To study on the extent of hand pain experienced and risky postures adopted by rural women working with sickle

1.0 Introduction

Ergonomic is the applied science of fitting tools and tasks to the persons performing them in such a way that the strengths of the human body and psychology are maximized and exposure of weakness to stressors is minimized. Most people fail to recognize the work of women which constitute almost half of the work force engaged in farm activities. Several constitutional and legal provisions do exist to safeguard the interests of women. In spite of these provisions, the women continue to be neglected and often exploited because of biasness. Though they make enormous contributions to the work, still they are suffering because of dual responsibilities and poor design of tools at the work place.

The tools and implements used by women are defective in design or do not suit the physical structure of women, which leads to various physical health hazards like injury, fatigue, exhaustion, etc. It also affects their performance, which in turn influences in all family activities carried out at home. Keeping in view of the ergonomics and women, the development of tools has to be standardized in terms of comfort, quality and efficiency.

There are the very few studies found on the present problem. To bring the women in light the investigator would like to work on this topic. The beneficiaries of the current topic are physiotherapists, orthopedics, NGO’s, ergonomists, students, equipment tools.

The present study was carried out with the following objectives:

- To identify the existing hand tools used by rural women working in farm.
- To study the type of postures adopted by the women while using sickle.
- To identify the extent of pain areas in hand of the rural women while using sickle.
- To assess the rate of perceived exertion of the respondents after the day’s work with sickle.
- To examine the hands of the rural women physically for redness, corns, scraped skin, irritation etc.
- To impart suggestions for improving the working of the rural women with respect to sickle.

2.0 Methodology

The study was conducted in three villages Tarapur, Sojitra and Umreth of Anand District, Gujarat. List of women working in five different farms of each village was made. Randomly two women working in each farm were selected for the survey. Total 40 women were selected who are working with sickle in the farm. This study was conducted to assess the drudgery of farm women at the time of harvesting with sickle. Well prepared Performa was used for assessing the data, while collecting the data special attention was given on the selected sample size as regarding to pain area, awkward postures and analysis of comfort aspects while using sickle and observations related to it.
To study the type of postures adopted by women while using the hand tool sickle, the activity was analyzed and split up into 2-3 postures which they adopt while working with the sickle. Photographs of those respondents while doing the activity were taken and postures were analyzed with REBA (Rapid Entire Body Assessment) sheets and very high risk postures were identified.

3.0 Results

The profile of respondents revealed that usually two-third (66%) of the respondents worked with sickle and half of the women were in the age group of 25-45 years and 55% were found illiterate. Two-third of the respondents felt uncomfortable with blade of the sickle. Two-third of women experienced severe pain in palmar digital area of the middle palm. The assessment of perceived exertion after the day's work show that 37% feel that it interferes with concentration while performing task at home. The posture analysis through REBA technique revealed that 70% of the postures adopted by the respondents while working with sickle, were of high risk (53%) and very highly risk (19%).

4.0 Conclusion

The sickle which cause discomfort or injury should be modified. The tools should be in proper proportion to the hand grip of the women users to maximize the work and not demand unusual postures. Tools must be designed to increase the strength and work capacity of the users.

Introduction

Rural women form the most important productive work force and are a vital part of the Indian economy. Women put in labor not in terms of physical output but also in terms of quality and efficiency so are critical to wellbeing of farm households. Apart from raising children, women are expected to prepare meals, maintain home, attend to the general health of the family and assist in crop and animal production.

Women are involved in all aspects of agriculture from crop selection to land preparation, seed selection, planting, weeding, harvesting. Whatever the reason for this neglect, the importance of developing technologies relevant to women has only recently been recognized. Moreover women are also under taking several farm activities traditionally carried out by men, as men are pulled away in higher paying employment.

Agriculture engineering traditionally has been viewed as a male dominated technical discipline and most tools have been developed with ‘men’ as farmer. Women are now handling the entire agriculture operations all by themselves.

Both men and women use same tools that are exclusively made for men. Weight, size and handle grip of tools are the major problem faced by women while working in farm.

Ergonomics can be defined as the science technology and art of people at work. Rodger and Convangh (1962) described ergonomics as an attempt to fit the job to the man rather than to fit the man to the job.

Ergonomic is the applied science of fitting tools and tasks to the persons performing them in such a way that the strengths of the human body and psychology are maximized and exposure of weakness to
stressors is minimized. Most people fail to recognize the work of women which constitute almost half of the work force engaged in farm activities.

