

Musculo-skeletal disorders among the workers engaged in organized poultry farm

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ABSTRACT

The cardiac cost of work was higher while cleaning of hatchery, cleaning of layer house and slaughtering/defeathering/packaging as compared to all other activities that ranged from 120-130. There was not a big difference in working heart rate when different activities were taken under consideration. It ranged from 90-92.8 beats/min. as the same energy expenditure also ranged from 5.90-6.03 kj/min. Paired t-tests, two sample t-tests and correlation coefficient showed that there was significant relationship between physiological cost due to different activities and physiological cost before and after the activity. In many respects heart rate is a better index of the overall physiological demands of work and can be used as a reliable indicator of stress. The workers, who were working since long years, were facing problems like asthma, allergic reaction and numbness.

INTRODUCTION

The world is heading towards 21st century with widespread mechanization and automation in every field but this advancement is seen more in the developed countries. In a country like India, because of its large population size and low general economic status, the use of manpower may likely persist on a larger scale in the coming decades. Most of the work force is employed in organized as well as unorganized sectors and many other occupations comprise men as well as women. Poultry sector is also one of them in which the maximum number of laborers are working and performing most of the activities manually. Poultry work involves considerable degree of manual efforts which are associated with body movements. If such movements are minimized by adopting motion economy and proper working postures, it would reduce fatigue to a considerable extent. While attempting such motion economy, one can take resource to biomechanical approaches and identify the wasteful movement or awkward body postures. If these are avoided through improvement in the work place layout, one can quantitatively evaluate the advantages gained

by using appropriate physiological and psychological indicators.

“OSHA defines ergonomics as “the science of fitting the job to the worker, and when there is a mismatch between the physical requirements of the job and physical capacity of the worker, work related musculo-skeletal disorders (WMSDs) can result. Workers who must repeat the same motion throughout their work day, who must do their work in an awkward position, who use a great deal of force to perform their jobs, who must repeatedly lift heavy objects or who feel a combination of these risks factors are most likely to develop work related musculo-skeletal disorders (WMSDs)”.

In recent years, there has been a significant increase in the reporting of musculo-skeletal disorders and other work related disorders due to ergonomic hazards. Much of the increase in musculo-skeletal disorders is due to change in process and technology that exposes employees to increase repetitive motion and other ergonomic risk factors.

There are a number of factors which are responsible for occupational health hazards in poultry industry. The goal of any health and safety programme is to prevent hazards and

illnesses by removing their cause. For ergonomic hazards, this goal is achieved through taking steps to eliminate or materially reduce worker exposure to conditions related to musculo-skeletal disorders, related injuries and illnesses. Because of the huge population of India, any slight ergonomic improvement at the individual level would yield very significant qualitative effect in total, especially in unorganized sectors such as agriculture and poultry where an application of ergonomics is much less common than in organized sectors. According to Bureau of Labor Statistics (BLS), 1982 nearly 20 per cent of all injuries and illnesses in the work place and nearly 25 per cent of the annual worker's compensation payment are attributed to back injuries. A more recent report by the National Safety Council indicated that over exertion is the most common cause of occupational injury, accounting for 31 per cent of all injuries. So, it is clear that a tremendous number of workers are routinely exposed to physical hazard and many of them develop one or more serious work related musculo-skeletal disorders during their working life time. Prevalence of these has increased dramatically in developing countries and it is expected to be much worse due to inadequate safety system, lack of awareness, lack of training of occupational safety and health and lack of ergonomic standards. Poultry workers, who spend most of the time in buildings, therefore, experience the greatest amount of exposure at greatest risk. They perform different activities manually and mechanically. Besides this, poultry industry has not only been labour intensive but also a hand intensive industry. Mainly the work includes sweeping/cleaning/washing of brooder, layer and grower houses, carrying or loading, feeding and watering, collection of eggs, medication, slaughtering, defeathering, packaging, hatchery management and operation. These are very tedious jobs at their work place. All these jobs are physically demanding and involve the main risk factors because of repetitive motion, heavy physical work load and excessive body motion which can result in high risk for back injury, neck, shoulders, arms and upper limbs. The efficiency of any activity varies according to the type of activity and the manner in which it is performed. It may be as high as 30 per cent and as low as 3 per cent (Grandjean, 1975). A number of studies reported by Singh (1989) and Sharma and Thakur (1999) showed that there is significant relationship between the fatigue or perceived exertion or discomfort, pulse rate, respiration rate, heart rate, energy expenditure rate, posture and O₂ consumption. They showed that working in any posture increases the load on the heart and therefore a simultaneous increase in blood pressure, heart rate and O₂ consumption. Space limitation requires workers to use many uncomfortable postures like standing, stooping, squatting, stretching, reaching, bending and twisting during the activities. It can be classified as "Moderately heavy" work because the energy expenditure is more in these activities (Canadian Centre for Occupational Health and Safety, 1998). The work place which

