Prevalence of Work-Related Musculoskeletal Symptoms among Medical Laboratory Technologists in Dhaka City: A Cross Sectional Study

By

Sathi Moni Jonaki

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Bachelor of Science in Occupational Therapy

Bangladesh Health Professions Institute (BHPI)

Faculty of medicine

University of Dhaka

Thesis completed by:

Sathi Moni Jonaki
4th year, B.Sc. in Occupational Therapy
Bangladesh Health Professions Institute (BHPI)
Centre for the Rehabilitation of the Paralysed (CRP)
Chapain, Savar, Dhaka: 1343

……
Signature

Supervisor's Name, Designation, and Signature

Nayan Kumer Chanda
Assistant Professor
Department of Occupational Therapy
Bangladesh Health ProfessionsInstitute (BHPI)
Centre for the Rehabilitation of the Paralysed (CRP)
Chapain, Savar, Dhaka: 1343

……
Signature

Head of the Department's Name, Designation, and Signature

Sk. Moniruzzaman
Associate Professor & Head
Department of Occupational Therapy
Bangladesh Health ProfessionsInstitute (BHPI)
Centre for the Rehabilitation of the Paralysed (CRP)
Chapain, Savar, Dhaka: 1343

……
Signature

Board of Examiners

Sk. Moniruzzaman
Associate Professor and Head
Department of Occupational Therapy
Bangladesh Health Professions Institute (BHPI)
CRP, Savar, Dhaka-1343

.....
Signature

Dr. Md. Shakhaoat Hossain
Associate Professor
Department of Public Health and Informatics
Jahangirnagar University
Savar, Dhaka -1342

.....
Signature

Statement of Authorship

Except where it is made in the text of the thesis, this thesis contains no material published elsewhere or extracted in whole or in part from a thesis presented by me for any other degree or seminar.No other person's work has been used without due acknowledgement in the main text of the thesis.This thesis has not been submitted for the award of any other degree in any other tertiary institution.The ethical issue of the study has been strictly considered and protected. In case of dissemination of the findings of this project for future publication, the research supervisor will be highly concerned, and it will be duly acknowledged as an undergraduate thesis.

Sathi Moni Jonaki
4th year, B.Sc. in Occupational Therapy
Bangladesh Health Professions Institute (BHPI)
Centre for the Rehabilitation of the Peralysed (CRP)
Chapain, Savar, Dhaka: 1343

……
Signature

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Table of Contents

Contents

List of Tables

List of Figures

List of Abbreviations

BHPI	Bangladesh Health Professions Institute
BIHS	Bangladesh Institute of Health Sciences General Hospital
BSMMU	Bangabandhu Sheikh Mujib Medical University
CRP	Centre for the Rehabilitation of the Paralysed
IRB	Institutional Review Board
MSDs	Musculoskeletal Disorders
NMQ	Nordic Musculoskeletal Questionnaire
WMSDs	Work-related Musculoskeletal Disorders
WMSSs	Work-related Musculoskeletal Symptoms

Abstract

Background: Work-related Musculoskeletal Symptoms are one of the most common occupational disease. It is an important issue worldwide. Medical Laboratory technologists are exceptional group of health care professionals who are at risk for developing work related musculoskeletal symptoms.

Aim: The aim of this research was to determine the prevalence of work-related musculoskeletal symptoms among medical laboratory technologists in Dhaka city.

Methods: The study followed a cross sectional quantitative design by conducting face-to-face survey among 158 participants who worked in a hospital more than one year. Standardized questionnaire, Nordic Musculoskeletal Questionnaire to find out the prevalence of WMSDs of this population were used to collect data. Descriptive analysis was used by SPSS 26 to analyse the data.

Results: 78 male and 80 female with mean age 31.27, SD (5.971) responded to the survey. 99.4% medical laboratory technologists experienced MSDs. 78 male and 79 female medical laboratory technologists was experienced MSDs problems in any parts of the body region. Last 12 months prevalence of MSDs found, neck was 91.4%, shoulder was 75.3%, elbow was 20.3%, wrists/hands score was 32.3%, upper back was 5.7%, lower back was 12.7%, hips/thighs/buttocks was 26.6%, knees was 15.8% and ankles/feet was 4.4% . The most affected body region by musculoskeletal symptoms was found neck, shoulders, wrists/hand, one or both hips/thighs/buttocks and elbows.

Conclusion: Medical laboratory technologists are at a high risk of Work-related Musculoskeletal Disorders and it is very much necessary to take appropriate and effective corrective preventive action to prevent them from Work-related Musculoskeletal Disorders reoccurrence.

Keywords: Prevalence, Musculoskeletal Disorders, Work-related Musculoskeletal Disorders, Work-related Musculoskeletal Symptoms, Medical Laboratory Technologists.

CHAPTER I: INTRODUCTION

1.1 Background

Work-Related Musculoskeletal Disorders (WMSDs) are one of the most common occupational disease. Work-Related Musculoskeletal Disorders impact everyday function, working ability and quality of life. Medical laboratory workers are at a high risk for WMSDs (AlNekhilan et al., 2020).

Medical laboratory technology is one of the most rapidly growing health care fields. Laboratory technologists are exceptional group of health care professionals who are at risk for developing work related musculoskeletal symptoms ("Prevalence of Work-related Musculoskeletal Disorders Among Laboratory Workers of Sindh: Across-sectional Study," 2022).

In 14th July 2022 World Health Organization reported that, approximately 1.71 billion people have Musculoskeletal Disorders worldwide. Musculoskeletal Disorders are the leading contributor to disability worldwide, with low back pain being the single leading cause of disability in 160 countries. Musculoskeletal Disorders significantly limit mobility and dexterity, leading to early retirement from work, lower levels of well-being and reduce ability to participate in society. Because of population growth and ageing, the number of people living with Musculoskeletal Disorders and associated functional limitations, is rapidly increasing. Musculoskeletal health refers to the performance of the locomotor system, comprising intact muscles, bones, joints and adjacent connective tissues. Musculoskeletal impairments comprise more than 150 different

diseases/conditions that affect the system and are characterized by impairments in the muscles, bones, joints and adjacent connective tissues leading to temporary or lifelong limitations in functioning and participation. Musculoskeletal conditions are typically characterized by pain (often persistent) and limitations in mobility and dexterity, reducing people's ability to work and participate in society. Pain experienced in musculoskeletal structures is the most common form of non-cancer pain. Musculoskeletal conditions are relevant across the life-course – from childhood to older age. They range from those conditions that arise

suddenly and are short-lived (such as fractures, sprains and strains, associated with pain and limitations in functioning) though to long-term conditions such as chronic primary low back pain and osteoarthritis. Musculoskeletal conditions are also the highest contributor to the global need for rehabilitation. They are among the largest contributors to the need for rehabilitation services among children and account for approximately two-thirds of all adults in need of rehabilitation. Musculoskeletal conditions often co-exist with other non communicable diseases and increase the risk of developing other non communicable diseases, such as cardiovascular disease. People with musculoskeletal conditions are also at higher risk to develop mental health issues (Musculoskeletal Health, 2022).

Musculoskeletal Disorders (MSDs) are a group of inflammatory and degenerative conditions that affect the muscles, tendons, ligaments, joints or peripheral nerves, usually leading to aches, pains or discomfort. MSDs usually result from repetitive manual labor, lifting heavy loads, prolonged static work, overexertion, vibration, or working in an awkward posture. MSDs are a major public health problem in both industrialized and

developing countries and may result in work restriction, absenteeism, or even the need to change jobs, which are themselves associated with major economic costs resulting in serious impacts on the person's quality of life. Compared to the average nonfatal workplace injury or illness, MSDs need longer recovery times and are responsible for millions of lost workdays every year (Nabi et al., 2021).

A narrative review conducted by Parul Raj Agrawal, Arun G. Maiya, Veena Kamath and Asha Kamath among medical laboratory professionals to review literature on prevalence of work-related musculoskeletal disorders among medical laboratory professionals. In this study total 7 studies were included for the review. The overall prevalence's ranges was from 40-60% and with neck being more prevalent 18-78% (Agrawal et al., 2014).

A cross-sectional study conducted by Sidra Zaheer, Quratulain Amir, Hira Fatima Waseem, Komal Riaz, Nirmal Zehra, Shagufta Shakil and Masooma Shoaib among health care providers in Pakistan. The aim of this study focused on patterns of work-related musculoskeletal disorders (WMSDs) affecting different health care providers working in a different unit of a tertiary care hospital. This study collected from 2000 allied health care providers working at various departments of Civil Hospital and Dow University Hospital of Karachi (DUHS), via self-administered questionnaire, based on Occupational Safety and Health Administration (OSHA) guidelines. In this study, findings revealed that 92.9% of individuals had MSDs as a result of poor ergonomics, with 93% reporting that the disease interferes with their normal job routine and Medical technologists are the most affected group among allied health care workers (Zaheer et al., 2022).

1.2 Justification of the Study

Medical Laboratory Technologists are health professionals who play an important role in our medical science. In our country a huge number of Medical Laboratory Technologists work in different hospitals. Medical Laboratory Technologists work in the same position for long period of time, they do not adhere to proper posture, perform different hand activities repeatedly, which causes them to develop various types of Musculoskeletal Disorders. By knowing the prevalence rate of Musculoskeletal Disorders among Medical Laboratory Technologists, we can understand the extent to which a Medical Laboratory Technologist is hampering the work performance. As they are office employees and they work in a work place settings like hospitals. In this case, Occupational Therapists play an important role in work place modification. Occupational Therapists provide intervention and education about using ergonomic chair-table, maintain proper posture and joint protection technique. By properly designing of the work place of the Medical Laboratory Technologists, the hospital higher authority will know about the importance of Occupational Therapy role and in future it will be an opportunity for expansion of the role of the Occupational Therapists. Occupational Therapists post will create in different hospitals.

1.3 Operational Definition

1.3.1 Prevalence: prevalence represents existing cases of a disease and can be seen as a measure of disease status; it is the proportion of people in a population having disease.

1.3.2 Musculoskeletal Symptoms: Musculoskeletal symptoms are defined as pain in the muscles, tendons, and nerves arising from repetitive, continuous, and unnatural movements.

1.3.3 Musculoskeletal Disorders (MSD): MSD are injuries or disorders of the muscles, nerves, tendons, joints, cartilage and spinal disc.

1.3.4 Work-Related Musculoskeletal Disorders (WRMSD): WMSDs is a musculoskeletal disorder that results from, or is exacerbated by, conditions in the workplace environment or the performance of work tasks.

1.3.5 Medical Laboratory Technologist: Medical laboratory technologist perform complex tests and procedures, such as examining and analyzing body fluids and tissue samples to identify micro-organisms, bacteria, abnormal cells or other signs of disease and infection.

1.4 Study Question, Aim and Objectives

1.4.1 Study Question

What is the prevalence of Work-related Musculoskeletal Symptoms among Medical Laboratory Technologists in Dhaka city?