The tools and implements used by women are defective in design or do not suit the physical structure of women, which leads to various physical health hazards like injury, fatigue, exhaustion, etc. It also affects their performance, which in turn influences in all family activities carried out at home. Keeping in view of the ergonomics and women, the development of tools has to be standardized in terms of comfort, quality and efficiency.

Several constitutional and legal provisions do exist to safeguard the interests of women. In spite of these provisions, the women continue to be neglected and often exploited because of biasness. Though they make enormous contributions to the work, still they are suffering because of dual responsibilities and poor design of tools at the work place.

There are the very few studies found on the present problem. To bring the women in light the investigator would like to work on this topic. The beneficiaries of the current topic are physiotherapists, orthopedics, NGO’s, ergonomists, students, equipment tools.

Key words: Rural farm women, postures, fatigue, pain intensity of hand

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Review of Literature

It is believed by some historians that it was women who first initiated farming by domesticating crop plants. While men went out hunting, women started gathering the seeds of plants and began cultivating them to meet their need, fiber and fuel needs.

(Ergonomic guide line for manual material handling)

A 1988 National Health Interview Survey reported that the agriculture fishing and forestry occupation group was the most likely to report daily exposures to all of the types of musculoskeletal injury hazards asked about. When individuals working in production agriculture were separated from the agriculture forestry and fishing group, their back pain was in the top ten of all US industry sub sectors (Guo et.al. 1999)

Some of the occupational health hazards of farm women engaged in agriculture (Suman and Maurya, 1993) include cuts, wounds and injuries; allergy, skin and eye irritation; swollen and sore hands and feet; chest congestion and breathing problem; body ache; sunstroke; physical tiredness, fatigue and exhaustion; psychological fatigue; food poisoning; malnutrition and anemia.

The tool can press into the palm at the base of the thumb, where blood vessels and nerves pass through the hand. This situation may result in some pain and swelling of the hand. (Greenberg and Chaffin, 1977)
The newly introduced modern technologies should not lead to displacement of women labor, but should result in improving their productivity employment and income.

(www.Elsevier.com/locate/apergo)

**Methodology**

The study was conducted in three villages Tarapur, Sojitra and Umreth of Anand District, Gujarat. List of women working in five different farms of each village was made. Randomly two women working in each farm were selected for the survey. Total 40 women were selected who are working with sickle in the farm. This study was conducted to assess the drudgery of farm women at the time of harvesting with sickle. Well prepared Performa was used for assessing the data, while collecting the data special attention was given on the selected sample size as regarding to pain area, awkward postures and analysis of comfort aspects while using sickle and observations related to it.

General information like age, education, occupation, working experience, income earned was collected from each farm women.

To study the type of postures adopted by women while using the hand tool sickle, the activity was analyzed and split up into 2-3 postures which they adopt while working with the sickle. Photographs of those respondents while doing the activity were taken and postures were analyzed with REBA (Rapid Entire Body Assessment) sheets and very high risk postures were identified.

**Results and Discussion**

The result of the study reveals that the workers are mainly from lower income group. They have no fixed source of income. Generally the families are large and live in joint families. The workers have hand to mouth existence. They are totally dependent on the income earned from farm work for their daily needs.

To identify the existing tools used by the selected farm women. A exhaustive list of the tool used by farm women was made.

<table>
<thead>
<tr>
<th>Sr no</th>
<th>Tools</th>
<th>F (N=70)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sickle</td>
<td>40</td>
<td>66.66</td>
</tr>
<tr>
<td>2</td>
<td>Pavdo</td>
<td>10</td>
<td>16.66</td>
</tr>
<tr>
<td>3</td>
<td>Tagaru</td>
<td>5</td>
<td>8.33</td>
</tr>
<tr>
<td>4</td>
<td>Kharpd</td>
<td>5</td>
<td>8.33</td>
</tr>
</tbody>
</table>

It was found that sickle was used by majority of farm women.
Table: 1: Distribution of respondents according to age group and education.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Distribution of respondents according to age group</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 to 25</td>
<td>55%</td>
</tr>
<tr>
<td>25 to 45</td>
<td>15%</td>
</tr>
<tr>
<td>45 to 65</td>
<td>30%</td>
</tr>
</tbody>
</table>

Less than one- fifth workers had age between 15 to 25 years, two-fifth workers had age 45-65years, while more than two-fifth worker had age from 25-45years. Less than one-third workers had education up to 5th standard, less than one-fifth had education between 5-10 standard while more than half of the workers were illiterate.

Table: 2: Distribution of respondents according to years’ of work in farm.

