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CONTENTS

Job strain and muscle fatigue in small scale unorganized agri enterprises

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ABSTRACT: Agri enterprises have predominance of health risk factors which affects to the workers health and overall wellbeing. The health problems of workers in agri enterprises increased due to incessant long working hours and uncomfortable work posture. The most common health problems experienced by workers in agri enterprises are job strain and musculoskeletal discomforts. Thus, present investigation was undertaken with the objective to assess the job strain and muscle fatigue among the workers engaged in different activities of small scale unorganized agri enterprises. Two analysis tools i.e., Job Strain Index and Rodgers Muscle Fatigue were used to find out the exposure of critical risks among the workers in different agri enterprises. The results revealed that among all the selected agri enterprise activities, highest job strain was found for the workers working in grain packaging activities particularly in loading and lifting of grains packets (JSI score 81 for each hand.) Weaving enterprise, vegetable cutting and grain packaging activities were associated with very high muscle fatigue as analyzed by the Rodgers overall priority matrix. The prevalence of job strain and muscle fatigue was found at hazardous level in workers engaged in small scale unorganized agri enterprises.

Key words: Agri enterprises, agriculture, muscle fatigue, strain, unorganized sector

Agricultural sector has preponderance of unorganized work with requisites of highest workforce involvement and a great number of enterprises consist. Unorganized sector workforce defined by the first Indian National Commission on Labour (1966-69) as those workers who have not been able to organize themselves in pursuit of their common interest due to certain constraints like casual nature of employment, ignorance and illiteracy, small and scattered size of establishment. Predominance of workforce in unorganized sector especially in agri enterprises has been one of the central features of the employment scenario in developing countries such as India. According to report published in the Economic Survey more than 90 per cent of the total workforce has been occupied in unorganized sector in year 2016-2017. According to NCEUS report (2007), agriculture sector has the highest workforce share in Indian unorganized sector with about 253 million workers strength out of total 395 million unorganized sector workers. The total women workforce strength in unorganized sector as well as in agriculture sector is more than men workforce. In year 2013-2014, 95.90 per cent female workers and 90.07 per cent male workers were involved in unorganized sector (NCEUS report, 2007). Agriculture based enterprises have prevalence of casual, contractual and seasonal employment availability, lack of social and physical security, contradiction in social standards and welfare legislations and denial of minimum wages security however have maximum workforce absorbing capacity. Besides high workforce proportion involved in the agri enterprises directly or indirectly concentrated in growth and development of nation however they face a large number of problems *viz*., physical or mental health risks, low wages, lack of facilities at worksite, lack of security for women, job insecurity etc. Workers engaged in agri enterprises activities may suffer from certain specific health problems which risks to workers wellbeing and life too. Fetching of water through traditional methods by respondents leads to pain in neck, forearm, palm and feet(Vinay *et al.,* 2019).The risks to health and wellbeing of workers of agri enterprises are increased to a great extent due to poor working conditions, ergonomically inappropriate working tools, technologies and equipments, lack of safety guidelines for specific work procedure and poor work station. The health problems in agri enterprises amplified when longer and continuous working hours and awkward working body posture contribute to worsen the occupational health problems among which job strain and musculoskeletal discomforts

are most common health problems experienced by agriculture worker. Therefore, the present investigation was undertaken with the objective to assess the job strain and muscle fatigue among the workers engaged in different activities of small scale unorganized agri enterprises.

MATERIALS AND METHODS

The present investigation was conducted to assess the job stress and muscle fatigue of the workers engaged in small scale unorganized agri enterprises. Eight unorganized agri enterprises namely weaving, bead making, sericulture, food processing, grain packaging, bamboo product making under All India Coordinated Research Project (Indian Council of Agricultural Research) were selected. The eighty-three workers were selected for the study to find out the drudgery involved by performing different enterprise activities. Data was collected through interview schedule along with the video recording of the task performed by the respondents for further investigation. Job strain index developed by Moore and Garg (1995) has six variants i.e., intensity of exertion, duration of exertion, efforts per minute, hand/wrists posture, speed of work, work duration per day need to be calculated for each task. Each variable assigned a rating and a multiplier which ranges from the score of 1 to 5. SI rating 1 indicates the light intensity of exertion and very good hand/ wrists posture whereas SI rating 5 indicates the maximum intensity of exertion and very bad hand/ wrists posture of job strain. Rodger Muscle Fatigue Analysis was done on the basis of three variable associated with physical risk factors, effort level and frequency and duration. Musculoskeletal Discomforts was analyzed in terms of muscle fatigue faced by the workers engaged in different type of selected small scale unorganized agri enterprises. The Rodgers Muscle Fatigue Analysis method was used as a technique to assess the amount of fatigue that accumulated in muscles during different work patterns within 5 minutes of work. A task sheet was used for each task and each body region and three job risk factors i.e., effort level, continuous effort duration and effort frequency were assessed by giving each factor a rating. According to scores provided for each body region for effort level, continuous effort duration and effort frequency, the level of fatigue was determined as low, moderate, high and very high muscle fatigue on the basis of overall priority matrix. The task data sheet consists a format for this whole procedure. The collected data were suitably coded, analyzed and presented.

