# Postural Assessment Of Rural Water Fetcher Using Ergonomics

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***Abstract:*** ***REBA and RULA Ergonomic tools are used for evaluation and ergonomic assessment while carrying, handling, lifting and shifting the load. For evaluation of complex manual water fetching activities a RULA and REBA ergonomic tool is used .In this study of water fetching activities maximum women from rural area were participated. Based on this ergonomic tool observation, water fetching activities of women while water fetching, video recordings and photographs were taken. The reviewed literature, postural activity guidelines are proposed for summarizing analysis of water fetching women's activity and discomfort has been reported. The basic aim of water fetching study is to make assessment of the level of exposure of ergonomics in various water fetching activities. Another objective of the water fetching activities is to find the level of exposure and musculoskeletal disorders in different body segment and gives the corrective steps to reduce the health risk in the water fetching activity.***

***Keywords: Musculoskeletal disorder; Pain; water fetching Aid; Rural women; RULA; REBA;***

## 1. INTRODUCTION:

Due to heavy load in the construction industry and activities related to construction industry related to heavy load transportation from one place to other lead to MSDs symptoms in the human body. Different industrial work with an awkward posture produces ergonomic health risk and highly injures in human body. While working in construction industry produces MSDs by different activities like carrying heavy loads, repetitive movement, working awkward postures and pain, stress (Kulkarni and Devalkar 2017). In construction industry workers are working for a longer period without break so there is a fracture and fatigue produces in construction workers. Hence, there is need to take corrective steps to reduce to workers pain. Many of the times construction workers doing their work repetately; so there is need to spend time for understanding the construction workers stress, strain produced in workers' health condition. After understanding the workers condition about fatigue and fracture ergonomics come in the front. Ergonomics is one of the tool which is helpful for understanding the workers pain assessment. The Rapid Entire Body Assessment (REBA) and Rapid Upper Limb Assessment (RULA), this are the two tools of ergonomics which are helpful for identifying the disorder, fracture, discomfort involved in the existing working condition described in McAtamney and Corlett (1993) and Hignett and McA- tamney (2000).

Ergonomic tool RULA is investigate every industrial worker who is associated with health risk factors.RULA analysis it gives us an RULA score which is associated with the risk factors of the upper-limb disorder. Development of this ergonomic tool RULA is based on the workers repetitive action and the awkward postures of workers which

are related to the upper body segment. On same front the development of REBA ergonomic tool was based on the repetitive movement of the workers and which is related to the entire body parts, there is difference between the RUAL and REBA Ergonomic tool is that assement of the lower body leg and trunk. RULA and REBA assessment tool gives an RULA score or it is known as a number which is calculated by using the standard chart of RULA score. The RULA score is calculated based on calculation of score of each body segment. Without any special equipment Ergonomic tool like RULA and REBA assess the awkward posture based on the RULA and REBA standard chart. Ergonomic tool is focused on direct observation method like the video recording, photographs of workers. In this paper water fetching activities, awkward water fetching posture evaluated by using REBA and RULA method of ergonomic.

## 2. MATERIALS AND METHODS:

***Literature review:*** In this paper researcher describe the ergonomic tool which assesses the whole human body. The Ergonomic tool like a REBA and RULA is used a practitioner's ,assessment tool for the awkward working postures condition such posture find in health-centre and industrial service (Hignett and McAtamney 2000). For the analysis of different postures and easily understanding the MSDs symptoms and Health risk ergonomic tool like RULA is used.RULA is a simple observation tool, based on the observation we can quickly assess the posture with the upper limb like Neck, trunk, Muscle function, described in McAtamney and Corlett (1993).REBA and RULA ergonomic tool easily assess the body without any equipment, machine. These ergonomic tool find the score and based on the score we can predict the working postures of human body. Based on awkward posture while lifting and lowering the loads ergonomic tool quantify the fatigue and fracture in the human body. Ergonomic tool RULA and REBA assess the Postural activity during working condition by using the standard charts of RULA and REBA score which is useful for understanding the awkward posture and the quantify the risk during working and suggest the changes in the working postures. This method of assessing is useful for the knowing the high pain, high fatigue described in Bhandare et al. (2013).

