

S V- A- 1

**MUSCULOSKELETAL DISORDER OF WOMEN LABOUR ENGAGED IN SHELLING  
ACTIVITY OF CASHEW NUT FACTORY**

Swapnali Borah

'College of Home Science, Central Agricultural University, Dakopgne,

Tura, Meghalaya - 794 001

Email: [swapnali70@yahoo.com](mailto:swapnali70@yahoo.com)

**Abstract**

Musculo-skeletal disorder is the leading cause of the occupational ill health. An awkward and static posture has been recognized as a risk factor for work related musculo-skeletal problem. In India mostly women labour are engaged in the cashew nut processing factory.

The present study was conducted in a cashew nut factory of Meghalaya where in the tedious static activity of shelling was done entirely by women labour. The sample included twenty women labour of a factory within the age group of 20 – 50 yrs. having the average BMI of 19.38 which is in normal range. Rating of feeling of physical exertion and musculoskeletal disorders were studied by using rating scales, Hand grip Dynamometer and Flexicurve.

The study revealed that the perceived workload of the activity by the female workers was heavy to very heavy and they felt severe to very severe pain in both upper and lower extremities and most of the joints of the body, and also demanded the angle of deviation of normal spinal curve by the activity which are the high risk factor for musculoskeletal disorders.

**Keywords:** Musculoskeletal disorder, perceived workload, angle of deviation

SV-A-2

## WORK RELATED BODY DISORDERS AND HEALTH HAZARDS FACED BY FARM WOMEN OF PUNJAB

Harpinder Kaur and Shivani Sharma

Email:harp\_07@rediffmail.com

### Abstract

In India, the contribution of women is very high in the farm sector as they are involved in majority of farm operations and are therefore subjected to extra harsh conditions of work that leads to both physical and psychological stress. The work amenities that are poor of essential facilities, static postures, dependence on muscular force and strength make the work laborious. The implications of such work load result in disorders and health hazards.

A survey was conducted by taking 200 farm women of Punjab State. The results showed regarding the level of work related body disorders in agriculture by women included pain in many parts of body followed by numbness or stiffness. Some farm women also felt itching and swelling in hands while working in the fields and some felt burning in abdomen and chest especially during spraying of pesticides in the fields due to inhalation. The reasons of pain or stiffness may be due to the poor body postures while performing certain farm operations and lack of awareness regarding the right body postures. Sometimes, they did not even take rest in between which is essential to make our body stress free.

Regarding the impact of these disorders, it was found that maximum of respondents discontinued their work temporarily. Respondents also reported cuts and wounds, sprain, scratches and ulcerations as work related hazards. They usually used different indigenous methods as coping mechanisms for these work related body disorders or hazards. Therefore, it can be concluded that work place and postures need to be improved to reduce the musculoskeletal disorders among farm women.

**Key words:** Musculoskeletal Disorders, Physiological Stress, Coping Mechanisms, Indigenous Methods, Health Hazards

S V- A- 3

**ERGONOMIC ASSESSMENT OF BEAUTICIANS' OCCUPATIONAL HEALTH & SAFETY AT THE WORK CENTRE**Paulomi Dalal (Shah)\*, Manjari Acharya\*\*Email: [paulomidalal@gmail.com](mailto:paulomidalal@gmail.com)**Abstract**

The purpose of conducting a research was to place more emphasis on detailed analysis of Beauticians' work pattern for the selected activities, a comprehensive knowledge about their work posture while working in the beauty parlor and thus, Musculo-skeletal problems if any.

For the present study 50 respondents each were randomly selected from both the places i.e. Mumbai and Vadodara respectively. Experimental work was carried out after the findings of baseline survey. All 50 respondents of Vadodara city was chosen for the detailed survey and experimental work. The study was carried out with multiple tools, i.e., a structured interview schedule. A Rapid Upper Limb Assessment (RULA) and Ovaku Work Assessment Sheet (OWAS) were used for the evaluation of postural load during work and gave a quick and systematic assessment of the postural risks of a worker. For analyzing the angle of working postures Ergo-Master software was used. The data were analyzed employing descriptive as well as relational statistics and were presented in frequencies, percentage, minimum, maximum, SD, 5<sup>th</sup> and 95<sup>th</sup> percentile.

