Faculty of Medicine

University of Dhaka

Prevalence of Musculoskeletal Disorder among the Hand Loom Workers

Submitted by:

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Course: MSc in Physiotherapy

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Department of Physiotherapy

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Preface

I hereby humbly declare that the dissertation work titled "Prevalence of Musculoskeletal Disorder among the Hand Loom Worker" a requirement for the degree of MSc. (Physiotherapy) program under the University of Dhaka Faculty of Medicine Bangladesh was carried out by me under the guidance of Dr. Kamal Ahmed during the study period of January to May 2016

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Supervisor's Certificate

This is to certify that the dissertation entitled "Prevalence of Musculoskeletal Disorder among the Hand Loom Worker" submitted by Md. Akhter Hossain , student of MSc. (Physiotherapy), Session: 2012-2013 has carried out the dissertation work under my direct supervision and guidance in the Department of Physiotherapy, Bangladesh Health Professional (BHPI), Saver, Dhaka, under University of Dhaka Faculty of Medicine.

I have the confidence regarding the originality of his data and I also express that the dissertation is up to my satisfaction.

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Declaration

This work has not previously been accepted in substance for any degree and is not concurrently submitted in candidature for any degree.

This dissertation is being submitted in partial fulfillment of the requirements for the degree of MSc in Physiotherapy.

This dissertation is the result of my own independent work/investigation, except where otherwise stated. Other sources are acknowledged by giving explicit references. A Bibliography is appended.

I confirm that if anything identified in my work that I have done plagiarism or any form of cheating that will directly awarded me fail and I am subject to disciplinary actions of authority.

I confirm that the electronic copy is identical to the bound copy of the Thesis.

In case of dissemination the finding of this project for future publication, research supervisor will highly concern and it will be duly acknowledged as undergraduate thesis.

Signature:………………

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ABSTRACT

A cross sectional study was carried out prevalence of musculoskeletal disorder among the hand loom worker. The study was conducted from January to May 2016. Respondents (N=230) were interviewed with a semi-structured questionnaire. In this study the mean age of the respondent was 35.73; (SD=±11.602). Majority of the respondents were in adolescent age and maximum respondents (85.2%) were married. Educational level of respondents more than one third (43.5%) belong to primary level. and monthly income average was 9023.91 ;(SD=±2792.675). Most of (37.8%) were in Taka 8001-10000 and minimum monthly incomes were 21.8% in Taka ≤6000. Duration of working in the handloom 23.9% in 11-15 years and almost handloom workers (32.2%) were working in their 13-14 hours. The risk of developing musculoskeletal disorder pain was most of 61.3% respondents were 7-8 hours daily time spending sitting, (78.3%) standing at work. Most of 54.8% times with the increase in amount of perceived stress and 45.5% respondents by heavy physical duty (lifting). Type of co-morbidities 4.8% had suffered diabetes 12.2% had hypertensive and 33% had arthritis and more than fifty (87.2%) had common co-morbidities. Suffering from any neurological disorder 69.4% were motor (walking) and 79.8% radiating pain sensory (lower extremity). At the present musculoskeletal disorder pain prevalence was 27.4%. They had experience more than one third (33.9%) handloom worker of suffering from 1-6 days. Considering the pain in different parts of the body, 26% had complaints of pain in the hip/things knees neck pain (10.1%), shoulders pain (17.4%), wrist pain both elbow(11.6%), lumbar spine (18.8%). Majority of 42.9% had suffered from temporary 41.2% were continuous according to shoulders, ankles, lumbar spine; cervical spine had Nature of complaints maximum continuous and Severity of complaints on movement. They had no received treatment (73.9%)

because most of respondents (84.7) responses lack of money. Musculoskeletal disorder in the past (23.9%) and duration of affected 29.1% were 6-15 years similarly number. Most of respondents BMI 84.8% had normal. The relationship between daily time hours spend & lifting by participant's musculoskeletal disorder pain were increasing and the risk of developing musculoskeletal pain was 2.75 & 1.77. The finding are each age of respondents, duration of job, sitting, lifting and work stress statistically highly significant (p=0.001).

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LIST OF ABBREVIATIONS

BDHS: Bangladesh Demographic Health Survey

BRAC: Bangladesh Rural Advancement Committee

DGHS: Directorate General of Health Services

DSF: Demand Side Financing

FWV: Family Welfare Visitor

FWC: Family Welfare Centre

JICA: Japan International Cooperation Agency

MDG: Millennium Development Goal

NIPORT: National Institute of Population Research and Training.

NGO: Non Governmental Organization

PAHO: Pan American Health Organization

SD: Standard Deviation

SEAR: South East Asia Region

UNICEF: United Nations Children's Fund

UHCs: Upazilla Health Complexes

WHO: World Health Organization

CHAPTER-I

1.1 Introduction

The handloom is simply a weaving device made of wood and iron mainly operated by hand, relying solely on human metabolic energy. It requires a space barely 8 sq. meters. Handloom weaving is a cottage based industry spread throughout the country. The sounds of the handloom are the music of the rural home inviting fortune to them. In the process of weaving the handloom weaver create a harmony of motion and rhythm.

The Handlooms was enacted with a view to protect the livelihood of millions of handloom weavers and rich cultural heritage of Bangladesh.

Handloom Industry from encroachment of the power loom and Mill Sector.

Handloom has been defined as follows:

   a) "Handloom" means any loom, other than power loom.

   b) "A hand operated machine for producing cloth by weaving. In some instances, the Shedding is performed by foot operation."

On the other hand, Hand loom is a machine or device which is made from wood and some portion of iron and used to produce woven fabric. Hand loom running without any electrical motor, its urn by man's hand and foot combination (Khan, AM. (2013).

As we have described before that around 1.5 million people are directly and indirectly dependent on this industry. Even in 1977 there was an ordinance to establish Bangladesh Handloom Board. This board is doing their job with dignity though they have lack of resources. Now the main problem is in the sector of

employment generation. This board has a variety of activities to do. After doing all the jobs under the board they try to create some room for the unemployment. Even in the Bangladesh Handloom Board Ordinance in 1977 there is no specific citation to create employment for the unemployment.

Now we are going find that, what are the activities the handloom board has taken in the country? Moreover we have done the case study of Enaitpur Thana in Sirajgonj, Bangladesh. We have discussed the detail of the geographical and population information later. Moreover I want to add one more thing that, as we have discussed before that handloom is the largest hand craft industry in Bangladesh. Likewise handloom board of Bangladesh is the mother organization to control the policy initiatives regarding the handloom in Bangladesh. We have not focused all the policy issues of the handloom board rather we have focused the employment generation activities of the handloom board of Bangladesh. Here in our study the main problem is the low income generating activities in the field of handloom industry in Bangladesh. Moreover the handloom board is also doing less in this field. (Khan, AM. (2013).

The Handloom industry is still a very important part of the textile industry of Bangladesh, Is responsible for a very high percentage of the nation's economy. As Handloom industry Is the biggest handicraft industry in our country, it is the second largest source of rural Employment after agriculture (Ahmed, 1999). Manpower of about 1.5 million weavers, Dyers, hand spinners, embroiderers and allied artisans have been using their creative skills into more than 0.30 million active looms to produce around 620 million meters of fabrics Annually. It shares 63% of the total fabric production in the country designed for home Consumption, meeting 40% of the local demand for fabrics. Besides, it provides

Employment opportunities to a million rural people, 50% of which are female in hole Bangladesh. Another half a million people are indirectly engaged in the industry. It contributes more than 10 (ten) billion taka annually to the national exchequer as value addition (BHB, 2012).

The hand loom board was established in 1977. Its main responsibility is to take. The vast majority of Bangladeshi handlooms is engaged in weaving cotton and blended fabrics although handloom cloth of silk earned a good reputation. Famous areas for silk weaving are Rajshahi, Tangail and Nobabgonj. Rajshahi produces mainly famous /silk sarees, a special type of cloth weared by the women folk. Tangail produces also silk saree namely Tangail Muslin and Narayangonj produces the famous Jamdanisaree, silk sareesTangail Muslins and famous jamdani. Zari work called brocade is also famous in Mirpur, Dhaka .In Bangladesh there are different schools of weaving on jacquard, dobby, frame and pit looms. Product assortments made of other are saree, lungie, gamsa, grameen check fabrics, printed bed covers, pillow covers, table mats, kitchen and hand towels, apron, curtain and upholstery, furnishing fabrics, bags bandage etc.

Handloom weaving encompasses a wide range of tasks such as manual sorting of raw materials, carding and spinning in cord machine, dyeing by acid and chrome dyes preceding the actual weaving. The workers are exposed to noise and dust. The job demands high attention in making designs. Fibers are boiled in a vat containing acetic acid and dye solution, washed in running water and dried, and spindles are made out of fibers. Weaving processes are done on two types of hand operated looms e.g., (i) desk-bench type workstation and (ii) sitting on floor with their legs hanging to operate the pedals at a lower level. The task of weaving demands repeated movement of upper and lower limbs to operate pedals and shuttles, with arms raised away from the body. (Anjali NAG 2010).

Number of handloom establishment and loom- 2011

Upazila	Number of unit (factory)	Number of hand loom	Operation al	Non-operational	Total hand loom
Belkuchi	3630	35050	31250	4800	35050
Chauhali	1319	6994	5274	1720	6994
Kamarkhanda	00	00	00	00	00
Kazipur	401	2932	2631	301	2932
Royganj	855	5580	4185	1395	5580
Shahjadpur	4754	47900	39500	8400	47900
Sirajganj Sadar	1997	15916	11538	4378	15916
Tarash	14844	26	26	00	26
Ullahpara	1886	14844	10391	4453	14844
Total-	**14849**	**129242**	**104795**	**25447**	**129242**

(According to District Statistics 2011 Sirajganj District

Employment status in handloom industry- 2011

Upazila	Number of loom & handloom	Person engaged	Regular	Hired /Casual	Total Person engaged
Belkuchi	35050	49500	32500	8700	49500
Chauhali	6994	7349	5015	322	7349
Kamarkhanda	00	2747	1237	1000	2747
Kazipur	2932	3438	2390	542	3438
Royganj	5580	11590	4185	3585	11590
Shahjadpur	47900	65700	20000	25000	65700
Sirajganj Sadar	15916	35283	13792	19494	35283
Tarash	07	28	7	7	14
Ullahpara	14844	32521	10391	13586	32521
Total	**133223**	**208156**	**89517**	**72236**	**208156**

(According to District Statistics 2011 Sirajganj District

Important Products with Places of Production

Sl.	Name of the Products	Place of Production
1	Jamdani	Rupgonj and Sonargaon of Narayangonj district.
2	Benarasi	Mirpur of Dhaka, Iswardi of Pabna district and Gangachara of Rangpur district.
3	TangailSharee (Cotton sharee, Half Silk, Soft Silk, Cotton Jamdani, Gas-mercerised twisted cotton sharee, Dangoosharee, Balucherri)	TangailSadar, Delduar and Kalihati, Nagorpur, Basail of Tangail District.
4	Handloom Cotton share	Shahjadpur, Belkuchi and Sadar of Sirajgonj district, Narsingdi and Pabna districts.
5	Lungi	Ruhitpur of Keranigonj and Dohar of Dhaka district,Shahjadpur,Ullapara, Belkuchi, Sadar of Sirajgonjdistrict,Kumarkhali of Kushtia district, Sathia,
6	Silk share	Sadar and Shibgonj of ChapaiNawabgonj and Rajshahi district.
7	Gamcha	Ullapara,Kamarkhand of Serajgonj, Gouranadi of Barisal, Fultola,Doulatpur of Khulna,Jhalokathi, Jessore and Bogra districts.
8	Check Fabrics	Belkuchi of Sirajgonj district.
9	Mosquito Nets	Araihazar and Rupgonj of narayangonjdistrict, Shibpur and Sadar of Narsingdi district.
10	Bed Sheet & Bed Cover	Kumarkhali of Kustia district, Danga of Narsingdi district.

11	Sofa Cover	Danga of Narsingdi district.
12	Rakhine Special Wear(Wooling Shirting, Woolen Bed Sheet, ladies chadar, Bag,Lungi and Thami for tribal ladies)	Taltoli of Borguna district, Kalapara, Rangabali of Patuakhali district and Cox's Bazar district.
13	Tribal Fashion Wear (Thami for tribal ladies, Khati(Orna), Ladies Chadar& Lungi.	Rangamati, Khagrachari&Bandarban Hill districts.
14	Miniouri Fashion Garments (MonipuriSharee, Punek for ladies like lungi, Lungi, Un-stitched cloth (three pieces), Innachi(Orna) & Vanity Bag	Sylhet and Moulivibazar districts.

A manpower of about 1.5 million weavers, dyers, hand spinners, embroiderers and allied artisans have been using their creative skills into more than 0.30 million active looms to produce around 620 million meters of fabrics annually. It shares 63% of the total fabric production in the country designed for home consumption, meeting 40% of the local demand for fabrics. Besides, it provides employment opportunities to a million rural people,. Another half a million people are indirectly engaged in the industry. It contributes more than 10 (ten) billion taka annually to the national exchequer as value addition. (www.assignmentpoint.com)

For the development of Handloom sector to ensure well being of the handloom weavers, Bangladesh Handloom Board has been implementing a number of package programmes covering supply of input, innovation of suitable designs, financing of working capital, development of human resources, modernization of handloom

technology, efficient marketing management and formation of sound weavers societies.In a world, the Handloom Industry has no alternative in the development of rural economy. (www.assignmentpoint.com)

Handloom is an important cottage industry among developing countries like India, Pakistan, Bangladesh, Iran, Turkey and China, where traditional ways of weaving is still significantly practiced. The vast majority of workforce in South Asia is engaged in the informal sectors which also embraces the cottage industries. Weaving is acknowledged to be one of the oldest surviving crafts in the world (Pandit *et al.,* 2013).

During the weaving operation handloom workers adopt awkward postures, which is one of the most important factor of their poor working efficiency and prevalence of musculoskeletal disorders. Musculoskeletal disorders (MSDs) are a common health problem and a major cause of disability throughout the world. The economic loss due to such disorders affects, not only the individual level but also the organization level and the society as a whole (Kemmlert, 1994).

