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An Assessment of the Physiological Health and Occupational Health Hazards among Pottery Workers

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Abstract

In the different states of India and other Asian nations, potters create pots and are among the most selected job in the unorganized sector. Many people work in the production of pottery, which is still primarily done manually. Most of the pottery activities in India are being done by manual efforts and the tasks are physically and physiologically demanding. The primary goal of this research was to assess the physiological health and occupational health issues of potters from an ergonomic standpoint. Eighty potters were chosen at random from Paschim Medinipur district of West Bengal for this study. The modified Kuppuswami Scale was used to assess the Socio-economic Status. Pottery workers' physiological health was assessed using the WHO-recommended methods for determine body mass index and measuring blood pressure. It was found that all the pottery workers were from lower socioeconomic classes. The results revealed that the 40% of male and 55% of female workers were within normal range but 60% of male and 40% of female workers were overweight and 5% of females were obese. The systolic and diastolic blood pressure was significantly ($p<0.001$) higher in female workers than that of the male. According to the blood pressure cut-off values**,** it was found that the most of the subjects were within the normotensive range (90% and 95% of males and females respectively). However, a little percentage of the female subjects had hypotension (5%), although the prevalence of male hypertension was very low (10%). It was noted that the occurrence of MSD was remarkably high (≥60% of the respondents) in neck, shoulder, lower back, hip and knee. In discomfort rating of male and female pottery workers there was a significant difference ($p<0.05$; $p<0.001$) in the

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occurrence of discomfort in different body segments (upper arm-left, lower arm-both, buttock, shoulder, and feet-left). The study concludes that the pottery workers had more or less good general health but they suffer from occupational health problems.

Keywords: Pottery Worker, Health Status, Body Mass Index, Blood Pressure, Musculo Skeletal Disorders, Posture Analysis

Introduction

Pottery is an age-old handicraft in India. The roots of the Indian pottery industry can be traced back to the earliest times of civilization. Pottery and clay sculptures from India have always been admired for their unique beauty and ethnic value. They are produced mainly in the villages in West Bengal, India but are exported various countries throughout the world. The beginning of pottery making trails back to the Neolithic era. During the time of the Indus Valley Civilization, this effective art form improved with technology (Kasemi, 2014). The pottery industry in India has been put forward as a major cottage industry in both small and big pottery concerns. In a predominantly rural country with a very low income and simple needs, pottery plays an important role (Meena *et. al.*, 2005).

An object of art made of a composition of clay and sand and baked with earthen colour, is Pottery. An Artisans artistic touch adds value to the clay and gives life to the crafts for pottery because of its unique quality of clay. The society is to purchase the finished pottery products from the members and sale them to the open local market (Akilandeeswari and Pitchai, 2016). Red clay pots, water pots, garden pots, firewood ovens, saw dust ovens, maga chools, nursery pots, dhoop (incense) stand, and decorative red clay pottery ware are the main products of pottery. In the present Indian scenario, most of the potters have given up their traditional vocation due to technological advancements in various areas as the demand for their traditional ware is low. The earthen pots used earlier for garden plants have also been replaced by pots made of plastics. The need to create awareness in people about the benefits of using clay pots in the kitchen and for gardening is obvious (Patil *et al.*, 2016).

Potters represent a part of the workers of the unorganized sector in the various sectors of India and other Asian countries. According to data obtained from the Workers Compensation Board of India, there was a high rate of musculoskeletal injuries in the unorganized industries in India (Jaiswal and Veerkumar, 2016). The physical

overload is associated with prevalent manual tasks, frequent monotonous movements, lifting and manual handling of heavy loads during work shift, uncomfortable working posture, which lead to occupational disorders. It has been reported by Windau *et al.*, (1999) that nearly two million workers are injured each year because of postural discomfort on the job. The workers have always compromise with improper working postures, hazardous working environment and heavy workload.

The human body can adapt to various types of posture. Workers are required to adapt to a multitude of postures for performing different tasks. Awkward work postures are responsible for short-term body discomfort, segmental pain and long-term damage (Maity *et al.*, 2016). The workers who adopted awkward postures at work, most often suffered from MSDs particularly affecting the lower back and neck region.