RESULTS AND DISCUSSION

A. Job strain faced by the workers in small scale unorganized agri enterprises in India

Work related upper extremity disorders are a problem in terms of both economic and quality of life measures. The ability to predict which task and the number of activities can lead to upper extremities work related musculoskeletal disorders and are not safe, requires modification can be tested by using job strain index. Health risks in unorganised small scale agri enterprises may occur due to long hours working, repetitive nature of tasks, awkward, prolonged and sustained or difficult body postures, performing strenuous physical work and forceful effort required. Job strain is the utmost risk to workers, can be experienced when work demand and work pressure do not match the awareness, knowledge and capabilities of the workers and also the work station, work environment, work organisation and working tool or techniques are not ergonomically suitable. Job strain leads to the perilous physical, physiological and mental alterations which further leads to the worker's poor health and occupational injuries.

Job strain faced by the workers in weaving

Weaving activity is a main activity of smallscaletextilebased enterprises. Approximate 4.75 million weavers work in 1.7 million powerlooms in India (Nag *et al.*, 2010). Women worker constitute about 65 per cent of the total workforce in powerloom in rural and semiurban setting (Nag *et al.,* 2010). Work nature and workplace in textile based enterprises associated with several factors such as repetitive work, awkward and static body postures resulted in upper extremity pain and discomfort. Hand woven carpet industry have high prevalence of musculoskeletal

problems among weavers due to working postures, poor design of loom, working time, repetitive work and seat type (Choobineh, 2007). The main risk factors for women worker in hosiery industry are work-related musculoskeletal and vision related disorders mainly due to awkward work postures, repetitive nature of work, time pressures, psychological stress and improper job organization (Shilla*et al*., 2018). More to the point, occupational safety and health is a neglected area in unorganised small scale weaving enterprises.

Results revealed that the scores of Job Strain Index assessed for the workers engaged in weaving enterprise was 13.77 for left hand and 13.76 for right hand (Table 1). Subedi and Banamala (2015) also found in their study conducted on workers in small scale cottage factories in Nepal and illustrated that workers spent 8 to 12 hours in the cottage factories. Mohammadpour*et al.* (2018) also analysed that weaving activity as hazardous activity in their cross-sectional descriptive-analytical study using job strain index which was conducted on 143 weaving workers in Qom city, south Tehran Province and resulted that prevalence of musculoskeletal disorders in the upper extremities was significant and weaving activities included in the hazardous risk level. Nag *et al.* (2010) reported that about 88 per cent male and 79 per cent female weavers have the high prevalence of MSDs specifically in the upper back and lower back of the female weavers and knee and hand of male weavers. Priyadarshini *et al.* (2016) reported that weaving process in silk industry required constant movement and women workers have to work continuously on machines with repetitive motion which causes stress on the muscles and injuries in hands due to cut by the thread.

Job strain faced by the workers in bead making

Bead making is one of the small scale enterprise practices in Northern western part of Haryana state of India (Dua*et al*, 2018). Bead making is a very precise activity which requires static and awkward body posture to perform the activity. Bead making comprises a series of sub activities such as procurement of wood, chopping of wood, seasoning of wood, bit designing, sharpening blade/bit, designing bead, drilling, sieving, sorting, colouring, waxing, buffing, stringing and mala making. Worker performs bead making activities in standing, squatting and bending posture.