1.4.2 Aim

To determine the prevalence of work-related musculoskeletal symptoms among medical laboratory technologists in Dhaka city.

1.4.3 Objectives

- To find out the prevalence of work-related musculoskeletal symptoms of medical laboratory technologists.
- To determine the socio-demographic factors and musculoskeletal symptoms.
- To identify most affected body region by musculoskeletal symptoms.

CHAPTER II: LITERATURE REVIEW

This chapter will provide information regarding Musculoskeletal Disorders (MSDs), causes of musculoskeletal disorders (MSDs), Work-Related Musculoskeletal Disorders (WRMSDs) and the prevalence of Musculoskeletal Disorders (MSDs) of Medical Laboratory Technologists.

2.1 Musculoskeletal Disorders

Musculoskeletal Disorders (MSDs) are an increasing cause of morbidity among workers. In the 2016 global burden of disease study, musculoskeletal conditions were the second highest contributor to global disability, with lower back pain being the single leading cause of disability. A cross-sectional study conducted with 22 medical technologists to evaluate the prevalence and risk factors associated with Musculoskeletal Disorders (MSDs). The study was located on a tertiary hospital in Singapore. All medical technologists who were above the age of 21 years old, participated in this study. The study used the Nordic Musculoskeletal Questionnaire (NMQ) (Chia et al., 2020). Musculoskeletal disorders can lead to increased health care use, reduced work productivity, and lower levels of health-related quality of life. Shu Yi Wang, Liang Chun Liu, Ming Chi Lu and Malcolm Koo conducted cohort study where 7820 medical personnel were included in the analysis. Data from the (2000-2010) Taiwan National Health Insurance Research Database were used to identify personnel of 10 different medical professions. High rates of Work-Related musculoskeletal injury are well documented among medical professionals and particularly physical therapists, occupational therapists, dental professionals and nurses (Wang et al., 2015).

Musculoskeletal Disorders (MSDs) in the work place have a huge impact, emerging as a growing problem in our modern societies. Additionally, a cross-sectional study conducted among dentists, laboratory technicians, nurses, physicians and physiotherapists of various clinical departments in a tertiary care hospital in Chennai, India from January to June 2013. Non probability sampling and face to face interviews were used in the study. The study was aimed at looking into WMSDs affecting five different health professionals working in a tertiary care hospital (Yasobant & Rajkumar, 2014). A field survey was conducted by Taehyung Kim where 7 radiological technologists with work experience in hospitals for more than 5 years were included. This study was conducted to analyze the working postures of radiological technologists and to utilize the results for the prevention and treatment of their musculoskeletal disorders. The musculoskeletal disorders of radiological technologists occur in various regions of their bodies but occur most frequently in the shoulder and the lumbar region (Kim & Roh, 2014).

2.2 Causes of Musculoskeletal Disorders

There are risk factors causing MSDs in many types of work. They include risk factors to do with the work, like:

- lifting heavy or bulky loads
- pushing, pulling or dragging heavy loads
- bending, crouching or stooping
- stretching, twisting and reaching
- sustained or excessive force
- repetitive tasks, particularly using the same hand or arm action

- carrying out a task for a long time

Or the risk factors can be to do with the work environment or organization:

- poor working environment (including lack of space, temperature and lighting)
- poor work organization (including workload, job demands) (Help for Workers With Musculoskeletal Disorders - HSE, n.d.)

2.3 Work-Related Musculoskeletal Disorders

Work-related MSDs were reported to result in rising compensation and healthcare costs, lower quality of life, reduced productivity and increased absenteeism. In North America, MSDs accounted for the largest proportion of lost productivity at the workplace. Many studies have reported that Healthcare Workers (HCWs) are at increased risk of work related MSDs. Factors associated with work-related MSDs include age, Body Mass Index (BMI) , marital status, gender as well as work-related factors such as awkward postures, excessive work load and time pressures. Medical technologists working in specialized diagnostic laboratories performing vascular ultrasonographic studies and neurodiagnostic investigations are exposed to various ergonomic hazards such as awkward postures as well as repetitive and forceful movements (Chia et al., 2020). Another cohort study reported the same findings: the risk of work-related musculoskeletal disorders is high among various healthcare professionals. Additionally, a study conducted on 1,600 employees in six hospitals in Turkey reported that nurses had the highest prevalence of low back pain. Age, female sex, smoking, occupation, perceived work stress, and heavy lifting were significant and independent risk factors for low back pain. Another cross-sectional study conducted on dentists, laboratory technicians, nurses, physicians, and

physiotherapists in a tertiary care hospital in India revealed that working in the same position for long periods, working in awkward positions, and handling a large number of patients were commonly reported risk factors for work-related musculoskeletal disorders (Wang et al., 2015). A cross-sectional study also reported that, WMSDs are responsible for morbidity in many working populations and are known as an important occupational problem with increasing compensation and health costs, reduced productivity and lower quality of life. WMSDs are characterized as multifactorial. This study also included that, WMSDs are also reported to cause lost work time or absenteeism, increase work restriction, transfer to another job (Yasobant & Rajkumar, 2014). Archina Kumari, Hussain Ali, Zunaira Solangi, Irum Unar, Asma Abro, Samina Samejo, Nida Rizvi and Faizan Saeed Syed conducted a cross-sectional study from November 2019 to January 2020. In this study, data was collected by using Standardized Nordic Musculoskeletal Questionnaire (SNMQ) and Numeric Pain Rating Scale (NPRS) to determine the prevalence of Work-Related Musculoskeletal Symptoms and pain intensity along with participants demographic data, among laboratory workers. Data was analyzed using the Statistical Package for the Social sciences (SPSS) version 20. This study also added that, Medical laboratory technology is one of the most rapidly growing health care fields. Laboratory technicians are exceptional group of health care professionals who are at risk for developing work related musculoskeletal symptoms and the most frequent health issue faced by working population are musculoskeletal disorders. Musculoskeletal disorders not only attack on person’s ability to work and function but also exert an financial influence on the work place health system and community (Kumari et al., 2022).

2.4 Prevalence of Work-Related Musculoskeletal Disorders of Medical Laboratory Technologists

On a cross-sectional questionnaire survey, it has been reported that: (96%) medical technologists experienced MSDs over at least one body region in the past 12 months. The shoulders were the most commonly affected region (86%), followed by the neck (73%) and lower back (64%). 15 (68%) of all medical technologists also reported difficulties performing normal activities due to MSDs (Chia et al., 2020). Another cross-sectional study was conducted among health care professionals (dentists, laboratory technicians, nurses, physicians and physiotherapists). This study revealed that, a high proportion of health care professionals reported WMSDs at one or other body region, lower back being the most commonly affected area. Working in the same position for long periods, working in awkward or cramped positions and handing an excessive number of patients and or samples in one day were found to be the most commonly reported job risk factor that contributed to development of WMSDs (Yasobant & Rajkumar, 2014). A study was conducted in Sindh, Pakistan. This study's finding was: In this study they found 38% prevalence of Work Related Musculoskeletal Disorders (WRMSDs) among laboratory workers. Moreover, ankles/feet turned out to be the most symptomatic region with prevalence of 0.7% followed by neck and upper back being more common among male 131(87.3%), laboratory technicians 121(81.3%), with mean age of 34.65(11.82%). In our study, most of the participants (63.3%) were having mild pain and 4% had severe pain (Kumari et al., 2022).

To review literature on the prevalence of WMSDs among medical laboratory technologists in a narrative study was conducted in 2014. This study covered 7 studies.

From the all 7 studies, one study reported that, feet/ankle (21.7%) were noted highest in incidence followed by knees (20.8%) and upper back (10.7%) and another one study reported the one month prevalence. Florian et al. has done online survey on pathologist of Switzerland through a questionnaire. 163 pathologists were involved in the study. 40% prevalence of musculoskeletal symptoms was noted in this study. Among all the body parts neck was found to be the highest in the prevalence. This study also represents that, Marianne et al. reported MSD in upper extremity through a cross-sectional study done on 128 female laboratory technicians. The findings of MSD in hand (44%), shoulder (58%) and neck pain (44%) was more compare to other body parts. Another study on medical laboratory technician by Shreya Maulik et al. reported the musculoskeletal problems among these professionals. This study reported low back as the most prevalent symptoms followed by upper back and neck which is unlike the findings of previous studies reporting neck symptoms as most prevalent (Agrawal et al., 2014).

2.5 Key Gaps of the Study

- Majority of the study have been conducted on Medical Technologists at a specific hospital. So, the results cannot be generalized all over the world.
- In Bangladesh, no study has been conducted regarding on Medical Laboratory Technologists.
- However, there is very limited literature on the prevalence and risk factors of MSDs among medical technologists working in specialized clinical laboratories.

CHAPTER III: METHODS

3.1 Study Design

The study followed the cross-sectional study design of quantitative research. The student researcher chose this method because the researcher selected a population from Bangabandhu Sheikh Mujib Medical University, Bangladesh Institute of Health Sciences General Hospital and Government Employee Hospital (3 specific hospitals) for a specified period. Student researcher analysed data over a period of time across a sample population to determine the prevalence of work-related musculoskeletal disorders. This is similar to a snapshot (Setia, 2016). The aim of the study could be achieved with a cross-sectional approach; therefore, the student researcher chose the design of this study. For this purpose, this study used a cross-sectional design that fulfills the aim and objective of the study.

3.2 Study Period

The study period was between April, 2022 to February, 2023.

3.3 Data Collection Period

Data collection period was from 24th October to 28th November 2022.

3.4 Study Setting

Three hospitals: Bangabandhu Sheikh Mujib Medical University (BSMMU), Bangladesh Institute of Health Sciences General Hospital (BIHS) and Government Employee Hospital (Sarkari Karmachari Hospital). The researcher student collected data from Medical Laboratory Technologist's of this three hospitals.

3.4.1 Information about BSMMU

Bangabandhu Sheikh Mujib Medical University (BSMMU) is the premier Postgraduate Medical Institution of the country. It bears the heritage to Institute of Postgraduate Medical Research (IPGMR) which was established in December 1965. In the year 1998 the Government converted IPGMR into a Medical University for expanding the facilities for higher medical education and research in the country. It has an enviable reputation for providing high quality postgraduate education in different specialties. The university has strong link with other professional bodies at home and abroad. The university is expanding rapidly and at present, the university has many departments equipped with modern technology for service, teaching and research. Besides education, the university plays the vital role of promoting research activities in various discipline of medicine. Since its inception, the university has also been delivering general and specialized clinical service as a tertiary level healthcare center (BSMMU-Bangabandhu Sheikh Mujib Medical University, n.d.).

3.4.2 Information about BIHS

BIHSH is the Bangladesh's oldest and largest Diabetic patient care centre devoted to the prevention, treatment, and cure of Diabetic. Founded in 1884, BIHSH has long been a leader in early detection, precise diagnosis, and individually tailored treatments for Diabetic. They recognize and support employee's efforts to expand their knowledge, improve their skills, and assume added responsibility. They fulfill the mission-the progressive control and cure of cancer through programs of patient care, research, and education by facilitating collaborations among scientists and clinical specialists, enabling new discoveries and the development of new treatments. Regardless of where individual

work at BIHSH, individual's skills will contribute to the fulfillment of the mission. The greatest reward comes from knowing that the employee have a role in the advances they are making together, toward the control and cure of diabetic (Bangladesh Institute of Health Sciences Hospital, n.d.)