Musculoskeletal Disorders (MSDs) is the catch-all term used to describe all work-related injuries and disorders of the back, upper and lower limbs that result in pain and impairment problems for workers. The burden of musculoskeletal disorders is global and looking at the gravity of the situation WHO declared 2000-2010 as the Bone and Joint decade. Risk factors include physical, psychological, and socio-demographic aspects (Devereux *et al.*, 2002). Psychological demands and social work factors for MSDs include job demands and social or co-worker support, job satisfaction, a degree of satisfaction with leisure time activities, high job insecurity and work stress (Ermakova *et al.*, 1985)

Arphorn *et al.*, (2008) studied on pottery handicraft to reduce muscular fatigue and discomfort. “Pottery” job is associated with musculoskeletal disorder (MSDs) of various body parts. Deteriorating working conditions cause physiological problems, which have a negative impact on the workers.

Gender has no relationship to MSDs in pottery craftsmen workers. Thus, it can be concluded that men and women have the same risk for MSDs complaints. There is no difference between men and women in relation to the risk of MSDs complaints; it really depends on the type, activity and workload carried out by workers (Shobur, 2019).

Workers with long periods of work and activities that tend to be monotonous will be

more at risk for experiencing physical fatigue that will result in injury (Diani and Hafifah, 2019). The longer the worker performs the same activity, the more he/she is aware of the risk of MSDs risk; this is because MSDs are a chronic disease that takes a long time to manifest (Shobur, 2019). Lower limbs have been a very common site of pain among industry workers and it is related to working in fixed positions for extended periods without posture variations (Orlando and King, 2004; Chatterjee *et al.*, 2015). Sitting postures while making pottery and sculptures are very awkward. Body postures depend on various circumstances e.g., the type of work and workplace, individual characteristics, specific tools and frequency and the duration of work cycle (Arphorn *et al.*, 2008). Indian workers adopt different forms of sitting postures during work and leisure. Squatting is one of the most common postural patterns and has been a part of the traditional sitting posture, i.e., sitting on the floor with folded legs. Workers adopt such posture to perform various activities, i.e., a variety of domestic tasks, handcrafting, a complete range of professional work and leisure activities (Maity *et al.*, 2016).

The main aim of the present investigation was to evaluate the physiological and occupational health problems of pottery workers from ergonomic point of view.

Methodology

To fulfill the above objectives following methods were employed:

1. Selection of Site

The study was conducted on pottery workers in the district of Paschim Medinipur, West Bengal. The sampling was targeted on the workers, specifically those who were engaged in earthenware such as cups, plates, pots, elephants, horses, statues of deities etc.

2. Selection of Subjects

The study was carried on workers having the age range of 25-55 years, who have been engaged in making earthenware. The total subjects included in this study were 80 pottery workers. The subjects having at least 4 years of working experience in the present occupation was one of the inclusion criteria.

3. Evaluation of Socioeconomic Status (Ses)

Socioeconomic status of the subjects was evaluated by modified Kuppuswami Scale

(Gururaj and Maheshwaran, 2014). From the response of the subjects each question quoted against their score and determined summated score was compared with the graded chart of social status (Mahata *et al.*, 2015).

4. Study of General Health Status

4. I Measurement of Resting Pulse Rate

Following a 15-minute rest period while seated in a relaxed state, each individual's resting pulse rate were measured using a 30 beats time recording technique (Mahata and Dhara, 2019).

4. II. Measurements of Blood Pressure

The blood pressure of the workers was measured in resting period using auscultatory method with the help of a sphygmomanometer and a stethoscope. Blood pressure was an important determinants and indicator (Bailey and Williams, 2015) of the health status of the population. The resting blood pressure of the participants was measured after taking a rest in a sitting position for at least 20 min prior to measurement.