At present, MSDs are one of the most important problems ergonomists encounter in the workplace all over the world. In many countries, prevention of work-related musculoskeletal disorders (WMSDs) has become a national priority. The nature of the work of the female handloom weavers of Uttarakhand is also consisted of several occupation related risk factors. For example, most of the workers had to work in static and awkward body postures and work with contact pressure at the hand and wrist areas. Keeping this in view, an attempt was made to analyze the prevalence of musculoskeletal disorders and postural discomfort in various body regions of male and female handloom weavers of Uttarakhand. (Heena, et al. 2015)

Musculoskeletal disorders (MSDs) are injuries or disorders of the muscles, nerves, tendons, joints, cartilage, an disorders of the nerves, tendons, muscles and supporting structures of the upper and lower limbs, neck, and lower back that are caused, precipitated or exacerbated by sudden exertion or prolonged exposure to physical factors such as repetition, force, vibration, or awkward posture. (This definition specifically excludes those conditions such as fractures, contusions, abrasions, and lacerations resulting from sudden physical contact of the body with external objects.) (NIOSH).

Causes of Musculoskeletal Pain:

The causes of musculoskeletal pain are varied. Muscle tissue can be damaged with the wear and tear of daily activities. Trauma to an area (jerking movements, auto accidents, falls, fractures, sprains, dislocations, and direct blows to the muscle) also can cause musculoskeletal pain. Other causes of pain include postural strain, repetitive movements, overuse, and prolonged immobilization. Changes in posture or poor body mechanics may bring about spinal alignment problems and muscle shortening, therefore causing other muscles to be misused and become painful.

Symptoms of Musculoskeletal Pain:

People with musculoskeletal pain sometimes complain that their entire bodies ache. Their muscles may feel like they have been pulled or overworked. Sometimes, the muscles twitch or burn. Symptoms vary from person to person.

Symptoms of WMSDs:

Pain is the most common symptom associated with WMSDs. In some cases there may be joint stiffness, muscle tightness, redness and swelling of the affected area. Some

workers may also experience sensations of "pins and needles," numbness, skin colour changes, and decreased sweating of the hands.

WMSDs may progress in stages from mild to severe.

Early stage: Aching and tiredness of the affected limb occur during the work shift but disappear at night and during days off work. No reduction of work performance.

Intermediate stage: Aching and tiredness occur early in the work shift and persist at night. Reduced capacity for repetitive work.

Late stage: Aching, fatigue, and weakness persist at rest. Inability to sleep and to perform light duties.

Not everyone goes through these stages in the same way. In fact, it may be difficult to say exactly when one stage ends and the next begins. The first pain is a signal that the muscles and tendons should rest and recover. Otherwise, an injury can become longstanding, and sometimes, irreversible. The earlier people recognize symptoms, the quicker they should respond to them.

The table below outlines occupational risk factors and symptoms of the most common disorders of the upper body associated with WMSDs.

Identified disorders, occupational risk factors and symptoms

Disorders	Occupational risk factors	Symptoms
Tendonitis/tenosynovitis	Repetitive wrist motions Repetitive shoulder motions Sustained hyper extension of arms Prolonged load on shoulders	Pain, weakness, swelling, burning sensation or dull ache over affected area
Epicondylitis (elbow tendonitis)	Repeated or forceful rotation of the forearm and bending of the wrist at the same time	Same symptoms as tendonitis
Carpal tunnel syndrome	Repetitive wrist motions	Pain, numbness, tingling, burning sensations, wasting of muscles at base of thumb, dry palm
DeQuervain's disease	Repetitive hand twisting and forceful gripping	Pain at the base of thumb
Thoracic outlet syndrome	Prolonged shoulder flexion Extending arms above shoulder height Carrying loads on the shoulder	Pain, numbness, swelling of the hands
Tension neck syndrome	Prolonged restricted posture	Pain

Musculoskeletal Pain Treated:

Different types of manual therapy, or mobilization, can be used to treat people with spinal alignment problems. For some acute musculoskeletal pain, these techniques have been shown to speed recovery.

Medications such as nonsteroidal anti-inflammatory (NSAIDs) may be used to treat inflammation or pain.

In patients with musculoskeletal disorders such as fibromyalgia, medications to increase the body's level of serotonin and nor epinephrine (neurotransmitters that modulate sleep, pain, and immune system function) may be prescribed in low doses. Some of the medicines used to aid sleep include zolpidem (Ambien), eszopiclone (Lunesta), and ramelteon (Rozerem).

Other treatments may include:

- Injections with anesthetic or anti-inflammatory medications in or around the painful sites

- Exercise that includes muscle strengthening and stretching

- Physical or occupational therapy

- Acupuncture or acupressure

- Relaxation/biofeedback techniques

- Osteopathic manipulation (a whole system of evaluation and treatment designed to achieve and maintain health by restoring normal function to the body)

- Chiropractic care

- Therapeutic massage

Work-related musculoskeletal disorders (WMSDs) have emerged as major health problem among workers in both industrialized and industrially developing countries (Westgaard 1997). Several work place factors, such as repetitive work, awkward and static postures, have been identified as being associated with upper extremity pain and discomfort. Studies in Iranian hand woven carpet industry have reported high prevalence of musculoskeletal problem among weavers due to constraints of working

postures, poor design of loom, working time, repetitive work and seat type (Punnett 2000). Physical and psychosocial load, poor climatic conditions, and vibrations have been identified as risk factors that contribute to developing MSDs among agricultural workers). In machine manufacturing plant) and textile weavers), high physical demands, poor postures and insufficient recovery time are the contributing factors to develop musculoskeletal disorder. In spite of apparently similar occupational pattern of work, gender differences do exist in the prevalence and severity of MSDs and perception of work as stressors. The present study focuses on identification of different dimensions of work stressors among the weavers in handloom and power loom and explores its association with the prevalence of MSDs among male and female weavers and existence of any gender difference. Warping and weaving machines. The workers are exposed to vibration, cotton dust and noise. Standing work posture is maintained throughout the shift in operating 3 looms simultaneously. After raw materials are warped, the workers push and move iron beams weighing 75–100 kg for a distance of about 2 m and this kind of materials handling are performed 6–7 times per day. The job demands high attention in observing threads do not break off, mending the breaks and then change the beam after one is completed. (Punnett 2000).

1.2. Justification of the study

A manpower of about 1.5 million weavers, dyers, hand spinners and allied artisans have been using there creative skills into more than .30 million active looms to produce around 620 million meters of fabrics annually. It shares 64% of the total fabric production in the country designed for home consumption, meeting 40% of the local demand for fabrics. Besides, it provides employment facilities to a million rural people are indirectly engaged in the industry. It contributes more than 10 billion taka to the national exchequer as value addition for the development of handloom sector

and ensure well being of handloom weavers, Bangladesh handloom board has been implementing a number of package programmers covering supply of input, innovation of suitable designs, financing of working capital, development of human resources, modernization of handloom technology, efficient marketing management and formation of sound weavers societies. In a world, the handloom industry has no alternative in the development of rural economy (Rahman, 2013).

Musculoskeletal diseases affect more than one out of every two persons in the United States age 18 and over, and nearly three out of four ages 65 and over. Trauma, back pain, and arthritis are the three most common musculoskeletal conditions reported, and for which health care visits to physicians' offices, emergency departments, and hospitals occur each year. The rate of musculoskeletal diseases outstrips that of circulatory diseases and respiratory diseases, which affect about one in three persons, with the majority reporting relatively easily treatable conditions such as chronic hypertension or hay fever and bronchitis.

The cost of treating major musculoskeletal diseases, which often includes long-term pain and disability, is also greater than for treatment of many other common health conditions. Yet research dollars to identify causes, create new treatments, and reduce pain and disability remain much lower than that of other health conditions.

1.3 Research question:

What is the prevalence of musculoskeletal disorder among the hand loom worker?

1.4 Objectives:

1.4.1 General objective:

To find out the prevalence of musculoskeletal disorder among the loom worker in a selected weaving factory at Belchuchi, Sirajgonj, Bangladesh.

1.4.2 Specific objectives:

- To investigate the number of loom workers experienced musculoskeletal disorder;

- To find out more affected age group;

- To know the severity of symptom by using Visual Analog Scale;

- To explore the relationship between the MSD and socio-economic condition.

1.5 Key variables:

A. Independent variables

B. Dependent variables

A. Independent variables –

Socio-demographic variables

- Age

- Sex

- Religion

- Marital status

- Educational status

- Education of husband/father

- Occupation of husband/father

- Monthly family income

- Number of child

- Duration of work experience

B. Dependent variables

a. General health related information

- Suffer from any other disease

- Hypertension

- Suffer from any of co-morbidities

- Leave during last twelve months sick

C. Musculoskeletal disorder related information

- Musculoskeletal pain

- Place of treatment of Musculoskeletal pain

- Experienced Musculoskeletal pain in the past

- Duration of experienced Musculoskeletal pain

1.6. Conceptual Framework

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                          ┌──────────────────┐
                          │    Variables     │
                          └──────────────────┘
                     ┌────────────┴────────────┐
                     ▼                          ▼
        ┌────────────────────────┐   ┌────────────────────────┐
        │ Independent Variables  │   │  Dependent Variables   │
        └────────────────────────┘   └────────────────────────┘
                     │                          │
                     ▼                          ▼
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Socio-demographic characteristics	Factors related variables
• Age	• Suffer from any other disease
• Sex	
• Religion	• Hypertension
• Marital status	
• Educational status	• Suffer from any of co-morbidities
• Education of husband/father	
• Occupation of husband/father	• Leave during last twelve months sick
• Monthly family income	
• Number of child	
• Duration of work experience	

┌──────────────────────────────────┐
│   Prevalence of musculoskeletal   │
└──────────────────────────────────┘

1.7 Operational definition

Age of the respondent - Age of the rural male at the time of interview in completed years.

Religion – The religion he follows categorized into Islam, Hindu, Christian, Buddhist and others.

Education – The level of education of the respondent & his father. It was further categorized as-

    i.   Illiterate: person who not neither read nor writes.

    ii.   Primary: person who went to school to learn and completed upto class 5.

    iii.   SSC; person who went to school and completed school upto class 10.

    iv.   HSC: person who went to college and completed upto class 12.

    v.   Graduation and Masters are the degree of university completed by the person.

    vi.   Others: Not in above mentioned group and may be the non formal group.

Occupation – Any activity or activities a person's father involved in for earning or engaged for maximum time in a day.

    i.   Housewife: Women exclusively engaged on household work.

    ii.   Service: Who were employed and got their salary on monthly basis.

    iii.   Day-laborer: Who earned their wages daily by physical labor?

    iv.   Garment worker: Who were employed in garments factory.

    v.   Business: Who were earning in return of their own monetary investment.

Monthly income of the family-

Means the total monthly income of all the family members living in the same household and sharing the same kitchen.

Family member- Including the new born infant.

Type of Family:

Nuclear family: Consisting of mother, father, and their children all living in a single dwelling unit where the head of the family is the head of the household.

Joint or extended family: It is a family group consisting of a number of married couples and their children, living together in the same household and are usually related by blood.

Handloom

A handloom is a simple machine used for weaving. In a wooden vertical-shaft looms, the heddles are fixed in place in the shaft. The warp threads pass alternately through a heddle, and through a space between the heddles (the shed), so that raising the shaft raises half the threads (those passing through the heddles), and lowering the shaft lowers the same threads—the threads passing through the spaces between the heddles remain in place.

Prevalence

The number of all current (old and new) musculoskeletal disorders pain among the study population during the interview.

Musculoskeletal Disorders

Musculoskeletal disorders (MSDs) consist of minor physical disabilities. This term is used to describe a variety of conditions that affect the muscles, bones, and joints. The

severity of the MSD can vary. Pain and discomfort may interfere with everyday activities. MSDs are extremely common, and your risk increases with age. Early diagnosis is the key to ease pain while potentially decreasing further bodily damage.

Symptoms of MSDs

Symptoms of musculoskeletal disorders can hamper everyday tasks, such as walking. You may notice you have limited range of motion, as well as difficulties accomplishing your favorite activities

Low Back Pain: Low back pain is a universal human experience -- almost everyone has it at some point. The lower back, which starts below the ribcage, is called the lumbar region. Pain here can be intense and is one of the top causes of missed work. Fortunately, low back pain often gets better on its own. When it doesn't, there are effective treatments.

Muscle Strain or Sciatica?

The kind of back pain that follows heavy lifting or exercising too hard is often caused by muscle strain. But sometimes back pain can be related to a disc that bulges or ruptures. If a bulging or ruptured disc presses on the sciatic nerve, pain may run from the buttock down one leg. This is called sciatica.

Obesity

Height was measured in centimeters to the nearest 5 mm in a standing position, with shoes removed, using a wall-mounted stadiometer. Weight was measured to the nearest 0.1 kg with the subject in light indoor clothes, with shoes removed and emptied pockets. BMI (body mass index) was calculated as weight in kilograms divided by height in meters squared, and subjects were stratified into obese (BMI $\geq$ 30 kg/m2) and nonobese (BMI < 30 kg/m2).

1.8. Limitations of the study

This cross sectional study was conducted in a rural area of Belchuchi, Sirajgonj. The limitations those were perceived while conducting the research work are stated below-

1. As the study place is purposively selected in Belchuchi, Sirajgonj so the result of the study might be area specific and might not reflect the country scenario.

2. As the male hand loom worker were the respondent, female worker are not allowed in belchuchi,sirajgonj area. Females are raping cotton by bobbin machine. It was very much difficult to take face to face interview at their work place because their time schedule during work is fixed and due to the nature of the study it was impossible for them to talk freely in front of the authority or owners side people. Face to face interview was done at their factories at the evening and night after their work time which was very much inconvenient and difficult for the researcher.

3. Though the topic of this study is new one, the availability of the relevant published material is not satisfactory.

4. To conduct such a study resource is very much important factor. Researcher being a student without any financial support felt serious problem.