3.5 Study Participants

3.5.1 Study Population

The population of the study was medical laboratory technologists who work on a hospital. Both male and female medical laboratory technologist could participate in this study and they should have more than one year of work experience. Medical Technologists who were newly recruited and had sever illness, they were not included in this study.

3.5.2 Sampling Techniques

Purposive sampling was used to conduct this study by following the inclusion and exclusion criteria. Purposive sampling is a sampling technique in which the researcher relies on his or her judgment and follows criteria when choosing members of the population to participate in the study (Alchemer, 2021). In this study, the researcher student selected the participants from three hospitals. The researcher student selected those three hospitals, because it was quiet easy and time effective to collect data from the three hospitals for the researcher student. Consequently, purposive sampling was the best suited to select the participants of this study.

3.5.3 Sample Size

$$n=\frac{z2 \times pq}{d^2}$$

$$=\frac{(1.96)^2 \times 0.5 \times 0.5}{(0.05)^2}$$

$$= 384$$

Here,

n = sample size

z = the standard normal deviate usually set at 1.96

p = 0.5; though the prevalence of musculoskeletal disorders is yield, so the quantity of medical laboratory technologists with musculoskeletal disorders is considered as 50% of the total amount of person with a musculoskeletal disorders (10%) in Bangladesh, q= (1-p) = 0.5; proportion in the target population not having the characteristic . d = 0.5; degree of accuracy required (level of significance/margin of error) According to this equation, the sample should be 384 participants. Due to short period of time, the student researcher could collect 158 data from the participants of this study.

3.5.4 Inclusion Criteria

- Medical Laboratory Technologist, who work in a hospital settings.
- Both male and female technologists.
- Job experience more than 1 year.

3.5.5 Exclusion Criteria

- Newly recruited Medical Laboratory Technologists.

- Sever illness Medical Laboratory Technologists.

3.5.6 Participant Recruitment Process

In this study, the student researcher had set some inclusion and exclusion criteria to meet the exact population for the study. The student researcher went to three hospitals, than took the authority permission for data collection from the participants, whose data match with the inclusion and exclusion criteria.

3.6 Ethical Considerations

3.6.1 Consent from IRB

The ethical clearance has been sought from the Institutional Review Board (IRB) explaining the purpose of the research, through the Department of Occupational Therapy, Bangladesh Health Professions Institute (BHPI). IRB from number: CRP/BHPI/IRB/652. The research student also taken permission from three hospital's Medical Laboratory Department explaining the purpose of the research before taking participant's information.

3.6.2 Informed Consent

The student researcher explained the purpose of the research to the participants, those who felt willing to participate, their data was collected. Then, written consent was taken from the participants on consent form for data collection.

3.6.3 Right of Refusal to Participate or withdraw

In this study, participants were free to choose, whether to participate or not. They were also free to withdraw participation from the study within 2 weeks from the time of

interview. In withdraw form, the researcher student provided her email address so that, the participant could contact with the researcher for withdraw of data.

3.6.4 Confidentiality

The information provided by the participants was confidential. Their name and identity were not disclosed to anyone and it was also stated on the information sheet. The participants were informed that, their identity will remain confidential for future uses, such as report writing, publication, conference or any other written materials and verbal discussion.

3.6.5 Unequal Relationship

The student researcher did not have any unequal or power relationship with the participants.

3.6.6 Risk and Beneficence

The participants did not have any risk and they did not get any beneficence from this research.

3.7 Data Collection Process

3.7.1 Data Collection Method

The student researcher contacted with the hospital authority (Laboratory Medicine unite) for taking permission of collecting data from the hospital's medical laboratory technologists. The student researcher took written consent from all the participants. Data took from who meet inclusion and exclusion criteria and who felt willing to participate. Data was taken by structured interview (face-to-face) using structure questionnaire.

3.7.2 Interview Guide/Survey Tool

Nordic Musculoskeletal Questionnaire

The Nordic Musculoskeletal Questionnaire (NMQ) was developed from a project funded by the Nordic Council of Ministers. The aim was to develop and test a standardized questionnaire methodology allowing comparison of low back, neck, shoulder and general complaints for use in epidemiological studies. The tool was not developed for clinical diagnosis. The NMQ can be used as a questionnaire or as a questionnaire or as a structured interview. However, significantly higher frequencies of musculoskeletal problems were reported when the questionnaire was administered as part of a focused study on musculoskeletal issues and work factors than when administered as part of a periodic general health examination (Crawford, 2007).

Items:

Section 1: a general questionnaire of 40 forced-choice items identifying areas of the body causing musculoskeletal problems. Completion is aided by a body map to indicate nine symptom sites being neck, shoulders, upper back, elbows, low back, wrist/hands, hips/thighs, knees and ankles/feet. Respondents are asked if they have had any musculoskeletal trouble in the last 12 months and last 7 days which has prevented normal activity.

Section 2: additional questions relating to the neck, the shoulders and the lower back further detail relevant issues. Twenty-five forced-choice questions elicit any accidents affecting each area, functional impact at home and work (change of job or duties), duration of the problem, assessment by a health professional and musculoskeletal problems in the last 7 days. (Crawford, 2007)

3.7.3 Validity

The reliability of the NMQ, using a test–retest methodology, found the number of different answers ranged from 0 to 23%. Validity tested against clinical history and the NMQ found a range of 0 to 20% disagreement. The authors concluded this was acceptable in a screening tool. Further trials identified that the number of different answers between questionnaires ranged from 7 to 26% for annual prevalence and 6 to 19% for weekly prevalence. This research also led to a number of improvements within the questionnaire including changing wording, layout and administration for use in the UK. Comparing pain in the last 7 days and clinical examination found sensitivity ranged between 66 and 92% and specificity between 71 and 88%. In a further study of outpatients with a range of upper limb disorders, participants completed a Nordic style questionnaire on two occasions 1 week apart. The study identified that symptoms reporting for pain were highly repeatable and in terms of sensitivity, 0.90 for cervical spondylosis, 1.00 for shoulder capsulitis, 0.90 for lateral epicondylitis, 1.00 for carpal tunnel syndrome and 0.78 for Raynaud's phenomenon. Both papers conclude that the NMQ is repeatable, sensitive and useful as a screening and surveillance tool. However, medical examination is essential to establish a clinical diagnosis. (Crawford, 2007)

3.8 Data Management and Analysis

The document was presented in the Microsoft office word. The data collected from the participants were initially stored in a excel database to be sure the data and time of the data collection and it helped the student researcher to manage and analysed data in a appropriate way. Student researcher also checked all the collected data collection form with the responsible supervisor. After that the student researcher input data in the SPSS.

Descriptive statistics was used to analyse the data by using the Statistical Package for Social Science (SPSS) v26.

3.9 Quality Control and Quality Assurance

The proper quality of data was assured and managed by the student researcher. Firstly data was taken from the participants by data collection sheet. Than all the data stored in a excel database. This database also helped to give proper information about the participants. Then, the data were input in the SPSS. Missing data was also checked properly. All of the data were input properly and assured by the student researcher. The student researcher also checked all the data with her responsible research's supervisor.

CHAPTER IV: Results

This chapter represents the findings of the study. The chapter contains the study findings in tables and figures focusing the socio-demographic information, prevalence of work-related musculoskeletal disorders symptoms among medical laboratory technologists, twelve months prevalence of work-related MSDs, seven days prevalence of work-related MSDs, twelve months prevalence of activity restriction and the most affected body region.

4.1. Socio-Demographic Characteristics

Table 4.1.1 Socio-demographic characteristics of Medical Laboratory Technologists

Variable	**Frequency (N=158)**	**Percent(%)**
Sex		
Male	78	49.4%
Female	80	50.6%
Age	Mean age 31.27 years, SD (5.971).	
Minimum age	21	
Maximum age	48	
21-28	82	51.9%
29-38	56	35.4%
39-48	20	12.7%
Height		
Minimum height	5	
Maximum height	5.11	
Weight		
Minimum weight	45	

Maximum weight	89

The table 4.1.1 shows an overview of socio-demographic information of Medical Technologists including the participant's sex, age, height and weight. Female were more than (50.6%) male (49.4%) in this study. Total participants in this study was 158 and male was 78 and female was 80. In this study all the participant's was adult, the minimum age of participant's was 21 and maximum age of participant's was 48. The mean age was 31.27 years and SD (5.971). In terms of height, the minimum height was 5 feet and maximum height was 5 feet 11 inch. The minimum weight was 45 kg and maximum was 89 kg. Among all of the participants, most of the participants 51.9% (n=82) were between 21-28 years. Others participants 35.4% (n=56) were between 29-38 years & 12.7% (n=20) were between 39-48 years.

4.2 Prevalence of Work-related Musculoskeletal Symptoms of the Participants

Table 4.2.1: Prevalence of Work-related Musculoskeletal symptoms among Medical Laboratory Technologists

Variable	**Category**	**Frequency (n=158)**	**Percent (%)**
Musculoskeletal	No	1	0.6%
symptoms	Yes	157	99.4%

The table 4.2.1 presents the findings of the prevalence of Musculoskeletal symptoms among Medical Laboratory Technologists. Prevalence of musculoskeletal symptoms was

found 99.4%. From total participants (n=158), 157 participants was experienced musculoskeletal symptoms and 1 was not experienced.

Table 4.2.2: Prevalence of Work-related Musculoskeletal symptoms among male and female Medical Laboratory Technologists.

Category	Gender		
Musculoskeletal symptoms	Male	Female	Total
No	0	1	1
Yes	78	79	157
Total	78	80	158

The table 4.2.2 represents the findings of prevalence of Musculoskeletal symptoms among male and female Medical Laboratory Technologists. The total number of male participants was 78, from 78 male participants all was experience Musculoskeletal problems in any parts of the body region. The total number of female participants was 80, from 80 female participants 79 experienced Musculoskeletal problems (1 was found, who didn't experienced MSDs).

4.3 Twelve months prevalence of Work-related Musculoskeletal Symptoms among Medical Laboratory Technologists

In twelve months prevalence we found musculoskeletal problems/trouble in different body regions. The body regions are neck, shoulders, elbows, wrists/hands, upper back, lower back, one or both hips/thighs/buttocks, one or both knees, one or both ankles/feet.

Table 4.3.1: Last Twelve months prevalence of Work-related Musculoskeletal Symptoms among Medical Laboratory Technologists.

