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RESEARCH ARTICLE

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Development and evaluation of scale for measurement of postural discomfort and satisfaction of agriculture workers after weeding operation

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ABSTRACT

Agriculture production is the back bone of Indian economy and for enhancing agriculture production, weeding operation plays an important role. Most of the agriculture workers are doing weeding operation by traditional methods that's why they are suffered from postural discomfort. Postural discomfort at the time of weeding affects the productivity of work and efficiency of workers. Postural discomfort plays an important role in increasing the productivity and efficiency of agriculture workers. Hence, present study was undertaken with an objective to develop scale for measuring postural discomfort and satisfaction of agriculture workers regarding working performance and to evaluate the developed scale by agriculture workers. Present investigation was undertaken in Dept. of Home Science, RTMU, Nagpur during the year 2010-2011. As the scale was found to be reliable and valid, the developed scale will serve as a scientific tool for measurement of postural discomfort of agriculture workers after weeding operation. Most of the agriculture workers were having not tolerable postural discomfort after existing method of weeding. Most of the agriculture workers were having postural discomfort at neck, wrist, shoulder and knee than the other part of the body.

KEY WORDS : Agriculture workers, Postural discomfort, Weeding operation and Self rating scale

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INTRODUCTION

Women in rural India play a major role in shaping the country's economy through their active participation in agriculture. At present, women work force in agriculture and allied sector is estimated at about 61 million which amounts to about 30% of the total rural workers in the country. In India, particularly in Maharashtra, women are primarily associated with weeding operation in rural areas. They are doing weeding operation manually that's why they suffer from postural discomfort at the time of weeding. Owing to poor socio-economic conditions, they are compelled to carry out a considerable number of manual, rigorous tasks in agricultural fields.

Gangopadhyay *et al.*(2005) shows that those workers worked continuously in awkward postures during certain agricultural activities. Consequently they suffered from discomfort in different parts of their body. Even though they were very young, they were likely to suffer from serious musculoskeletal disorders in the future.

Chung *et al.* (2005) Shows that many Korean workers are exposed to repetitive manual tasks or prolonged poor working postures that are closely related to back pain or symptoms of musculoskeletal disorders. Workers engage in tasks that require not only handling of heavy materials, but also assuming prolonged or repetitive non-neutral work postures. Poor work postures that have been frequently observed in the workplaces of shipbuilding shops, manufacturing plants, automobile assembly lines and farms often require prolonged squatting, repetitive arm raising and wrist flexion and simultaneous trunk flexion and lateral bending. In most manufacturing industries, workers have to assume improper work postures repetitively, several hundreds of times per day depending on daily production rate. A series of psychophysical laboratory experiments were conducted to evaluate the postural load at various joints. A postural load assessment system was then developed based on a macro-postural classification scheme. The classification scheme was constructed based on perceived discomfort for various

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joint motions as well as previous research outcomes. On the basis of the perceived discomfort, postural stress levels for the postures at individual joints were also defined by a ratio scale to the standing neutral posture. Laboratory experiments simulating automobile assembly tasks were carried out to investigate the relationship between body-joint and whole-body discomfort. Results showed a linear relationship between the two types of discomfort, with the shoulder and low back postures being the dominant factor in determining the whole body postural stresses. Hence, present study was undertaken with an objective to develop scale for measuring postural discomfort of agriculture workers and to evaluate the developed scale by agriculture workers.

METHODOLOGY

Present investigation was undertaken in Dept. of Home Science, RTMU, Nagpur during the year 2010-2011. For present investigation, 2500 agriculture workers are selected randomly from five districts, 1500 male agriculture workers and 1000 female agriculture workers. The details consisted of the steps followed for developing scale for measuring the postural discomfort and satisfaction of agriculture workers regarding working performance after existing method of weeding operation, such as collection of statements, editing and pre-selection of items, analysis and selection of items, validity and reliability of the scale.

Development of rating scales:

It is a device which can be used by an observer to summarize his judgment of activity and behaviour that he has observed. Agriculture workers are suffered from postural discomfort due to neck pain, shoulder pain, arm pain, elbow pain etc. as a source of information used to measure the postural discomfort of agriculture workers after weeding operation.

Self rating scale:

The procedures for construction of the scale given by Edwards (1957) were followed (Table 1).

Table 1 : Details about items developed and finally retained in self rating scale for postural discomfort of agriculture workers

Sr. No.	Heads/dimension	Total number of items identified	No. of items retained after relevancy test
1.	Postural discomfort	40	27
2.	Working performance	10	07
	Total	50	34

Collection of statements:

The major components and sub components which contribute to self rating of agriculture workers were collected after reviewing of relevant literature and discussion with social scientists, agriculture experts from the university. The scale consists of two main head and 50 items were collected for the scale.