is the second important aspect to be considered for workers health and safety cannot be ignored. The work place is the setting in which people spend maximum time while working. Other health hazards in poultry buildings are such as respiratory hazards, noise hazards, animal hazards, and mechanical hazards, electrical and chemical hazards. The identification and control of ergonomic hazards require an interactive approach involving management, engineers, human resource, safety and medical personnel as well as hourly employees. In industrially developing countries like India, application of ergonomics is still in initial stage. The significance of occupational ergonomics is unquestionable in the progress and development of the country as a whole. Hence, this sector is taken for research purpose because in addition to the presence of occupational risk factors, the workers are also affected by these disorders.

Therefore, the problems related with the workers engaged in organized poultry farm were explored with an aim to examine the maintenance of right working posture during work which is of paramount importance. In some cases, energy expenditure during work may be low but due to adaptation of wrong posture, early fatigue appears without substantial contribution to work. It is necessary to fit the job to the man which seeks to gain maximum safety, efficiency and comfort. Keeping this in view, a need was felt to study and to observe their occupational health hazards.

Justification:

A number of studies have been conducted in India regarding the livestock technology and livestock management but very few studies have been done on livestock workers and poultry workers are one of them. A worker's physiological reaction to his job must be established to maintain the physiological cost of work within safe limits. Work that demands awkward physical postures and forces has adverse relationship to the physiological comfort of the person leading to lowering of work efficiency. This sector has significance for research because in addition to the presence of occupational risk factors, the workers also get affected by their job. Each and every activity requires physical effort, *i.e.* work is performed with the expenses of time and energy. Every activity affects the working efficiency of the workers and produce physiological and psychological hazards. The time of amount spent and efficiency of work varies according to the types of the activities and the manner in which it is performed. To perform any activity, body segments have to be manipulated in the space available resulting in changes to posture. Therefore, in this background, the present study was conducted to examine various improper working conditions and their effect on health status of the workers. Its main aim was to find out the activities performed by the workers which have direct effect on the physiological living conditions of the workers. The study was planned with the objectives to find out the type of activities

performed by the workers and to measure the physiological (heart rate) cost of work (job satisfaction).

Limitation:

- The study was limited to the poultry workers only.
- The study was limited to the sample size of 60.
- Since ergonomics is a very vast area of research, only selected activities were taken under study.

Assumption:

The awareness level of the selected respondents was very poor regarding the ergonomic hazards.

All India Coordinated Research Project (1999) stated that women in different states of India are engaged in various jobs and have to carry the work load ranging light to very heavy in weight on their head, shoulders, back, hands etc. It was reported that in the morning for age group of 21-30 years the subjects while carrying of water experienced the heart rate increases up to 102.73 beats per minute and 107.38 beats per minute for 31-40 years aged women. The energy expenditure was 7.32, 8.41, 11.50 and 12.03 KJ/minute, respectively. The total cardiac cost of work was 574.43 and 523.8 beats, respectively for different age groups. In afternoon all the value showed markable increase. Hazarika *et al.* (2001) studied different posture and musculo-skeletal problems faced by women working in tea industry of Assam standing with forward bending posture was found uncomfortable by majority of the respondents. The most comfortable posture was reported by the majority of the women workers was squatting on "Pidha" for stalk. Picking (97.88 %) and sorting (93.91 %). Musculo-skeletal problems were very common especially in the age group of 36-45 years. Acute backache was most frequently occurring musculo-skeletal problems among the women workers (68 %).