	Problems within last 12 months n (%)			
Body regions	**No**		**Yes**	
	Frequency	**Percent**	**Frequency**	**Percent**
Neck	14	8.9%	144	91.1%
Shoulders	39	24.7%	119	75.4%
Elbows	126	79.7%	32	19.67%
Wrists/hands	107	67.7%	51	32.2%
Upper back	149	94.3%	9	5.7%
Lower back	138	87.3%	20	12.7%
One or both hips/thighs/buttocks	116	73.4%	42	26.6%
One or both knees	133	84.2%	25	15.8%
One or both ankles/feet	150	94.6%	7	4.4%

The table 4.3.1 represents the findings of the prevalence of last 12 months work-related musculoskeletal symptoms among Medical Laboratory Technologists. Nordic Musculoskeletal Questionnaire was used to assess the prevalence of this population. This questionnaire divided human body into 9 parts of body regions. This questionnaire also have 3 sections. First section provided information about musculoskeletal problems within last 12 months, second section provided information about musculoskeletal problems of last 7 days and third section is about musculoskeletal problems preventing

daily activities within last 12 months. As shown in the table 4.3.1 musculoskeletal problems of neck was 91,1%, shoulder was 75.4%, elbow was 19.67%, wrists/hands score was 32.2%, upper back was 5.7%, lower back was 12.7%, hips/thighs/buttocks was 26.6%, knees was 15.8% and ankles/feet was 4.4%.

4.4 Seven days prevalence of Work-related Musculoskeletal Symptoms among Medical Laboratory Technologists

In seven days prevalence we found musculoskeletal problems/trouble in different body regions. The body regions are neck, shoulders, elbows, wrists/hands, upper back, lower back, one or both hips/thighs/buttocks, one or both knees, one or both ankles/feet.

Table 4.4.1: Last seven days prevalence of Work-related Musculoskeletal Symptoms among Medical Laboratory Technologists.

	Problems within last 7 days n (%)			
Body regions	**No**		**Yes**	
	Frequency	**Percent**	**Frequency**	**Percent**
Neck	24	15.2%	134	84.8%
Shoulders	66	41.8%	92	58.3%
Elbows	153	96.8%	5	3.2%
Wrists/hands	138	87.3%	20	12.7%
Upper back	152	96.2%	6	3.8%
Lower back	147	93.0%	11	7.0%

One or both hips/thighs/buttocks	92	58.2%	66	41.8%
One or both knees	153	96.8%	5	3.2%
One or both ankles/feet	156	98.7%	2	1.3%

The table 4.4.1 represents the findings of the prevalence of last 7 days work-related musculoskeletal symptoms among Medical Laboratory Technologists. As shown in the table 5 musculoskeletal problems of neck was 84.8%, shoulder was 58.3%, elbow was 3.2%, wrists/hands was 12.7%, upper back was 3.8%, lower back was 7.0%, hips/thighs/buttocks was 41.8%, knees was 3.2% and ankles/feet was 1.3%.

4.5 Twelve months prevalence of activity restriction among Medical Laboratory Technologists

In the section, we will find the results of what problems occur in daily activities due to musculoskeletal problems. The prevalence will show an overview of the last 12 months musculoskeletal problems, that prevent from carrying out normal activities (eg. job, housework, hobbies).

Table 4.5.1: Last Twelve months prevalence of activity restriction among Medical Laboratory Technologists.

	Problem preventing daily activities within last 12 months n (%)			
Body regions	**No**		**Yes**	
	Frequency	**Percent**	**Frequency**	**Percent**
Neck	17	10.8%	141	89.2%
Shoulders	67	42.4%	91	57.6%
Elbows	128	81.0%	30	19.0%
Wrists/hands	103	65.2%	55	34.8%
Upper back	138	87.3%	20	12.7%
Lower back	132	83.5%	26	16.5%
One or both hips/thighs/buttocks	60	38.0%	98	62.0%
One or both knees	151	95.6%	7	4.4%
One or both ankles/feet	153	96.8%	5	3.2%

The table 4.5.1 represents the findings of the last 7 days work-related musculoskeletal problems that prevented from carrying out daily activities and it has an negative impact on Medical Laboratory Technologist's daily life and productivity. As shown in the table 6 musculoskeletal problems of neck was 89.2%, shoulder was 57.6%, elbow was 19.0%, wrists/hands was 34.8%, upper back was 12.7%, lower back was 16.5%, hips/thighs/buttocks was 62.0%, knees was 4.4% and ankles/feet was 3.2%.

4.6 Most affected body region

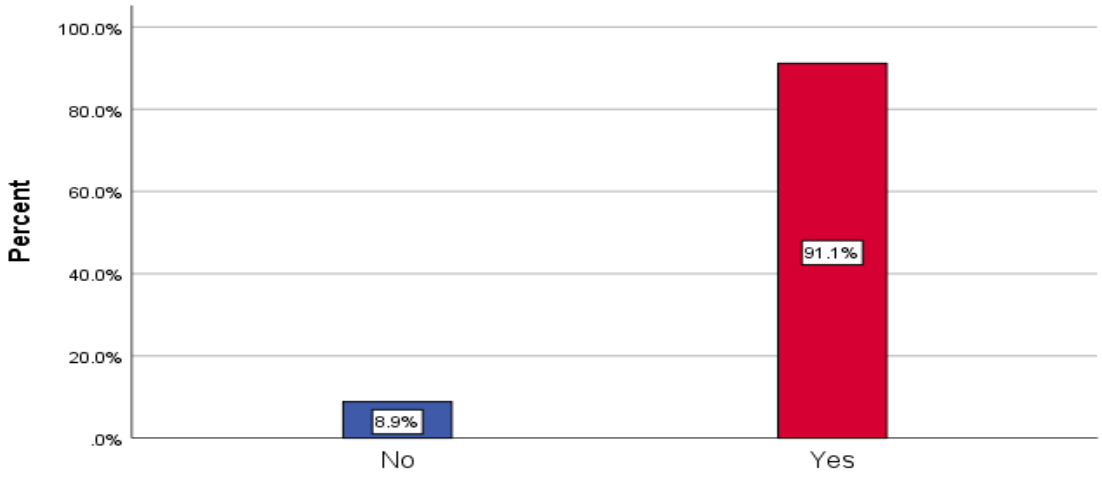

Figure 4.6.1: Musculoskeletal problems of neck within last 12 months.

Figure 4.6.1 shows that from the total participants, majority of the participants 91.1% had trouble/problem in neck and 8.9% participants had no trouble/problem in neck with last 12 months.

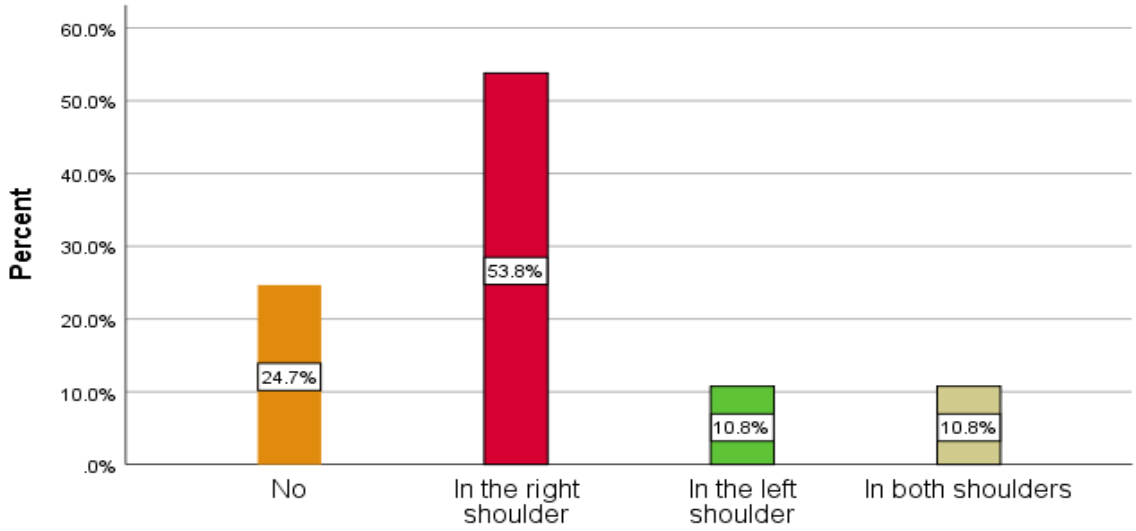

Figure 4.6.2: Musculoskeletal problems of shoulder within last 12 months.

Figure 4.6.2 shows that from the total participants, 24.7% participants had no trouble/problem in shoulder. On the other hand, majority of the participants 53.8% participants had trouble/problem in the right shoulder, 10.8% participants had trouble/problem in left shoulder and 10.8% participants had trouble/problem in both shoulders.

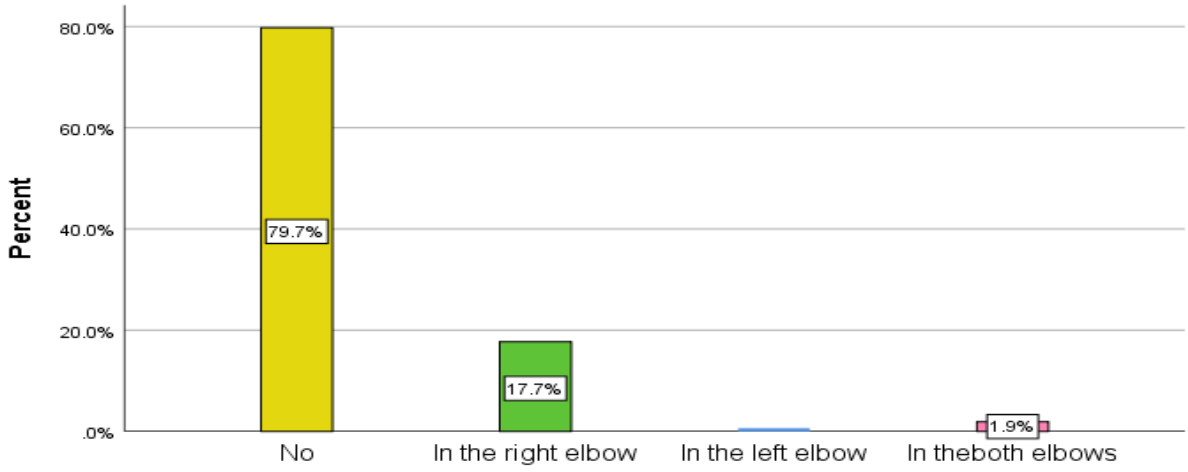

Figure 4.6.3: Musculoskeletal problems of elbow within last 12 months.

Figure 4.6.3 shows that from the total participants, majority of the participants 79.7% had no problem/trouble in elbow, only 17.7% participants had trouble/problem in the right elbow and 1.9% participants had trouble in the both elbows within last 12 months.