The data in Table 1 revealed that the scores of Job Strain Index was 6.75 for both the hands of the worker engaged in bead enterprise which depicts that the bead making activity as hazardous activity. As job strain is mainly associated with the awkward body posture adopted by the worker while working for longer duration therefore workers in bead making activity also affected by various occupational hazards. Dua*et al.* (2018) in their study on workers engaged in bead making activities reported that hundred per cent of the respondents had cuts, ninety per cent of them had eye irritation, seventy per cent had muscle pain due to prolonged sitting.

Job strain faced by the workers in sericulture

Sericulture industry is an agro-industry employing 70 lakhs workers in India and about 23,060 tonnes of silk is produced nationally generating turnover Rs. 25, 000 crore of which Rs. 2500 crore is exported (Pandey, 2014). Sericulture work requires hard manual effort in various activities such as cultivation of silkworm food plants, silkworm rearing, silk reeling and other post-cocoon processes. Sericulture is a labour-intensive industry which provides employment opportunities mainly in the hand reeling and hand weaving operations however cover a number of health hazards.

Table 1 shows that Job Strain Index score of sericulture workers was recorded with the score of 0.37 for left hand and 4.5 for right hand while rearing of silkworms whereas score of 3 for left hand and 6.75 for right hand was recorded while extraction of pupa form cocoon and score of 1.5 for left hand and score of 3 for right hand was recorded during reeling activity. Workers involved in silk rearing activities get exposed to multiple physical, chemical and biological agents which leads to various health problems that includes injuries, musculoskeletal disorders, allergies and respiratory diseases. Wani and Jaiswal (2011) in their study mention that workers engaged in silkworm rearing suffered from

Table 1: Job strain index scores of different selected small scale unorganized agri enterprises activities

S.No.	Name of the enterprise	JSI score of left hand	JSI score of right hand
1.	Weaving enterprise	13.77	13.76
2.	Bead enterprise	6.75	6.75
3.	Sericulture		
	a. Rearing of silkworms	0.37	4.5
	b. Extraction of pupa from cocoon	3	6.75
	c. Reeling	1.5	3
4.	Food processing (*amla* squash making)		
	a. Removing seeds and chopping *amla*	5.06	5.06
	b. Sun drying of *amla*	3.37	3.37
	c. Peeling and pulp extraction in squash making	6.75	6.75
	Food processing (lemon pickle making)	10.86	13.36
	Food processing (vegetable cutting)	27	29.58
5.	Grain packaging		
	a. Packaging of grains	4.5	20.25
	b. Storage of grains	13.5	13.5
	c. Sealing of grain packets	10.12	40.5
	d. Stacking of grain packets	6.75	45.56
	e. Loading and lifting of grain packets	81	81
	f. Labeling of stickers on grain packs	1.12	13.5
6.	Bamboo enterprise (cutting and stripping)	14.5	22

respiratory problems, musculoskeletal disorders, eye irritation, allergies and injuries.

Sericulture activities requires long-suffering hours of work in various awkward body positions considering whole body go through strain while working moreover, the activities are done in the natural light in unhygienic rooms which leads to the eye strain. Workers face the musculoskeletal health problems and they mainly suffer from headache, knee pain, joint pain, back ache and weakening eyesight. About 60 per cent of respondents were suffering from one or another disease caused due to silk weaving activity whereas majority of the respondents were suffering from the joint pain and back pain in the study conducted on silk weavers by Khan *et al.* (2013) in Srinagar city of India.

Sericulture activities were found very risky activities in terms of physical risk factors and the medium risk level was recorded for workers engaged in extraction of pupa form cocoon (JSI 6.75) Job strain is a serious health related problem in workers involved in sericulture activities which may develop irreversible musculoskeletal disorders and discomforts. Jyotsna *et al.* (2019) conducted a study on sericulture industry workers in the North coastal Andhra Pradesh to find out the health problems faced by the workers and concluded that workers of sericulture industry have considerably high prevalence of MSDs mainly low back pain (67.8%), headache (57.6%), noise induced hearing loss, tinnitus (25.8%) and physical injuries (16.9%).

Job strain faced by the workers in food processing

Food processing activities dominates in small scale unorganized agri enterprises in India and a large number of workers especially women are involved in Indian food processing enterprises. Food processing industry involves 50 per centof the workers engaged in production work in which workers exposed to adverse environment and have high risk to occupational health hazards. The pressure and workload on the workers leads to consequent overexertion which can give rise to stress and muscular disorders. A number of monotonous and repetitive efforts associated with the food processing activities enhance the incidences of musculoskeletal disorders. In present study Table 1 depicts the job strain faced by the workers in food processing activities in *amla* squash making, lemon pickle making and vegetable cutting task.

