International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 09 Issue: 01 | Jan 2022 www.irjet.net p-ISSN: 2395-0072

STUDY ON POSTURAL ANALYSIS AND MUSCULOSKELETAL DISORDER RISK ON THE DOMESTIC IRONING WORKERS

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Abstract – Domestic ironing play vital role in family economic status. Apart from the garment industry domestic ironing are majorly use in domestic sector. Men and women both are working in the field of ironing. Domestic ironing workers performing the various tasks to ironing various cloths and folding the cloths properly. The nature of the work, domestic ironing workers adopted awkward posture, which cause discomfort and occupational health hazard. The awkward posture of the neck, trunk, legs, upper arm position, lower arm position, and wrist position and the monotonous repetitive movement's finally result in high prevalence musculoskeletal complains. Musculoskeletal disorders are among the leading causes of low productivity in today's work environment. Industrial ergonomics systems are designed to improve productivity of company no other system is developed to domestic ironing workers. In this study, we conducted the Rapid Entire Body Assessment for group of persons to find out discomfort level and suitable remedies are discussed

Key Words: Posture Analysis, Health hazard, domestic ironing, Proper standing position and REBA.

1. INTRODUCTION

Ironing is the process of removing wrinkles from fabric using a machine, usually a heated tool (an iron). Based on the fabric, the heating is usually performed at a temperature of 180 – 220 °C (356-428 °F). When ironing workers conduct physical work for an extended amount of time, wMSDs are discovered to be severe occupational health hazards. Workplace stress is significant in occupational laundry shops, where individuals are manually ironing garments in large quantities. As per Occupational Safety and health Administration (OSHA), any injury or illness is consider work-related if an event or exposure in work environment either caused or contributed to the resulting condition or significantly aggravated a pre-existing condition. The safety is the measure of relative freedom from risks or dangers. It is the degree of freedom from risk and hazard in any environment such as in home, office, factory and other workplace [8]. The ergonomic interventions i.e. by careful design of task, tools and furniture can potentially reduce musculoskeletal stress, fatigue and can improve workers' productivity. The strain in neck and shoulder can be reducing at the work by appropriately designing furniture and tasks [10]. The study focuses on ironing employees in various laundry establishments (either at home or in sheds) in Erode district, Tamilnadu state, India, where there is a total population of 300 ironing workers. Because 30% of the respondents were unable or unwilling to participate, the ultimate number of people who took part in this study was 210. The study's objective and benefits were properly described to the participants. The author of this study initially identifies pain complaints in various places of workers based on their gender (male and female). The male participation rate was roughly 167 (79.53%), while the female participation rate was 43. (20.4 percent).

The data was obtained from ironing workers in several laundry shops, input into Microsoft Excel, and analysed using SPSS Version 20 to determine the prevalence of MSD using descriptive statistical parameters such as percentages and frequencies [1]. In this study[2], On six female respondents, muscular fatigue (hand grip) and body aches were measured while ironing garments in a standing position on an 82 cm high board with selected irons of various weights. The results showed that when ironing with light weight iron (0.77 kgs), muscular tiredness and bodily discomfort were greatly reduced when compared to other irons. When ironing with a heavy weight iron (2.92 kgs), muscle tiredness and body pains were shown to be much higher than when ironing with a light weight iron or a steam iron (1.29kgs). As ergonomic safety is a part of workplace safety, improving ergonomic safety [2].

According to this study[3], to compare investigate personnel working in the garment industry using three distinct approaches in order to assess working postures, identify musculoskeletal system stress factors, and determine exposures based on working postures. The scientific observation-based methodologies employed in the study are REBA, Ovako Working Posture Analyzing System (OWAS), and PLIBEL. The working stations and working postures of operators in the garment industry were evaluated, as well as their movements that could hurt the body, and some recommendations were made to prevent these movements [3].

1.1 Objective of the Study

- To assess the extent of bodily discomfort experienced by the domestic ironing workers
- To assess the ergonomic risk factors of the ironing workers
- To assess their workload perception.
- To analyze their work posture.
- To improve safety and prevent WMSDs of the shoulders, arms, spinal column and feet at ironing workstations by implementing scientifically evaluated ergonomically designed working postures.

2. MATERIALS AND METHODOLOGY

2.1 Rapid Entire Body Assessment (REBA)

A single page employee assessment work sheet is used to evaluate body postured forceful exertion, types of movement, repetition and coupling. The work sheet is dividing into two body segment sections on the label A and B.