Chronobiological knowledge is increasing and the relationship between this knowledge and shift work is becoming clearer. This, in turn, is highlighting a need to facilitate a mix of permanent (day, evening and night) and rotational shift system within individuals units. Is it perhaps time to allow greater flexibility in how individual nurses deal with the profession's need to care for patients throughout the 24 hours period? This review will focus on the 24 hour day night or circadian rhythms and the consequences of the disruption of these rhythms as restaurant workers undertake shift work and other activities which demand efficient functioning at times when an individual's circadian rhythms are expecting them to be at rest as disruption of these rhythms is essentially unavoidable when 24 hours care is required, the choice becomes one of determining a preference for tolerable rhythm desynchronize and shorter more frequently occurring episodes of night work, or some degree of rhythm synchrony and adaptation during slightly longer but less frequent episodes of rhythm disruption (Sandra, 2001). Vannam and Kher (2008) studied the effects of night

shifts working on human circadian rhythm and found that the call centres ranked high for attrition due to health reason, for sleeping disorders 83 per cent compared to industry average of 39.5 per cent, voice loss 8.5 per cent as against 3.9 per cent, other problems were ear problems (8.5 %) digestive disorders (14.9 %) and eye sight problem (10.6 %). Korompeli *et al.* (2009) reported that mean reduction of cortisol level between the two measurements was statistically greater for the 'rotating' rather than 'morning' shift group. There were no statistically significant differences between the two groups in overall mean change from the first to the second measurement of prolactine, thiodothyronine and thyroid stimulating hormone. Level of thyroxine increased statistically significantly in the 'rotating' group but not in the morning group. The morningness scale score was greater job for 'rotating' group, while greater job satisfaction levels were found in the 'morning' group. Statistically significant correlations were found between thyroid-stimulating hormone, thiodothyronine, thyroxine and prolactine changes and specific scales of the SSI questionnaire. Ergonomic shift schedule sympathetic to the body clock and workers preferences should be adopted to mitigate the adverse effect on health.

METHODS

Two poultry farms were purposively selected for the present study namely: Instructional Poultry Farm, Nagla and NGO's Poultry Farm, Nagla, Udham Singh Nagar district, Uttarakhand. Simple random sampling without replacement was used to select the study area and workers. Sample size was determined before the data collection. For the descriptive data, the sample size of 60 was selected and 50 per cent of the total sample was selected for experimental data. Descriptive data were collected personally by using the interview schedule method. Experimental data like physiological cost of work while performing the different activities in poultry farms. All the subjects volunteered the study. They were informed about the

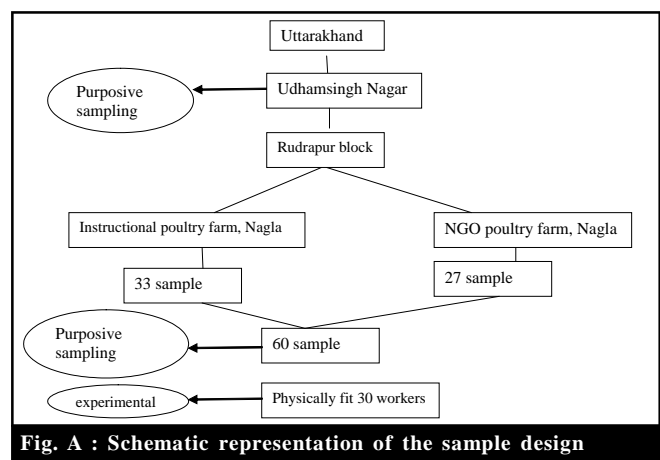


Fig. A : Schematic representation of the sample design

study. The study protocol is presented in Fig. A.