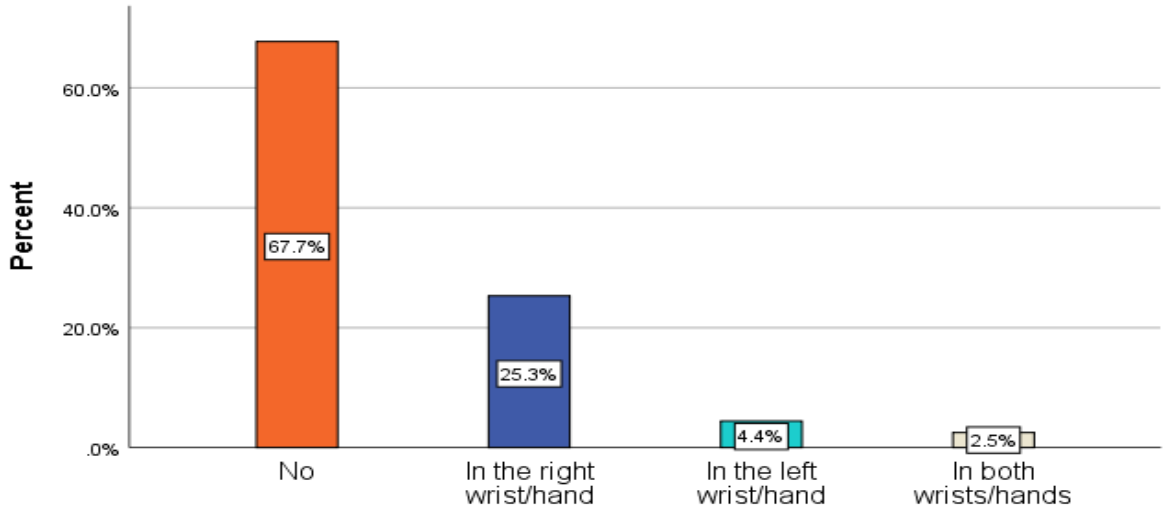

Figure 4.6.4: Musculoskeletal problems of wrists/hands within last 12 months.

Figure 4 shows that from the total participants, majority of the participants 67.7% had no trouble/problem in wrist/hand. On the other hand 25.3% participants had trouble/problem in the right wrist/hand, 4.4% participants had trouble in the left wrist/hand and only 2.5% participants had problem in both wrists/hands within last 12 months.

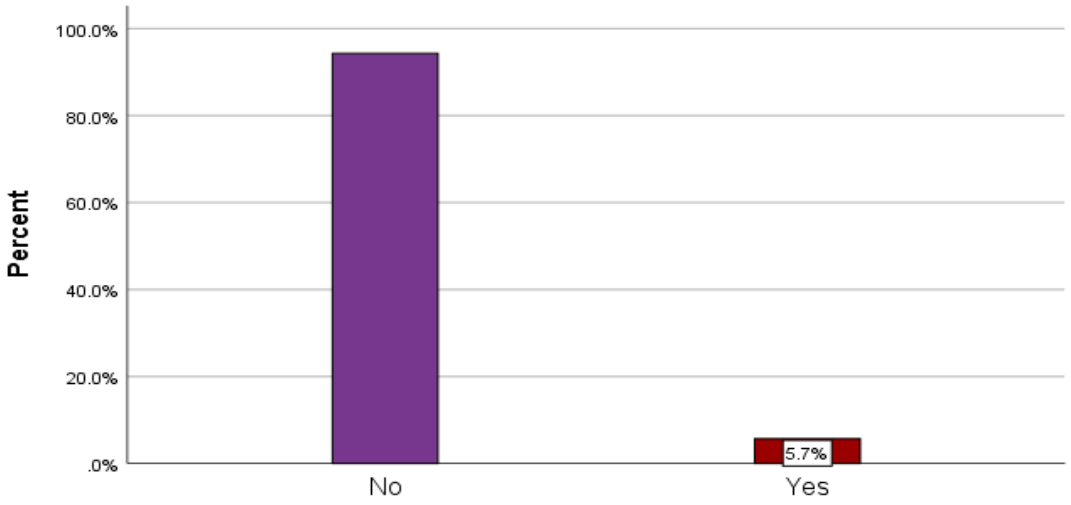

Figure 4.6.5: Musculoskeletal problems of upper back within last 12 months.

Figure 4.6.5 shows that from the total participants, only 5.7% participants had trouble/problem in upper back and majority participants had no problem in upper back within last 12 months.

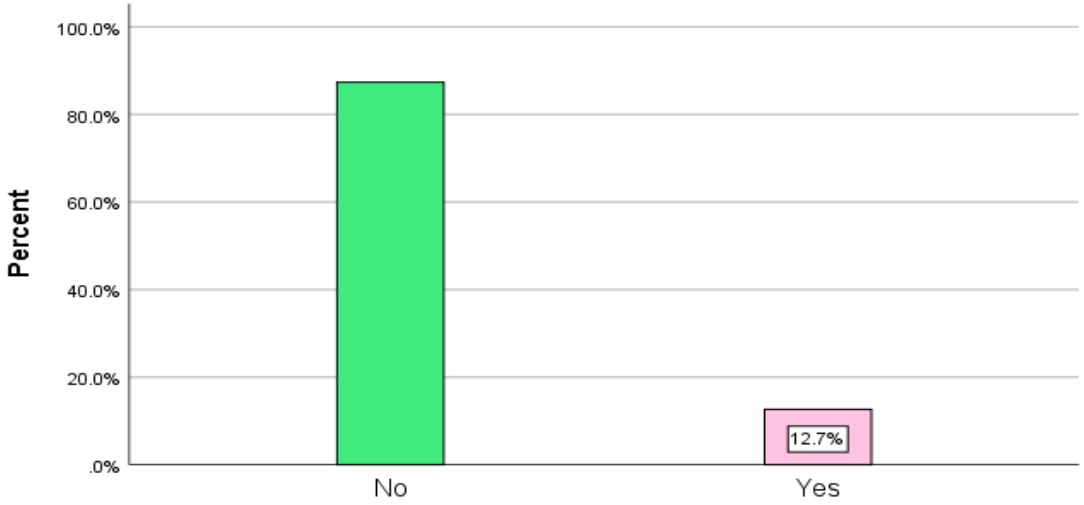

Figure 4.6.6: Musculoskeletal problems of lower back within last 12 months.

Figure 4.6.6 shows that from the total participants, only 12.7% participants had trouble/problem in lower back and majority of the participants had no problem in lower back within last 12 months.

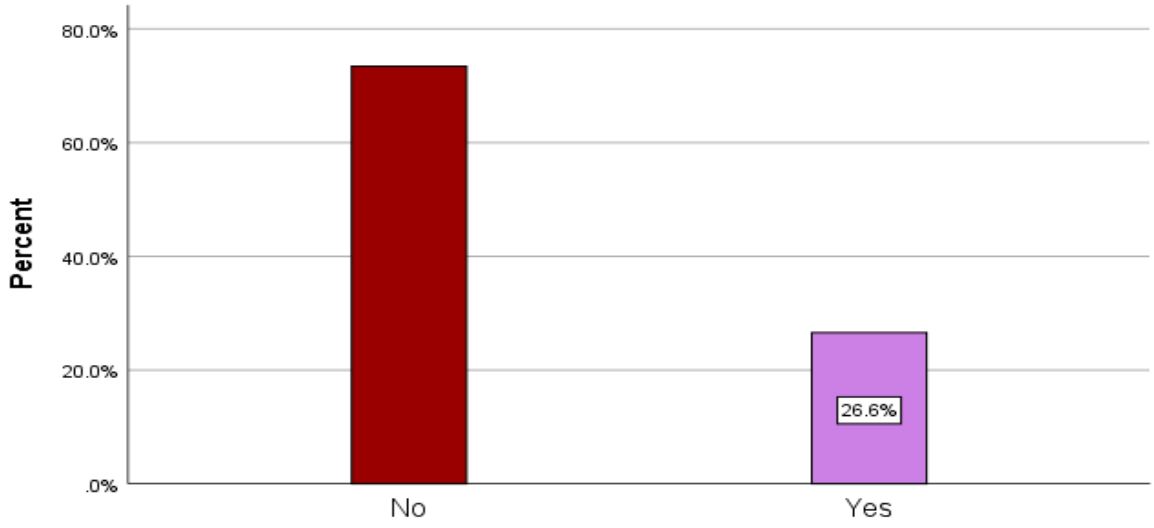

Figure 4.6.7: Musculoskeletal problems of one or both hips/thighs/buttocks within last 12 months.

Figure 4.6.7 shows that from the total participants, only 26.6% participants had trouble/problem of one or both hips/thighs/buttocks and majority of the participants had no problem/trouble of one or both hips/thighs/buttocks within last 12 months.

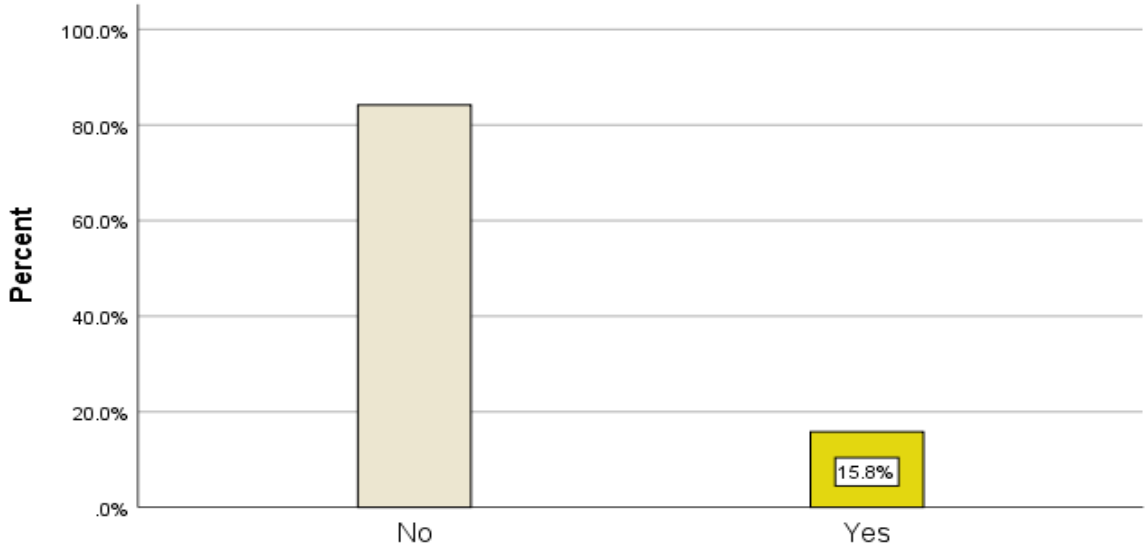

Figure 8: Musculoskeletal problems of one or both knees within last 12 months.

Figure 4.6.8 shows that from the total participants, only 15.8% participants had trouble/problem of one or both knees and majority of the participants had no problem/trouble of one or both knees within last 12 months.