5. Assessment of Nutritional Status *By* Body Mass Index (BMI)

From measures of height and weight of the subjects the body mass index (BMI) was computed using the following standard equation (Park, 2005): BMI=weight (kg)/height^2 (m). The subject was classified into three categories, viz., underweight (BMI <18.5kg/m^2), normal weight (BMI 18.50-24.99 kg/m^2) and overweight (BMI > = 25.00 kg/m^2) in accordance with the international classification system of the WHO (2004).

6. Evaluation of Occupational Health Problems

6. I. Evaluation of Musculoskeletal Disorder

The musculoskeletal disorders of the pottery workers were evaluated by the modified Nordic questionnaire technique (Kuorinka *et al.*, 1987). The questionnaire emphasized their type and details of work and the occurrence or frequency of pain felt in different body parts.

6. II. Evaluation of Body Part Discomfort (BPD) Rating

The intensity of pain or discomfort in different body segments of the subjects was

assessed by a 10-point scale which was a modified pain mapping scale of Wilson and Corlette (1985). The scale was grade from no discomfort at all to maximum discomfort.

Twelve body segments were assessed in this study. The overall discomfort level was computed as the mean of the individual discomfort level assessed at various body segments.

7. Evaluation of Postural Stress

7. I. Postural Analysis by Ergonomic Assessment Tools

Various techniques have been applied for postural analyses to identify the stress of the work. Working postures were evaluated by OVAKO Working postures Analysis System (OWAS) method (Heinsalmi, 1986). Though OWAS method has a wide range of use but the results can be low in detail. Therefore, Rapid Upper Limb Assessment (RULA) (Mc Atamney and Corlett, 1993) and Rapid Entire Body Assessment (REBA) methods (Hignett and McAtamney, 2000) were also applied for analysis work posture of the workers. The selected postures used in this study were those that the field observers classified as stressful to the human musculoskeletal system.

Results

1. Evaluation of Socioeconomic Status

The purpose of the study was to evaluate the physical efficiency of the pottery workers. Before doing that, some associated factors were also investigated. Assessment of socioeconomic condition for a group of population is an essential characteristic in community-based studies because it is a significant determinant of nutrition and health of an individual.

The socioeconomic status of a person or a population is determined by several factors. In the present study the socioeconomic status of the pottery workers has been expressed in terms of the scores of modified Kuppuswami scale (Gururaj and Maheshwaran, 2014).

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Sex	f & %	Illiterate	Literate			
			Primary level	Upper primary level	Secondary level	Above secondary level
Male (n=40)	**f**	4	10	20	4	2
	%	10	25	50	10	5
Female (n=40)	**f**	8	4	24	4	-
	%	20	10	60	10	-

Table: 1.1 Frequency and percentage (%) of educational status of the pottery workers

The socioeconomic status of the pottery workers has been determined by three factors, e.g., occupation, education, and family income. The educational status of the pottery workers has been shown (Table1.1). Results showed that the educational level of the pottery workers (both male and female) was average. Almost 10 % of male and 20% of female workers in this study were illiterate. The rest of them were literate but only 5% had above secondary level education.

Total Score	SocioeconomicStatus Scale	Male (n=40)		Female (n=40)		All together (N=80)	
		f	%	*f*	%	*f*	%
26-29	Class I (Upper)	-	-	-	-	-	-
16-25	Class II (Uppermiddle)	-	-	-	-	-	-
11-15	Class III (Lowermiddle)	-	-	-	-	-	-
5-10	Class IV (Upperlower)	-	-	-	-	-	-
<5	Class V (Lower)	40	100	40	100	80	100

Table 1.2: Socioeconomic status of pottery workers according to the modified Kuppuswami Scale (Values showing the % of total subjects)

From the composite socioeconomic score evaluated by the modified Kuppuswami Scale (Table1.2), it was revealed that all of the pottery workers were belonging to lower class socioeconomic category.

