

**ERGONOMICS OF TRADITIONAL LOOMS- OCCUPATIONAL HEALTH HAZARD  
AMONG WOMEN WEAVERS OF GADAG-BETGERI**

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**ABSTRACT**

Ergonomics is now a well recognized discipline and constitute an integral part of any advanced occupational health services. Ergonomics means "fitting the job to the workers" and aims to achieve the best manual adjustment of man and his work for the improvement of human efficiency and well being. Role of women in the cultural and socio economic life of GadagBetgeri is significant. This region of north Karnataka has lot of living actives to the extent of twenty thousand people engaged in this profession. Handloom weaving enjoys its glory and experienced fall in India. It was understood as a way of life rather than an occupation that nearly provides livelihood. It was subjected to drastic changes in the course of time and its fall stated with the advent of British to India. The handloom weavers failed to compete with power looms and mills. As a result they have tried to adopt occupational other than handloom weaving. They have adopted different types of coping mechanism along with occupation in order to overcome the crises. Hence this study has been taken up to know the socio-economic status and also the various hazards faced by the handloom weavers of Betageri village, of Gadag District, Karnataka. Despite being the biggest industry in Gadag Betgeri, they function only as small scale! Cottage industries and expose these women weavers to all kinds of safety and work related health hazards typical of the unorganized sector. Weaving being the universal vocation among Gadag Betgeri, the ill effects of engaging in non-ergonomic weaving practices are accepted without showing much of ado. The looms that they use, namely the throw shuttle, fly shuttle and the indigenous loin loom only aggravate the issues as they are used in unconducive work environments. The plight of such women just remains invisible even today. This paper projects the impact of these looms on the users in their typical work environments, specific to Gadag Betgeri. The findings prove that the indigenous loin loom impacts the weavers more than the other two looms.

**Keywords:**

Gadag Betgeri, Ergonomics, handloom, Health Hazards and weaving

**I. INTRODUCTION**

The textile industry occupies distinguish place in our country. One of the earliest to become into existence in India. In accounts for 14% of the total industrial production, contributes nearly 3% of the total exports and is the second largest employment generator after agriculture. The handloom sector plays a very important role in the country's economy. The impacts of each looms on the users are different in certain ways. The handloom industry plays a vital role in India. Gadag Betgeri is famous for handloom weaving. Handloom weaving is wholly in the hands of women in Gadag Betgeri. There are three types of loom are used, the looms used are not ergonomically designed, women are suffering from many problems that hinders their development and one among those problems are design of loom they used. They required more research and help to develop their loom used.

**II. RESULTS AND DISCUSSIONS**

Results and discussions of the studies are presented below

**A. Posture Adopted**

For performing the activities the samples were found to adopt different postures while working in different loom. While pre-loom activities required the samples to sit or squat, loom related activities made them sit and work. Posture-wise, all activities of all types of loom users were found to be highly demanding.

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### **B. Ease in Handling the Loom.**

The beating stick of the loin loom was very heavy (2.0 kgs). Placing it alternately on the ground and raising it to beat the weave for closing was highly painful especially on the shoulders. Nine and six per cent of weavers using throw shuttle and fly shuttle loom also expressed that they were not comfortable with the tools, especially the spindles.

### **C. Work Related Bodily Discomforts Perceived**

Eighty four percent of the weavers stated to be suffering from physical musculo skeletal discomforts (acute or chronic) due to involvement in these Vocations

### **D. Work Induced Body Pain Endured**

Pain in the back, shoulder, and hands were mostly faced by a majority of loin loom weavers as they kept pulling the beating stick very forcefully while weaving.

As the pull force exerted was towards left and right with every alternate strike, and up and down movement (strike of the sword or beater) these syndromes were felt quite often which lasted longer. Repetitive motions, all the more, aggravated their problems. Throw shuttle loom users complained more of eye problems, back and neck pain as they mostly used fine threads and delicate designs for which they had to look down below carefully, compared to their counterparts. Swelling in the foot was also frequently felt, as their legs were kept hung for long time while weaving. As the knee was not supported, some also complained of swelling in the knees along with foot. Fly shuttle loom users suffered pain in the shoulder, wrist and hand due to the repetitive movement of hand to fly the shuttle and make closing of the yams faster. As both the hands were put into motion in opposite directions they called for not only physical discomfort but also mental stress, as one wrong movement was bound to end up in a piece branded 'damaged' (wrong weave). This fear complex remained with all types of weavers. Hence the samples endured psychogenic stresses too. They were quite unaware of the occupational health hazards that they would land in, if they didn't take some preemptive measures at the earliest. An enquiry was made to find out if they at least knew the reasons for getting such pain and responses received were quite thought-provoking.