For statistical evaluation Chi-square, t-test was used. Highly significant difference ('Z' = 15.85 at 0.05 % level) was found between pre and post test comparison through 'Z' test for minor engineering changes done to rectify postural problems. The present study will be helpful to many professionals such as – academicians, engineers, physical therapists and occupational therapists, interior designers and to start a trend of furniture design studies from the "ergonomic" aspects, rather than limiting them to only the medical research.

**Keywords:** Beauticians', MSDs, Workstation design, Work Posture.

S V- A- 4

**WORKSITE INJURIES IN FEMALE CONSTRUCTION LABOURERS IN UNORGANIZED SECTORS: AN ERGONOMIC STUDY**

Kumkum Basu, Soumen Chattopadhyay, Subhashis Sahu and Goutam Paul

Department of Physiology, University of Kalyani

Kalyani, West Bengal, Pin -741 235

Email: skcsahu@yahoo.co.in

**Abstract**

The construction industry is an injury prone industry. The work site injury of the labourers in the construction industry has not been studied significantly till date in India. The present study was aimed at analyzing of the work site injuries experienced by female labourers and suggesting some ergonomic interventions to reduce incidences of work site injuries.

Along with questionnaire study, regular recording of work site injuries were carried out for two years in 100 different work sites. From these records, the work site injuries in female labourers were analyzed.

Different causes of injuries were tripping, slipping, fall of objects from above, hit by materials, pricking by nails or other sharp objects. In these work site injuries, maximum affected body part was toes. Tripping or slipping in uneven ground, littered work place, falling of object etc. were the main cause of toe injuries. Eighty four percent (84%) of female construction labourers working in unorganized sectors used only slippers or chappals. Many of them were bare footed. Bad house keeping, unsafe work practice and unexperienced workers caused the worse situation. It was observed that quite a considerable number (28.0%) of female labourers loses 1 to 3 working days per year due to work site injuries. The labour contractors or employers of the construction workers did not keep any injury report. They did not give any compensation for work site injuries also.

Good house keeping, training of workers, use of personal protective devices are suggested for female labourers to reduce the occurrence of injury at work place.

**Key words:** Work site injuries, Female Labourers, Construction industry, Unorganized sectors.

## QUANTIFYING FARM WOMEN INVOLVEMENT IN DIFFERENT PADDY CULTIVATION PRACTICES IN TAMIL NADU

R. S. Singh\*, L. P. Gite\*\* and K. V. R. Rao\*\*\*

\*Principal Scientist (Agril Economics), \*\* Project Co-ordinator, AICRP on ergonomics and Safety in Agriculture and \*\*\* Senior Scientist (S & WCE) respectively. Central Institute of Agril Engineering, Nabibag, Berasia Road, Bhopal – 462038 (M.P.), India

Email: [rssingh123@yahoo.com](mailto:rssingh123@yahoo.com); [rssingh@ciae.res.in](mailto:rssingh@ciae.res.in)

### Abstract

Women in rural India account for a significant share of wage labour in agriculture. Although their earnings contribute significantly to household incomes, many of the agricultural activities that women perform go unacknowledged as work, so that rural women are sometimes referred to as “invisible farmers”. The nature and extent of their involvement in agriculture, no doubt, varies greatly depending on regions, ecological sub-zones, farming system, castes, classes and stages in family cycle. Technological change in agriculture – to the extent that it increases returns to labour and land- has a direct bearing on women earnings especially for women who have some control over income from land. Augmenting women’s effective earning capabilities can also enhance their status and security in the family. Thus, an attempt has made to examine the involvement of men and women in various farm operations in paddy cultivation using 8 row improved direct paddy seeder and manual transplanting. Data were collected from a representative sample of 60 growers using 8 row TNAU improved direct paddy seeder (locally called Drum seeder) and 30 growers using manual transplanting of paddy in different villages of Padukottai and Trichnapally districts of Tamil Nadu during the year 2008-09. The participation of male and female labour was recorded for all the operations performed in the paddy cultivation. Women Involvement Index in farm operation (WII) was also calculated using following formula:

$$WII = [TN_w \times TT_w / (TN_m \times TT_m + TN_w \times TT_w)]$$

Where,

WII = Women Involvement Index in farm Operations,

TN<sub>w</sub> = Total number of farm women involved in all operations

TN<sub>m</sub> = Total number of men involved in all operations

TT<sub>w</sub> = Total time spent by farm women in the operations, days/ha

TT<sub>m</sub> = Total time spent by men in the operations, days/ha

The study revealed that the hand weeding and harvesting & threshing were the major operations performed predominantly by the women in cultivation of direct seeding of paddy while transplanting, weeding, harvesting & threshing were the important operations of women involved in cultivation of transplanted paddy. Women also played a role in many other farm activities including application of manure, fertilizers and irrigation, but were excluded from activities which required operation of machinery in the operations like tillage, seeding by drum seeder, weeding by cono-weeder and harvesting by combine. Women Involvement Index in farm operations (WII) was found to be 0.62 that varied from 0.56 to 0.73 across the selected villages. The operations that showed involvement index of more than 0.60 were transplanting, weeding, harvesting & threshing, indicates the monotony of farmwomen in these operations for paddy cultivation. Though crop establishment and weeding are traditionally women dominated jobs, the 8-row seeder and the cono weeder were generally operated by male workers due to their high efforts requirement. In view of this, it is necessary to develop/promote suitable women friendly equipments so as to take care of their job opportunities.

**Key words:** Invisible farmers, TNAU improved direct paddy seeder, cono weeder, women involvement index, women friendly equipments

S V- A- 6

**REGRESSION MODELS FOR ASSESSMENT OF SELECTED DYNAMIC MEASUREMENTS OF WOMEN IN SQUATTING POSTURE**Madhuri Kulkarni<sup>1</sup> D. Murali<sup>2</sup> and Hemangini Sarambekar<sup>3</sup>

1. Associate Professor, Family Resource Management, College of Home Science, M.A.U. Parbhani

2. Associate Dean &amp; Principal, College of Home Science, M.A.U. Parbhani

3. Professor &amp; Head, Dept of Family Resource Management, College of Home Science, M.A.U. Parbhani

Email: [kul.home@yahoo.co.in](mailto:kul.home@yahoo.co.in)**Abstract**

The study was carried out with the objective of studying the relationship between static and dynamic measurements of women and to develop the regression models for assessing dynamic measurements of women in squatting posture.

The selected static and dynamic measurements of randomly selected 500 women from Marathwada region were recorded in predefined observation schedule. The data was analysed by applying simple correlation, multiple regression analysis and  $\chi^2$  test was applied to test goodness of fit of developed regression models.

Wide variations were observed for the static and dynamic measurements of selected women in squatting position. Selected set of static measurements like hand length, squatting height, squatting mid-shoulder height and right knee height were positively correlated with selected dynamic measurements of women in squatting posture. Multiple regression analysis indicated 53% impact of selected set of squatting static anthropometry on squatting vertical arm reach of women, whereas, the total impact of these static measurements was very less on other dynamic measurements of women in squatting position. It was observed that the linear multiple regression models were better fit and had shown highly significant value of coefficient of multiple determination ( $P \leq 0.01$ ) for the relationship of selected static and dynamic measurements of women in squatting posture. Estimated dynamic measurements were slightly different from the actual measurements of selected women in squatting position.

Hence, it can be said that developed regression models are proved to be fit for calculating vertical and horizontal dynamic measurements of women in squatting posture. Application of  $\chi^2$  indicated non-significant values of comparative assessment of observed and predicted dynamic measurements, thus, the goodness of fit is proved for the developed regression models.