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2. Study of General Health Status

2.1 Resting Pulse Rate

Male (n=40) (Mean ± SD)	Female (n=40) (Mean ± SD)	*t-value*
74.54±8.56	70.51±6.16	2.47*

w.r.t female *p<0.05

Table 2.1.1: Mean ±SD of resting pulse rate of pottery workers

The average resting pulse rate of male pottery workers were 74.54 beats / minute and that of the female workers were 70.51 beats /minute. The resting pulse rate of male was higher than that of female. The resting pulse rate in male and female pottery workers had no significant difference. But in case male subjects pulse rate are slightly higher than the female subjects.

2.2 Blood Pressure

Blood Pressure	Male (n=40) (Mean ± SD)	Female (n=40) (Mean ± SD)	*t-value*
SBP (mm Hg.)	133.73 ± 15.74	125.14 ± 17.47	2.31*
DBP (mm Hg.)	83.21 ± 4.70	77.56 ± 4.15	5.69***
MAP (mm Hg.)	100.03 ± 7.25	93.37 ± 4.83	4.83***

SBP- Systolic blood pressure; DBP- Diastolic blood pressure, MAP- Mean arterial pressure, **w.r.t female *p<0.05; ***p<0.001**

Table 2.2.1: Mean ± SD of blood pressure of pottery workers

The blood pressure values of the subjects have been shown in table 2.2.1. The *t* test of blood pressure represented that there was no significant difference between male and female pottery workers. The mean systolic and diastolic pressure and mean arterial pressure of workers was within the normal range.

In the studied population, the subjects were categorized into normotensive, hypotensive and hypertensive, according to the blood pressure cut-off values (Chobanian *et al.*, 2003) and itwas found that the most of the subjects were within the normotensive range (90% and 95%).

Blood pressure categories#$ (mm-Hg)	Male (n=40)		Female (n=40)		Chi Square Value between two group (χ2)
	(*f*)	(%)	(*f*)	(%)	
Hypotensive	-	-	2	5	2.051
Normotensive	36	90	38	95	0.721
Hypertensive	4	10	-	-	4.211*

#Chobanian *et al*., 2003; $Pickering *et al*., 2005

Table 2.2.2: Frequency and percentage of the workers of different blood pressure categories

Following Chi Square (χ2) test no significant difference was observed in hypotension, normotension, hypertension between male and female pottery workers. However, a little percentage of the female subjects had hypotension (5%), although the prevalence of male hypertension was very low (10%).

3. Evaluation of Nutritional Status in Terms of Body Mass Index (BMI)

Nutritional status may be related to the health and efficiency of the workers. Malnutrition is a silent crisis and continues to be a major public health problem all over the world including India.

The physical characteristics, i.e., the height, weight and BMI of the pottery workers have been presented in Table 3.1.1. The body mass index (BMI) is an estimate of body composition that correlates an individual's weight and height to lean body mass.

Variables	Male (n=40)	Female (n=40)	*t-value*
Age (years)	48.32±8.40	41.14±8.61	3.77***
Body Weight (kg)	64.50±6.03	59.55±9.70	2.74**
Stature (cm)	160.47±16.19	154.28±11.65	1.96
BMI (kg/m^2)	26.54±2.66	24.81±4.03	2.26*

w.r.t female *p<0.05; **p<0.01; ***p<0.001

Table 3.1.1: The physical characteristics of the pottery workers

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BMI Classification[1]	Frequency and Percentage of the pottery workers				Chi Square Value between two group ($\chi 2$)
	Male (n=40)		Female (n=40)		
	f	%	*f*	%	
Under weight	-	-	-	-	-
Normal range	16	40	22	55	1.805
Overweight	24	60	16	40	3.200
Obese	-	-	2	5	2.051

[1]WHO Classification (WHO, 1995)

Table 3.1.2: Frequency (f) and percentage (%) of according to BMI of the pottery workers.

The average BMI of the male subjects was 26.54 Kg/m^2 and female subject was 24.81 Kg/m^2 (Table 3.1.1). About 40% of male and 55% of female workers were within normal range but 60% of male and 40% of female workers were overweight and 5% of females are obese (Table 3.1.2). Chi Square ($\chi 2$) test showed that the BMI had no significant difference between male and female pottery workers.