- Section A - trunk, neck, leg
- Section B – upper arm, lower arm and wrist.

Initially, it needs to score group A (Trunk, Neck, Leg) and score group B (Upper arm, Lower arm and Wrist). For each position the postural score is assigned from the work sheet and some adjustment is made for force and coupling. Finally, from group A and group B scores C are obtained, and activity score is added to get final REBA score [20].

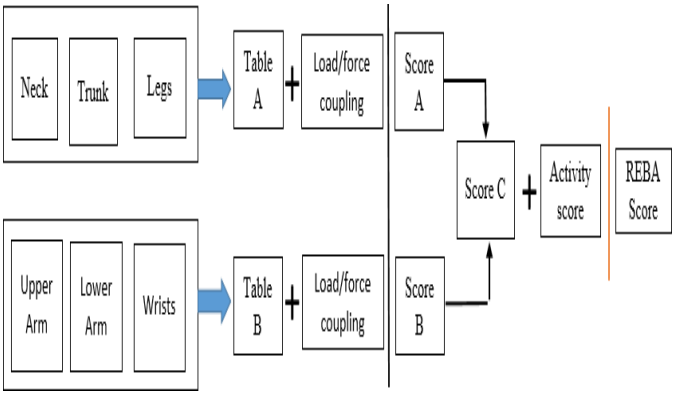

Fig- 1 Flow chart of REBA

Table -1: Classification of Risk According to REBA

REBA Score	Action Required
1	Acceptable posture
2-3	Change may be needed
4-7	Change soon
8-10	Implement change
11-15	Change immediately

2.2 Methodology

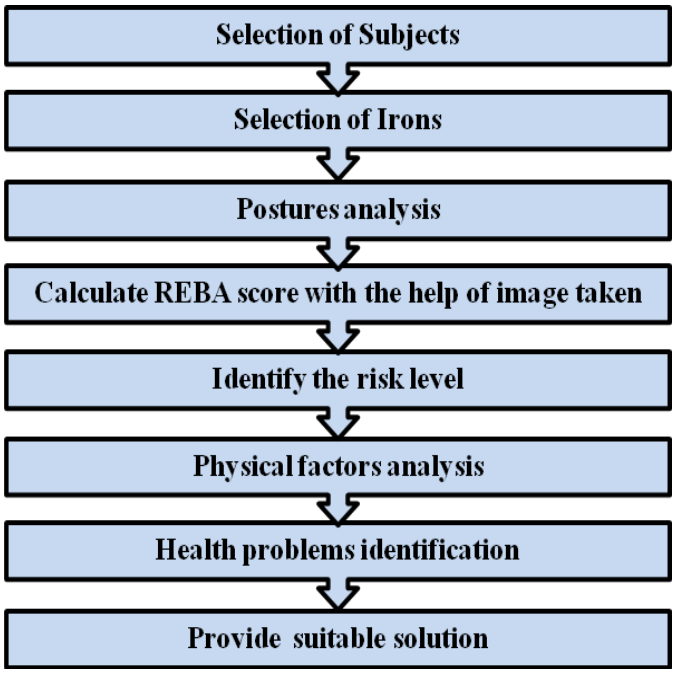

Fig -2: Methodology

At the time of the survey, all the jobs were thoroughly observed before starting the work and detailed information will be collected from the workers to ensure the completion of ergonomic risk. A video recording and photographs were taken in the different operations such as ironing and folding cloths to record the different movements of workers and working postures. The photographs are used to analyze to fill the scores and to evaluate the risk assessment of a job or task use REBA. Based on REBA, score the risks of MSD are recognize and ergonomic interventions are suggested.

3. EVALUATION

Examine 10 samples by working on domestic ironing. Ironing operation are dividedinto three they are

1. Ironing cloths
2. Folding cloths

Conduct Rapid Entire Body Assessment (REBA) for 10 samples. The 20-work postures are select for identifying risk factors. To evaluate the postures the photo of 20 postures are taken from different angles. For each different operation ironing and folding 10 postures are evaluate.