CHAPTER-II

2. Literature review

The handloom was devised about 2,000 years ago and was brought to England by the Romans. The process consisted of interlacing one set of threads of yarn (the warp) with another (the weft). The warp threads are stretched lengthwise in the weaving loom. The weft, the cross-threads, is woven into the warp to make the cloth. In his book, History of Cotton Manufacture (1823), Richard Guest pointed out: "The warp was placed between two beams about five feet apart; half way between the beams the warp passed through a frame work of looped threads, called heralds, each alternative thread of the warp going through one healed, and the other threads through the other healed. The heralds were worked by two treadles, which upon one being put down by the foot, raised one half of the healds and every second thread of the warp; the shuttle which contained the weft was then thrown by the right hand between the threads which were at rest, and the second or alternative threads raised by the treadle and the heralds; the shuttle was caught on the other side by the left hand, and the weft thus transversely shot between the threads of the warp." Weaving remained unchanged for hundreds of years until John Kay devised the flying shuttle, which enabled a weaver to knock the shuttle across the loom and back again using one hand only. The speed of weaving was doubled; and a single weaver could make cloths of any width, whereas previously two men had sat together at a loom to make broad cloth. By 1800 it was estimated that there were 250,000 handlooms in Britain.

Khan, AM. (2013).

The handloom industry in Bangladesh is having a glorious past, questionable present and confusing future. The art of weaving is perhaps as old as human civilization. Bangladesh can proudly claim to have many branches of this ancient art, of which the best known and most popular is the specialty Jamdani, which is one of the varieties of the famous Dhaka Muslin or Mul-mul (Zohir 1996). For over ten centuries, the Dhaka area has been renowned for this fine fabric. So fine was its texture and quality that it was said to be woven with the "thread of the winds" and the Greek and the Roman texts mention the "Gangetic muslins" as one of the most coveted luxury items. Woven from superfine cotton or silk yarn, Jamdani fabric is embroidered or inlaid on the loom with silk, gold and silver threads. Over the years, the weavers simplified the designs making them more stylized and geometric. Handloom products have shown decisive upward trend in the export market since 1972 and Bangladeshi handloom products with their distinctive design and superior quality have created a niche for themselves in overseas markets (Asian Development Bank 2002).

Information about occupational health in the informal sector is lacking, despite this group being relatively large and growing. It is a vulnerable population at risk for long term disability due to a number of risk factors. Informal sector workers are at increased risk for musculoskeletal disorders due to poor working posture and conditions long work hours in static positions, a poor physical working environment, high levels of stress, and low levels of work satisfaction and support. As these studies show, many factors can increase these workers' risk of musculoskeletal disorders, including biomechanical, psychosocial and individual factors. Little is known about the efficacy of musculoskeletal disorder prevention strategies

among informal sector workers, despite the high incidence of such injuries. A comprehensive search of the literature found no review that systematically examined the effectiveness of interventions for reducing/preventing work injuries in the informal sector. The purpose of this systematic review was to investigate the effectiveness of interventions in reducing the incidence/ prevalence of musculoskeletal health problems and/or reducing risk factors among informal sector workers. The main question evaluated in this review was: "Which preventive interventions had an effect on reducing musculoskeletal disorders in the informal sectors? This review may be of benefit to health care personnel who are involved in the prevention of musculoskeletal health problems and to informal sector workers themselves. (Krungkraipetch, N. et al. 2012).

Edward Baines, in his book The History of the Cotton Manufacture (1935) he described, in 1738, Mr. John Kay, a native of Bury, in Lancashire, then residing at Colchester, where the woolen manufacture was at that time carried on, suggested a mode of throwing the shuttle, which enabled the weaver to make nearly twice as much cloth as he could make before. The old mode was, to throw the shuttle with the hand, which required a constant extension of the hands to each side of the warp. By the new plan, the lathe (in which the shuttle runs) was lengthened a foot at either end; and, by means of two strings attached to the opposite ends of the lathe, and both held by a peg in the weaver's hand, he, with a slight and sudden pluck, was able to give the proper impulse to the shuttle. The shuttle thus impelled was called the flying-shuttle, and the peg called the picking-peg (i.e. the throwing peg). This simple contrivance was a great saving of time and

exertion to the weaver, and enabled one man to weave the widest cloth, which had before required two persons. (Khan, AM. (2013).

Handloom weaving is one of the oldest industries in India, particularly in West Bengal, where approximately 400 000 people are engaged in this informal sector activity. On average, weavers are of a low socio-economic status and although they are occasionally eligible to receive government aid to purchase handloom and raw materials, this assistance is not sufficient to sustain long-term business. Moreover, many weavers do not own a handloom and instead, work for the weavers who do own weaving equipment. Inadequate salaries and lack of equipment result in people having to work long hours to meet basic food and housing needs.(Santu et al. 2014).

Bangladesh Handloom Board (BHB) was established in 1977 as a Statutory Public Sector Organization under the administrative control of the Ministry of Textiles and Jute. The Board has been entrusted with the responsibility for overall development of the handloom sector of the country and to make welfare of the people engaged therein historically handloom has got its predominance and heritages in Bangladesh. The tradition of weaving cloth by hand constitutes one of the richest aspects of Bangladesh culture and heritage. The level of artistry and intricacy achieved in handloom fabrics are unparallel and unique. The handloom can meet every need from exquisite fabrics of daily use. The industry has displayed innate resilience to withstand and adopt itself to the changing demand of modern times.

Handloom sector in Bangladesh consists of more than 0.183 million handloom units with 0.505 million handlooms and about 1 million handloom weavers of which about 50% are female worker. A manpower of about one million weavers, dyers, hand spinners, embroiderers and allied artisans have been using their creative skills into more than 0.30 million active looms to produce around 620 million meters of fabrics annually. Production of these handloom fabrics is diffused in numerous production centers all over the country which are linked up by a network of primary, secondary and central markets (Bangladesh Handloom Board 2012)

A manpower of about 1.5 million weavers, dyers, hand spinners, embroiderers and allied artisans have been using their creative skills into more than 0.30 million active looms to produce around 620 million meters of fabrics annually. It shares 63% of the total fabric production in the country designed for home consumption. Besides, it provides employment opportunities to a million rural people, 50% of which are female. Another half a million people are indirectly engaged in the industry. It contributes more than 10 billion taka annually to the national exchequer as value addition. (Source: Bangladesh Handloom Board). (Foysal 2012).

This sector is responsible for a very high percentage of the nation's economy, as Handloom industry is the biggest handicraft industry in our country *(Ahmed, 2001)*. Recently the production of handloom is decreasing and dependence on powered mills is just opposite. Here is a chart that represents the change from 1989-2004.
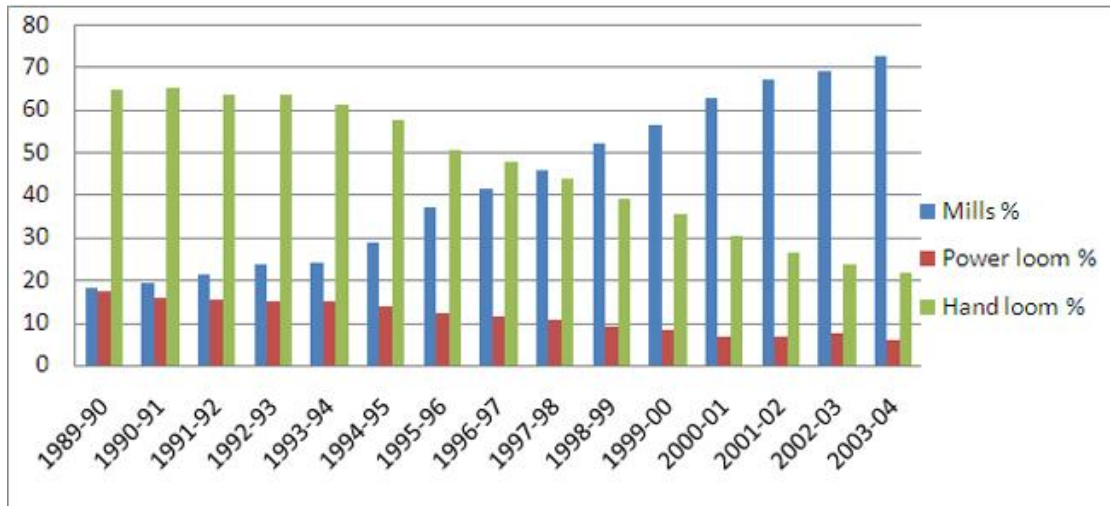
Long work hours and strenuous activities put weavers at risk for work-related musculoskeletal disorders (WMSDs), predominantly low back pain (LBP). WMSDs are a major health problem among workers in both industrialized and industrially developing countries. (Westgaard& Banerjee, 1997 & 2003). Previous reports suggest that Indian handloom weavers have a high prevalence of pain. (Pandit2013).

Studies in Iran with workers in the carpet weaving industry have found a high prevalence of musculoskeletal problems due to working postures, poor tool (loom) design, long hours, repetitive work, and seat type. (Choobineh, 2007).

Studies with other unorganized worker populations suggest that low back pain is a common problem in the informal sector. A study among brick and construction workers in West Bengal, India found that more than 80% of female workers complained of back pain. Moitra *et al.* found that in West Bengal, India among 120 male goldsmiths, 43.8% reported musculoskeletal disorder. Sahu and Sett reported that the percentage of WMSDs were high among male jute hacklers (i.e. the jute mill workers who sorted out the jute bundles) (92.5%) of West Bengal.(Moitra, 2011).

on with continuation of trauma or pressure on muscles, tendons, joints or bones in long run, due to repeated works without observing ergonomic principles. The most prominent example of them is different kinds of low back pain, which is almost a common disease with around 80% all people get inflicted with it at least once during their lifetime. According to the latest studies carried out in relation with disease burdens with risk factors in Iran in the year 2004, musculoskeletal disorders occupy the second position after cardiovascular diseases among the work related diseases (Health Programs Office of Network Development Center, Ministry of Health and Medical Education, 2007). Diseases like musculo-tendinous pressure or strain/degenerative changes, stiffness with rigidity of vertebral column in the morning, radiating pain from sciatic nerve, epicondylitis, carpal tunnel syndrome can be considered as musculoskeletal disorders caused by not observing the proper regulations of doing the job.2-4 In accordance with the report of World Health Organization in 2002, low back

ampaign against musculoskeletal disorders (as the silent epidemic)". (Aghili, et al. 2012)

The aim of this study was to evaluate the prevalence of LBP among handloom weavers in West Bengal, India. There is a dearth of knowledge regarding the postural strain of weavers in this region. With such a large number of rural workers involved in this profession, minimizing the occupational hazards through improved workplace ergonomics will increase work efficiency, production, and workers' quality of life.

Anjali et al. study found that about 88% males and 79% females in handloom reported work related MSDs. Co-morbidity among the workers was high and workers with elevated co-morbidity (pain in two or more regions) reported severe pain. Only 17% of the total workers reported MSDs in only one region, 33% in two regions, 35% in three regions and 15% in all the four regions. Males in both powerloom (OR 5.8) and handloom (OR 2.9) had greater loss of productivity in terms of loss of working days. The weavers had mixed responses about their perception to the cause of pain and discomfort and were generally indifferent to remedial measures. In handlooms females having age >25 yr (OR 2.9, p10 yr (OR 2.2, CI 1–5.6; p<0.05).
 (Anjali, NAG. 2010).

Power loom and handloom industries are the largest economic sector after agriculture, in India. Nearly 3.8 million handlooms provide employment to 6.5 million workers, who are engaged in producing natural fiber fabrics like cotton, silk and woolen, as well as man-made and mixed fiber fabrics. Besides, 4.75 million weavers work in 1.7 million power looms in the country. Females constitute 65% of the total workforce in rural and semi urban settings. Work-related musculoskeletal disorders (WMSDs) have emerged as major health problem among workers in both industrialized and industrially developing countries[1, 2]. Several work place factors, such as repetitive work, awkward and static postures, have been identified as being associated with upper extremity pain and discomfort[3–5]. Studies in Iranian hand woven carpet industry have reported high prevalence of musculoskeletal problem among weavers due to constraints of working postures, poor design of loom, working time, repetitive work and seat type[6, 7]. Physical and psychosocial load, poor climatic conditions, and vibrations have been identified as risk factors that contribute to developing MSDs

among agricultural workers8). In machine manufacturing plant9) and textile weavers10), high physical demands, poor postures and insufficient recovery time are the contributing factors to develop low back pain. In spite of apparently similar occupational pattern of work, gender differences do exist in the prevalence and severity of MSDs and perception of work as stressors. The present study focuses on identification of different dimensions of work stressors among the weavers in handloom and power loom and explores its association with the prevalence of MSDs among male and female weavers and existence of any gender difference.(Anjali NAG 2010).

Anjali Nag, H V yas and PK Nag (2009) did a study to identify the work stressors among male and female weavers in power loom and handloom industries and came to the conclusion that gender differences exist in the prevalence of work related musculocutaneous disorders and the perception of work and psycho-social stresses among the weavers. (Anjali Nag 2010).

Alireza Choobineh, Mostafa Hosseini, Mohammadali Lahmi , Reza Khani Jazani, Houshang Shahnavaz(2007), did a study on the musculoskeletal problems prevailing in the Iranian hand-woven carpet industry on 1439 randomly selected weavers and concluded that majority of ergonomics shortcomings originated from ill-designed weaving workstation and guidelines for an adjustable workstation was set up. (Alireza, 2007).