**Key Words:** Squatting posture, Women, Regression Model, Dynamic Measurements.

S V- A- 7

**DESIGN DEVELOPMENT SCOPE ON WOMEN OCCUPATIONAL ASPECT:  
SPECIFIC REFERENCE TO LOCAL FRUIT PROCESSING INDUSTRIES IN NE INDIA**Nandita Bhattacharyya<sup>a</sup> and Debkumar Chakrabarti<sup>b</sup><sup>a</sup> Associate Professor, Faculty of Home Science, Assam Agricultural University, Jorhat<sup>b</sup> Department of Design, Indian Institute of Technology Guwahati, Guwahati, AssamE-mail: <sup>a</sup> nbhatta2000@yahoo.com, <sup>b</sup> dc@iitg.ernet.in**Abstract**

Specifically when women workers concern, in order to bring efficiency in work performances, design development of machinery and equipment meant to assist, many of them have demonstrated to be a major cause of injury when is not conceived or not used properly. In India, while women are entering occupations previously closed to them, the labour force is still highly segregated on the basis of gender. Depending on physical and social constrains women labour forces face certain difficulties in comparison with male work forces even they are engaged in similar activity. To attract them the above needs to be critically looked into.

Vast population of North-east (NE) part of India is with varied traditional occupations, which have turned now an income generation profession. Such a small scale industry in tis effect is food processing with local raw materials and it is a promishing field of growth. Context specific application of ergonomics principles are to be studied in the process of designing of work related equipment of local manufacturing units, and thus a compatible effective interface may be established between the material resource and human resource and the developmental approaches. Recently ergonomics studies and design developments of various work accessories to assist various tasks in such industries, e.g., tea industry, where women constitute the major workforce have been initiated.

Studies have been conducted viewing to increase productivity through design development to suit the working conditions and physical compatibility with women workers. These address specific issues to improve the workers motivation leading to enhancement of productivity and improving occupational health and safety.

**Keywords:** Fruit processing, ergonomic intervention, productivity

S V- A- 8

## MUSCULOSKELETAL DISORDERS AND BODY PART DISCOMFORT WHILE CARRYING LOADS BY HILL WOMEN

Dhyani, Vijay Shree\*, Sharma, Promila\*\* and Thakur, T.C\*\*\*

\* Department of Family Resource Management

\*\*Professor and Head, Department of Family Resource Management,  
College of Home Science

\*\*\* National Professor-ICAR, Department of Farm Machinery and Power Engineering,  
College of Technology

G.B.Pant University of Agriculture and Technology, Pantnagar, U. S. Nagar, Uttarakhand

Email: vsdhyani@gmail.com

### Abstract

Most of the tie hill women spent carrying water, fuel, wood, fodder materials from long distances which involve carrying loads on head, back, shoulders, on lap of hands etc. It was important to assess the level of MSDs and BPDS while carrying loads.

One hundred women were selected of in the age group of 20-45 years for anthropometric data by simple random sampling without replacement. For body part discomfort scale was used to measure local muscle pain and discomfort.

The back was the most badly affected part of the body, and about 79% women felt pain in the back while carrying loads followed by the body pain 70%, shoulder pain 46%. About 82% of women slipped while carrying heavy load on the graded hill surface whereas about 67% fell while carrying loads. About 46% women had cuts and wounds while slipping or falling during carrying loads. It was also found that 10% women had fractures in various body parts and about 27% women had swollen body parts while slipping or falling during carrying loads.

On BPDS, subjects felt light to moderate discomfort and pain in various body parts such as lower back and shoulders while carryings loads on the back where as moderate to very uncomfortable pain in shoulders, hands, neck and palms while carrying loads on shoulder. It was also found that the subjects felt moderate discomfort and pain in knees, thighs and toes while carrying load at 20 % grade. It can be concluded from the above that the carrying loads on the shoulder caused more pain and discomfort in various body parts.

