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Analysis of Working Posture in Mathadi Workers Using the Computerized Ovako Working Posture Analyzing System (OWAS)

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Abstract:

Background: Navi Mumbai holds a large-scale market in Vashi that is the APMC market. Hence, several mathadi workers work there on regular basis.

Purpose: The analysis was done to identify the working posture of the mathadi workers and whether they require any changes or not

Method: Sixty mathadi workers who had spent at least one year on the job participated in this survey. They were recruited by non-probability sample of convenience from APMC market situated in Navi mumbai.

Results: Working posture analysis of 60 mathadi workers was done. Analysis was done using Ovako working posture analyzing system (OWAS). From OWAS action category table we can identify which body segments bring discomfort to the mathadi workers. Besides level of action category, it also gives guidelines whether the working postures are harmful or not and whether it needs to be changed immediately or not.OWAS evaluates the posture of the back and found that 52% of the workers are in leaning forward posture and 83% of workers lift both their arms above shoulder level while lifting weight.It is found that 23(83%) mathadi workers fall under action category 3 and are at moderate risk whereas 15(25%) fall under action category 4 and are at severe risk.

Keywords: Ovako working posture analyzing system, Digital camera, mathadi workers, work related musculoskeletal disorder.

Introduction: Occupational health and safety problems prevail in every industry. Musculoskeletal injuries are a major occupational concern worldwide especially in those occupations that rely heavily on manual means of handling and performance. (1) Awkward working posture is a physical factor identified in occupational musculoskeletal injuries. The National Institute for Occupational Safety and Health reported that awkward working posture had a strong relation to the causation of musculoskeletal injuries. (2)

In scientific literature, awkward posture is one that involves considerable deviation from neutral. Typical examples of awkward posture include reaching behind, twisting, working overhead, wrist bending, kneeling, stooping, forward and backward bending, and squatting. [2]

Mathadi labourers are individuals who carry material loads either on head(matha) or on his back to stack at the appropriate place. Mathadi workers are exposed to various physical factors at work, which include awkward posture, heavy lifting, forceful exertion, and repetitive motion. [3] Their job demands a high intensity of physical strength; they are exposed to high levels of physical demand and lesser amount of rest makes them vulnerable to injuries over a period of time. [4] These physical factors were reported to result in an elevated risk for musculoskeletal and occupational injuries. In order to avoid and minimize the risk of musculoskeletal injuries it is important to understand and analyze working posture. [1]

One of methods to identify and analyze work posture to ensure safety and comfort in work is the Ovako Work Posture Analysis System (OWAS). The different postures that they use while loading and unloading are graded using OWAS postural tool to assess the awkward postures in assembly workers. [2] The OWAS grades are then categorized to rule out the harmful effects that their postures can have on different body segments and how can they lead to harmful effect on musculoskeletal system. [2] OWAS analysis provides the opportunity to compare the job studies according to the number of postures which need to be corrected soon or immediately. Besides, the computer programs show a detailed analysis of the distribution of posture observations into categories in need of corrective measures. [4]

Review of literature:

1. Jaz IM et-al, "Cross-Sectional Musculoskeletal Disorders in Workers Practicing Traditional Methods of Underground Coal Mining" Int J Environ Res Public Health concluded that load carrying workers poses a great threat of musculoskeletal disorders, among which aged workers reported high severity of disorder. **(1)**
2. Tzu-Hsien et-al "Analysis of Working Postures at a Construction Site Using the OWAS Method" International Journal of Occupational Safety and Ergonomics concluded using OWAS that 34% of total postures attained while working are risk causing for musculoskeletal disorders. **(2)**
3. Vijaya Krishnan et al "Work related musculoskeletal pain amongst mathadi workers – a prevalence study" International Journal of Medicine and Health Profession concluded prevalence of musculoskeletal pain among mathadi workers and alterations in working pattern and use of ergonomically appropriate postures may reduce the occurrence of work-related musculoskeletal disorders. **(3)**
4. Chowdhury SS et al "Identification of awkward postures that cause discomfort to Liquid Petroleum Gas workers in Mumbai" India. Indian J Occup Environ Med concluded in assembly workers like LPG workers 90% of workers fall under category 4 of OWAS and 70% of workers fall under category 3 of OWAS and require corrective actions for improvement. **(4)**
5. M. AripWahyudi et-al "Work Posture Analysis of Manual Material Handling Using OWAS Method" concluded using OWAS that 26% jobs are on third category risk and 26% jobs are on fourth category risk, the remaining have medium level risk and interventions are required in near future. **(5)**