4. Evaluation of Oocupational Health Problems

Musculoskeletal Disorders (MSD) is the most common work-related health problems among the worker for their exhausting work culture and that may affect nerves, muscles, tendons andintervertebral discs (Summers *et al*., 2015).

4. 1. Musculoskeletal Disorder

Results of prevalence of WMSD of pottery workers were presented in Table 4.1.1. It was noted that the occurrence of MSD was remarkably high (≥60% of the respondents) in neck, shoulder, lower back, hip and knee.

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Body Segments	Pottery Workers				Chi Square Value between two group (χ^2)
	Male (n=40)		Female(n=40)		
	f	%	f	%	
Neck	22	60	24	60	0.205
Shoulder	22	60	30	75	3.516*
Elbow	12	30	12	30	0.00
Wrist	20	50	16	40	0.808
Upper back	8	20	10	25	0.287
Lower back	26	65	26	65	0.00
Hip	34	85	38	95	2.222
Thigh	36	90	40	100	4.211*
Knee/Calf	36	90	34	85	0.457
Feet	16	40	14	35	0.213

w.r.t female *p<0.05

Table 4.1.1: Frequency (f) and percentage (%) for MSD of the male and female pottery workers

Very high prevalence of MSD was found (Table 4.1.1) in different segments of the body among the Pottery workers. Among all segments, in case male, the prevalence of MSD was very high at thigh and knee region (90%). A high percentage of workers reported pain in their hip (85%) followed by the neck and shoulder (60%) and lower back (65%). In female pottery workers the prevalence of MSD was high at thigh (100%), hip (95%), knee (85%), shoulder (75%) and lower back (65%). The results of Chi Square ($\chi 2$) test of MSD in male and female pottery workers revealed that there was a significant difference ($p<0.05$) in the occurrence of discomfort in shoulder and thigh. In the present study the pottery workers performed their work in three different postures, Viz., squatting posture, sitting posture, forward bending and reported pain in different body segments which might be related to the working posture.

4.2 Body Part Discomfort Rating

Occupational health status of pottery workers was also evaluated by a unique technique that was the body part discomfort rating (BPD). For the measurement of

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BPD, a 10-point subjective scale was used. It was graded "0" (no pain) to "10" (very severe pain).

In statistical test, BPD rating of male and female pottery workers had significant difference ($p<0.05$; $p<0.001$) in different body segments(upper arm-left, lower arm-both, buttock, shoulder, and feet-left). Female workers showed higher level of body part discomfort than that of male (Table 4.2.1) pottery workers.

Body Region		**Pottery workers**		***t-Value***
		Male (n=40) Mean ± SD	**Female** (n=40) Mean ± SD	
Neck		3.10±2.46	3.57±2.34	0.87
Shoulder	**R**	7.23±4.46	8.02±3.95	0.83
	L	3.95±1.99	3.09±1.82	2.017*
Upper arm	**R**	3.08±1.11	3.25±1.45	0.58
	L	2.10±1.59	3.57±1.63	4.08***
Lower arm	**R**	6.20±1.47	7.45±1.70	3.51***
	L	5.40±1.64	3.76±1.36	4.86***
Upper back		0.95±1.50	1.00±1.69	0.14
Middle back		0.00±0.00	0.10±0.45	1.40
Lower Back		6.51±3.41	8.34±4.48	2.05*
Buttock		7.74±3.57	5.35±1.73	3.81***
Thigh	**R**	3.90±2.34	4.05±1.27	0.35
	L	4.13±2.06	4.35±1.14	0.59
Calf	**R**	4.05±2.33	4.11±1.86	0.12
	L	4.25±2.34	4.00±2.00	0.51
Feet	**R**	2.35±1.63	1.65±1.66	1.90
	L	2.23±1.61	1.57±1.31	2.01*

R: Right and *L*: Left; w.r.t female *p<0.05; ***p<0.001

Table 4.2.1: The Body part discomfort rating (BPD) (Mean ±SD) in different body segments of the pottery worker (in a ten-point scale).