There is a one of the other ergonomic tool Ovako Work Posture Analysing Sys- tem (OWAS) which is useful for the assessment of akaward working posture which is used in construction industry workers. The Ovako Work Posture Analysing Sys- tem (OWAS) having the different objective like postural analysis as per the risk level and provide the corrective steps to improvement and reducing the risk level which is described by (Lee and Han 2013).

Biomechanical evaluation of manual handling material and lifting ,pulling, pushing material all activities are under the risk for human body. The objective of the biomechanical analysis to understand the stresses and strains, MSDs symptoms produces in the different body segment while doing construction work in industry in India. Such an biomechanical evaluation will be helpful for the redesigning of product for con- struction workers which will reduce the pain, risk in human body, fatigue,MSDs and improved performance of the workers postures (Ray et al. 2015).The highlighted five points (communication, ergo- nomic design, safety management, training and education, written programme) significant correlate with ergonomic. Risk control is followed by appropriate ergonomics design, organization training and education (Abdul- Tharim et al. 2011).The OWAS method is based on the Posture, Activity, Tools and Han- dling (PATH) method. The study shows the different road construct- tion workers, labors pain and spend their large time i.e. 20% of time in manual material handling tasks (Buchholz et

al.1996).

Work details-: In the water fetching activities are more in amount in a rural area where water scarcity problem is higher. In this paper for the study of health assessment peoples are participated from the solapur and latur district. During summer season the water fetching becomes very difficult peoples collected at the source of water, waiting in line and fetches the water. Sometimes women from rural area deadly taken effort to water fetch water from well. So such a water fetching activities women doing daily so such awkward posture becomes risky for rural women. During water fetching activities there are a process like a filling of water in pot, lifting of pot, lowering of pot. Based on the activity the analysis of postures was done. If rural women is Pregnant then such a water fetching activities becomes very risky while fetching activities like lowering,lifting,filling water in pot, lifting water from well. Water is one of the most important parts of human so that daily peoples from rural area live their home for fetching water and spend their time for water.

Figure1 shows the awkward posture of women while water fetching activities

Some of the akward postures are shown below. For awkward postures RULA and REBA score is calculated from standard chart. RULA ergonomic tool is used for the upper limb analysis, where the REBA ergonomic tool is used for the finding out the RULA score of the entire body. RULA score and REBA score is calculated from the standard chart based on this score the remark is given as standard chart. Some of the awkward water fetcher posture selected during water fetching activities from rural area. Women's from rural area gather at a source and in a group they were fetching the water with a 2-3 pot on head, hand, shoulder. Total load taken by rural women which is ranges between the 10-30 liter in a single trip with all awkward postures of water fetching. Fetching distance is also more and road used by rural women for water fetching is very bad. So it becomes risky and painful for rural women.

## 3. RESULTS:

The ergonomic tools used for measuring the RULA and REBA score of awkward posture of women while fetching the water. This RULA score is shown in the table 1 and REBA Assessment is shown in Table 2. The score is calculated for the different water fetching activities like water filling, water lowering, water lifting. The results about the score is highest in both the tools so there is need of investigation such remark is shown in the table 1 and table 2. Highest score shows the risk for the repetitive activity and fatigue, fracture, sometimes distress produces in the women body there are two ergonomics tool which shows the different aspect for entire body and the upper limb body segment. Hence, in the RULA and REBA score is different for different working condition.