Alireza Choobineh, Houshang Shahnavaz, Mohammadali Lahmi (2004),did a study to identify an effective tool for ergonomic bottlenecks in weaving workshops and enlisted a checklist containing lighting, hand tools, working posture and thermal conditions after studying around 50 such stations. (Alireza Choobineh et al. 2004)

Treaster D, Burr D (2004), did a literature review on the current base to determine the strength of support for the hypothesis that women experience higher prevalences of upper extremity musculoskeletal disorders (UEMSDs) than men, for which 56 articles were reviewed and concluded that majority of the studies showed that women had significantly higher incidences of various types of UEMSDs than men. (Treaster D. 2004)

Tiwari R, Pathak M, Zodpey S (2003),did a cross sectional study on 514 textile workers by using an interviewer method as a tool and found out that working position and duration of exposure are significant factors in the prevalence on low back pain among the textile workers along with other factors.(Tiwari R. 2003)

Ohisson, K., Attewell, R. G., Pålsson, B., Karlsson, B., Balogh, I., Johnsson, B., Ahlm, A. Skerfving, S. (1995), did a cross-sectional study to assess physical examinations of the neck and upper limbs on 82 working female industrial workers with exposure to repetitive work tasks and on 64 working referent subjects without exposure to repetitive work tasks and found statistically significant association between repetitive work tasks and musculoskeletal injuries among the 82 working female population then compared to the 64 group (Ohlsson, K. 1995)

Chavalitsakulchai P, Shahnavaz H (1993), in their survey using interviews based on Standardized Nordic Questionnaires for evaluating musculoskeletal disorders of 1,000 female workers in five different industries in Thailand, viz. garment, fertilizer, pharmaceutical, textile, and cigarette found that about 50% of the female workers experienced a high prevalence of musculoskeletal symptoms in their lower backs, particularly the textile workers. (Chavalitsakulchai , P. 1993).

Bongers P, Winter C, Kompier M, Hildebrandt V (1993), did a study to find out the association between psychosocial work factors and musculoskeletal disease and concluded that monotonous work, high perceived work load, and time pressure are related to musculoskeletal symptom (Bongers, P. 1993).

Hopkins A (1990),did a   survey on repetition injuries among keyboard operators using the Insel and Moo Work Environment Scale and certain other job stress variables and came to the conclusions about the need to redesign jobs in order to reduce the risk of repetition injuries.(Hopkins, A. 1990).

Dempsey, Patrick G., Burdorf, Alex, Webster, Barbara S. did a study to find out the influence of Personal Variables on Work-Related Low-Back Disorders and concluded that age, gender, injury history, relative strength, smoking, and psychosocial variables have a very significant affect on work related low back disorders (Salik ,Y. 2004).

2.1 Prevalence of musculoskeletal disorder

Low back pain is the most prevalent musculoskeletal condition in developing nations did a systematic appraisal of 27 published prevalence studies conducted on the African continent. Sixty seven percent of these studies were methodologically sound and were analyzed. They found that the low back pain point prevalence in adults was 32%, while the one year prevalence was 50%, and the lifetime prevalence was 62%. Concluded that findings in the developing world support global findings and subsequent burden of low back pain (Louw, 2007).

Prevalence of MSDs among weavers but the back pain observed in the present study was much higher (76% among handloom women) than those reported studies. Forced

back bent sitting work posture due to positioning of loom; workspace constraints, high muscle exertion and repetitive movement of limbs to operate the looms might be attributed to high prevalence of MSDs among handloom weavers in the present study. High prevalence of back and knee pain among the female weavers in handloom (fixed work station) might be due to the fact that either they had to stretch their legs maximally or had to sit with minimal hip support in a constrained posture to operate the pedals. Non-adjustability of workstations of the looms had distinct constraints on workers due to anthropometrics and physiologic characteristics and contributed to the MSDs. Female reported higher incidences of back pain in comparison to males in this study and the same has been reported by other researchers. Though we did not study the non-work related social factors, the incidences of higher MSDs among women might possibly be due to the physiological demand to perform the household activities, including fetching of water from far off places, raring of cattle, taking care of the children and elderly at home. This reduces their physical recovery throughout the day. The study observed that long hours (>5 h) and long duration (>10 yr) of job involvement had positive impact on the occurrence of MSDs among women as observed in the previous study. Weaving activities involve repetitive work, causing strain on the musculoskeletal system increasing the likelihood of fatigue and decreasing the opportunity for tissue to recover leading to pain and discomfort. Standing for long hours influences centre of pressure points of the body and lumbar extensor muscle fatigue, suggesting that the occurrence of pain in knees among power loom male weavers might attribute to their standing work for long hours

 (Madigan, 2006)

Disorders of the musculoskeletal system are the single largest group of work related illness in the developed world (Punnett, 2004). The number of studies shows that musculoskeletal problems, diseases of the respiratory system and eye, accidents, injuries, skin diseases, stress, insomnia, etc. are all common among the garments workers. The ill health is compounded by various socioeconomic factors such as poverty, lack of education, poor working conditions, excess working hours, and poor diet. Work provides income and thus contributes to a better socioeconomic condition which, in turn, is related to good health. However, the work environment exposes many workers to health hazards that may result in injuries, respiratory diseases, cancers, musculoskeletal disorders, reproductive disorders, cardiovascular diseases, mental and neurological illnesses, eye damage, and hearing loss, as well as communicable diseases. Musculoskeletal problems were the commonest health problem detected in the study population. This may be explained by the fact that their work required them to remain in a bent position for many hours at a stretch, often in an overcrowded, ill-ventilated, and poorly illuminated room. The neck was the commonest anatomical area to be affected. Similar findings were reported by the Canadian Women's Health Network, with musculoskeletal disorders being the most common hazard in women engaged in sewing and the neck being the most commonly affected part, followed by the low back. From 1996 to 2000, the Union of Needle trades Industrial and Textile Employees created a union-based health program to provide more timely access to medical treatment for garment and textile workers in New York. Investigators at New School University Health Policy Research Center conducted a descriptive evaluation of the project. The evaluation also described the patient population, their work-related injuries and the impact of these injuries on income and their medical benefits. The union implemented the system in 1996.

According to the project director, since 1999 approximately 1,000 injured workers each year have received medical treatment for workplace injuries through the center or its participating outside providers. Carpal tunnel syndrome was the top diagnosis for both the garment workers and the computer users. Other common work-related conditions included forearm tendonitis, lateral epicondylitis (i.e., tennis elbow), neck tension and wrist/digit tendonitis. Though out the India, now consider a major power and is turning into a developed country from a developing country, a large section of its population still belong to the poorest of the poor (Workers, 2004).

The prevalence of musculoskeletal pain varies tremendously according to the exact wording of the question.26 27 in this study we were working towards estimating needs that might give rise to demand for healthcare and so we focused on pain that had lasted for at least one week. Using this definition we estimated that the one month period prevalence of back pain was 23%. A study in South Manchester, which used a definition of pain lasting for 24 hours or longer, estimated that the one month period prevalence was 39%. 8 Hillman et al found that, on a single day, the point prevalence of back pain was 19%.18 In terms of establishing the need for primary and secondary healthcare services for back pain what really matters is the severity of the pain, the disability associated with it, and the duration. The second phase of our study tackles these issues. (Michelle, 1998)

In developing countries, great efforts are directed towards the advancement of small-scale industries as these are considered the engine for their economic growth. According to WHO, over 1000 million people worldwide are employed in small-scale industries (WHO 2014).Workers with high physical work demands are well

documented to be at elevated risk for impaired work ability, musculoskeletal disorders, cardiovascular disease, all-cause mortality, long term sickness absence and early retirement from the labour market. Specifically, prolonged standing, highly repetitive work, heavy lifting, working with the hands lifted to shoulder height or higher, and working with the back twisted or bent forward are physical exposures, that have been shown to predict impaired work ability, musculoskeletal disorders and enhance long term sickness absence. Therefore, workers in job groups exposed to these physical factors at work are at particular need for health promoting initiatives for preserving or improving their work ability (Holtermann, 2012).

The prevalence of musculoskeletal problems amongst these Sri Lankan garment workers was quite low, with just a handful of sewing machine operators reporting upper extremity or neck pain. This is surprising as the garment industry typically carries one of the highest rates of neck and shoulder pain relative to other manufacturing fields. Stress at work is a growing problem for all workers, especially women. Many of the job conditions, along with the problem of balancing work and family issues, contribute to stress in the workplace (Nusrat, 2015).

United States Bone and Joint Decade found that a large annual health care survey is conducted in the United States by the National Center for Health Statistics for the purpose of identifying the incidence and prevalence of select health conditions. Pain from any muscle, joint, or bone (musculoskeletal pain) was reported by 52.1% of persons aged 18 years and older in 2012. Low back pain was the most common, affecting 28.6%; neck pain was the third most common at 15.2%. (Knee pain was second at 18.1%.) The prevalence of back pain has remained stable since 2005, and is

measured in response to the question of whether the individual "had low back pain or neck pain during the past three months." Females report musculoskeletal pain more frequently than males (54.6% vs. 49.5%). The prevalence of low back pain and neck pain is highest for person's age 45 to 64 years, while overall, joint paint is highest among persons age 65 years and older, where 7 in 10 report joint pain. (US 2008).

About 1 in 13 persons (7.5%) in the population age 18 or older report they have a physical, mental, or emotional problem or illness that precludes work. Among these persons, 27%, or nearly 4 of the 13, are unable to work due to chronic back or neck problems. Another 1 out of 25 persons is limited in the type and duration of work they can do because of back and neck pain. Three in four persons with pain in multiple areas of the back and neck report work limitations (US 2008).

Great Britain, 2015 study found that An estimated 9,466,000 working days were lost due to WRMSDs, an average of 17.1 days lost for each case. However, whilst the number of days lost is significantly lower than days lost in 2001/02, there has been no significant change over the last five years. WRMSDs represent 40% of all days lost due to work related ill health in Great Britain in 2014/15. Within the total number of 9,466,000 days lost due to WRMSDs, WRULDs account for around 43% of days lost at 4,112,000, with back disorders around 31% of days lost at 2,857,000 days and WRLLDs 25% at 2,396,000 days. (Great Britain, 2015).

2.2 Heavy physical duty: lifting

During strenuous repetitive mechanical work, structures associated with the vertebral column are placed under tension. According to the Panel of Musculoskeletal Disorders

and the, the biomechanical load tolerance model of musculoskeletal disorders manifests as a result of an imbalance between load and tolerance. They described "load" as physical stresses imposed on the anatomical structures of the body, for example kinetic (motion), kinematic (force), oscillatory (vibration) or thermal energy sources and "tolerance" is described as the capacity of the body to endure load through physical and physiological responses. An imbalance between load and tolerance caused by heavy physical duty may cause degenerative disc changes which may be the primary cause of non specific low back pain. Lifting of more than 10kg was reported as a risk factor for low back pain in both males and females. Heavy, frequent physical work and repeated rotation of the trunk were also associated with low back pain did a systematic review in order to assess aspects of physical load during work and leisure time as risk factors of low back pain and found that handling manual materials, bending and twisting were notable risk factors. Similarly, reviewed literature on work-related back disorders and found that lifting or carrying loads and frequent bending and twisting was consistently associated with low back pain. Linked to that was also the finding that lifting loads of any weight increases the risk of sick leave due to low back pain. A significant positive association between duration of sick leave due to low back pain and heavy work was established (Burdorf, A. 1997).

2.3 The Effect of Co-Morbid Diseases on Low Back Pain

Co-morbid diseases have been associated with low back pain Prevalence estimates for low back pain in patients with diabetes ranged from 4,8% to 5,1%. A psoas abscess is a common occurrence in patients with diabetes mainly as a result of secondary infections following staphylococcal colonization. A patient with a psoas abscess, usually present with fever, hip or back pain. A psoas abscess is just one cause of low back pain in

patients with diabetes. Spinal 21 epidural abscesses are also associated with diabetes. One of the symptoms of spinal epidural abscesses is localized back pain found that the range of prevalence estimates of low back pain for patients with hypertension varied between 17,6% and 24,4%. Possible causes of low back pain associated with hypertension may be disc degeneration as a result of altered blood circulation due to vascular constriction, carboxy hemoglobin generation, atheroma formation and cellulose dissolution problems also established that 4,4% of patients with low back pain suffered from rheumatoid arthritis. Rheumatoid arthritis may cause pain in various joints, including the lower back. Diabetes, hypertension and arthritis are co-morbid diseases which affect a person's general health. Other co-morbidities not discussed above may also play a role in the development of low back pain (Stewart et al., 1989). Each of these diseases influences the lower back by means of different causal mechanisms. (Ritzwoller DP. et al. 2006).

Diagnosis: Low back pain can be related to a herniated disc, nerve root irritation, annular tear, facet joint arthritis, muscle spasm, injuries to the ligament, sacroiliac joint arthritis and referred pain from visceral organs. An MRI finding of a herniated disc, no matter how large, is not enough to justify surgery. A thorough history and physical examination is tantamount to judge whether the herniated disc is the real source for the ongoing pain (Ragab A. 2008).

Medications: Non-steroid anti-inflammatory medications should be offered as the first line medication to patients with mild back pain. Early administration of oral steroid medication in patients with acute sciatica may lead to slightly more rapid improvement in pain, mental well-being, and disability scores. Anti-depressants,

especially tricyclic antidepressants, are often used to treat patients with chronic back pain. (Mullin WJ et al. 2000).

Physical therapy, massage therapy and chiropractic management have been widely used for treatment of back pain and lumbar radicular pain, even though the value of these treatment modalities have yet to be proven.

Spine injections: Multiple double blind, clinical controlled studies have confirmed the clinical efficacy of lumbar epidural steroid injection (LESI) in relieving the acute radicular pain due to herniated nucleus pulposus, speeding the rate of recovery and return to function. The pain relieving effect of LESI may last up to three months. Inflammatory mediators, such as phospholipase A2, have been implicated in lumbar radiculopathy and disc herniation and have been the focus of recent research. Lumbar epidural steroid injections can decrease pain by suppressing the function of inflammatory mediators. As long as the patient is pain free and is without any neurological deficits, a herniated disc should not be a clinical concern. Even though LESI alone may not decrease the necessity of back surgery, it will be intriguing to investigate whether a combination of LESI and other treatment such as physical therapy and life style modification will decrease the need for surgery (Sethee J, 2009).

Minimally invasive surgery: Minimally invasive surgery offers another alternative in the treatment of back pain. These treatments include chymopapaine, percutaneous nucleotome, automated percutaneous lumbar discectomy, laser discectomy, neucleoplasty and disc deKompressor. The advantage of the minimally invasive techniques is that it leaves no or minimal scar after the surgery. Among the minimal invasive techniques, laser discectomy has a reported success rate of 80% to 90%. Neucleoplasty and disc deKompressor have been recently introduced with early non-

controlled studies showing success rates up to 78%. These procedures are still not widely accepted and more studies are needed to confirm their clinical efficacy

(Al-Zain F, et al. 2008).