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5. Evaluation of Postural Stress by Ergonomic Assessment Tools

Patterns of posture adopted by the pottery workers during performing different tasks were analyzed. Depending upon the type of work and requirement of tools for performing a specific task as well as the frequency and duration of work cycle, the workers had to adopt various types of postures in their work place. For assessing work posture as the risk factor for musculoskeletal damage, the postural analysis can be an acceptable technique (Kee and Karwowski, 2007). The work-related pain / discomfort in different body segments can be pointed out by the assessment of work postures through ergonomic methods. A number of methods have been suggested by the researcher for assessing the work posture and also for finding the ergonomic risk factors of workers.

Different postures adopted by the pottery workers were assessed by three posture analysis methods, viz., OWAS, RULA and REBA and the results have been presented in table 5.1.1. The working categories are divided into three phases – clay preparation, pot making,shaping.

From the results (Table 5.1.1) of postural assessment by OWAS method it was found that all the postures adopted during clay preparation and shaping of pot by the male and female workers had ‘Action Level 3’ indicating the posture needed corrective measures as soon as possible. In case of pot making ‘Action level 2’ was noted which indicated corrective measure in near future.

The results obtained from REBA method represented that the male and female workers who prepared clay, had ‘Action level 8 and 9’ that indicated high risk of posture. Other tasks that are, pot making and shaping had ‘Action level 7’ that indicated medium risk of posture.

Different work activities	Sex	**OWAS**		**REBA**		**RULA**	
		Action Level	Risk level	Action Level	Risk level	Action Level	Risk level
Clay Preparation	**Male**	3	Corrective measure assoon as possible	8	High risk	7	Investigate and implement change

	Female	3	Corrective measure assoon as possible	9	High risk	7	Investigate and implement change
Pot Making	**Male**	2	Corrective measure in future	4	Medium risk	6	Change soon
	Female	2	Corrective measure in future	7	Medium risk	7	Investigateand implement change
Shaping	**Male**	3	Corrective measure assoon as possible	7	Medium risk	5	Change soon
	Female	3	Corrective measure assoon as possible	7	Medium risk	6	Change soon

Table 5.1.1: Results (action and risk levels) of postural analysis of the workers engaged in pottery tasks (n=40; Male: 20; female: 20).

The results of postural assessment by RULA method showed that in clay preparation male and female workers had 'Action Level 7' that indicated 'investigate and implement change the risk posture'. In other two tasks action level indicated the requirement of changing work posture soon.

The results obtained from REBA method represented that the male and female workers who prepared clay, had 'Action level 8 and 9' that indicated high risk of posture. Other tasks that are, pot making and shaping had 'Action level 7' that indicated medium risk of posture. The results of postural assessment by RULA method showed that in clay preparation male and female workers had 'Action Level 7' that indicated 'investigate and implement change the risk posture'. In other two tasks action level indicated the requirement of changing work posture soon.