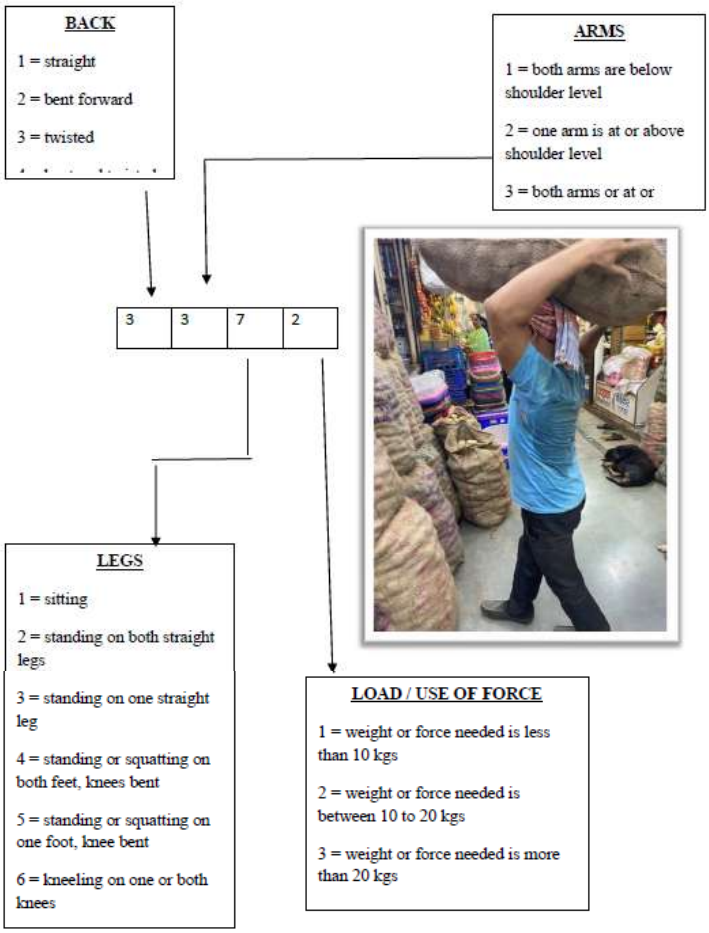
Methodology:

The participants for this study were 60 mathadi workers who had spent at least one year on the job. They were recruited from APMC market situated in Vashi, Navi Mumbai. Mathadi workers who had undergone fracture or surgery in the past 6 months were excluded from the study. Subjects between the age group of 20 to 50 years were included in the study. Mathadi labourers are individuals who carry material loads either on head (matha) or on his back to stack at the appropriate place. Mathadi workers are exposed to various physical factors at work, which include awkward posture, heavy lifting, forceful exertion, and repetitive motion.Before executing this study, ethical approval was sought and obtained from the principal author's institution's Research and Ethical Committee.Cover letters explaining the purpose of the study as well as assurance that the information obtained will be used strictly for research purposes were distributed to the market officials, where the participants were recruited. Every participant was also requested to sign a consent form prior to the study. The objective, procedure of filling the questionnaire and benefits of the study were explained to the participants, and they were assured that the study has no known inherent physical harm.

Analysis and interpretation:

Analysis and interpretation were done with the help of results.