Life style modification: Low back pain can often be the result of improper lifestyle choices. Smoking can increase the risk of low back pain[12]. Obesity can worsen back pain and contribute to disk degeneration. Heavy lifting, sport related injuries and motor vehicle accidents can cause back pain. Education to patients with low back pain is critical to help them recover from back pain and prevent future back pain. Smoking cessation and weight control should be strongly recommended to back pain patients. Proper exercise techniques should be taught. Patients, especially those with spinal stenosis often have difficulty walking due to neurological claudication. Treadmills and long distance walking exercise may exacerbate back pain. Some studies suggested therapeutic aquatic exercise is potentially beneficial to patients suffering from chronic low back pain (Waller B, et al. 2009).

2.4 Risk factors for developing musculoskeletal disorder

Beyond underlying diseases, certain other risk factors may elevate one's risk for musculoskeletal disorder, including:

Age: The first attack of musculoskeletal disorder typically occurs between the ages of 30 and 50, and back pain becomes more common with advancing age. As people grow older, loss of bone strength from osteoporosis can lead to fractures, and at the same time, muscle elasticity and tone decrease. The intervertebral discs begin to lose fluid and flexibility with age, which decreases their ability to cushion the vertebrae. The risk of spinal stenosis also increases with age.

Fitness level: Back pain is more common among people who are not physically fit. Weak back and abdominal muscles may not properly support the spine. "Weekend warriors"—people who go out and exercise a lot after being inactive all week—are more likely to suffer painful back injuries than people who make moderate physical activity a daily habit. Studies show that low-impact aerobic exercise is beneficial for the maintaining the integrity of intervertebral discs.

Pregnancy is commonly accompanied by musculoskeletal disorder, which results from pelvic changes and alterations in weight loading. Back symptoms almost always resolve postpartum.

Weight gain: Being overweight, obese, or quickly gaining significant amounts of weight can put stress on the back and lead to musculoskeletal disorder.

Genetics: Some causes of back pain, such as ankylosing spondylitis, a form of arthritis that involves fusion of the spinal joints leading to some immobility of the spine, have a genetic component.

Occupational risk factors: Having a job that requires heavy lifting, pushing, or pulling, particularly when it involves twisting or vibrating the spine, can lead to injury and back pain. An inactive job or a desk job may also lead to or contribute to pain, especially if you have poor posture or sit all day in a chair with inadequate back support.

Mental health factors: Pre-existing mental health issues such as anxiety and depression can influence how closely one focuses on their pain as well as their perception of its severity. Pain that becomes chronic also can contribute to the

development of such psychological factors. Stress can affect the body in numerous ways, including causing muscle tension.

Backpack overload in children: Musculoskeletal disorder unrelated to injury or other known cause is unusual in pre-teen children. However, a backpack overloaded with schoolbooks and supplies can strain the back and cause muscle fatigue. The American Academy of Orthopaedic Surgeons recommends that a child's backpack should weigh no more than 15 to 20 percent of the child's body weight.

Recurring back pain resulting from improper body mechanics is often preventable by avoiding movements that jolt or strain the back, maintaining correct posture, and lifting objects properly. Many work-related injuries are caused or aggravated by stressors such as heavy lifting, contact stress (repeated or constant contact between soft body tissue and a hard or sharp object), vibration, repetitive motion, and awkward posture. Using ergonomically designed furniture and equipment to protect the body from injury at home and in the workplace may reduce the risk of back injury (BRAIN, 2015)

CHAPTER-III

3. Methodology

3.1 Study design: This was a descriptive of cross sectional study.

3.2 Place of study: Purposive and random sampling was used to select the study area and sample size of 230 respondents from Belchuchi upazilla, Sirajongj. Most of the male workers were from the 18-60 years of age and they were performing the hand-loom weaving operation more than 10 hours per day which is not permissible. There are 14849 listed (approximate) hand loom factory, total number of hand loom 129242, number of operational 104795 and non- operational 25247; Total number of hand loom workers are 208156 in Sirajgonj district. (According to district statistic of sirajgonj-2011)

Sirajganj district was formerly a sub-division of Pabna district. During the reign of Nawab Alivardi Khan, Sirajganj became the commercial centre of Bengal. He flourished this commercial centre further for steady supply of papers to different parts of the country by transferring a group of highly skilled people in making hand-made papers (generally known as Tulat kagas) from central Asia to this place. He also gave the name of this place as Sirajganj after the name of his beloved Grandson Sirajuddowla, the last independent Nawab of Bengal. Sirajganj is surrounded on the north by Bogra district, on the east by Tangail and Manikganj districts, on the south by Manikganj and Pabna districts and on the west by Natore and Bogra districts. It lies between 24º01' and 24º47' north latitudes and between 89º15' and the area of the town is 28.49 sq km. As a jute-trading centre once it was considered next to Calcutta and Narayanganj. The total area of the district is 2,402.05 sq. km.

3.3 Study period: The study was done within the time period of June 2015 to May 2016.

3.4 Study population: Total male workers of 4 selected hand looms factory are 1687. Among them 230 male workers are taken as sample for this study.

3.5 Eligibility criteria

Inclusion criteria: Those who were male hand loom workers that is those who get wage on monthly basis.

- Loom worker whose have no assistant for help in their work place
- At least 1 year services as a loom worker

Exclusion criteria:

- Female worker
- Loom worker suffering from serious pathological disease e.g. tumors, Tuberculosis etc.
- Any history of surgery.
- Less than 1 year experienced

3.6 Sample size: Sample size was thought to be taken as per formula prior to the study-

$$n = \frac{z^2 pq}{d^2} = \frac{(1.96)^2 \times (0.5)(0.5)}{(0.05)^2} = 384.16 = 384$$

n= the desired sample size (eventual sample size).

z= 1.96 which corresponds to the 95% confidence level.

p= proportion of the target population estimated 50%, q=(1-p).

d= degree of accuracy set at 5%= 0.05.

But due to limitation of time and unavailability of the responded, the feasible sample size was 230.

3.7 Sampling technique: 4 hand loom factory was selected randomly by using lottery. Total 230 male workers are randomly selected, which was taken from 1687 male workers out of four factories. Data were collected by using parts of a standardized CUPID (Cultural and Psychosocial Influences on Disability) questionnaire focused on MSP in 10 body sites, including the low-back, neck, right and left shoulders, elbows, wrists/hands, individual, physical and psychosocial risk factors.

3.8 Data collection instrument: According to the study objectives, all variables were listed and appropriate scales of measurements were determined. In the study for maximum output, semi structured questionnaire was developed and applied for data collection. The questionnaire was pre tested among similar group of people. Several consultations were made with other faculty members those who have skilled in their field with the developed questionnaire.

3.9 Data collection technique: The purpose of the study was explained to the selected respondents. Then data were collected by face to face interview by researcher herself and the responses were written in questionnaire accordingly. One questionnaire was used for each respondent.

A range of 10-15 respondents were interviewed each day within 20 days and each interview required around 25 to 40 minutes including rapport building with the respondents.

Pre test: Data collection instrument was pre tested in two different sites other than my study area having the similar socio demographic characteristics.

Pre test was done among 10 respondents. After pre test some changes were made of the instrument for its validity and its reliability. Change in the language and irrelevant wording were done after consultation with the respected guide.

3.10 Data collection plan: A different work plan was done regarding data collection.

- Permission for collection of data taken.
- Setting necessary time for data collection.
- Data collection.
- Data handling.

All possible measures have been taken to maintain good quality of data. To avoid the chance of missing and inconsistency after collection of data every day, were checked and kept in the sequences in which those have been numbered.

3.11 Data analysis plan: At the end of data collection through semi structured interview questionnaires were edited, coded and checked finally for any inconsistency with full attention and sincere efforts. Four point pain index scale (0=No pain, 1=Mild pain, 2=Moderate pain, 3=Severe pain) was

used for the measurement of pain and oxford muscle grading technique was used for the detection of muscle weakness.

The data were entered into a personal computer using the programmed SPSS, version 20 entered data were cleaned, edited and appropriate statistical test were done depending on the distribution of the data.

Prevalence percentage for musculoskeletal pain and the odd ratios of the test measures were obtained.

CHAPTER-IV

4. Results

A cross-sectional study was conducted among 230 hand loom workers were enrolled in this study. The objectives of the study was to prevalence of musculoskeletal disorder among male hand loom workers, determine the demographic characteristics of the workers related to musculoskeletal pain. Data were analyzed with the help of SPSS+PC software and the results obtained were as follows.

Table-1. Distribution of respondents by socio-demographic characteristics

N=230

Variables	Frequency	Percent
Age (in years)		
≤20 years	26	11.3
21-30 years	64	27.8
31-40	72	31.3
41-50 years	36	15.7
>50 years	32	13.9
Mean = 35.73; (SD=±11.602)		
Marital status		
Unmarried	30	13.0
Married	196	85.2
Divorced male	2	0.9
Separated	1	0.4
Others	1	0.4

Educational level		
Illiterate	18	7.8
Only can sign	68	29.6
Primary level	100	43.5
Secondary level	44	19.1

Monthly family income		
Taka ≤6000	50	21.7
Taka 6001-8000	42	18.3
Taka 8001-10000	87	37.8
Taka 10001-12000	33	14.3
Taka >12000	18	7.8
Mean =9023.91;(SD=±2792.675)		

Socio-demographic Characteristics of the respondents

Table-1 shown that the mean age of the respondents was 35.73; (SD=±11.602) years. More than one third (31.3%) respondents were age from 31-40 years followed by 11.3% were age group ≤20 years, 27.8% age group 21-30 years, 15.7% were 41-50 and 13.9% in the age group 50 years & above. Among the interviewed respondents, 85.2% were married and 13.0% were unmarried. Considering the level of education, more than one third respondents (37.4%) were belong to illiterate & only can sign according to 43.5% were primary level and 19.1% were secondary level. The mean of monthly family income was taka 9023.91 ;(SD=±2792.675). Maximum 37.8% respondents had monthly family income Taka 8001-10000 followed by 21.7% had Taka ≤6000, 18.3% had Taka 6001-8000 and 22.1% had Taka 10001-12000 or above respectively.

Table-2. Distribution of respondents by working hours, duration of job, spend sitting and standing

N=230

Variables	Frequency	Percent
Working hours 8-10 hours	37	16.1
11-12 hours	54	23.5
13-14 hours	74	32.2
15-16 hours	65	28.3
Mean =13.05; (SD=± 2.040)		
Duration of job year		
1-5year	25	10.9
6-10 year	48	20.9
11-15 year	55	23.9
16-20 year	36	15.7
21-25 year	29	12.6
>25 year	37	16.1
Mean =17.03; (SD=± 10.167)		
Spend sitting (in hours)		
7-8 hours	141	61.3
9-10 hours	89	38.7
Mean =2.74; (SD=± 2.62)		
Spend standing		
No standing	24	10.4
1 hour	180	78.3
2 hours	26	11.3
Mean =5.00; (SD=± 2.784)		

As the table-2 shows more than one third (32.2%) respondents were 13-14 hours their working in place according to 23.5% were 11-12 hours, 28.3% were 15-16 hours. The mean working hours was Mean =13.05; (SD=± 2.040). Duration of job 10.9% this work for 1-5 years according to 20.9 were 6-10 years remaining 23.9% were 11-15 years, 15.7%, 12.6% were 16-25 years and 16.1% were >25 years. The risk of developing musculoskeletal disorder pain was most of 61.3% respondents were 7-8 hours and 38.7% were >8 hours by daily time spending sitting at work. Most of similar percentage by standing. More than two third (78.3%) respondents were one hours by daily time spending standing at work.

Figure-1 Distribution of respondents by heavy physical duty (lifting)
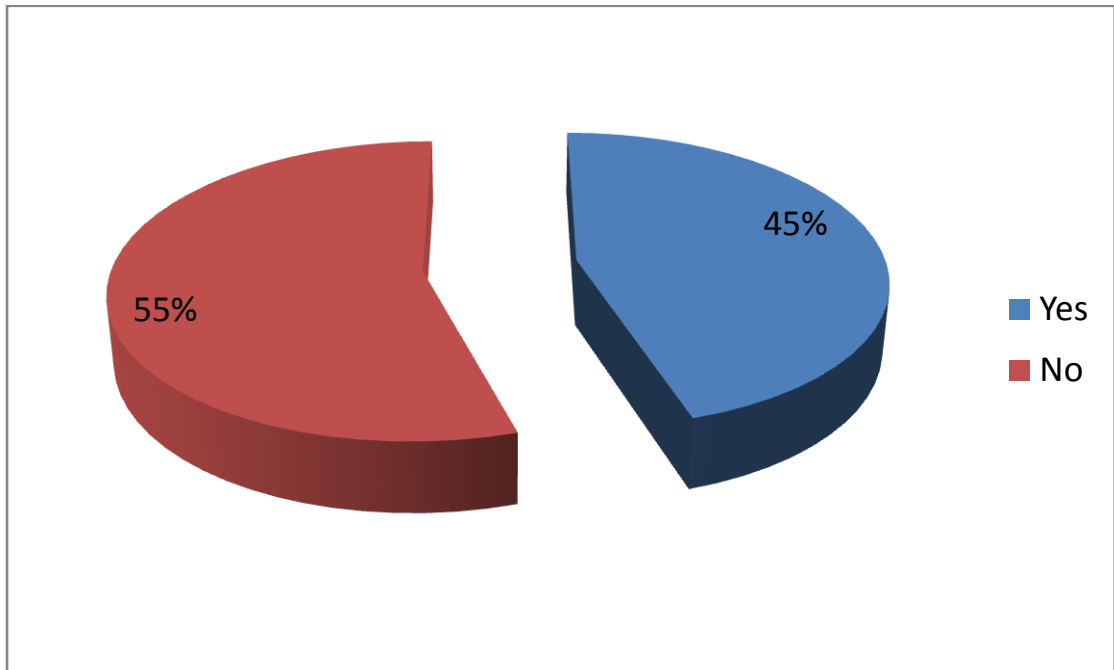
Its regards 45% respondents by heavy physical duty (lifting)