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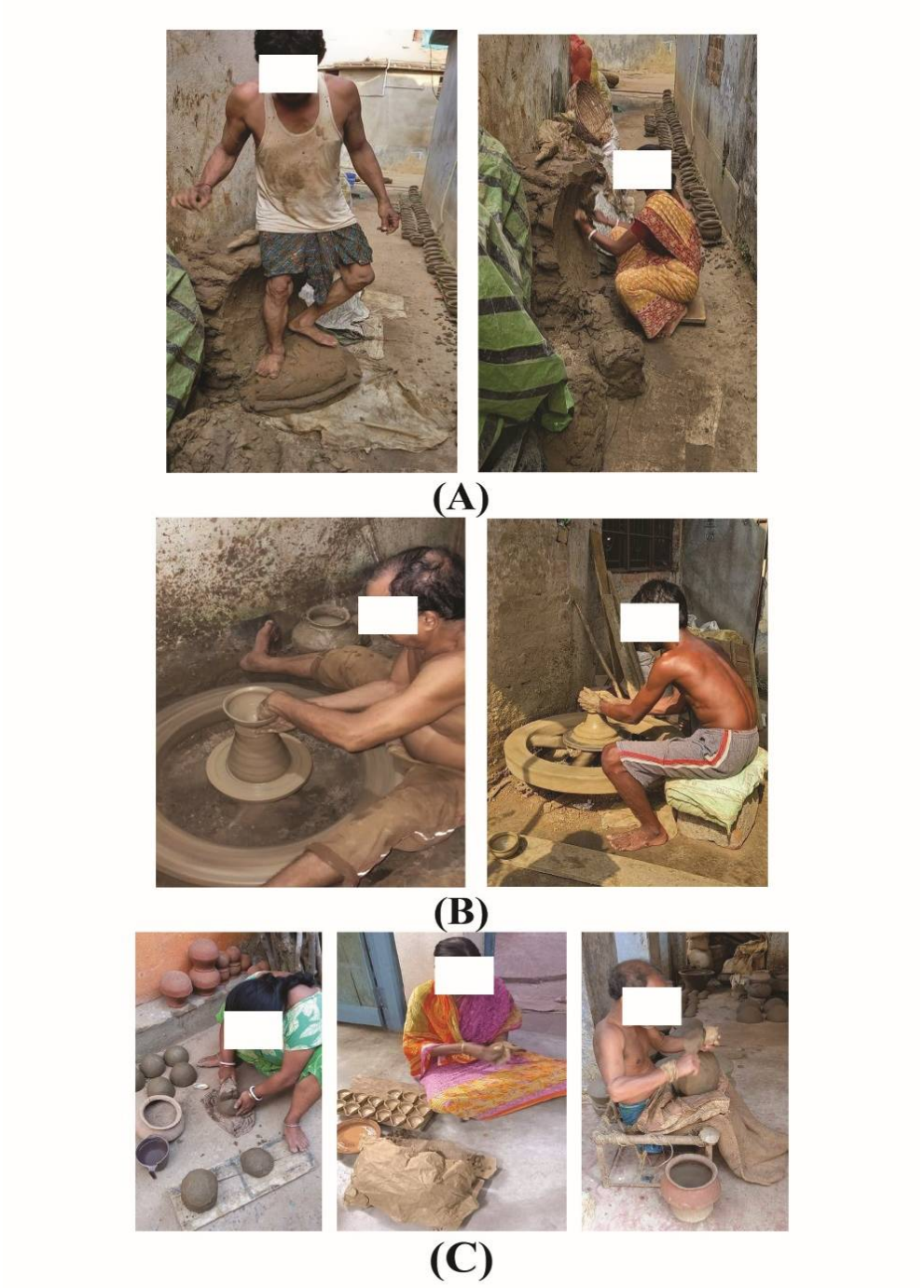

Fig: Different pottery activities: A: Clay Preparation; B: Pot Making; C: Shaping

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Discussion

The low literacy level of pottery workers might be due to the lack of awareness regarding the advantage of education as well as to the limited family income of the subjects. The low socioeconomic status of the workers might influence their nutritional intake and health. The socioeconomic condition of the workers might affect the work-related health problems. Thus, poor socioeconomic status might be one of the concerns for the occurrence of work-related musculoskeletal disorders. Boyer *et al.*, (2009) reported that the socioeconomic condition of the workers influenced the work-related musculoskeletal disorders.

In general, the pottery workers were normotensive in this present investigation. Some other study concluded that there was a rising tendency of blood pressure among other populace ('Santal') of Birbhum district in West Bengal (Roy, 2005). This variance might be caused for caste difference and variation in food habit and life style living. Wu *et al.*, (2008) noted the prevalence of orthostatic hypotension (15.9%) in Taiwan population and inferred that age was one of the factors determining for it.

According to Binagwaho *et al.,* (2011) malnutrition is enormously linked with poverty and in India it has long been documented as a serious problem. Long term effect of malnutrition relates to vital consequences in terms of work capacity, substantial growth and risk of chronic diseases (Singh *et al.*, 2013). The BMI is also sensitive to socio-economic status and to seasonal fluctuations in food consumption relative to the level of physical activity (Venkatramana *et al.*, 2005).