Result of Table 1 shows the Job Strain Index score of *amla* squash making activity. The JSI score of

5.06 was recorded for both hands while removing seeds and chopping *amla*, score of 3.37 was recorded while sun drying of *amla* for both hands and score of 6.75 was recorded for both hands while peeling and pulp extraction during squash making which depicts that removing seeds and chopping *amla*, sun drying of *amla* andpeeling and pulp extraction in squash making activities may place workers at increased risk for distal upper extremities.

Job strain associated with the lemon pickle making which revealed that the job strain index scores of worker engaged in lemon pickle making activities was 10.86 for left hand/wrist and 13.36 for right hand/wrist. The job strain index score depicts that lemon pickle making was probably hazardous activity in order to develop the job strain and further severe musculoskeletal disorders (Table 1).

When comparing all the selected activities, second highest job strain was encountered for the workers engaged in vegetable cutting activities resulted by the allied scores of Job Strain Index as it was recorded 27 for left hand and 29.58 for right hand. Vegetable cutting activities at small scale enterprise level was found at hazardous level in terms of development of job strain in workers.

Job strain faced by the workers ingrain packaging

Job strain faced by the workers while grain packaging was assessed and activities i.e., packaging of grains, storage of grains, sealing of grains packets, stacking of grains packets, loading and lifting of grains packets and labelling of stickers on grain packets were selected. Table 1 revealed that job strain Index score was 4.5 and 20.25 for left hand and right hand respectively while packaging of grains, 13.5 for each hand while storage of grains, 10.12 and 40.50 for left hand and right hand respectively while sealing of grain packets, 6.75 and 45.56 for left hand and right hand respectively while stacking of grain packets, 81 for each hand while loading and lifting of grains packets and 1.12 and 13.50 for left hand and right hand respectively while labelling of stickers on grain packets. Results shows that maximum job strain score found in loading and lifting of grains packets by each hand (JSI score 81) and minimum job strain was found in left hand while labelling of stickers on grain packets (JSI score 1.12). When comparing all the selected activities of all selected enterprises, highest job strain was encountered for the workers engaged in grain packaging activities mainly in loading and lifting of grains packets (JSI score 81 for each hand) while in packaging tasks, highly repetitive hand and wrist movements was also observed by Malagie*et al.* (2012) and while packaging tasks workers sufferers from repetitive strain injuries which was developed due to repetitive movements of body parts.

Job strain faced by the workers in bamboo enterprise (cutting and stripping)

India has the world's largest area under bamboo plants and second largest bamboo resource with 136 species, 23 genera covering 13.96 million hectares (FSI, 2011). Bamboo has more than 1500 documented uses (Khan *et al.*, 2007) ranges from handicraft item making to aircraft manufacturing. Indian small scale bamboo product making enterprises promotes the handicrafts items and has enormous scope for improvement of rural livelihood providing employment to the rural population. According to Planning Commission's 10th plan document (2002) approximate 8.6 million Indian people depend upon bamboo based employment for their livelihoods. Women workers is mainly employed in the bamboo based handicraft item making enterprises and design beautiful handicraft items. Bamboo based products making involves different awkward posture due to this workers prone to several health hazards such as job strain and musculoskeletal problems.

In the present study Table 1 revealed that worker engaged in bamboo enterprise (cutting and stripping activities) had job strain index score of 14.5 for left hand and 22 for right hand which depicts that cutting and stripping activities in bamboo enterprise were very hazardous and workers encountered to very high occupational health risk as high amount of job strain may build irreversible musculoskeletal problems. A study conducted by Parimalam and Balakamakshi (2006) on worker engaged in bamboo basket making reported that law back pain (99%), pain in upper

Table 2: Muscle fatigue analysis in workers engaged in small scale unorganized agri enterprises using Rodgers Muscle Fatigue Analysis method