<table>
<thead>
<tr>
<th>Years of Work</th>
<th>Distribution of respondents according to years’ of work in farm</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 years</td>
<td>7%</td>
</tr>
<tr>
<td>3 years</td>
<td>15%</td>
</tr>
<tr>
<td>4 years</td>
<td>40%</td>
</tr>
<tr>
<td>More than 5</td>
<td>43%</td>
</tr>
</tbody>
</table>

Less than one tenth were working in farms since 2 years. Less than one fifth were working since three years, more than one fifth were working since four years while more than half of the women were working in the farms with sickle for more than 5 years.
Table: 3: Distribution of respondents according to comfort aspects of sickle.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Comfort aspects while using sickle</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F(N=40)</td>
<td>Per</td>
<td>F(N=40)</td>
</tr>
<tr>
<td>01</td>
<td>Weight of Sickle</td>
<td>27</td>
<td>67.5</td>
</tr>
<tr>
<td>02</td>
<td>Easy Grip</td>
<td>27</td>
<td>67.5</td>
</tr>
<tr>
<td>03</td>
<td>Handle of Sickle</td>
<td>28</td>
<td>70</td>
</tr>
<tr>
<td>04</td>
<td>Size as per User</td>
<td>21</td>
<td>52.5</td>
</tr>
<tr>
<td>05</td>
<td>Blade Sharpened</td>
<td>15</td>
<td>37.5</td>
</tr>
</tbody>
</table>

When the respondents were inquired about the comfort aspect of the sickle name weight, grip, handle, size, blade. The result revealed that more than two third workers were comfortable with weight/grip of sickle, less than three fourth workers were comfortable with handle. More than half workers were comfortable with size of sickle. More than three fifth were not comfortable with the blade of sickle which need more sharpening and the reasons could be that they are so habituated to working with the same sickle every day that they don’t feel the weight, grip, handle uncomfortable.
Table: 4: Distribution of respondents according to extent of pain areas in hand.

**PAIN IN PALM [SICKLE]**

<table>
<thead>
<tr>
<th>sr no.</th>
<th>Type of pain</th>
<th>UPPER PALM</th>
<th>MIDDLE PALM</th>
<th>LOWER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>F (N=40)</td>
<td>%</td>
<td>F</td>
</tr>
<tr>
<td>01</td>
<td>Mild</td>
<td>15</td>
<td>37.5</td>
<td>13</td>
</tr>
<tr>
<td>02</td>
<td>Moderate</td>
<td>11</td>
<td>27.5</td>
<td>7</td>
</tr>
<tr>
<td>03</td>
<td>Severe</td>
<td>1</td>
<td>2.5</td>
<td>7</td>
</tr>
<tr>
<td>04</td>
<td>None</td>
<td>13</td>
<td>32.5</td>
<td>13</td>
</tr>
</tbody>
</table>

**Upper palm**

Greater than one-third women had mild pain, less than one-third had moderate pain, and very few had severe pain while one third had no pain in distal phalanx. One-third women had mild pain or no pain in middle phalanx while less than one-fifth had moderate pain or severe pain in middle phalanx. Two-fifth women had mild pain, less than one-third had moderate pain, greater than one-tenth had severe pain while less than one fifth had no pain in proximal phalanx.

**Middle palm**

One-third women had mild pain, greater than two-fifth had moderate pain, less than one-fifth has severe pain while less than one tenth had no pain in distal phalanx. Greater than one-third had mild pain; one-third had moderate pain, and less than one -third had severe pain while very few had no pain in proximal phalanx. Less than one fifth had mild or moderate pain, greater than three-fifth had severe pain while very few had no pain in thenar. Less than one-tenth had mild pain, less than one fifth had moderate pain, greater than seven tenth had severe pain while very few had no pain in hypothenar. Less than one-tenth had mild pain, less than one fifth had moderate pain, greater than seven tenth had severe pain while none had no pain in palmar digital. Less than one third had moderate pain, seven tenth had severe pain while none had no pain or mild pain in palmar.

**Lower palm**

Less than one-tenth women had mild pain, one-fifth had moderate pain, seven tenth had severe pain while very few had no pain in wrist crease.
Pain intensity (hand diagram)

PAIN AREAS WHILE USING SICKLE

- 8 Palmar digital
- 9 Palmar
- 10 Wrist Crease

Legend:
- Green: Mild
- Blue: Moderate
- Red: Severe
- Yellow: None

1 dot = 5 %
Table 5: Distribution of respondents according to subjective feeling of fatigue after the day's work with sickle.