The causal factors for such discomforts or pain as perceived by the sample highlighted repetitive motion, posture, pressure (force) exerted, duration of work, and adopted. The work itself as strong contributors, culminating in various other health problems for the samples. Hence ergonomic analysis by using suitable tool is required for finding out the degree and types of problem for each loom. Following analysis shows the results:

## **III ERGONOMIC ANALYSIS OF THE SAMPLES**

This study was conducted by using Corlett and Bishop (1976) body part discomfort scale. Different parts of the day was divided for identifying the discomfort of body parts and their degree of discomfort in different types of loom users

### **Discomfort Perceived on the Loin Loom (LL):**

After working and before lunch, loin loom users complained of pain and discomfort in the upper and lower arm, shoulder and lower back. Pain and discomfort in the leg, wrist, buttock and difficulty to breathe were also complained about. The graph highlights the body parts receiving higher discomfort rates. After lunch break, though the samples agreed that the pain in the neck, buttocks, legs and wrist subsided, ache in the upper arm, lower arm, shoulder, and lower back were not found to ease out completely after the break. Pain generally increased and by the end of the day it was at its peak in these concerned parts.

The impact of the previous day's work as pain in the upper extremities, lower back and knee was reflected on the day's (days when the tool was administered) work. The samples happened to start the

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day's work itself with pain in those parts. A short tea break also was not much of a help to reduce their feelings of pain. Ultimately weaving on the loom was the cause for upper limb disorders and pain in the lower back and knees - the most vulnerable, yet important body parts of everybody. As the work was started and ended with pain, it is concluded that pain in these parts had become a part and parcel of the selected samples.

**Body discomfort felt on throw Shuttle Loom(TSL):**

The day's work itself was started with pain in the lower back and foot, eyes and upper arm, which gradually increased and reached the peak by evening. Though pain had tended to decrease slightly after small rest pauses, the samples really endured pain throughout the day and 24/7 hours. Among these, pain in the lower back ranked high followed by shoulder. Eye sight was affected more among these weavers as they used fine fiber and delicate designs. Working after lunch break and before snacks too, ache in the shoulder and lower back recorded the highest score. A short break as tea time even was not much helpful in relieving the samples from pain in the upper / lower arms, hip and wrist. As the working time advanced, the samples also started experiencing difficulty with breathing too. Another feature was the swelling in the foot which increased with the time of pedaling and posture adopted.

**Perceived Body Discomfort Vs Fly Shuttle Loom (FSL):**

Unlike the other two groups, the fly shuttle loom weavers reported of pain in the chest and stomach along with the ache in the upper extremities. For this group too, incidence of pain was found to be gradually increasing as the time of day and the work time advanced. Here again, breaks in between work was only a temporary relief from pain. By evening like the other samples, this group too wound up the day with pain in the shoulders, arms and lowers back. All these findings stand testimony to the fact that the samples in all the looms are eventually prone to work related musculoskeletal disorders (WMSDs) in the upper extremities and the lower back. Among them the worst hits were the loom weavers who recorded the highest score (above 40) for pain/discomfort in all their vulnerable regions. Mean Cumulative Body Discomfort Score for Weaving This aspect projects the mean cumulative score recorded for the impact of the job on all the 42 selected samples (14 each using three types of looms respectively), and the perception of pain /discomfort in different parts of the body while performing in the looms. The data is presented under Table (1)

This analysis enabled identifying the body parts which were mainly involved in weaving operations and the stress inflicted on them. Through the sample complained of pain in the neck, buttock, upper back, hip the stress inflicted on them. Though the samples and wrist and swollen foot, the distress subsided during the lunch break. Pain in the shoulder, upper and lower arm, chest, stomach, lower back and knees was not found to ease out completely even after the break. Pain in the shoulder and lower back was found to be in the peak among all discomforts during the lunch break and work after the break following lunch recess, all the even after the minimal rest. Evidently while resuming samples were found to be enduring pain in the shoulder followed by lower back, lower arm and upper arm knee.