Figure-2. Distribution of the respondents by physical stress at work
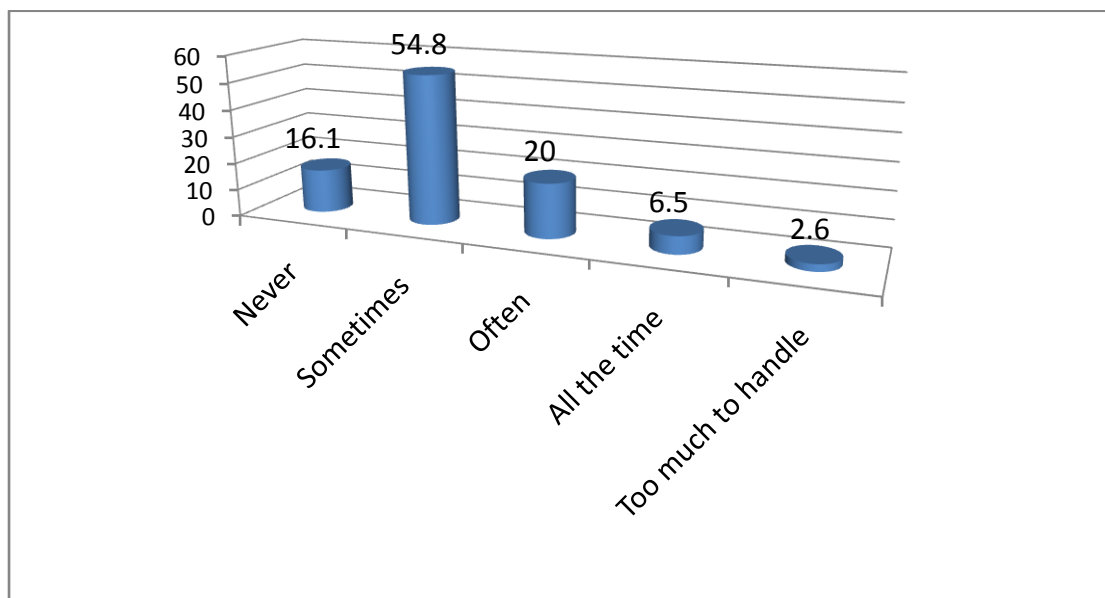
The risk of developing musculoskeletal disorder pain was 83.9% times with the increase in amount of perceived stress. Those who never stress (16.1%) participate in group respectively.

Table-3. Distribution of the respondents by suffering from diabetes, hypertension and arthritis

Variables	Frequency	Percent
Diabetes	11	4.8
Hypertension	28	12.2
Arthritis	76	33.0

From the table shows that little percentage (4.8%) had suffered from diabetes, 12.2% had suffered from hypertension and 33% had from arthritis.

Table-4. Distribution of respondents by suffering from common co-morbidities

N=230

Suffering from any co-morbidity	Frequency	Percent
No problem	32	12.8
Dermatitis	8	3.2
Hearing problem	18	7.2
Skin allergies	40	16.0
Dysentery	22	8.8
Pain in abdomen	14	5.6
Common cold	37	14.8
Fever	42	16.8
Nausea and vomiting	13	5.2
Anemia	24	9.6
Total	250	100.0

Multiple responses

Above the table shows 12.8% respondents were no suffering from common co-morbidities. Among them 16% was suffering skin allergies, 7.2% hearing problem 14.8% were common cold and 16.8% were fever. Maximum respondents were multiple responses others co-morbidities.

Table-5. Distribution of respondents by suffering from any neurological disorder

N=230

Variables	Frequency	Percent
Sensory (3)		
Temperature	3	1.3
Motor (62)		
Walking	43	69.4
Gripping	10	16.1
Functional activities	6	9.7
Walking 2	3	4.8
Radiating pain sensory (84)		
Upper extremity	17	20.3
Lower extremity	67	79.8

Regarding the table shows that by suffering from any neurological disorder. Among them few percentages 1.3% were sensory (temperature). Out of the 62 respondents neurological disorder motor. Among them 69.4% were walking and 16.1% were gripping. Remaining that 20.3% were radiating pain sensory upper extremity 79.8% were lower extremity respectively.

Table-6. Distribution of respondents by during the last 12 months number of sick

Last 12 months number of sick	Frequency	Percent
0 day	92	40.0
1-6 days	78	33.9
7-12 days	28	12.2
12 or more than 12 days	32	13.9
Total	230	100.0

From table shows majority of 40% respondents were no sick, 33.9% respondents number days 1-6 days in last 12 months, 12.2% sick in 7-12 days and 13.9% were sick more than 12 days.

Figure-3. Distribution of respondents by experienced musculoskeletal disorder
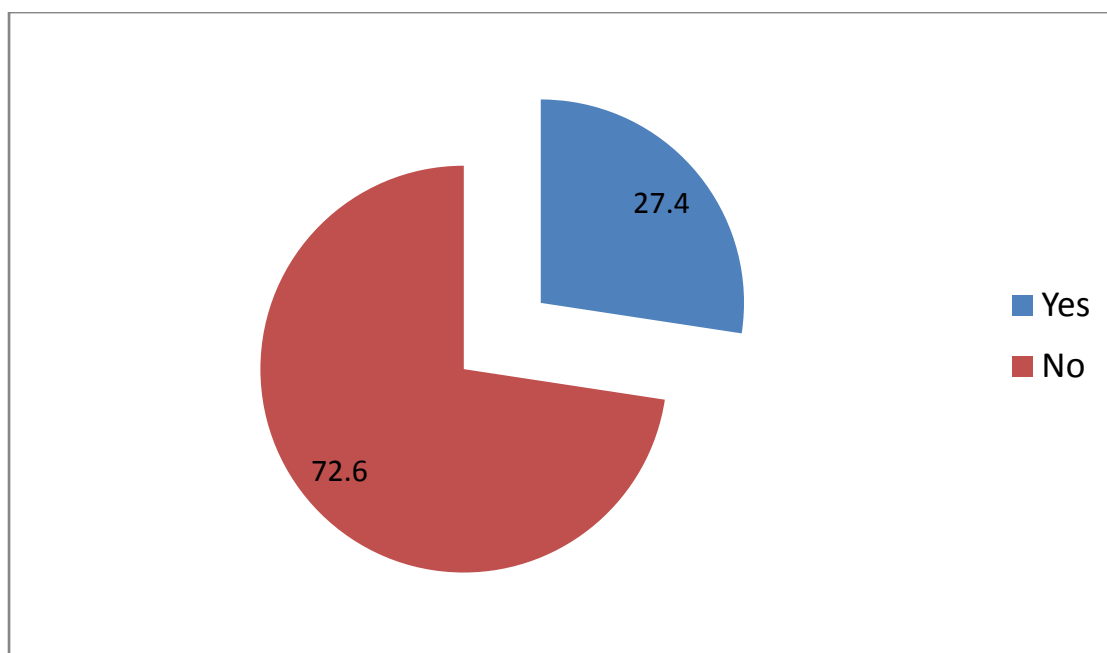
Figure shows that out of 230 respondents, 27.4% had the musculoskeletal disorder pain and the rest 72.6% had not. The musculoskeletal disorder pain prevalence was 27.4%.

Figure-4. Distribution of respondents by pattern of musculoskeletal disorder
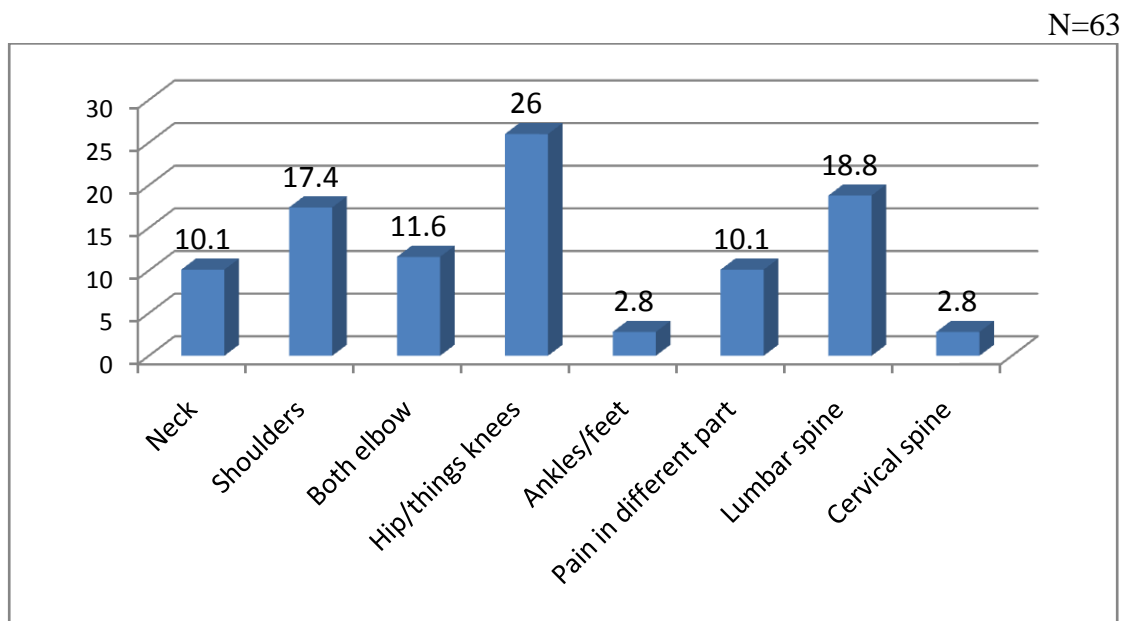
Considering the pain in different parts of the body, 26% had complaints of pain in the hip/things knees followed by neck pain (10.1%), shoulders pain (17.4%), wrist pain both elbow(11.6%), lumbar spine (18.8%).

Table-7. Distribution of respondents by pattern of musculoskeletal disorder

N=63

Pain in body parts	%	Nature of complaints	%	Severity of complaints	%
Neck (n=7)	10.1	Temporary	42.9	Mild	32.4
		Continuous	31.4	Moderate	41.2
		On movement	25.7	Severe	26.5
Shoulders (n=12)	17.4	Temporary	22.2	Mild	20.0
		Continuous	44.4	Moderate	40.0
		On movement	33.3	Severe	40.0
Ankles/feet (n=2)	2.8	Temporary	30.0	Mild	32.4
		Continuous	40.0	Moderate	31.0
		On movement	30.0	Severe	55.2
Pain in different part (n=7)	10.1	Temporary	38.9	Mild	13.8
		Continuous	27.8	Moderate	27.8
		On movement	33.3	Severe	50.0
Lumbar spine (n=13)	18.8	Temporary	39.8	Mild	12.9
		Continuous	46.2	Moderate	55.9
		On movement	14.0	Severe	31.2
Cervical spine (n=2)	2.8	Temporary	11.5	Mild	16.0
		Continuous	42.3	Moderate	40.0
		On movement	46.2	Severe	44.0

Regarding the table shows that pattern of musculoskeletal disorder neck pain majority of 42.9% had suffered from temporary 41.2% were continuous according to shoulders, ankles, lumbar spine, cervical spine had Nature of complaints maximum continuous and Severity of complaints on movement.

Table-8. Distribution of the respondents by received treatment for musculoskeletal disorder pain

N=230

Received treatment	Frequency	Percent
Physicians	8	3.5
Pain medication	21	9.6
Pharmacist	10	4.3
Not treatment	170	73.9
Others	2	.9
Physicians and Pain medication	18	7.8
Total	230	100.0

Out of 230 hand loom worker among them majority of 73.9% had no received treatment only 26.1% had received treatment their muscular.

Table-9. Distribution of the respondents by causes of not received treatment (n=170)

No received treatment	Frequency	Percent
Distance from health facilities	5	2.9
Expenditure for treatment	7	4.1
Lack of money	144	84.7
Service not satisfactory	2	1.2
Refusal of decision maker of family	11	6.5
Others	1	0.6
Total	170	100.0

Most of the respondents 84.7% had no received treatment because they have lack of money according to similarly 4.1% causes of expenditure for treatment and the few percentage 6.5% causes of refused of decision maker of family.

Table-10. Distribution of the respondents by experienced musculoskeletal disorder in the past

Experienced in past	Frequency	Percent
Yes	55	23.9
No	175	76.1
Total	230	100.0

From the table shows that only 23.9% experienced musculoskeletal disorder in the past and large number 76.1% were no experienced musculoskeletal disorder in the past.

Table-11. Distribution of the respondents by duration of affected musculoskeletal disorder

Duration of affected	Frequency	Percent
1-5 years	11	20.0
6-10 years	16	29.1
11-15 years	16	29.1
16-20 years	5	9.1
> 20 years	7	12.7
Total	55	100.0

Above the table shows that the similar percentage 29.1% duration of affected 6-10 & 11-15 years followed by 20% were suffering from 1-5 years and 12.7% had suffered more than twenty years.

Table-12. Distribution of respondents by height

Height	Frequency	Percent
≤ 5 ft	61	26.5
5.1-5.5 ft	132	57.4
>5.5 ft	37	16.1
Total	230	100.0

Most of the respondents (57.1%) were belong to 5.1-5.5 ft height, 26.5% were belong to ≤ 5 ft and only 16.1% were >5.5 ft height respectively.

Table-13. Distribution of respondents by weight

Weight	Frequency	Percent
≤ 45 kg	23	10.0
46-50 kg	66	28.7
51-55 kg	52	22.6
56-60 kg	58	25.2
>60 kg	31	13.5
Total	230	100.0

Above the table shows 10% respondents were ≤ 45 kg, according to 28.7% were belong to 46-50 kg, 22.6% were 51-55, 25.2, 13.5% were 56-60 kg and >60 kg respectively.