Some commonly known factors such as inequalities of socioeconomic status and the life style of industrial workers played an important role for BMI (Wadden *et al.*, 2012; Eckel *et al.*, 2014). Distribution of fat in the upper part of the body and averting stoutness might be controlled by physical activity (Wadden *et al.*, 2012; Lee *et al.*, 2012). Levels of BMI are the good predictor for the work ability of the workers, more than normal range of BMI effect on work ability among the workers of advanced age (Linaker *et al.*, 2020). Industrial workers of our country were poorly paid and that might be the cause for poor range of BMI (Khongsdier, 2005).

Many investigators showed relationship between the socioeconomic status and occurrence of MSD. MSD was found to be significantly related with the level of

education (Erick and Smith, 2014; Verma and Madhavi, 2017). In this study it was shown that workers were belonging to low socioeconomic condition and their levels of educational were also very poor (Table 1.1). This might be the one of the important reasons for the occurrence of higher percentage of MSD. Songkham *et al.*, (2008) investigated occupational hazards and health status of 307 pottery workers in Chiang Mai, Thailand. The study revealed that primary illnesses amongst the sample population were essentially MSDs, including hand-arm-shoulder pain, back pain, neck pain and leg pain. The problem emanating out of stooping and squatting postures is of greatest relevance in developing countries in general and in (Norman, 1998). Unfortunately, such hazardous postures are frequently observed in pottery workers in India. In workers, where operators are mostly women, 75% of them suffer from posture-induced MSDs (Metgud *et al.*, 2008). Workers of unorganized sectors (viz., stone carving, jewellery making, craft work and pottery) were suffering from one most common occupational health problem that was the musculoskeletal problems (Mrunalini and Loeswari, 2015). Cheng *et al.*, (2016) reported that lifting heavy weight, moving repeatedly and maintain work posture for prolonged time all are responsible for high work-related musculoskeletal problems.

The Potter's had different levels of body part discomfort during executing different tasks. Postural discomfort is common in potters, in which they suffer from discomfort / pain in the lower back, shoulders and their other extremities. Potters report a high prevalence of work-related postural discomfort (Sahu *et al.*, 2013). Array of task might be responsible for the high rate of discomfort at neck shoulder and lower back of the body. Adoption of bending posture by the potters was very common in all tasks ofpottery. Van Hoof *et al.*, (2012) and Vijendren *et al.*, (2016) suggested that bending posture was more stressful work posture than the straight back postures. A factor that was originating discomfort was the bending posture during work (Chaffin *et al.*, 2006).

Singh *et al.*, (2012) investigated the working posture in small scale forging industry by using RULA method and categorized the workers engaged in this industry as having high to very high-risk level of stress. Other investigators (Bijetri and Sen, 2014; Das, 2015) also found that the female workers engaged in squatting posture for prolonged period had high scores of OWAS, RULA and REBA indicating high risk of postural stress. In the present study the pottery workers often

adopted squatting posture during clay preparation and pot making for a prolonged period. The majority of postures used by bell metal workers were squatting, which put more postural stress on the workers (Das *et al*., 2017). Physical ergonomic factors such as the combination of load and postures, repetitive bending of the wrist, vibration and localized mechanical pressure, prolonged periods of improper squatting, standing or walking trunk twisting, monotonous work are associated with MSDs (Chung *et al.*, 2001).

Conclusion

The general health of pottery workers was more or less good. The BMI study indicated that the workers had no underweight case. However, a notable percentage of them were overweight. The blood pressure of most of the pottery workers was within the normal range. Only a little percentage of the workers had hypotension or hypertension. The Pottery workers suffered from occupational health problems. Musculoskeletal disorder was prevalent among them. The prevalence was high in the segments of lower limb as well as neck and shoulder. The prevalence of postural discomfort among potters was considerably high. The postural stress and risk of postural discomfort varied from one task to another. The study suggests that postural discomfort was somewhat higher in females in comparison to males in some of the cases.

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