**TABLE 1: WEAVING VS MEAN CUMULATIVE SCORE FOR BODY DISCOMFORT**

Body Parts Affected	Mean Cumulative Scores for the Six Varied Times of the Day					
	BSW	AW/BL	ALB	AW/BS	AS	EOD
N	0	0.09	0	0.21	0.11	0.23
S	0.13	1.4	0.35	1.6	0.72	1.89
UA	0.05	1.26	0.30	1.40	0.42	1.61
LA	0.04	0.78	0.19	0.92	0.54	1.16
C	0.02	0.07	0.08	0.21	0.08	0.21
S	0.01	0.04	0.04	0.07	0.2	0.07
LB	0.01	1.25	0.34	1.15	0.55	1.53

B	0.03	0.21	0	0.35	0.04	0.01
K	0.1	0.53	0.16	0.57	0.34	0.11
L	0	0.30	0.04	0.33	0.07	0.11
F	0	0.05	0	0.02	0.01	0.01
E	0.16	0.27	0.22	0.36	0.29	0.16
UB	0	0.04	0	0	0.04	0.01
H	0	0.01	0	0.02	0	0.01
W	0	0.11	0	0.1	0	0.01

Discomfort increased in all the body parts after lunch break while performing work. Difficulty to breathe, stomach ache and pain in the eye, chest, and buttocks were common complaints. But by the end of the day the samples disclosed that the pain had increased in their shoulder, upper and lower arm, shoulder, lower back, legs and knees in descending order. It is proved therefore that the shoulder, upper and lower arm, lower arm and lower back were the body parts to suffer heavy impact due to weaving for all the samples.

Naturally by the end of the day all the sample weavers were found to be silent sufferers as they switched over to the task of domesticity immediately they vacated the loom, thus revealing that they faced the household chores a real drudgery after the days toil in the physically discomforting looms. Evidently this multitasking, further added to the samples' poor health status.

Work Time on Looms Vs Mean Cumulative Body Discomfort Score: The cumulative score for body discomfort (all parts inclusive) based on work time of the day was done including scores for each type of loom during performance by weavers. The data is presented under the following Table (2). The analysis 'per se' analysed the looms for their impact on weavers.

This exercise enabled studying the cumulative pain/discomfort felt by the sample during each phase having body discomfort and pain. Nevertheless the rate of performance of the day. The analysis also facilitated comparing the impact of performing on the three types of looms. Such a comparison revealed that, the body discomfort rate of the samples performing in the loin loom was more than that expressed by sample in the other two looms. The graph also reveals that all loom users (irrespective of the type of loom used) to be of discomfort varied during different times of the day. This has also proved and singled out performing in the loin loom as the most strenuous, which can and will leave a major dent in the health status of the samples.

**TABLE:2 WORK TIME VS TOTAL BODY DISCOMFORT SCOREVS LOOMS**

Time of the Day	Total Cumulative Body Discomfort Score		
	Types of Loom		
	LL	TSL	FSL
BSW	0.85	0.82	0.17
Aw/BL	9.0	6.0	4.14
AL	2.21	1.57	1.60
AW/BS	10.35	7.42	5.35
AS	5.28	3.35	1.85
EoD	11.64	8.07	7.0

#### IV. CONCLUSION


Many aspects of human life constrain the quality of life despite the tremendous changes made in technology. Since quality of life is partly a function of the risks to life, the human community is still subject to a state of unhealthy. As a correlate, it is essential to know more about the limitations of performance and capacities of human beings. There has been a sustained interest in giving more systematic attention to the implications of the human factor in designing tools and equipments used in work performance. This general area of human endeavor, known as Human Factors Engineering or Ergonomics has evolved with the major objective of maintaining or enhancing human welfare (health,

safety and satisfaction) and deals with one aspect of design of equipment taking into consideration the operator's capacities, anthropometric data, limitations, comforts and compatibility.

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