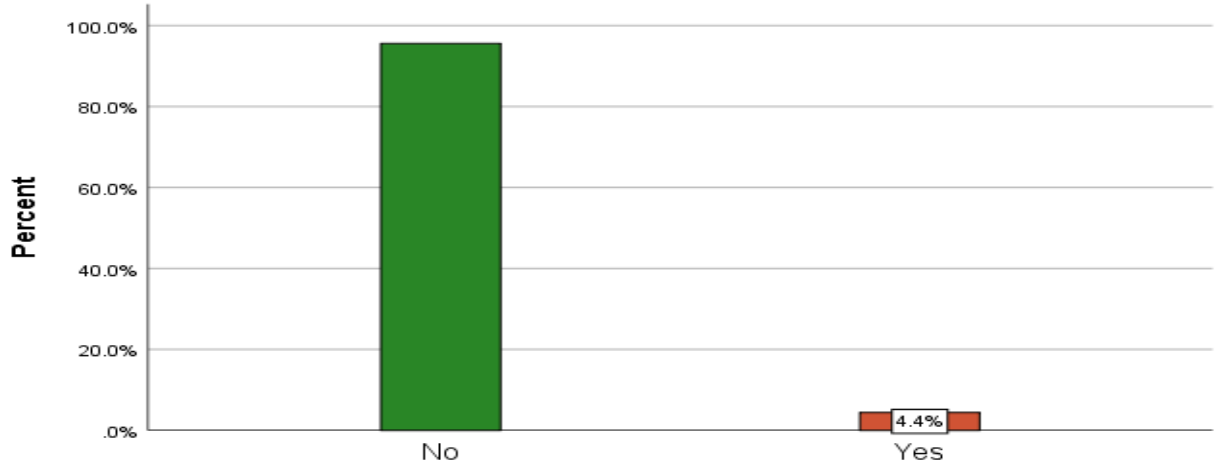

Figure 4.6.9: Musculoskeletal problems of one or both ankles/feet within last 12 months.

Figure 4.6.9 shows that from the total participants, only 4.4% participants had trouble/problem of one or both ankles/feet and majority of the participants had no problem/trouble of one or both ankles/feet within last 12 months.

According to the findings of charts, the results that within last 12 months, the Musculoskeletal problems were commonly seen in the neck, shoulders, wrists/hand, one or both hips/thighs/buttocks and elbows. During this period, majority of the study participants had trouble in neck (91.1%), shoulders (in the right shoulder 53.8%, in the left shoulder 10.8% and in both shoulders 10.8%), wrists/hands (in the right wrist/hand 25.3%, in the left wrist/hand 4.4% and in both wrists/hands 2.5%), one or both hips/thighs/buttocks (26.6%) and elbows (in the right elbow 17.7% and in the both elbows 1.9%). So, neck, shoulders, wrists/hand, one or both hips/thighs/buttocks and elbows were the most affected body region.

CHAPTER V: Discussion

This study was carried out in Dhaka city of Bangladesh. The number of participants was 158 Medical Laboratory Technologists. The study aimed to determine the prevalence of work-related musculoskeletal symptoms among medical laboratory technologists. It was cross-sectional study.

In this study, from 158 participants, 78 participants were male and 80 participants were female. Minimum age of participants was 21 years and maximum was 48 years. The mean age in this study was 31.27 years. In other authors found the mean age as 35.02 years (AlNekhilan et al., 2020) and 34.65 years (Kumari et al,. 2022). Participant's minimum weight was 45 kg and maximum was 89 kg. The mean weight was 63.58 kg. A cross-sectional study was carried out on occupational and physical therapists prevalence of work-related musculoskeletal disorders, when other authors found the mean weight as 70.71 kg (Himan et al., 2017). Participant's minimum height was 5 feet and maximum was 5 feet 11 inch when other authors found 151 cm and 187 cm (Himan et al., 2017).

The first objective of the study was to find out the prevalence of work- related musculoskeletal symptoms of medical laboratory technologists. The findings of prevalence was 99.4% had WRMSSs and 0.6% had no WMSDs when other authors found WMSDs prevalence as 82% (Alnekhilan et al., 2020). It was an important findings that, male's musculoskeletal problems score is more than female. Other articles did not find out the prevalence. Twelve months work-related musculoskeletal problems/trouble in different body regions were reported in the following order of occurrence: neck

(91.1%), shoulders (75.4%), wrists/hands (32.2%), one or both hips/thighs/buttocks (26.6%), elbows (19.67%), one or both knees (15.8%), lower back (12.7%), upper back (5.7%), and one or both ankles/feet (4.4%). During this period, majority of the study participants had trouble in neck (91.1%) and neck was the most affected body region. Evidence also reported the findings that, shoulders were the most commonly affected region (86%), followed by neck (73%) and lower back (64%) (October, Shi Zhe Gabriel, Melvin Seng & Gan Wee Hoe, 2020). The investigator observed that the participants worked in the same position for long period of time, they do not adhere to proper posture, perform different hand activities repeatedly, which causes them to develop various types of Musculoskeletal Disorders. Previous studies mentioned the same findings that: the possible reason maybe the because of risk factors such as awkward sustained postures and repetitive forceful movements were observed during their work activities and MSDs were also associated with reduced work ability (October, Shi Zhe Gabriel, Melvin Seng & Gan Wee Hoe, 2020). Seven days work-related musculoskeletal problems/trouble in different body regions were reported in the following order of occurrence: neck (84.8%), shoulders (58.3%), one or both hips/thighs/buttocks (41.8%), wrists/hands (12.7%), lower back (7.0%), upper back (3.8), elbows (3.2%), one or both knees(3.2%) and one or both ankles/feet (1.3%). During this period, majority of the study participants had trouble in neck (84.8%) and neck was the most affected body region. Evidence also reported the findings that, one or both ankles/feet was the most commonly affected region (28.7%), followed by lower back (20%), one or both knees (17.3%) and neck (16.7%) (Kumari et al., 2022). Twelve months work-related musculoskeletal problems/trouble in different body regions that creates a restrictions and trouble from carrying out normal activities

(such as job, housework, hobbies etc) were reported in the following order of occurrence: neck (89.2%), one or both hips/thighs/buttocks (62.0%), shoulders (57.6%), wrists/hands (34.8%), elbows (19.0%), lower back (16.5%), upper back (12.7%), one or both knees (4.4%) and one or both ankles (3.2%). During this period, majority of the study participants had trouble in carrying out normal daily living activities in neck (89.2%). But another author found as elbows (98%) (Kumari et al., 2022).

The another objectives of the study to identify most affected body region by musculoskeletal symptoms. The study found that, during this period, majority of the study participants had trouble in neck (91.1%), shoulders (75.4%), wrists/hands (32.3%) and one or both hips/thighs/buttocks (26.6%). According to the overviews of findings, within last 12 months, the MSDs problems majority participants had trouble in right shoulder (53.8%), right wrist/hands (25.3%) and right elbow (17.7). But in many studies this information of the findings was not found. Work-related musculoskeletal disorders (WMSDs) are responsible for morbidity in many working populations. Apart from lowering the quality of worker's life and reducing the productivity (Sandul & Paramasivab, 2014). So the impact of WMSDs affects in our every day functioning, activities of daily living and also in our productivity. But, to the best of the investigator's knowledge there is no any study conducted in Bangladesh before which determine the WMSDs specifically among medical laboratory technologists. So this study will support and contribute in literature to investigate this study further. Lots of studies conducted in many countries among medical laboratory technologists to determine the prevalence. But in Bangladesh studies was conducted to determine the prevalence of WMSDs among other populations such as garment workers, metal workers, automobile mechanics,

sawmill workers, rural house makers, office workers, bank workers, medical health workers and so on. However, there are some limitations of this study, the study comprises small sample size and data was collected only from three hospitals. So, if a study will be conducted on large group of participants, the result would be more clear and effective.

CHAPTER VI: Conclusion

6.1 Strengths and limitations

6.1.1 Strengths

- This was the first study among Medical Laboratory Technologists in Bangladesh.
- Nordic Musculoskeletal Questionnaire was used in this study and author permitted to use the tool.
- The study was time effective.
- The researcher find out MSDs prevalence among man and women participants. Other literature's author did not find out this prevalence.
- The response of the participants in this study was quite good.

6.1.2 Limitations

There were some limitations of the study. They are,

- The sample size was relatively small in number, if this study compared with other published study, for the reason, the limited sample may often change the study outcome and sometimes, it does not represent the actual impression of investigation.

- The limited sample was taken from selected study setting. Data was collected from 3 hospital's medical laboratory technologists, which does not signify the total population.
- The investigator did not found any one literature related to prevalence of musculoskeletal disorders among medical laboratory technologists in Bangladeshi perspective for comparing the findings between them.

6.2 Practice Implication

6.2.1 Organization Based Practice Implication

Organizational structure, environment and factors play a vital role in developing WMSDs. So it is essential to develop an MSDs policy to improve work organization and psychosocial environment in the workplace and promote musculoskeletal health.

6.2.2 Workplace MSDs Prevention Practice

Musculoskeletal disorders remain a substantial burden to society and to workplaces worldwide. So, it is high time to take prevention against MSDs. Effective MSDs prevention programmes must be based on psychosocial and organizational considerations.

6.2.3 Recommendation for Further Research

Some recommendations for doing research are as follow:

- Risk factors for work-related musculoskeletal disorders.
- Identify the association between work-related musculoskeletal disorders and ergonomic risk assessment.
- Evaluation of working posture and prevalence of musculoskeletal symptoms among medical laboratory technologists.
- Factors associated with musculoskeletal disorders among medical laboratory technologists.

6.3 Conclusion

The purpose of this study was to determine the prevalence of work-related musculoskeletal disorders among medical laboratory technologists. This is the first narration on prevalence of work-related MSDs among this population group (Medical Laboratory Technologists) in Bangladesh. The study contributes to our understanding of the socio-demographic characteristics and current status of MSDs of this population. The study has found that, the MSDs problems were commonly seen in the neck, shoulders, wrists/hand, one or both hips/thighs/buttocks and elbows among this population. The researcher has also found that, within last 12 months, the MSDs problems majority participants had trouble in right shoulder, right wrist/hands and right elbow. So, medical laboratory technologists are at a high risk of WMSDs and it is very much necessary to take appropriate and effective corrective preventive action to prevent them from WMSDs

reoccurrence. Screening and management of these highly vulnerable sites could play a primary role in reducing WMSDs injuries. A first step to prevent MSDs would be to provide education about proper body mechanics during work duties and to conduct research evaluating the medical laboratory technologist's working environments.

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APPENDICES

Appendix A: Ethical Approval Form

BANGLADESH HEALTH PROFESSIONS INSTITUTE

বাংলাদেশ হেল্‌থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)
Bangladesh Health Professions Institute (BHPI)
(The Academic Institute of CRP)

Ref: CRP/BHPI/IRB/09/22/652

Date: 28th September, 2022

Sathi Moni Jonaki
4th Year B.Sc. in Occupational Therapy
Session: 2017-2017, Student ID: **122170264**
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal "Prevalence of Work-Related Musculoskeletal Disorders among Medical Laboratory Technologists in Dhaka city" by ethics committee.