FIG 1: POSTURE OF MATHADI WORKER WHILE LOADING WEIGHT



Then the data collection sheet was collected from all the mathadi workers. And the photographs were taken from digital camera, then the data was processed into the laptop and working posture analysis was done using Ovako working posture analysis computerized software. Then all the data was transferred into the table using the excel sheet, and result was obtained. The harmful postures were identified and the needs for their changes were determined. Pain areas affected due to abnormal working posture were upper back and lower back which were prominent comparatively to other pain.

TABLE 1: OVAKO WORK ASSESSMENT SYSTEM POSTURE CODE DEFINITION

Body parts	**OWAS code**	**Description of posture**
Back	1	Back straight
	2	Back bent
	3	Back twisted
	4	Back bent and twisted
Arm	1	Both arms below shoulder level
	2	One arm at or above shoulder level
	3	Both arms at or above shoulder level
Leg	1	Sitting
	2	Standing on both straight legs
	3	Standing on one straight leg
	4	Standing or squatting on both feet, knees bent
	5	Standing or squatting on one foot, knee bent
	6	Kneeling on one or both knee
	7	Walking
Load handle	1	Load < 10 kg
	2	10 kg < Load < 20 kg
	3	Load > 20 kg

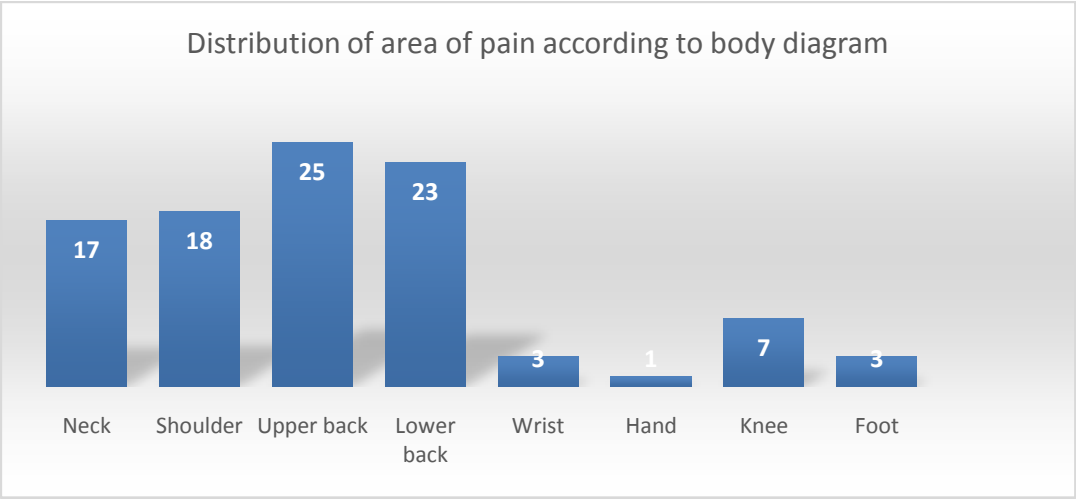
TABLE 2: LEVEL OF RISK ACCORDING TO ACTION CATEGORY (OWAS)

Action category	Explanation
1	Normal and natural postures with no harmful effect on the musculoskeletal system – No action required
2	Posture with some harmful effect on the musculoskeletal system - Corrective actions required in the near future