**Keywords:** Musculoskeletal Disorders (MSDs), Body Part discomfort Score (BPDS)

S V- A- 9

**ERGONOMIC SURVEY OF LEAF PLATE MAKING ACTIVITY OF TRIBAL WOMEN**

\*Manimala Dey and Subhashis Sahu

Department of Physiology, University Of Kalyani,

Kalyani - 741235, Nadia, West Bengal, India

E-mail: [skcsahu@yahoo.com](mailto:skcsahu@yahoo.com);

\*[mani.dey2009@gmail.com](mailto:mani.dey2009@gmail.com)

**Abstract**

Sal leaf plate making is one of the common part-time occupations of the tribal women of the districts of West Bengal and Jharkhand. A large number of tribal women are engaged in this job irrespective of age to give some financial assistance to their family. Present study aimed at analysis the plate making activity ergonomically and find out different health problems the postural stress experienced by them.

A detailed questionnaire along with Nordic questionnaire was applied on 94 tribal women. The questionnaire was sought information about different aspects of work pattern, food habits, culture, etc. of them. The working postures were also evaluated by REBA method.

It was observed that tribal people are very poor economical condition. A large number of them are suffering from chronic energy deficiency (CED). The tribal women's are go to the nearby forest (2-3 Km far) in 2-3 days per week to collect the shawl leaves and carry it their house for making plates. The tribal women's spend 4-6 hours daily in making sal leaf plates. They work at a stretch 2-3 hours. Apart from during this work they also perform other house hold work. The maximum discomforts felt by them are in low back, leg and hand. A large number of women complain about pain in the low back (77.7%) and hand (53.2%). Postural analysis shows some of the posture adopted during shawl leaf making is required corrective measure. Some low cost ergonomic intervention like working bench, intermittent breaks, back support, etc will improve the quality of life of them.

**Key words:** Ergonomics, tribal, women, questionnaire study, postural analysis.

**WOMEN IN AGRICULTURE: ERGONOMIC INTERVENTION FOR  
AVERTING MUSCULOSKELETAL INJURIES**

Surabhi Singh and Renu Arora

Assistant Professor, Dept. of Resource Management, SDAU, S.K. Nagar, Gujarat  
Reader, Dept. of Resource Management, Delhi University, Delhi

Email: [surabhi1882@yahoo.co.in](mailto:surabhi1882@yahoo.co.in)

**Abstract**

For more than a decade, farming has been rated one of the dangerous occupations. A considerable number of adverse health conditions, including musculoskeletal disorders are linked to agricultural work. This paper presents the results of a literature review undertaken to determine the types and extent of musculoskeletal disorders of the farm women in India and to identify opportunities for ergonomic intervention.

It was concluded that occupational risk factors in agriculture including static positioning, forward bending, heavy lifting and carrying, kneeling and vibration were a consequence of the numerous types of musculoskeletal disorders such as disorders of the back and neck, nerve entrapment syndromes, tenosynovitis, tendonitis, peri tendonitis, epicondylitis and non specific muscle and forearm tenderness (NIOSH, 1997). At the same time, ergonomics intervention has the potential to reduce musculoskeletal disorders among farm women. These may include design of women friendly tools and equipment, improved work processes and stipulation of shorter rest periods for farm women. There is a need to increase awareness of musculoskeletal disorders and associated risk factors and to train farm women periodically for the proper and safe ways of handling tools and equipment in order to avoid musculoskeletal disorders.

The information presented in this paper should result in (1) Prioritization of researches based on prevention of farm women from musculoskeletal disorders (2) Development of new technologies for women for critical field problems such as hand cutting of plant materials, stooped posture, and lifting and carrying of heavy materials (3) Funding and support for awareness and prevention programmes for musculoskeletal disorders.

**Keywords:** Musculoskeletal Disorders, Ergonomics, Farm women, women friendly tools and equipment, work process.