Fig -3: Awkward postures

3.1 Postures Analysis

Table -2: Postures Analysis

S.No.	Postures	Description of postures
1	Rising of shoulder	Lifting of iron box
2	Arms stretched	Ironing at extreme ends of clothes
3	Twisting of wrists	Folding the clothes
4	Twisting of lower back	Ironing clothes at the left and right extreme of clothes
5	Lower back bending	Ironing at forward extreme ends of clothes
6	Bending the neck	Ironing at middle portion of clothes
7	Prolonged standing	Standing continuously for hours

Posture refers to position of different parts of our body. Muscle, tendons, and ligament must work harder and can be stress when we are in awkward posture. Awkward posture occur when any joint of our body bends or wrist excessively. Awkward posture includes repeated or prolong reaching, twisting, bending, kneeling , squatting ,working overhead with our hands or arms or holding fixed position. A posture held for long time is called static posture. Awkward posture is create by (bending and twisting) or wrong workplace design and dimension Awkward posture caused MSD to worker. The more a joint deviate from neutral position, the greater the risk of injury.

3.2 Observational methods

The observational methods, most commonly used method, can be applied to evaluate theergonomic hazards at workplace, monitor the ergonomic improvements, and conduct research on ergonomic issues. It is a quantitative measurement of the exposure of ergonomic risk. In this method, data can be easily track. Due to low assessment cost quick and easy assessment process, the observational methods have very positive appearances in identifying ergonomics hazard in the workplace. In the workplace, a simple observational method is needed to recognizerisk and control the ergonomic hazards. Therefore, observational method can simply investigate the ergonomic risks and their severity in the work place. In REBA, along with postural score the static force or load score coupling score and activity scores are consider to achieve final score. The ironing workers while accomplishing their tasks move their trunk, neck, leg, arm and wrist.

4. RESULT AND DISCUSSION

The total number of population is 10 participants participated effectively in the survey. The 10 participants were first classified based on gender i.e. male and female, where the male participant is around 80% (N = 8) and female participant were around 20% (N = 2).

This report is provides ergonomic study on domestic ironing, here clearly analysis systematic REBA score for 20 postures. First 10 postures is for ironing operation in his REBA score 8 high risk, investigation and implement change. In another 10 postures is for folding operation in this REBA score 7 medium risk, further investigation, change soon.

4.2 REBA score percentage for ironing

Table – 3: REBA score percentage for ironing

REBA SCORE	NO.OF PEOPLE	PERCENTAGE
5	1	10
7	5	50
9	2	20
10	2	20

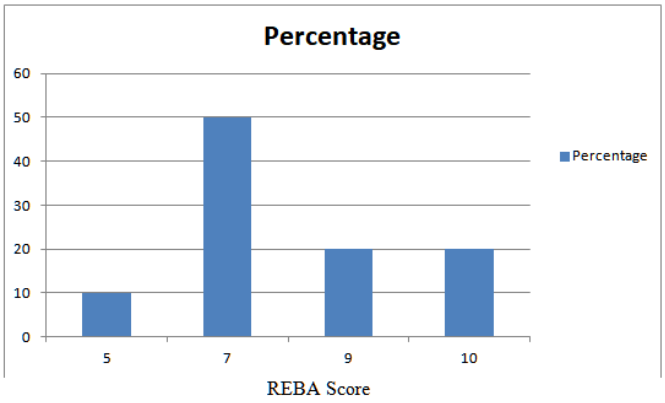

Chart -1: Graphical representation of REBA Score - ironing

This report is provides ergonomic study on domestic ironing, here clearly analysis systematic REBA score for 20 postures. First 10 postures are for ironing operation in his REBA score 8 high risks, investigation and implement change.

4.2 REBA Score percentage for folding

Table - 4: REBA score percentage for folding

REBA SCORE	NO.OF PEOPLE	PERCENTAGE
5	1	10
7	7	70
10	2	20

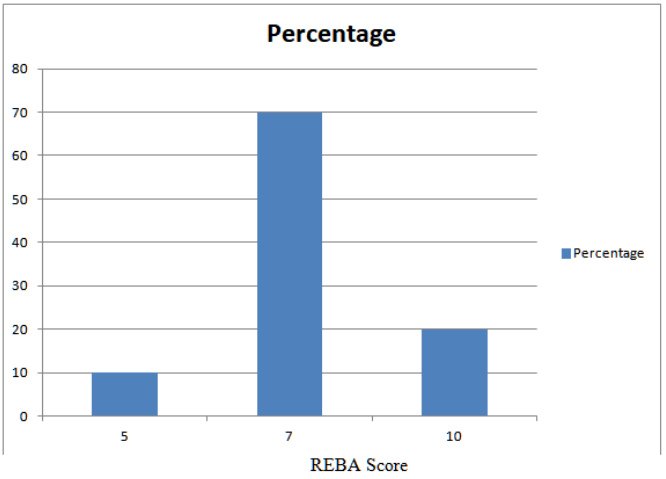

Chart -2: Graphical representation of REBA Score - folding

Second 10 postures is for folding operation in his REBA score 7 medium risks, further investigation, change soon.