Body Region		Sericulture			OPM	Weaving enterprise			OPM	Food processing (vegetable cutting)			OPM	Food processing (lemon pickle making)			OPM	Grain packaging			OPM
		Scores				Scores				Scores				Scores				Scores			
		Effort	Dur-ation	Freq-uency		Effort	Dur-ation	Freq-uency		Effort	Dur-ation	Freq-uency		Effort	Dur-ation	Freq-uency		Effort	Dur-ation	Freq-uency	
Neck		2.73	1.97	1.40	VH	3.2	2.4	2	H	2	4	3.5	VH	1.93	0.99	3.71	VH	2.5	4	1.5	VH
Shoulders	Right	1.83	1..90	2.7	H	3.8	2	3	VH	2	4	3.5	VH	2.14	1.04	2.5	M	2.5	4	1.5	VH
	Left	1.83	1.83	2.17	M	2.2	2.2	3.1	H	2	4	3.5	VH	1.86	0.97	1.5	L	1.5	4	1.5	VH
Back		2.00	1.80	2.83	H	3.1	2.3	2.9	VH	2	4	3.8	VH	2.64	0.86	3.71	VH	2	4	1.5	VH
Arms/Elbow	Right	1.76	1.60	1.83	M	3.1	2.6	3.8	VH	2	3	3.33	VH	1.93	0.94	2.5	M	2.5	4	1.5	VH
	Left	1.76	1.83	1.86	M	2.9	2.3	3.9	VH	2	3	3.33	VH	1.86	0.99	2	L	2	4	1.5	VH
Wrists/Hands/	Right	1.16	1.33	1.23	L	2	2.1	3.7	VH	2	4	3.5	VH	2.29	0.94	3	H	3	4	1.5	VH
Fingers	Left	1.1	1.23	1.1	L	1.4	2	3.6	VH	2	4	3.8	VH	2.00	1.01	2	L	2	4	2	VH
Legs/Knees	Right	1.83	1.9	1.43	L	1.4	2.7	1.8	M	2	3	3.1	VH	1.57	0.92	1	L	1	4	1	VH
	Left	1.9	1.87	L	M	1.2	2.6	1.8	M	2	3	3.5	VH	1.21	0.89	1	L	1	4	1.5	VH
Ankles/Feet/	Right	1.73	1.9	1.43	L	1.4	1.2	3.1	L	2	3	3.2	VH	1.14	1.21	1	L	1	4	1.5	VH
Toes	Left	1.9	1.87	1.47	L	1.4	1.4	3.1	L	2	3	3.2	VH	1.07	1.00	1	L	1	4	1.5	VH

OPM- Overall Priority Matrix/ Level of muscle fatigue; VH-Very High, H-High, M-Moderate, L-Low

arm (98%) and pain in shoulder (93%) were the major problems faced by the workers involved in bamboo basket making. The high prevalence of job strain in distal upper extremities in workers engaged in bamboo product making is due to the high involvement of upper body part especially hand, wrist and shoulder with repetitive and forceful movements.

B. Muscle fatiguein workers engaged in small scale unorganized agri enterprises in India

Work related muscle fatigue may contributes to occupational musculoskeletal discomforts which worsen by improper work design, routine and repeated motion adopted by the workers and large amount of applied force to finish a task. It is difficult to evaluate the accurate amount of workload carried by certain muscle however it is important to quantify the muscle fatigue in order to determine the limits of acceptable work amount. Rodgers muscle fatigue analysis helps to quantify the muscle fatigue experienced in completing different works by the workers. Small scale unorganized agri enterprises have huge number of workers involvement in different type of tasks. These tasks are repetitive in nature, require an enough muscle force and require deviation from natural body posture for longer duration to accomplish the work. These factors are the main contributing factors of the muscle fatigue formation in workers engaged in different activities. In the present study Rodgers muscle fatigue analysis method was used to assess the muscle fatigue in workers engaged in small scale unorganized agri enterprises in India.

Results in Table 2 revealed that workers engaged in sericulture activities were experienced very high muscle fatigue in neck region and high muscle fatigue in right shoulder and back region followed by moderate muscle fatigue in left shoulder, both arms/ elbow and left leg/knee and low muscle fatigue in both wrists/hands/fingers, right leg/knee and both ankles/ feet/toes as assessed by Rodgers overall priority matrix.

Table 2 further showed that very high muscle fatigue

was experienced by the workers engaged in weaving enterprise in right shoulder, back, both arms/elbow and both wrists/hands/fingers followed by high muscle fatigue in neck and left shoulder. Moderate muscle fatigue was seen in body regions i.e., both legs/knees and low muscle fatigue was experienced in both ankle/feet/toe due to weaving activities.