Table-14. Distribution of respondents by BMI

BMI	Frequency	Percent
≤18.5	22	9.6
18.5-24.9	195	84.8
≥ 25	13	5.7
Total	230	100.0

This table shows that majority of 84.8% respondents BMI were 18.5-24.9 followed by 9.6% respondents were ≤18.5 BMI and the rest of 5.7% respondents ≥ 25 BMI.

Table-15. Relationship between age of respondents with musculoskeletal disorder

Age group	Musculoskeletal disorder				Total(%)	Odds Ratio(OR)	χ2	P-value
	Yes		No					
	No.	%	No.	%				
≤ 30 years	17	18.9	73	81.1	90(100.0)			
> 30 years	46	32.9	94	67.1	140(100.0)	0.47	5.374	0.02
Total	63	27.4	167	72.6	230(100.0)			

From the table shows that relationship between age of respondents with musculoskeletal disorder most 32.9% respondents were musculoskeletal disorder >30 years, 18.9% respondents were no musculoskeletal disorder ≤ 30 years. Whereas 81.1% respondents were no musculoskeletal disorder ≤ 30 respectively. The findings are statistically significant χ2 = 5.374; P-value = 0.02).

Table-16. Relationship between marital statuses with musculoskeletal disorder

Marital status	Musculoskeletal disorder				Total(%)	Odds Ratio(OR)	χ2	P-value
	Yes		No					
	No.	%	No.	%				
Unmarried	7	23.3	23	76.7	30(100.0)			
Married	56	28.0	144	72.0	200(100.0)	0.78	0.286	0.59
Total	63	27.4	167	72.6	230(100.0)			

The relationship marital status with musculoskeletal disorder pain. Among them majority of 76.7% respondents unmarried and no developing musculoskeletal disorder other hand 28% respondents were married and musculoskeletal disorder pain. The risk of developing musculoskeletal disorder was 0.78. The findings are statistically not significant χ2 = .286; P-value = 0.59).

Table-17. Relationship between duration of job with musculoskeletal disorder

| Duration of job | Musculoskeletal disorder | | | | Total(%) | Odds Ratio(OR) | χ2 | P-value |
| | Yes | | No | | | | | |
	No.	%	No.	%				
≤ 10 years	11	15.1	62	84.9	73(100.0)			
> 10 years	52	33.1	105	66.9	157(100.0)	0.358	8.165	0.004
Total	63	27.4	167	72.6	230(100.0)			

The relationship between duration of job and participants with musculoskeletal disorder pain. Among them majority of 84.9% respondents were no pain duration of job ≤10 years. The risk of developing musculoskeletal pain was 0.358. The findings are statistically highly significant χ2 = 8.165; P-value = 0.004).

Table-18. Relationship between duration of job with musculoskeletal disorder

| Duration of working hours | Musculoskeletal disorder | | | | Total(%) | Odds Ratio(OR) | χ2 | P-value |
| | Yes | | No | | | | | |
	No.	%	No.	%				
≤ 8 hours	3	50.0	3	50.0	6(100.0)			
> 8 hours	60	26.8	164	73.2	224(100.0)	2.73	1.58	0.20
Total	63	27.4	167	72.6	230(100.0)			

The relationship between duration of working hours spent and participants with low musculoskeletal disorder pain. Among them majority of 73.2% respondents more than 8 hours spent working hours. The risk of developing musculoskeletal disorder pain was 2.73.

Table-19. Relationship between hours spent sitting and participants with

musculoskeletal disorder

Sitting in hours	Musculoskeletal disorder				Total (%)	Odds Ratio(OR)	χ2	P-value
	Yes		No					
	No.	%	No.	%				
≤ 8 hours	21	14.9	120	85.1	141(100.0)			
> 8 hours	42	47.2	47	52.8	89(100.0)	0.19	28.61	0.000
Total	63	27.4	167	72.6	230(100.0)			

The relationship between hours spent sitting and participants with and without musculoskeletal disorder pain. Among them majority of 85.1% respondents spent sitting 8 hours or less than eight hours. The risk of developing low back pain was 0.19The findings are statistically highly significant $\chi2 = 28.61$; P-value = 0.001).

Table-20. Relationship between hours lifting and participants with and musculoskeletal disorder

Lifting	Musculoskeletal disorder				Total(%)	Odds Ratio (OR)	χ2	P-value
	Yes		No					
	No.	%	No.	%				
Yes	35	33.7	69	66.3	104(100.0)			
No	28	22.2	98	77.8	126(100.0)	1.77	3.744	0.05
Total	63	27.4	167	72.6	230(100.0)			

Musculoskeletal disorder pain in respondents who lifted objects that table shows the majority of participants (66.3%) lifted objects or people in the performance of their occupational activities. The risk of developing low back pain was 1.77. The findings are statistically significant $\chi2 = 3.744$; P-value = 0.05).

Table-21. Relationship between perceived stress at work and musculoskeletal disorder

Perceived work stress	Musculoskeletal disorder				Total(%)	χ2	P-value
	Yes		No				
	No.	%	No.	%			
Never	10	27.0	27	73.0	37(100.0)		
Sometimes	29	23.0	97	77.0	126(100.0)		
Often	20	43.5	11	73.3	46(100.0)	9.468	0.05
All the time	4	19.0	17	81.0	21(100.0)		
Total	63	27.4	167	72.6	230(100.0)		

The relationship between perceived stress at work and musculoskeletal disorder pain. Few participants (27%) never experienced stress while 81% participants who experienced stress all the time had musculoskeletal disorder pain perceived stress at work was found to be significantly associated with the presence of musculoskeletal disorder pain (p=0.05).

CHAPTER-V

5. Discussion

The cross-sectional study is done in from Belchuchi upazilla, Sirajongj. The study population is the male handloom workers were from the 18-60 years of age and they were performing the hand-loom weaving operation more than 10 hours per day which is not permissible. The objectives of the study are to find out to the prevalence of musculoskeletal disorder among the loom worker in a selected weaving factory at Belchuchi, Sirajgonj, Bangladesh. Among the male handloom workers a total of 230 respondents were interviewed with a structured questionnaire as per objectives.

Socio-demographic Characteristics of the respondents

It was observed in the present study the mean age of the respondents was 35.73; (SD=±11.602) years. More than one third (31.3%) respondents were age from 31-40 years followed by 11.3% were age group ≤20 years, 27.8% age group 21-30 years, 15.7% were 41-50 and 13.9% in the age group 50 years & above. They were majority of respondents (85.2%) married. Considering the level of education, more than one third respondents (37.4%) were belong to illiterate & only can sign according to 43.5% were primary level and 19.1% were secondary level. The mean of monthly family income was taka 9023.91 ;(SD=±2792.675). Maximum 37.8% respondents had monthly family income Taka 8001-10000 followed by 21.7% had Taka ≤6000, 18.3% had Taka 6001-8000 and 22.1% had Taka 10001-12000 or above respectively.

More than one third (32.2%) respondents were 13-14 hours their working in place according to 23.5% were 11-12 hours, 28.3% were 15-16 hours. The mean working hours was Mean =13.05; (SD=± 2.040). Duration of job 10.9% this work for 1-5 years according to 20.9 were 6-10 years remaining 23.9% were 11-15 years, 15.7%, 12.6% were 16-25 years and 16.1% were >25 years. The risk of developing musculoskeletal disorder pain was most of 61.3% respondents were 7-8 hours and 38.7% were >8 hours by daily time spending sitting at work. Most of similar percentage by standing. More than two third (78.3%) respondents were one hours by daily time spending standing at work.

Its regards 45% respondents by heavy physical duty (lifting). The risk of developing musculoskeletal disorder pain was 83.9% times with the increase in amount of perceived stress. Those who never stress (16.1%) participate in group respectively.

In a Chinese study claimed that the 1-year prevalence of LBP was 64% (Doherty M, 2010). Another research in UK shows that 75% people suffered with low back pain in every year. Ratio found that low back pain is more common in female compared to male. Almost every male will have at least one episode of low back pain at some time in her life. The pain can vary from severe and long term to short period. Usually it resolves within a few weeks. The most common risk factor for low back pain of male are heavy physical workload, lifting, awkward posture, static work posture, , pushing & pulling, body vibration, increased body mass index and life style Baru, SK. 2015).

The few percentage (4.8%) had suffered from diabetes, 12.2% had suffered from hypertension and 33% had from arthritis and their 12.8% respondents were no suffering from common co-morbidities. Among them 16% were suffering skin

allergies, 7.2% hearing problem 14.8% were common cold and 16.8% were fever. Maximum respondents were multiple responses others co-morbidities.

Regarding the table shows that by suffering from any neurological disorder. Among them few percentages 1.3% were sensory (temperature). Out of the 62 respondent's neurological disorder motor. Among them 69.4% were walking and 16.1% were gripping. Remaining that 20.3% were radiating pain sensory upper extremity 79.8% were lower extremity respectively.

Majority of 40% respondents were no sick, 33.9% respondents number days 1-6 days in last 12 months, 12.2% sick in 7-12 days and 13.9% were sick more than 12 days. Among the table shows 27.4% experienced had musculoskeletal pain and 72.6% had no experienced musculoskeletal pain.

Heena'sstudyfound that regarding pain and discomfort during last 7 days less than half i.e. 37.5 percent of the respondents were having pain in wrists and 28.13 percent were suffering pain and discomfort in both shoulders. From the male population 32.14 percent respondents were suffering from neck pain whereas 41.67 percent. Only 29.69 percent handloom weavers were suffering from elbow pain and discomfort since last 7 days. More than half of the population i.e. 59.38 percent had pain and discomfort in lower back region whereas only 25 percent respondents were suffering from pain in upper back. When asked about pain in hips/ thighs only 28.57 percent male workers reported pain and discomfort. On the other hand total 43.75 percent respondents had pain in knees whereas 40.63 percent handloom weavers were suffering from pain and discomfort in ankles/ feet region. (Heena, 2015).

Considering the pain in different parts of the body, 26% had complaints of pain in the hip/things knees followed by neck pain (10.1%), shoulders pain (17.4%), wrist pain both elbow(11.6%), lumbar spine (18.8%).

The pattern of musculoskeletal disorder neck pain majority of 42.9% had suffered from temporary 41.2% were continuous according to shoulders, ankles, lumbar spine; cervical spine had Nature of complaints maximum continuous and Severity of complaints on movement.

According to the study proved that majority of workers (55%) complained about musculoskeletal problem. This was followed by neural problem such as headache (40%), respiratory (30%), skin problem (13%), numbness of hands and fingers (8%), hearing (5%) and visual discomfort (2%).

Out of 230 hand loom worker among them majority of 73.9% had no received treatment only 26.1% had received treatment their muscular. Most of the respondents 84.7% had no received treatment because they have lack of money according to similarly 4.1% causes of expenditure for treatment and the few percentage 6.5% causes of refused of decision maker of family.

Only 23.9% experienced musculoskeletal disorder in the past and large number 76.1% were no experienced musculoskeletal disorder in the past. The similar percentage 29.1% duration of affected 6-10 & 11-15 years followed by 20% were suffering from 1-5 years and 12.7% had suffered more than twenty years.

In the other study found that workers were asked few questions about perceived pain/discomfort. Pain was measured for past 12 months, last month and for 7 days. Majority of the respondents were feeling pain and discomfort in different body parts. Handloom weavers generally adopt sitting posture while working. Different sitting postures that is forward flexed, upright and side bending, are adopted by the weavers while performing weaving task. Prolonged flexion of the spine leads to increase intervertebral joint laxity and fluid loss in the intervertebral discs. (Heena, 2015).

Most of the respondents (57.1%) were belong to 5.1-5.5 ft height, 26.5% were belong to ≤ 5 ft and only 16.1% were >5.5 ft height respectively. 10% respondents were ≤ 45 kg, according to 28.7% were belong to 46-50 kg, 22.6% were 51-55, 25.2, 13.5% were 56-60 kg and >60 kg respectively. Majority of 84.8% respondents BMI were 18.5-24.9 followed by 9.6% respondents were ≤18.5 BMI and the rest of 5.7% respondent's ≥ 25 BMI.

Another study found that sixty eight per cent of the participants reported suffering from low back pain, making it the most prevalent disorder in our sample. Analysis of the Oswestry Low Back Pain Disability Questionnaire data revealed that among those with low back pain (n=119), 2% had severe disabilities, 46% had moderate disabilities, and 52% had minimal disabilities. Statistical analyses revealed a positive significant association between the intensity of pain in the lower back and an increased number of years of work experience (P<0.05). (Santu, 2014)

The relationship between age of respondents with musculoskeletal disorder most 32.9% respondents were musculoskeletal disorder >30 years, 18.9% respondents were no musculoskeletal disorder ≤ 30 years. Whereas 81.1% respondents were no musculoskeletal disorder ≤ 30 respectively. The findings are statistically significant

χ2 = 5.374; P-value = 0.02).The relationship marital status with musculoskeletal disorder pain. Among them majority of 76.7% respondents unmarried and no developing musculoskeletal disorder other hand 28% respondents were married and musculoskeletal disorder pain. The risk of developing musculoskeletal disorder was 0.78. The findings are statistically not significant χ2 = .286; P-value = 0.59).

Duration of job and participants with musculoskeletal disorder pain. Among them majority of 84.9% respondents were no pain duration of job ≤10 years. The risk of developing musculoskeletal pain was 0.358. The findings are statistically highly significant χ2 = 8.165; P-value = 0.004).The relationship between duration of working hours spent and participants with low musculoskeletal disorder pain. Among them majority of 73.2% respondents more than 8 hours spent working hours. The risk of developing musculoskeletal disorder pain was 2.73. The relationship between hours spent sitting and participants with and without musculoskeletal disorder pain. Among them majority of 85.1% respondents spent sitting 8 hours or less than eight hours. The risk of developing low back pain was 0.19The findings are statistically highly significant χ2 = 28.61; P-value = 0.001).Musculoskeletal disorder pain in respondents who lifted objects that table shows the majority of participants (66.3%) lifted objects or people in the performance of their occupational activities. The risk of developing low back pain was 1.77. The findings are statistically significant χ2 = 3.744; P-value = 0.05).The relationship between perceived stress at work and musculoskeletal disorder pain. Few participants (27%) never experienced stress while 81% participants who experienced stress all the time had musculoskeletal disorder pain perceived stress at work was found to be significantly associated with the presence of musculoskeletal disorder pain (p=0.05).