Dear Sathi Moni Jonaki
Congratulations.
The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above-mentioned dissertation, with yourself, Nayan Kumer Chanda as thesis supervisor. The Following documents have been reviewed and approved:

Sr. No.	Name of the Documents
1	Thesis Proposal
2	Questionnaire
3	Information sheet & consent form.

The purpose of the study is to determine the prevalence of Work-Related Musculoskeletal Disorders among Medical Laboratory Technologists in Dhaka city. The study involves use of a standardized questionnaire instruments to determine the prevalence of Work-Related Musculoskeletal Disorders among Medical Laboratory Technologists in Dhaka city that may take 20 to 30 minutes to answer in the questionnaire, Nordic Musculoskeletal Questionnaire (NMQ and there is no likelihood of any harm to the participants. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 8.30 AM on 27th August, 2022. at BHPI (32nd IRB Meeting).

The institutional Ethics committee 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. This Ethics committee is working accordance to Nuremberg Code 1947, World Medical Association Declaration of Helsinki, 1964 - 2013 and other applicable regulation.

Best regards,

Muhammad Millat Hossain
Associate Professor, Dept. of Rehabilitation Science
Member Secretary, Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

সিআরপি-চাপাইন, সাভার, ঢাকা-১৩৪৩, বাংলাদেশ। ফোন: +৮৮ ০২ ২২৪৪৪৫৪৬৪-৫, +৮৮ ০২ ২২৪৪৪১৪০৪, মোবাইল: +৮৮ ০১৭৩০ ০৫৯৬৪৭
CRP-Chapain, Savar, Dhaka-1343, Bangladesh. Tel: +88 02 224445464-5, +88 02 224441404, Mobile: +88 01730059647
E-mail : principal-bhpi@crp-bangladesh.org, Web: bhpi.edu.bd

Permission Letter of three hospitals

1.BSMMU Hospital's permission letter

Attention to
Dr. Saiful
Ul-Islam

2nd November, 2022
To
President
Laboratory Service Centre.
Bangabandhu Sheikh Mujib Medical University (BSMMU).
Shahbag, Dhaka-1000
Subject: Prayer for seeking permission to collect data for the research.

Sir,
I beg most respectfully to state that, I am a student of 4th year B.Sc. in Occupational Therapy of Bangladesh Health Professions Institute (BHPI). I have to submit a research to the University to fulfill the partial requirements of the degree of B.Sc. in Occupational Therapy. My research title is "Prevalence of Work-Related Musculoskeletal Disorders among Medical Laboratory Technologists in Dhaka city". As it is a quantitative study I have to take face to face interview and collect data of Medical Laboratory Technologists. Now I am looking for your kind approval to start my data collection from laboratory service centre of BSMMU and I would like to assure that anything of my research will not be harmful for the participant and also for the laboratory unit.
I therefore, pray and hope that you would be kind enough to give me the permission to collect data for the research and will help me to conduct a successful study as a part of my course and oblige thereby.

I remain sir,
Your most obediently
Sathi Moni Jonaki
4th year student of B.Sc. in Occupational Therapy.
Bangladesh Health Profession Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343.

21/11/22
Mr. Russel
Super visor
DR. MD. SAIFUL ISLAM
MBBS,M.Phil (Clin. Path)
Associate Professor
Department of Laboratory Medicine
BSMMU, Shahbag, Dhaka

Forwarded for your kind consideration and permission for data collection to conduct her research.
21/11/2022
S.K. Nurul Uzzaman
Associate Professor & Head
Dept. of Occupational Therapy
BHPI, CRP, Savar, Dhaka-1343

2.BIHS Hospital's permission letter

2nd November, 2022
To
Director General
Bangladesh Institute of Health Sciences General Hospital (BIHS)
An associate organization of BERDEM
125, 1 Darus Salam Rd, Dhaka-1216
Subject: Prayer for seeking permission to collect data for the research.

Sir,
I beg most respectfully to state that, I am a student of 4th year B.Sc. in Occupational Therapy of Bangladesh Health Professions Institute (BHPI). I have to submit a research to the University to fulfill the partial requirements of the degree of B.Sc. in Occupational Therapy. My research title is "Prevalence of Work-Related Musculoskeletal Disorders among Medical Laboratory Technologists in Dhaka city". As it is a quantitative study I have to take face to face interview and collect data of Medical Laboratory Technologists. Now I am looking for your kind approval to start my data collection from laboratory department of BIHS and I would like to assure that anything of my research will not be harmful for the participant and also for the laboratory unit.
I therefore, pray and hope that you would be kind enough to give me the permission to collect data for the research and will help me to conduct a successful study as a part of my course and oblige thereby.

I remain sir,
Your most obediently
Sathi Moni Jonaki
4th year student of B.Sc. in Occupational Therapy.
Bangladesh Health Profession Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343.

Forwarded for your kind consideration and permission for data collection to conduct her research.

02/11/2022
Sk. Mohiruzzaman
Associate Professor & Head
Dept. of Occupational Therapy
BHPI, CRP, Savar, Dhaka-1343

Allowed
09/11/22

3.Government Employee Hospital's permission letter

2nd November, 2022
To
In charge of Pathology Department
Government Employee Hospital
Fulbaria, Dhaka-1000
Subject: Prayer for seeking permission to collect data for the research.

Sir,
I beg most respectfully to state that, I am a student of 4th year B.Sc. in Occupational Therapy of Bangladesh Health Professions Institute (BHPI). I have to submit a research to the University to fulfill the partial requirements of the degree of B.Sc. in Occupational Therapy. My research title is "Prevalence of Work-Related Musculoskeletal Disorders among Medical Laboratory Technologists in Dhaka city". As it is a quantitative study I have to take face to face interview and collect data of Medical Laboratory Technologists. Now I am looking for your kind approval to start my data collection from pathology department of the hospital and I would like to assure that anything of my research will not be harmful for the participant and also for the laboratory unit.
I therefore, pray and hope that you would be kind enough to give me the permission to collect data for the research and will help me to conduct a successful study as a part of my course and oblige thereby.

I remain sir,
Your most obediently
Sathi Moni Jonaki
4th year student of B.Sc. in Occupational Therapy.
Bangladesh Health Profession Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343.

Forwarded for your kind consideration and permission for data collection to conduct her research.

02/11/2022
Sk. Moniruzzaman
Associate Professor & Head
Dept. of Occupational Therapy
BHPI, CRP, Savar, Dhaka-1343

Allowed
20.11.2022
Md. Rayhanul Islam
Lab In-Charge
Sarkari Karmachari Hospital
Fulbaria, Dhaka

Appendix B: Consent form, Information sheet and withdrawal form [English Version]

Consent Form

The researcher 'Sathi Moni Jonaki' is a student of Bangladesh Health Professions Institute (BHPI) in Occupational Therapy in 4th Year. As a part of Occupational Therapy course, she has conducted a study with Medical Laboratory Technologists in Dhaka city. The study is entitled as “Prevalence of Work-Related Musculoskeletal Disorders among Medical Laboratory Technologists.”

In this study I am.....a participant and I have been clearly informed about the purpose of the study. I have the right to refuse in taking part at any time and at any stage of the study. I will not be bound to answer to anybody. I understand that there will be no impact receiving treatment at present or in the future by participating in this study. I am also informed that, all the information collected from the interview that is used in the study would be kept safe and maintain confidentiality. Even, my name and address will not published anywhere in this study.

I can consult with the researcher and the research supervisor about the research process or get answers to any questions regarding the research project. I have been informed about the above-mentioned information and I am willing to participate in the study with consent.

Signature of the participant: Date:

Signature of the researcher: Date:

Information sheet

This is to inform you that Sathi Moni Jonaki is a 4 year student of Bangladesh Health Professions Institute of Occupational Therapy Department, the academic institute of CRP. She is conducting a research which is part of course curriculum. The researcher would like to invite you to participate the study. The research title is “Prevalence of Work-Related Musculoskeletal Disorders among Medical Laboratory Technologists in Dhaka city”. By conducting the research, the researcher will find out the prevalence of Work-Related Musculoskeletal Disorders of Medical Laboratory Technologists. Your participation in the study is voluntary. You can withdraw your information anytime. No fee will be paid to participant. You will not be harmed by participating in this research. You can gain knowledge and be aware about your health by participating.

All your information will be kept confidential. If you have any query regarding the study, please feel free to ask to the contact address given below.

Sathi Moni Jonaki.

4th year, B.Sc in Occupational Therapy.

Bangladesh Health Professions Institute.

Gmail: sathimonijonaki255@gmail.com

Withdrawal form

Participant name:

Reason for withdrawal:

.....

.....

.....

.....

.....

Participant signature:

Date:

Appendix B:Consent form, Information sheet and withdrawal form [Bengali Version]

সম্মতি পত্র

গবেষক 'সাথী মনি জোনাকি' বাংলাদেশ হেলথ প্রফেশনস ইনস্টিটিউটের(বিএইচপিআই) অকুপেশনাল থেরাপি বিভাগের ৪র্থ বর্ষের ছাত্রী। অকুপেশনাল থেরাপি কোর্সের অংশ হিসাবে, তিনি ঢাকা শহরের মেডিকেল ল্যাবরেটরি টেকনোলজিস্টদের সাথে একটি গবেষণা পরিচালনা করেছেন। গবেষণার শিরোনাম "মেডিকেল ল্যাবরেটরি টেকনোলজিস্টদের মধ্যে কাজের-সম্পর্কিত পেশীর ব্যাধির প্রকোপ"।

এই গবেষণায়, আমি.....একজন অংশগ্রহণকারী এবং আমাকে গবেষণার উদ্দেশ্য সম্পর্কে স্পষ্টভাবে অবহিত করা হয়েছে। গবেষণার যে কোন সময় এবং যে কোন পর্যায়ে অংশ নিতে আমার প্রত্যাখ্যান করার অধিকার আছে। আমি কাউকে জবাব দিতে বাধ্য হব না। এই গবেষণায় অংশগ্রহণ করে বর্তমানে বা ভবিষ্যতে আমার উপর কোন প্রভাব পড়বে না।আমাকে আরও জানানো হয়েছে যে, গবেষণায় ব্যবহৃত ইন্টারভিউ থেকে সংগৃহীত সমস্ত তথ্য নিরাপদ রাখা হবে এবং গোপনীয়তা বজায় রাখা হবে। এমনকি, আমার নাম ঠিকানা এই গবেষণায় কোথাও প্রকাশ করা হবে না।

আমি গবেষণা প্রক্রিয়া সম্পর্কে গবেষক এবং গবেষণা তত্ত্বাবধায়কের সাথে পরামর্শ করতে পারি বা গবেষণা প্রকল্প সম্পর্কিত যেকোনো প্রশ্নের উত্তর পেতে পারি। আমাকে উপরে উল্লিখিত তথ্য সম্পর্কে অবহিত করা হয়েছে এবং আমি সম্মতি সহ গবেষণায় অংশগ্রহণ করতে ইচ্ছুক।