Editing and pre-selection of items:

Preliminary selection and editing of item were done as per the criteria suggested by Edwards (1957) one main head and 50 items were retained after preliminary screening.

Analysis and selection of items:

The inventory of component was circulated among 25 judges for final selection of scale items to be developed. The judges selected for the study were mainly the heads of departments from College of Home Science, College of Agriculture, College of Agriculture Engineering.

After brief explanation about the study, the conceptual orientation and operational definition, judges were requested to go through the statements and indicate their relevancy on three point continuum as 'Relevant', 'Not So Relevant' and 'Irrelevant'. The judges were also requested to modify or delete any statement, if they feel. The three points of rating were also assigned scores 3, 2 and 1 for 'Relevant', 'Not So Relevant' and 'Irrelevant', respectively. These judgments were used for working out the relevancy percentage of occupational stress of teachers.

The relevancy percentage of more than 80 was used as cutting point while screening and consideration for further selection of heads and items. Using this procedures under one head 34 items out of 50 having more than 80 relevancy percentage were retained and others were rejected.

Validity of scale:

It becomes necessary to measure the validity of the scale before its use. Scale is said to be valid when it measures what it presumed to measure.

Content validity:

Content validity was considered as most appropriate for this type of scale. It was ensured that whether or not, the scale covered the entire area or dimension it deals with. The statements/items were collected from research articles, books and various websites.

Content validity is determined by expert judgment. In developing self rating scale the experts as judges were

identified as those who had good experience of postural discomfort of agriculture workers. They were asked to determine the relevancy of the statements.

The judges were provided with the concepts and operational definitions of heads/dimensions. They were informed about the purpose of developing this scale. Thus the judgments of the judges on the relevancy statements in the scale ensured adequate content validity.

Reliability of the scale:

A scale is said to be reliable when it will consistency produce the same results when applied to the same sample. To test the reliability split half technique as suggested by Kerlinger (1973) was employed.

Split half technique:

The split half technique, which is indicative of interval consistency, was thought appropriate. The statements of each main halves using the scale were divided into two halves using the odd numbered statements for the B group and even numbered statements for the A group. Then, the scales of each odd and even statement given by each judge were summed up. Thus, the two sets of the statements were treated as separate scale and "reliability coefficient was found to be 0.85", which is very high. Hence, the scale said to be reliable. The final scale is used for judging the postural discomfort of Agriculture workers.

OBSERVATIONS AND DISCUSSION

The results are summarized below according to objectives of the study :

Self-rating scale of postural discomfort:

The mean scale of each item was calculated by multiplying frequency of response with the weightage and dividing the number of respondents. Based on the scores obtained the following classification was made (Table 2).

Table 2 : Marking of developed scale

Scale	Marking
No discomfort	5
Light discomfort	4
Moderate discomfort	3
Not tolerable discomfort	2
Extreme discomfort	1

Table 3 shows the scale for measurement of postural discomfort at the time of weeding. This scale will serve as a scientific tool for measurement of postural discomfort of agriculture workers at the time of weeding operation. The evaluation of developed scale has been made in Table 3.

Table 3 shows the evaluation of developed scale. After the existing methods of weeding operation developed scale on postural discomfort of agriculture workers after weeding operation was evaluated. Firstly, information about the developed scale was given to the agriculture workers. The rate, their postural discomfort by ticking against each statement under given five point continuums (No discomfort-5, light discomfort-4, moderate discomfort-3, not tolerable discomfort-2, extreme discomfort-1).

Table reveals that most of the agriculture workers were having not tolerable discomfort after existing method of weeding. Most of the agriculture workers were having postural discomfort at low back, neck, wrist, shoulders and knee than the other parts of body. Most of the agriculture workers were dissatisfied about existing method of weeding operation. In agriculture, most of the workers are using traditional tool (Khurapi) for weeding operation in dry land as well as wet land for different crops. Due to traditional method of weeding productivity and efficiency of workers is decreased. They are not aware about manually operated weeder. That's why development of manually operated weeder is the need of the hour. Manually operated weeder increases the productivity and efficiency of workers.

Gangopadhyay *et al.* (2010) stated that discomfort level and risk level of the individual working postures were calculated by the use of risk level and discomfort level scale. From the questionnaire study, it was revealed that most of the core making workers grinds often in awkward postures. The workers were affected by musculoskeletal disorders like pain at low back (100%), hand (40%), shoulder (30%), wrist (20%) and neck (20%). It has been also found that there is a significant ($p < 0.05$) correlation between discomfort level and risk level of the individual working postures of the workers. It was concluded from the study that health of the core-making workers was highly affected by different awkward postures and that they suffer from posture-related musculoskeletal disorders primarily affecting the low back region.