4.3 Pain identification

Table - 5: Pain Identification

PAIN	NO. OF PEOPLE AFFECTED	PERCENTAGE %
Neck Pain	9	90
Shoulder Pain	10	100
Wrist Pain	8	80
Lower Back Pain	10	100
Knee Pain	9	90
Varicose Veins	3	30
Hernia	1	10
Black Lung Disease	3	30

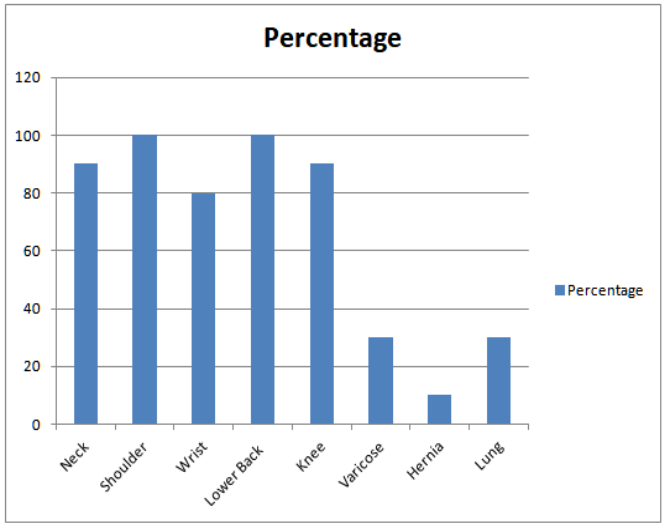

Chart -3: Over all Discomfort Level of Workers

The total number of participant is 10 and out of the total participants around 99.99% (10) of participants were suffering from any one of the musculoskeletal disorder problem. The 100 % participants have the shoulder pain, which is the most frequent pain symptom among the total male and female respondents. The shoulder is then followed by the lower back pain (100%), knee pain (90%), neck pain (90%) and wrist/hand pain (80%). Almost 99.99% of people work in standing posture in the occupational ironing sectors. Among all other parameters the most significant parameters are shoulder pain, lower back pain, knee pain, neck pain and the wrist/hand pain. The Chart -3 shows the cause for shoulder pain during ironing process among male and female workers in laundry shops. In this study the author first identifies the symptoms of pain in various locations of the workers based on the gender (male and female). The number of male participants was around 8 (80%) and the number of female participants was 2(20%).

Improper postures cause shoulder and lower back pain, which is caused by lengthy periods of standing while working, a poorly designed work table, and the weight of the iron box. Lower back pain is caused by excessive bending and stretching. In order to eliminate shoulder and lower back pain, the table height is adjusted to the person's height, which reduces overstretching and bending. Similarly, knee pain is caused by prolonged standing over the course of a day. It is recommended that workers take proper rest intervals in between ironing sessions. Workers who undertake continuous and repetitive labour should take at least 5-10 minutes of break after every 45 minutes, as recommended by the Applied Occupational and Environmental Hygiene.

5. CONCLUSION

The purpose of this study was to raise ergonomics consciousness in domestic ironing workers. The study shows that there is evidence to suggest that the general working conditions of workers are poor and must be seriously improve to reduce MSD risk factor. The findings of this study suggest that the comfort of ironing employees in laundry shops can be improved by altering the height of the table to match the height of the workers, and that a simultaneous weight reduction of the iron box should be utilised for ironing. Workers who are required to perform repetitive tasks should take frequent breaks. Stretching warm-up exercises are recommended to help decrease musculoskeletal pain at work. Furthermore, it is recommended that we avoid using the charcoal iron box because the smoke it emits is harmful to our lungs. It is also advised that the workers should undergo periodic health checkups and awareness about MSDs must also be increased.

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