অংশগ্রহণকারীর স্বাক্ষর: তারিখঃ

গবেষকের স্বাক্ষর: তারিখঃ

তথ্যপত্র

আপনাকে জানানো যাচ্ছে যে সাথী মনি জোনাকি সিআরপির একাডেমিক ইনস্টিটিউট বাংলাদেশ হেলথ প্রফেশনাল ইনস্টিটিউট অফ অকুপেশনাল থেরাপি বিভাগের ৪র্থ বর্ষের ছাত্র। তিনি একটি গবেষণা পরিচালনা করছেন যা পাঠ্যক্রমের অংশ। গবেষক আপনাকে গবেষণায় অংশগ্রহণের জন্য আমন্ত্রণ জানাতে চান। গবেষণার শিরোনাম "ঢাকা শহরের মেডিক্যাল ল্যাবরেটরি টেকনোলজিস্টদের মধ্যে কাজ-সম্পর্কিত পেশীর ব্যাধির ব্যাপকতা" গবেষণা পরিচালনা করে, গবেষক মেডিকেল ল্যাবরেটরি টেকনোলজিস্টদের কাজ-সম্পর্কিত মাসকুলোস্কেলিটাল ডিসঅর্ডারগুলির ব্যাপকতা খুঁজে বের করবেন। আপনি স্বেচ্ছাসেবী হিসাবে অধ্যয়নে অংশগ্রহণ করবেন। আপনি যে কোনো সময় আপনার তথ্য প্রত্যাহার করতে পারেন। অংশগ্রহণকারীকে কোন ফি প্রদান করা হবে না। এই গবেষণায় অংশগ্রহণ করে আপনার কোনো ক্ষতি হবে না। অংশগ্রহণ করে আপনি জ্ঞান অর্জন করতে পারেন এবং আপনার স্বাস্থ্য সম্পর্কে সচেতন হতে পারেন।

আপনার সকল তথ্য গোপন রাখা হবে। অধ্যয়ন সংক্রান্ত আপনার কোন প্রশ্ন থাকলে, অনুগ্রহ করে নিচে দেওয়া যোগাযোগের ঠিকানায় নির্দ্বিধায় জিজ্ঞাসা করুন।

সাথী মনি জোনাকি

৪র্থ বর্ষ, বিএসসি ইন অকুপেশনাল থেরাপি

বাংলাদেশ হেলথ প্রফেশনস ইনস্টিটিউট

জিমেইল: sathimonijonaki255@gmail.com

প্রত্যাহার পত্র

অংশগ্রহণকারীর নামঃ

প্রত্যাহারের কারণঃ

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অংশগ্রহণকারীর স্বাক্ষরঃ

তারিখঃ

Appendix C: Questionnaire

Nordic Musculoskeletal Questionnaire

Please answer by using the tick boxes ☑
– *one tick for each question*

Please note that this part of the questionnaire should be answered, even if you have never had trouble in any parts of your body.

Have you at any time during the **last 12 months** had **trouble (such as ache, pain, discomfort, numbness)** in:	Have you had **trouble** during the **last 7 days:**	During the **last 12 months** have you been **prevented** from carrying out normal activities (eg. job, housework, hobbies) **because** of this trouble:
1 ***Neck*** No 1☐ Yes 2☐	2 ***Neck*** No 1☐ Yes 2☐	3 ***Neck*** No 1☐ Yes 2☐
4 ***Shoulders*** No 1☐ Yes 2☐ in the right shoulder; 3☐ in the left shoulder; 4☐ in both shoulders	5 ***Shoulders*** No 1☐ Yes 2☐ in the right shoulder; 3☐ in the left shoulder; 4☐ in both shoulders	6 ***Shoulders (both/either)*** No 1☐ Yes 2☐
7 ***Elbows*** No 1☐ Yes 2☐ in the right elbow; 3☐ in the left elbow; 4☐ in both elbows	8 ***Elbows*** No 1☐ Yes 2☐ in the right elbow; 3☐ in the left elbow; 4☐ in both elbows	9 ***Elbows (both/either)*** No 1☐ Yes 2☐
10 ***Wrists/hands*** No 1☐ Yes 2☐ in the right wrist/hand; 3☐ in the left wrist/hand; 4☐ in both wrists/hands	11 ***Wrists/hands*** No 1☐ Yes 2☐ in the right wrist/hand; 3☐ in the left wrist/hand; 4☐ in both wrists/hands	12 ***Wrists/hands (both/either)*** No 1☐ Yes 2☐
13 ***Upper back*** No 1☐ Yes 2☐	14 ***Upper back*** No 1☐ Yes 2☐	15 ***Upper back*** No 1☐ Yes 2☐
16 ***Lower back (small of the back)*** No 1☐ Yes 2☐	17 ***Lower back*** No 1☐ Yes 2☐	18 ***Lower back*** No 1☐ Yes 2☐
19 ***One or both hips/thighs/buttocks*** No 1☐ Yes 2☐	20 ***Hips/thighs/buttocks*** No 1☐ Yes 2☐	21 ***Hips/thighs/buttocks*** No 1☐ Yes 2☐
22 ***One or both knees*** No 1☐ Yes 2☐	23 ***Knees*** No 1☐ Yes 2☐	24 ***Knees*** No 1☐ Yes 2☐
25 ***One or both ankles/feet*** No 1☐ Yes 2☐	26 ***Ankles/feet*** No 1☐ Yes 2☐	27 ***Ankles/feet*** No 1☐ Yes 2☐

Figure 2 Musculoskeletal questionnaire

Appendix D: Supervision Record Sheet

Bangladesh Health Professions Institute
Department of Occupational Therapy
4th Year B. Sc in Occupational Therapy
OT 401 Research Project

Thesis Supervisor- Student Contact; face to face or electronic and guidance record

Title of thesis: Prevalence of Work-Related Musculoskeletal Symptoms among Medical Laboratory Technologists in Dhaka City.

Name of student: Sathi Moni Jonaki

Name and designation of thesis supervisor: Nayan Kumer Chanda, Assistant Professor, Department of Occupational Therapy , Bangladesh Health Professions Institute (BHPI)

Appointment No	Date	Place	Topic of discussion	Duration (Minutes/ Hours)	Comments of student	Student's signature	Thesis supervisor signature
1	18.8.22	BHPI Office Building	Research topic, title	30 mins	Explanation about research idea	Sathi	
2	24.8.22	BHPI Office Building	Research title correction	30 mins	New idea for research development.	Sathi	
3	25.8.22	Library	Research title final	1 hour	Clear explanation about methodology	Sathi	

4	27.8.22	BHPI Office Building	Proposal Presentation feedback	1 hour	feedback of presentation	Sathi	
5	28.8.22	BHPI Office Building	Research proposal document submission	40 mins	Final correction	Sathi	
6	~~17.9.22~~ 3.9.22	BHPI Office Building	Research proposal 1st submission	40 mins	Refining final research proposal	Sathi	
7	14.9.22	BHPI Office Building	Research proposal correction	1 hour	Introduction review correction	Sathi	
8	26.9.22	BHPI Office Building	Research proposal correction	1 hour	Literature review correction	Sathi	
9	27.9.22	BHPI Office Building	Research proposal correction	1 hour	Methods correction	Sathi	
10	8.10.22	BHPI Office Building	Research proposal correction	1 hour	Methods recorrection	Sathi	
11	16.10.22	BHPI Office Building	Research draft	1 hour	Introduction part submission	Sathi	
12	19.10.22	BHPI Office Building	Research draft	1 hour	Literature review submission	Sathi	
13	26.10.22	BHPI Office Building	Research draft	1 hour	Result part submission.	Sathi	
14	5.11.22	BHPI Office Building.	Research draft	1 hour	Discussion submission	Sathi	

15	9.11.22	BHPI office Building	Research draft	1 hour	Methodology Discussion	Sathi	
16	16.11.22	BHPI office Building	Research draft	1 hour	Methodology correction	Sathi	
17	21.11.22	BHPI office Building	Questionnaire submission	30 mins	Questionnaire discussion	Sathi	
18	2.12.22	BHPI office Building	Questionnaire feedback	30 mins	Questionnaire discussion and data	Sathi	
19	9.12.22	BHPI office Building	Data input in spss discussion	1 hour	Effective feedback	Sathi	
20	13.12.22	BHPI office Building	Variable setup	1 hour	Effective feedback	Sathi	
21	24.12.22	BHPI Office Building	Data input	1 hour	Effective feedback.	Sathi	
22	27.12.22	BHPI Office Building	Data analysis	1 hour	Effective feedback	Sathi	
23	28.12.22	BHPI Office Building	Chi-square test	1 hour	Need clear explanation	Sathi	
24	29.12.22	BHPI Office Building	Introduction and literature review	1 hour	Introduction and Literature review feedback	Sathi	
25	31.12.22	BHPI office Building	Recode, descriptive analysis discussion	1 hour	Feedback	Sathi	

26	1.1.23	BHPI office Building	Result's discussion and feedback	1 hour	How to organize each things in result section.	Sathi	Nguyen
27	3.1.23	BHPI office Building	Result and discussion part feedback	1 hour	How to link discussion part with result.	Sathi	Nguyen
28	8.1.23	BHPI office Building	Methodology discussion	1 hour	Need more supervision for study degine.	Sathi	Nguyen
29	16.1.23	BHPI office Building	Methodology discussion	1 hour	Need more supervision for sampling technique	Sathi	Nguyen
30	19.1.23	BHPI office Building	Methodology discussion	1 hour	Need more supervision for data interethical consideration	Sathi	Nguyen
31	21.1.23	BHPI office Building	Methodology discussion	1 hour	sample size discussion	Sathi	Nguyen
32	23.1.23	BHPI office Building	Methodology discussion	1 hour	Inclusion criteria correction	Sathi	Nguyen
33	30.1.23	BHPI office Building	Methodology discussion	1 hour	Exclusion criteria correction	Sathi	Nguyen
34	6.2.23	BHPI office Building	Table, figure discussion	1 hour	need more information	Sathi	Nguyen
35	9.2.23	BHPI office Building	Table, figure discussion	1 hour	Effective supervision	Sathi	Nguyen
36	11.2.23	BHPI office Building	Reference discussion	1 hour	Effective supervision	Sathi	Nguyen

37	13.2.23	BHPI office Building	Appendix discussion	1 hour	Effective discussion	Sathi	Nagu
38	2.5.23	BHPI office Building	Thesis Book final draft submission and discussion	1 hour	Feedback was informative	Sathi	Nagu
39	7.5.23	BHPI Office Building	Thesis presentation discussion	1 hour	Require more supervision.	Sathi	Nagu
40	15.5.23	BHPI office Building	Thesis defence presentation feedback	1 hour	Need some correction	Sathi	Nagu
41	3.6.23	BHPI office Building	Final Feedback of book submission	1 hour	Overall feedback for final thesis and effective feedback	Sathi	Nagu
42	4.6.23	BHPI office Building	Find Feedback for book binding	~~1 hour~~ 30 mins	Title correction and general feedback	Sathi	Nagu
43							
44							
45							
46							
47							