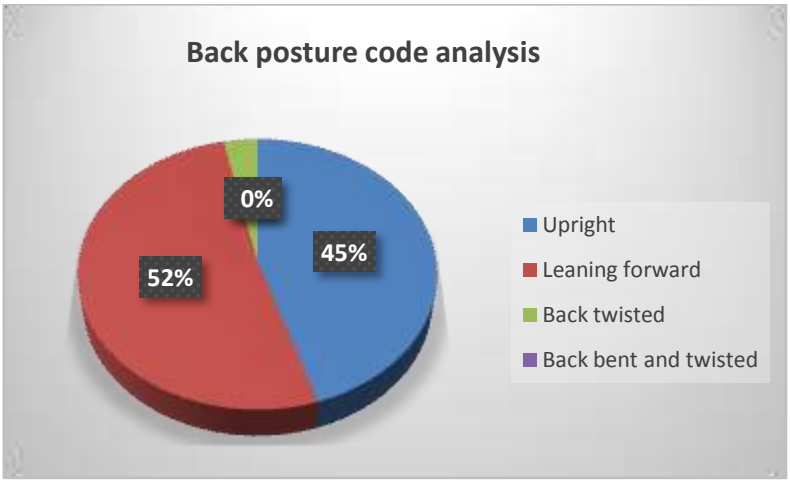
3	Postures have a harmful effect on the musculoskeletal system – Corrective actions should be done as soon as possible
4	The load caused by these postures has a very harmful effect on the musculoskeletal system - Corrective actions for improvement required immediately

TABLE 3: DEMOGRAPHIC DETAILS		Frequency	Percentage
Age	> 25 years	6	10.00%
	25-37 years	26	43.30%
	38-50 years	28	46.70%
BMI	underweight	1	1.70%
	normal	15	25.00%
	overweight/obese	44	73.70%
Years of experience	> 5 years	23	38.33%
	5-12 years	26	43.33%
	13-25 years	11	18.33%
Work time	8 hours/day	49	81.70%
	10 hours/day	9	15.00%
	12 hours/day	2	3.30%
BMI- BODY MASS INDEX			

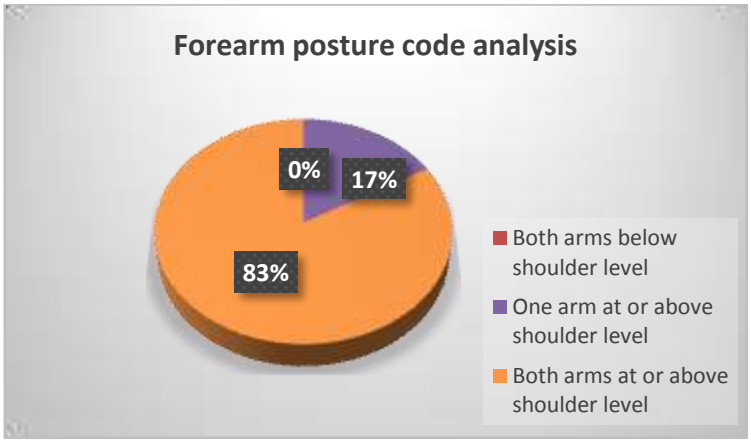
GRAPH 1: DISTRIBUTION OF AREA OF PAIN ACCORDING TO BODY DIAGRAM



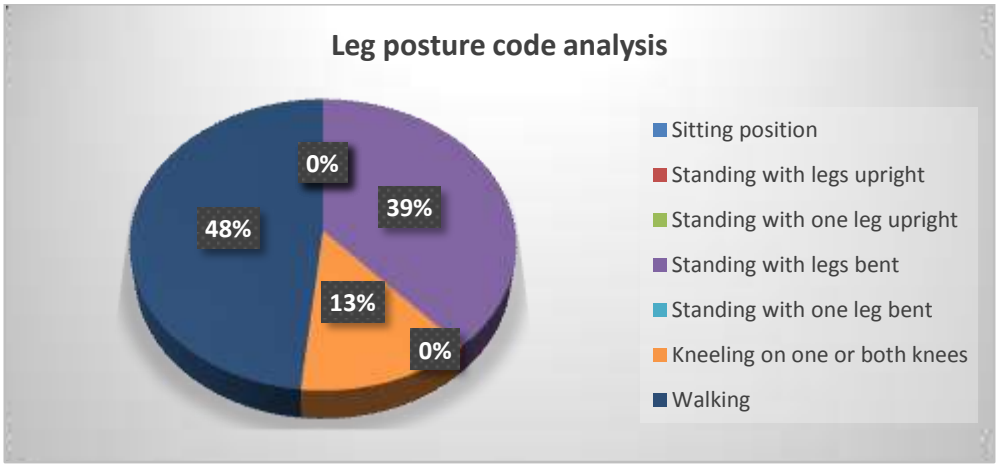
GRAPH 2: ANALYSIS OF BACK POSTURE USING OWAS WORK ASSESSMENT SYSTEM POSTURE CODE DEFINITION