The Rodgers overall priority matrix indicated that very high muscle fatigue was faced by the workers who were working in vegetable cutting activities in all body regions i.e., neck, both shoulders, back, both arms/elbow, both wrists/hands/fingers, both legs/ knees and both ankles/ feet/toes. Therefore, vegetable cutting may have very high health hazards for workers but muscle fatigue experienced by the workers engaged in *amla* squash making activities was seems less hazardous over vegetable cutting activities. It may be due to the difference in type, ways and nature of tool used to accomplish the particular activities performed by the workers. Very high muscle fatigue was experienced by the workers who were working in lemon pickle making activities in body regions i.e., neck and back region followed by high muscle fatigue in right wrists/hands/fingers, moderate muscle fatigue in body regions i.e., right shoulder and right arms/elbow while low muscle fatigue was seen in body regions i.e., left shoulder, left arms/elbow, left wrists/hands/fingers, both legs/ knees and both ankles/ feet/toes (Table 2).

Rodgers overall priority matrix indicated the high muscle fatigue in all body regions i.e., neck, both shoulders, back, both arms/elbow, both wrists/hands/ fingers, both legs/knees and both ankles/ feet/toes was experienced by the workers who were engaged in grain packaging activities (Table 2).

Therefore, weaving enterprise, vegetable cutting and grain packaging activities were having very high muscle fatigue whereas sericulture activities and lemon pickle making were having high muscle fatigue as analyzed by the Rodgers overall priority matrix.

CONCLUSION

Job strain and muscle fatigue among the workers engaged in small scale unorganized agri enterprises is a major concern because a huge number of involved worker's health is at risk which leads to severe and irreversible health problems to the workers and also lowers enterprise's output which restricts the wellbeing of workers and progress of enterprise. Therefore, the present investigation was an approach to find out the occupational risks to the workers associated with the different small scale unorganized agri enterprises by using two types of analysis tools i.e., Job Strain Index and Rodgers Muscle Fatigue Analysis which are able to find out the exposure of crucial areas of this study. From the findings under the present study, it was revealed that the workers engaged in selected enterprises were exposed to various level of job strain and muscle fatigue in one or more body parts therefore there is a need to conduct research to analyze and design the capable different selected task specific ergonomically work tools and method for the workers. It can be concluded from the results of the present study that the workers engaged in weaving enterprise was 13.77 for left hand and 13.76 for right hand. Job Strain Index was 6.75 for each hand of worker engaged in bead enterprise which depicts that the bead making activity was found as hazardous activity. Job Strain Index score of sericulture workers was 0.37 for left hand and 4.5 for right hand of the activity of rearing of silkworms, 3 for left hand and 6.75 for right hand of the activity of extraction of pupa form cocoon and 1.5 for left hand and 3 for right hand of the reeling activity. Job Strain Index score of *amla* squash making activities was 5.06 for each hand while removing seeds and chopping *amla*, 3.37 while sun drying of *amla* for each hand and 6.75 for each hand while peeling and pulp extraction in squash making. The job strain index scores of worker engaged in lemon pickle making activities was 10.86 for left hand/wrist and 13.36 for right hand/wrist. Job strain was encountered for the workers engaged in vegetable cutting activities resulted by the second highest scores of Job Strain Index as it was 27 for left hand and 29.58 for right hand. Job strain Index score was 4.5 and 20.25 for left hand and right hand respectively while packaging of grains, 13.5 for each hand while storage of grains, 10.12 and 40.50 for left hand and right hand respectively while sealing of grain packets,

6.75 and 45.56 for left hand and right hand respectively while stacking of grain packets, 81 for each hand while loading and lifting of grains packets and 1.12 and 13.50 for left hand and right hand respectively while labelling of stickers on grain packets. Worker engaged in bamboo enterprise (cutting and stripping activities) have job strain index score 14.5 for left hand and 22 job strain index score for right hand which depicts that cutting and stripping activities in bamboo enterprise is very hazardous job. Weaving enterprise, vegetable cutting and grain packaging activities were having very high muscle fatigue whereas sericulture activities and lemon pickle making were having high muscle fatigue as analyzed by the Rodgers overall priority matrix. Therefore, from the findings of present investigation it can be concluded that prevalence of job strain and muscle fatigue is at hazardous level in workers engaged in small scale unorganized agri enterprises.

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