Experimental data were collected in the month of January and February in two poultry farms. The workers working in the farm have very high energy expenditure, high heart and pulse rate while performing the different activities. The heart and pulse rates were measured with the instrument called heart rate monitor and pulse rate monitor, respectively. The precoded interview schedule and observation sheets were developed to record and gather the data regarding the physiological cost of work. Questionnaire recorded the report on occurrence of respiratory problems and other work related problems

OBSERVATIONS AND ANALYSIS

The data envisaged that most of the people were engaged mainly in sweeping, cleaning and washing of brooder, grower and layer houses in both the selected poultry farms (47 %). Only one fifth of the respondents were engaged in feeding and watering activity, whereas, in collecting the eggs from layer houses, only 10 per cent were involved. It was found that 12 per cent were engaged in giving the medical treatment to the hens. It was further reported that approximately 3 per cent persons were engaged in slaughtering and defeathering activity in instructional poultry farm the only activity which was not carried out in NGO's poultry farm. It was observed that there was no systematic procedure for packaging the poultry meat. The meat was sold as fresh in a polythene bags. Only 8 per cent workers were engaged in the activity of hatchery management and incubator operation.

Every worker had to perform a work for long period of

time but the work was done in shifts. Those workers, who perform in day timing, do not perform at night and *vice-versa*. But this shifting was only for some of the selected activities like feeding and watering and hatchery. And for rest of the task, the workers performed usually for 8 hours *i.e.* from 8 a.m. to 4 p.m.

Two methods were used to determine the physiological workload *viz.*, heart rate and energy expenditure (Table 1).

Heart rate responses, energy expenditure, total cardiac cost of work are shown in Table. It indicates that cardiac cost of work was higher while cleaning of hatchery, cleaning of layer house and slaughtering/defeathering/packaging as compared to all other activities.

This can also be supported by the classification of workload given by Varghese (1999). According to her, the workload during the performance of activity was moderately heavy due to this reason heart rate was more and the energy expenditure also exceeds. The data revealed that working heart rate of the respondent lied between 90-92.8 beats/min. the maximum working heart rate was found while doing the sweeping of brooder house, carrying load, feeding and watering. The maximum energy expenditure was found in some of the activities that was 6.0352 Kj/min. Christensen (1955) proposed that if works were performed with an energy expenditure rate below 50 per cent of a person's aerobic capacity, excessive fatigue would not occur.

Table 1 depicts the total cardiac cost of work in the selected activities. Total cardiac cost of work (TCCW) was as high as 130 while cleaning of hatchery, second highest TCCW was in slaughtering/defeathering/ packaging and cleaning of

Sr. No.	Type of activity	Resting heart rate/min	Working heart rate/min	Recovery heart rate/min	Energy expenditure Kj /min	Total cardiac cost of work
1.	Sweeping of brooder house	84	92.8	86	6.0352	108
2.	Sweeping of layer house	82	92	83	5.908	110
3.	Sweeping of grower house	84	92	85	5.908	90
4.	Cleaning of brooder house	82	90	84	5.59	100
5.	Cleaning of layer house	82	92	84	5.908	120
6.	Cleaning of grower house	80	90	80	5.59	100
7.	Carrying, loading, feeding and watering in brooder house	85	91	87	5.749	80
8.	Carrying, loading, feeding and watering in layer house	82	92	83	5.908	110
9.	Carrying, loading, feeding and watering in grower house	84	92.8	85	6.0352	98
10.	Collection of eggs	80	90	81	5.59	110
11.	Medication	85	92	87	5.908	100
12.	Slaughtering/defeathering/packaging	80	91	80	5.749	120
13.	Hatchery management	84	92	85	5.908	90
14.	Incubator operation	85	90	88	5.59	80
15.	Cleaning of hatchery	80	92	80	5.908	130

This can also be supported by the classification of workload given by Varghese (1994).

layer house activity (120). For collection of eggs, carrying load, feeding and watering activity it was found to be up to 110 whereas in other activities the TCCW varied in between 80-108 beats/min. It represents the energy expenditure in the selected activities.

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