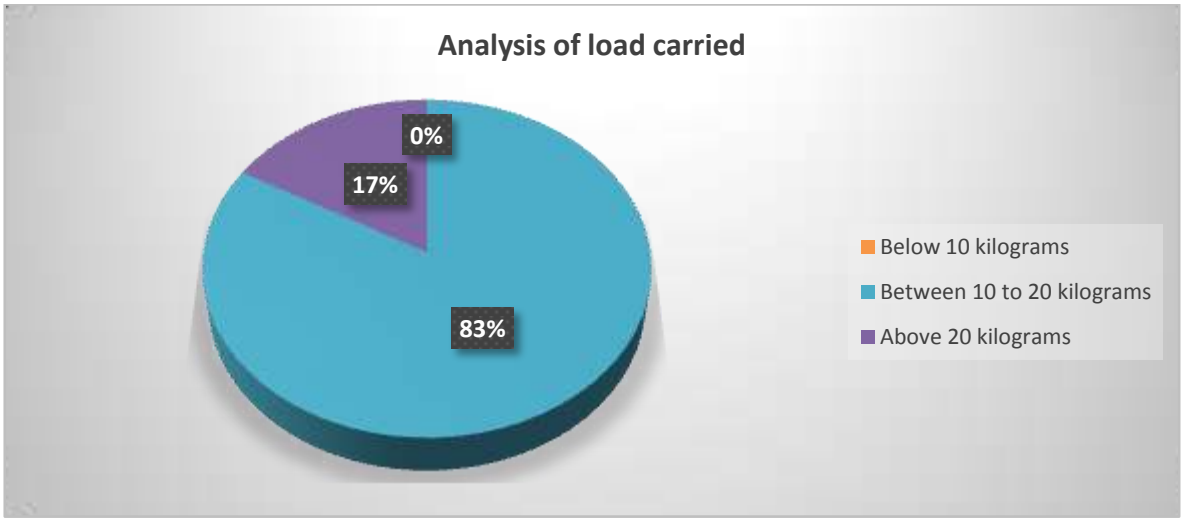
GRAPH 3: ANALYSIS OF FOREARM POSTURE USING OWAS WORK ASSESSMENT SYSTEM POSTURE CODE DEFINITION



GRAPH 4: ANALYSIS OF LEG POSTURE USING OWAS WORK ASSESSMENT SYSTEM POSTURE CODE DEFINITION



GRAPH 5: ANALYSIS OF LOAD CARRIED USING OWAS WORK ASSESSMENT SYSTEM POSTURE CODE DEFINITION



The analysis of data can be divided into 2 parts.

1) Descriptive statistics for demographic data (age, BMI, no of years of experience, no of working hours per day)
2) Analytical statistics for outcome measure (Ovako working posture analyzing system)

According to the working posture analysis, the most prominent risk factor is awkward posture which includes leaning forward (52%) and carrying overhead (83%) which is frequently adopted by the mathadi workers causing them various musculoskeletal disorders. It was due to improper lifting and carrying techniques and lack of attention paid to body position during work.

CONCLUSION:

From this study it is concluded that Mathadi workers are susceptible to various health related problems and there is a need of monitoring their health and posture on an ongoing basis. Mathadi workers work in extremely awkward postures exposing them to various risk factors. The most prominent risk factor is awkward posture which includes leaning forward (52%) and carrying overhead (83%) which is frequently adopted by the mathadi workers causing them various musculoskeletal disorders.

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