Conclusion:

As the scale was found to be reliable and valid, the developed scale will serve as a scientific tool for measurement of postural discomfort of agriculture workers. The attitude scale constructed in the present study can be used by future researchers for evaluation of postural discomfort of agriculture workers. Most of the agriculture workers were found having no postural

Table 3 : Evaluation of developed scale on postural discomfort and satisfaction of workers about working performance (N=2500)

Sr. No.	Statements	No discomfort	Light discomfort	Moderate discomfort	Not tolerable discomfort	Extreme discomfort
1.	Discomfort about (neck)	18(0.72)	15(0.6)	20(0.8)	22(0.88)	11(0.44)
2.	Discomfort about clavicle (left)	15(0.6)	18(0.72)	12(0.48)	11(0.44)	22(0.88)
3.	Discomfort about clavicle (right)	25(1)	18(0.72)	35(1.4)	10(0.4)	12(0.48)
4.	Discomfort about left shoulder	13(0.52)	17(0.68)	19(0.76)	21(0.84)	15(0.6)
5.	Discomfort about right shoulder	11(0.44)	13(0.52)	15(0.6)	21(0.84)	11(0.44)
6.	Discomfort about left arm	14(0.56)	17(0.68)	12(0.48)	28(1.12)	18(0.72)
7.	Discomfort about right arm	20(0.8)	17(0.68)	15(0.6)	21(0.84)	11(0.44)
8.	Discomfort about left elbow	10(0.4)	17(0.68)	18(0.72)	25(1)	15(0.6)
9.	Discomfort about right elbow	15(0.6)	13(0.52)	17(0.68)	21(0.84)	14(0.56)
10.	Discomfort about left forearm	20(0.8)	11(0.44)	12(0.48)	27(1.08)	10(0.4)
11.	Discomfort about right forearm	17(0.68)	12(0.48)	21(0.84)	21(0.84)	16(0.64)
12.	Discomfort about left wrist	10(0.4)	16(0.64)	21(0.84)	15(0.6)	14(0.56)
13.	Discomfort about right wrist	14(0.56)	10(0.4)	28(1.12)	17(0.68)	12(0.48)
14.	Discomfort about left palm	13(0.52)	27(1.08)	15(0.6)	18(0.72)	13(0.52)
15.	Discomfort about right palm	21(0.84)	18(0.72)	10(0.4)	32(1.28)	15(0.6)
16.	Discomfort about upper back	15(0.6)	16(0.64)	20(0.8)	14(0.56)	22(0.88)
17.	Discomfort about mid back	25(1)	15(0.6)	16(0.64)	22(0.88)	23(0.92)
18.	Discomfort about lower back	14(0.56)	28(1.12)	22(0.88)	20(0.8)	26(1.04)
19.	Discomfort about buttock	15(0.6)	22(0.88)	23(0.92)	16(0.64)	25(1)
20.	Discomfort about left thigh	20(0.8)	25(1)	26(1.04)	19(0.76)	17(0.68)
21.	Discomfort about right thigh	30(1.2)	35(1.4)	23(0.92)	27(1.08)	37(1.48)
22.	Discomfort about left leg	29(1.16)	30(1.2)	33(1.32)	28(1.12)	17(0.68)
23.	Discomfort about right leg	25(1)	24(0.96)	20(0.8)	22(0.88)	35(1.4)
24.	Discomfort about left foot	30(1.2)	37(1.48)	33(1.32)	17(0.68)	40(1.6)
25.	Discomfort about right foot	26(1.04)	41(1.68)	30(1.2)	24(0.96)	37(1.48)
26.	Discomfort about left knee	17(0.68)	17(0.68)	17(0.68)	30(1.2)	30(1.2)
27.	Discomfort about right knee	29(1.16)	20(0.8)	33(1.32)	28(1.12)	30(1.2)
28.	How much satisfied are you about weeding index	15(0.6)	13(0.52)	17(0.68)	21(0.84)	14(0.56)
29.	How much satisfied are you about plant damage	20(0.8)	11(0.44)	12(0.48)	27(1.08)	10(0.4)
30.	How much satisfied are you about plant damage	15(0.6)	16(0.64)	20(0.8)	14(0.56)	22(0.88)
31.	How much satisfied are you about effective field capacity	25(1)	15(0.6)	16(0.64)	22(0.88)	23(0.92)
32.	How much satisfied are you about theoretical field capacity	11(0.44)	13(0.52)	15(0.6)	21(0.84)	11(0.44)
33.	How much satisfied are you about field efficiency	14(0.56)	17(0.68)	12(0.48)	28(1.12)	18(0.72)
34.	How much satisfied are you about Cardiac cost of work and energy expenditure	20(0.8)	17(0.68)	15(0.6)	21(0.84)	11(0.44)

Note: Figures in parenthesis indicate percentages

discomfort after existing method of weeding. Most of the agriculture workers were found having postural discomfort at low back, neck, wrist, shoulders and knee than the other parts of body.

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