CHAPTER-VI

6.1 Conclusion

The present investigation showed that there was a high rate of poor working postures and musculoskeletal problems among handloom weavers. Therefore, control of musculoskeletal disorders risk factors and up gradation of working environment seem essential. Type of handloom, rest, working postures, daily working hours etc. are the most important and considerable factors which are directly associated with prevalence of musculoskeletal disorders among handloom weavers. The majority of ergonomic shortcomings and important factors for musculoskeletal symptoms in weaving operations originated from ill-designed weaving workstations. Therefore, it can be concluded that any working conditions improvement program in this industry can be regulated and should be focused on designing of ergonomic-oriented weaving workstations. This would minimize the fatigue and drudgery among weavers and significantly enhance their prouctivity and working efficien

6.2 Recommendations

Some recommendations may be made on the basis of different available statistics and the independent survey that we carried out:

All our recommends are only for the Handloom factory in Sirangonj, Bangladesh. This industry is facing a lot of problems that have been highlighted through our discussion and give some recommendation to bring the handloom factory at the blooming stage of development. We should extend our helping hand to the Government and NGOs to pave the way of development for our poor weavers.

- Don't slouch when standing or sitting. The lower back can support a person's weight most easily when the curvature is reduced. When standing, keep your weight balanced on your feet.

- Sit in a chair with good lumbar support and proper position and height for the task. Keep shoulders back. Switch sitting positions often and periodically walk around the office or gently stretch muscles to relieve tension. A pillow or rolled-up towel placed behind the small of the back can provide some lumbar support. During prolonged periods of sitting, elevate feet on a low stool or a stack of books.

- Obesity causes a constant weight on the lower back and contributes to this condition and should be kept under check.

- Sleeping on one's side with the knees drawn up in a fetal position can help open up the joints in the spine and relieve pressure by reducing the curvature of the spine. Always sleep on a firm surface.

- Don't try to lift objects that are too heavy. Lift from the knees, pull the stomach muscles in, and keep the head down and in line with a straight back. When lifting, keep objects close to the body. Do not twist when lifting.

- Maintain proper nutrition and diet to reduce and prevent excessive weight gain, especially weight around the waistline that taxes lower back muscles. A diet with sufficient daily intake of calcium, phosphorus, and vitamin D helps to promote new bone growth.

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Annexure-1

<u>Informed Consent</u>

I have read the for-going information. All of my quarries were answered satisfactorily. I have understood that it is a research work for Prevalence of musculoskeletal disorder among the hand loom worker. I have fully understood the purpose and duration of this research's. I have got a clear idea of this research including the procedures to be followed. I have understood that my personal identifies and other social information was kept highly confidential and the records connected with my participation in this research were safeguarded. My name was revealed in any publication that may arise from the study. I was haven't any risk and discomfort of participating into this research. I have understood that I have right to leave this research any time for any reason what so ever I have undersigned certify that I signed this document willingly to participate in the same research presence of following witness.

Principle investigator's Signature

Date:

Annexure-2

CRP-BHPI/IRB/03/16/

Date……………………..

To

Md. Akhter Hossain

Part – 2, Student of M.Sc. in Physiotherapy

Roll no-14, Reg. 4228

Session: 2012-2013, DU.

IHT, Mohakhali, Dhaka

Subject: Approval of the thesis proposal – "The Prevalence of Musculoskeletal disorder among the hand loom workers" in Belchuchi, Sirajgonj, by IRB of BHPI.

Dear

 Md, Akhter hossain

Congratulation!

The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application on March 10, 2016 to conduct the above mentioned thesis, with yourself, as the Principal investigator. The Following documents have been reviewed and approved:

SL#	Name of the Documents
1	Thesis Proposal
2	Questionnaire
3	Information sheet & consent form.

Since the study involves answering a questionnaire that takes 15 to 20 minutes, have

no likelihood of any harm to the participants rather possibility of benefit by knowing

factors associated with the Musculoskeletal disorders with physical disabilities from the information of Questionnaire, IRB has approved the study to be conducted in the presented form at the meeting held at 08:30 AM on March 10, 2016 at BHPI.

IRB expects to be informed about the progress of the study, any changes occurring in the course of the study, any revision in the protocol and patient information or informed consent and ask to be provided a copy of the final report. IRB of BHPI is working accordance to Nuremberg Code 1947, World Medical Association Declaration of Helsinki, 1964 - 2013 and other applicable regulation.

Best regards,

S.M. Ferdous Alam

Assistant Professor

Dept. of MSc in Rehabilitation Science

Member Secretary, Institutional Review Board (IRB), BHPI.

Annexure-3

<u>INTERVIEW QUESTIONNAIRE</u>

Respondent

I am a physiotherapist and also a student of MSc PT, Roll 14 Course at Bangladesh Health Profession Institute (BHPI) under University of Dhaka, Faculty of Medicine. I am going to conduct a research work about the **"Prevalence of musculoskeletal disorder among the hand loom worker"**. For the purpose of the study, I wish to ask you some questions. I expect you will give me proper answers and information. All information provided by you will be kept confidential & will be used only for the purpose of academic research.

Identification Number : ☐☐☐   Date: ..../........./......../

Name of the Interviewer:

Permanent Address:

A. Sacio-Demographic related Information

1. What is your age? (In full years) :   ☐☐

2. Marital Status?   ☐
    (1) Unmarred   (2) Married   (3) Widow
    (4) Divorced   (5) Separated   (99) Others (Specify ....)

3. What is your educational qualification?   ☐
    0   - Illiterate
    1-16   - Upto which year she has read
    17   - Can sign only
    18   - Can read Arabic only
    19   - Non formal education

4. What is the monthly income of your family?   ☐☐☐☐

5. What are the actual regular working hours ………………………..

6. How long, you are doing this job? (in year)   ☐

7. During an 8 hour working day, how many hours do you spend sitting? .... hours

85

8. During an 8 hour working day, how many hours do you spend standing? . Hours

9. Do you often lift objects/people during your working day

    1. Yes   2. No

10. In your personal opinion, do you experience any physical stress at work?

    1. Never   2. Sometimes
    3. Often   4. All the time
    5. Too much to handle

B. General health related information

11. Do you suffer from any of the following diseases? Diabetes (sugar problems)

    1. Yes   2. No

12. Hypertension (high blood pressure)

    1. Yes   2. No

13. Arthritis

    1. Yes   2. No

14. Do you suffer from any of co-morbidity is existing?

1. Dermatitis	2. Hearing problem	3. Fungal infection
4. Skin allergies	5. Diarrhea disease	6. Asthma
7. Dysentery	8. Pain in abdomen	9. Common cold
10. Fever	11. Nausea and vomiting	12. Anemia
13. Others		

C. Neurological disorder related information:

15. Did you suffer from any neurological disorder?
    a. Sensory: 1) Temperature   2) Pain   3) Touch
    b. Motor   1) Walking   2) Gripping   3) Functional activities
    c. Radiating pain 1) Upper extremity 2) Lower extremity

16. During the last 12 months, how much sick leave have you taken, if any?
    1. 0 days   2. 1-6 days
    3. 7-12 days   4. 12 more than 12 days

D. Musculoskeletal disorder related information

17. At this moment, Do you have musculoskeletal disorder?

      1. Yes   2. No

18. If yes, Where is is the pain of musculoskeletal disorder (Pain in body parts)

1. Neck	2. Shoulders	3. Right Elbow
4. Left Elbow	5. Both Elbow	6 Wrist/hands Upper back
7. Wrist/Lower back	8. Hip/thighs Knees	9. Ankles/feet
10. Pain in figure	11. Pain in different part 12. Lumbar spine 13. Cervical	
spine 14. Others		

19. How did you have musculoskeletal disorder by pain, nature and severity of complaints?

Complaints (Pain in body parts	Nature of complaints	Code no	Severity of complaints	Code no
Neck	Temporary 2. Continuous 3. On movement		1. Mild 2. Moderate 3. Severe	
Shoulders	Temporary 2. Continuous 3. On movement		1. Mild 2. Moderate 3. Severe	
Elbow	Temporary 2. Continuous 3. On movement		1. Mild 2. Moderate 3. Severe	
Wrist	Temporary 2. Continuous 3. On movement		1. Mild 2. Moderate 3. Severe	
Hip/thigh/Knees	Temporary 2. Continuous 3. On movement		1. Mild 2. Moderate 3. Severe	
Ankles/feet	Temporary 2. Continuous 3. On movement		1. Mild 2. Moderate 3. Severe	
Pain in different part	Temporary 2. Continuous 3. On movement		1. Mild 2. Moderate 3. Severe	

20. If yes, how did you manage your musculoskeletal disorder?

1. Physicians	2. Pain medication
3. Physiotherapist	4. Pharmacist
5. Not treatment	6. Others (Specify …………………..)

21. If no treatment what were the barriers of not seeking the treatment?
    1. Distance from health facilities   2. Expenditure for treatment
    3. Transport problem   4. Communication problem
    5. Lack of money   6. Service not satisfactory
    7. Refusal of decision maker of family 9. Others (Specify…)

22. Have you experienced musculoskeletal disorder in the past   ☐

    1.   Yes   2. No

23. . If you have musculoskeletal disorder in the past please indicate the number of

    years of months that it has affected ……………………………. years/months

24. Anthropometric measurement: ☐

    a. Height (cm) …………………………

    b. Weight (Kg) …………………………

    c. BMI ……………………………………

                                              Signature:
                                              Date: ..../.........../...........

District Map
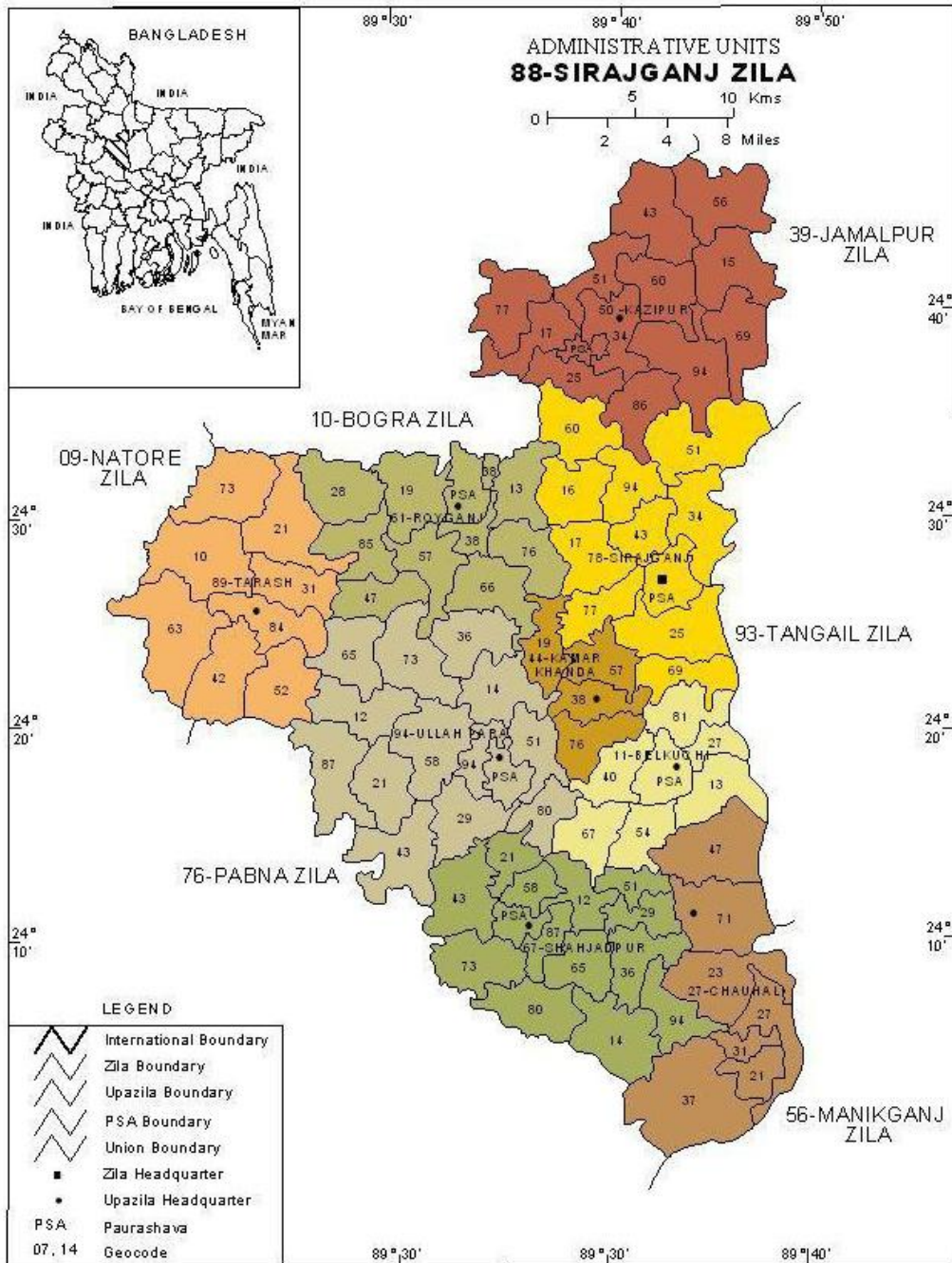
Annexure-5

Work Schedule

Activities	May 15	June 15	July 15	Aug 15	Sep 15	Oct 15	Nov 15	Dec 15	Jan 16	Feb 16	Mar16	Apr 16
Topic Selection	■											
Planning & designing		■	■									
Literature Review		■	■	■	■	■	■	■	■	■	■	
Selection of Study area				■								
Instrument development					■							
Pretesting & Finalizing						■						
Data Collection							■	■				
Data Analysis									■			
Data Tabulation									■			
Report Writing									■	■		
Finalizing the Report										■	■	■
Final Submission											■	■