists showed low back pain, shoulder pain followed by wrist pain and knee pain and most of the ultrasonologist fall under moderate risk of musculoskeletal injuries related to work.

### Declaration by Authors

**Ethical Approval:** Approved

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**Conflict of Interest:** The authors declare no conflict of interest.

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