<table>
<thead>
<tr>
<th>Sr no</th>
<th>Pain assessment</th>
<th>F (N=40)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No pain</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Can be ignored</td>
<td>15</td>
<td>37.5</td>
</tr>
<tr>
<td>3</td>
<td>Interfere with tasks</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>Interfere with concentration</td>
<td>15</td>
<td>37.5</td>
</tr>
<tr>
<td>5</td>
<td>Interfere with basic needs</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

When the respondents were asked about their level of perceived exertion working with sickle after the day’s work is over the data revealed that approximately two-fifth of respondents have pain that can be ignored and other two-fifth have exertion which interfere in the concentration while doing any household work. The reason may be that they are habituated doing these job and don’t feel the exertion.

Table 6: Distribution of respondents according to action level

<table>
<thead>
<tr>
<th>Sr NO.</th>
<th>REBA SCORE</th>
<th>ACTION LEVEL</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Negligible Risk</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>2-3</td>
<td>Low risk, change may be needed</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>4-7</td>
<td>Medium risk, further investigation, change soon</td>
<td>23</td>
<td>28.75</td>
</tr>
<tr>
<td>4</td>
<td>8-10</td>
<td>High risk, investigate and implement change</td>
<td>42</td>
<td>52.5</td>
</tr>
<tr>
<td>5</td>
<td>11+</td>
<td>Very high risk, Implement change</td>
<td>15</td>
<td>18.75</td>
</tr>
</tbody>
</table>

Less than one-third of respondents had medium risk, more than half had high risk postures while less than one-fifth had very high risk postures while working with sickle. Investigation, posture change and implement change is recommended.
Very risky postures adopted by farm women while working with sickle.

Posture Diagram
Observations made by investigator on the respondents while working with sickle.

1. While workers used sickle it was observed that in case of loose blade small pieces of wood were inserted to tighten the blade. If the blade was not sharpened then the user had to apply more strength.
2. In case of smooth handle sickle slipped due to perspiration hence handle is to be held more tightly, due to which rashes occur and corn also develops.
3. The grip of the handle is by thumb and first finger hence pain is felt the most by these fingers.
4. Continuous jerk is to be applied while working with sickle. As the end of the handle is held in middle of the palm it receives maximum effect of jerk.
5. All the workers have maximum pain in middle of the palm. In place below fingers the skin may get thick and corn may develop.

Corn develops while using sickle.
Suggestions

There are a number of characteristics that determine appropriate agricultural tools (Village Earth, 2011):

- It should allow for efficient and speedy work with a minimum of fatigue.
- It should be safe.
- It should have a simple design that allows them to be made locally.
- It should be ready for immediate use without preparatory adjustments that cost time.
- It should be made of readily available materials.

For reduction of this potential injury, handles for tools should be long enough so that they do not end in the palm. (Greenberg and Chaffin, 1977)

A small tool modification or adjustment in the work layout can make a big difference in preventing injuries.

Conclusion

Mostly farm women use sickle while working in farm. The most common posture adopted by the women while using sickle is in sitting or bending position. More than three-fourth of the sickle workers adopt squatting postures while working. One tenth workers adopt straight leg posture with bent back and neck.

The farm rural women performs their dual role of working in farm and in household as well, which leads to continuous work without rest leading to fatigue. Women experience mental fatigue, physical fatigue and sleep related fatigue. Women faced mental anxiety in morning due to management of household work, children and work at farm. Due to continuous work in same position in farm, women experienced physical fatigue. Women have to complete the work in limited time as they have other work waiting to be done at home, hence they get fatigue. Women do not get enough sleep as required by their body as they are late sleepers and early risers hence they get sleep related fatigue. While working in the farm with sickle; the tool was found unfit for them especially the size and blade. The hand analysis of pain areas show that maximum pain is in the middle palm while working with sickle. When the rate of perceived exertion was assessed two fifth of the respondents pain interfere with their day to day household work. The positive analysis of the respondents with respect to using sickle in the farm displayed that 70% of the posture were risky or very risky on REBA score. The observations done at their workplace showed working with continuous work and many times skin cuts, scrapes, corns in palmar region of the hand. The sickle which causes discomfort or injury should be modified. The tool (sickle) should be in proper proportion to the hand grip of the women users to maximize the work. Sickle should not create i.e. it should not demand unusual postures. Tools must be designed to increase the strength and work capacity of the women users.

References

4. Konz, S., 1979 a Work Design Columbus, Ohio : Grid Press, 592 page

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