| Rapid Entire Body Assesment | | India | | |
|---|---|---|---|---|
| Activity Description | | Water filling | Water lifting | Water lowering |
| Neck, Trunk & Leg Analysis | Neck Score | 3 | 3 | 3 |
| | Trunk Score | 4 | 4 | 3 |
| | Leg Score | 2 | 3 | 4 |
| | Look Posture Score -A | 7 | 8 | 8 |
| | Fore Load Score | 0 | 1 | 1 |
| | Score A | 7 | 9 | 9 |
| Arm & Wrist Analysis | Upper Score | 4 | 3 | 3 |
| | Lower Arm Score | 2 | 2 | 2 |
| | Wrist Score | 3 | 1 | 3 |
| | Look Up Posture Score - | 7 | 4 | 5 |

| | | | | |
|---|---|---|---|---|
| | B | | | |
| | Coupling Score | 1 | 1 | 1 |
| | Score B | 8 | 5 | 6 |
| Activity Score | | 1 | 1 | 1 |
| Table Score | | 10 | 10 | 10 |
| Final REBA Score | | 11 | 11 | 11 |
| Recommendation | | High Risk, Investigate & Implement Change | High Risk, Investigate & Implement Change | High Risk, Investigate & Implement Change |

Table 1 shows the REBA score awkward posture of women while water fetching activities

| Rapid Upper Limb Assesment | | India | | |
|---|---|---|---|---|
| Activity Description | | Water filling | Water lifting | Water lowering |
| Neck, Trunk & Leg Analysis | Neck Score | 3 | 3 | 3 |
| | Trunk Score | 3 | 3 | 3 |
| | Leg Score | 2 | 2 | 2 |
| | Look Up Posture Score - A | 5 | 5 | 5 |
| | Fore Load Score | 2 | 2 | 2 |
| | Score A | 7 | 7 | 7 |
| Arm & Wrist Analysis | Upper Score | 3 | 3 | 3 |
| | Lower Arm Score | 2 | 2 | 2 |
| | Wrist Score | 3 | 3 | 3 |
| | Look Up Posture Score - B | 4 | 4 | 4 |
| | Coupling Score | 2 | 2 | 2 |
| | Score B | 6 | 6 | 6 |
| Activity Score | | 1 | 1 | 1 |
| Table Score | | 7 | 7 | 7 |
| Final RULA Score | | 7 | 7 | 7 |
| Recommendation | | High Risk, Investigate & Implement Change | High Risk, Investigate & Implement Change | High Risk, Investigate & Implement Change |

Table 2 shows the RULA score awkward posture of women while water fetching activities

| Sr.No. | Score | Color | Meaning |
|---|---|---|---|
| 1 | 1 and 2 | Green | The posture is acceptable if it is not retained or repeated for longer period |
| 2 | 3 and 4 | Yellow | Further investigation is required and Changes may also be required. |
| 3 | 5 and 6 | Orange | Investigation and changes are needed soon. |
| 4 | 7 | Red | Investigation and changes are needed immediately. |

Table 3 shows Interpretation of RULA score in basic mode

## 4. DISCUSSIONS

The ergonomic tools RULA and REBA (Tables 1 and 2) both identify that the shoulders, knees, legs and lower back were at a high risk at the time of water fetching activities. The table no.3 gives an idea about the understanding and interpretation of RULA score in the basic mode of water fetcher. The repeated movement of the working condition, action, lifting and lowering create the highly pain in the women of water fetching. The process for reducing pain of water fetcher is need to improve and changes must be made for the water fetching activity with redesigning of equipment for water fetching. REBA ergonomic tool is identify the awkward postures and correlation between the highly pain, injuries with the awkward postures.

## 5. CONCLUSION

The awkward water fetching activities show the highest score as per standard sheet of RULA and REBA. The score from the standard charts is shown in the table with the permissible limits (Tables 1 and 2) .Figure 1 shows the various awkward postures which are at the position of highly risk and fur- there investigation and changes to be are needed. After studding the ergonomics of water fetcher By using RULA and REBA assessment, some suggestions were given for reducing pain of rural water fetcher:

- Water fetching product designing is required.
- Redesigning of the existing product or improvement in existing design is important.
- Water fetching aid should reduce the time of water fetcher to fetch water.
- Water fetching aid should fetch at least 50 liter water within one trip.

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