PREVALENCE OF SELF-REPORTED MUSCULOSKELETAL SYMPTOMS (MSS) AND ITS ASSOCIATED PHYSICAL RISK LEVELS AMONG DENTISTS IN BANGLADESH

By

Umme Mahzabin Hossain

March, 2015

This thesis is submitted in total fulfillment of the requirements for the subject RESEARCH 2 & 3 and partial fulfillment of the requirements for degree

Bachelor of Science in Occupational Therapy
Bangladesh Health Professions Institute (BHPI)
Faculty of Medicine,
University of Dhaka

Statement of Authorship

Except where is made in the text of the thesis, this thesis contains no materials published elsewhere or extracted in whole or in part form a thesis presented by me for any other degree or diploma or seminar.

No others person's work has been used without due acknowledgement in the main text of the thesis.

This thesis has not been submitted for the aware of any other degree or diploma in any other tertiary institution.

The ethical issues of the study has been strictly considered and protected. 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: ……. Date: …….

Umme Mahzabin Hossain
4th year, B.Sc. in occupational Therapy

Study Completed by:
Umme Mahzabin Hossain
4th year, B.Sc. in Occupational Therapy

Umme Mahzabin Hossain

Signature

Study Supervisor's name, designation and signature:
Md. Monjurul Habib
Lecturer in Occupational Therapy
Department of Occupational Therapy
Bangladesh Health Professions Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343.

Signature

Head of the Department's name and signature:
Nazmun Nahar
Assistant Professor and Head of the Department
Department of Occupational Therapy
Bangladesh Health Professions Institute, (BHPI).
CRP-Chapain, Savar, Dhaka-1343, Bangladesh

Signature

Acknowledgement

All the praise must goes to Almighty Allah for blessing and giving me the ability to conduct this study.

I would like to pay my highest gratitude to my honorable supervisor Md. Monjurul Habib for increasing my inspiration and endless support for completing my study.

I would like to express my gratitude to my parents who constantly inspired me to carry out this study. This thesis is heartily dedicated to my parents who encouraged me and prayed for me throughout the time of my research and are the most important people in my world.

I am also thankful to friends whose support and productive criticisms helped me to bring my work to success

Abstract

Background: Musculoskeletal symptoms (MSS) are increasing day by day among dentists around worldwide. The prevalence of MSS among in dentistry is relatively high. Musculoskeletal symptoms are a major cause of absence from work in many occupations all over the world. One reason is the frequent occurrence of work situations with longstanding or long sitting static or repetitive load on the neck, shoulder and arms.

Objectives: This review aims to provide an overview of work related musculoskeletal symptoms in the dental profession, more specifically, among general dental practitioners and specialist orthodontists. To determine the prevalence of musculoskeletal symptoms(MSS) among dentists in last 12 months, to know the association between demographic factors and MSS in last 12 months, identify the risk level associated factors and treatment among dentists over a one year period due to awkward posture among dentists.

Materials and Methods: A cross sectional survey of a convenient sample of 200 participants was conducted in this study. Identified the postural risk level of these participants were implemented by the REBA. In order to investigate the MSS, the Standard Nordic Questionnaires has been used and the data were processed by chi-square test to see the association of MSS and socio-demographic factors. Data was processed by using SPSS software 17.0 version.

Results: The result section had shown the general socio-demographic characteristics of the study participants. Relationship between participants MSS with socio-demographic and related factors, prevalence of MSS in most commonly affected body parts and normal activities disruption in last 12 months in different body parts and postural risk level of awkward posture of the participants and the activities of daily living problem those are associated with the Dentists. This study had shown that high prevalence of musculoskeletal symptoms on upper back 55.55% than wrists 22.22% and after that lower back 11.11%. The upper back prevalence is high than the other body region and this study had also shown that the highly significant relationship between socio demographic characteristics and musculoskeletal symptoms of the dentists in last 12 months and among them one is working days per week (*P=0.002*) and working hours in a day (*P=0.002*).

Conclusion: Pain was most commonly reported in the neck, wrist/hand, and upper back lower back, and back. This study shows that dentists has a high risk of MSS and the impact of MSS on the work and life of dentists demonstrates the need for increasing knowledge of MSS and the initiation of preventive strategies.

Keywords: *Cosmetic Dentist, Dental Hygienist, Dentistry, ergonomics, General Dentist, Musculoskeletal pain, Occupation, Orthodontist, Periodontics, risk factors.*

TABLE OF CONTENTS

List of Tables

List of figure

List of Appendix

List of Acronyms

DDCH: Dhaka Dental College and Hospital
CDCH: City Dental College and Hospital
SDCH: Sapporo Dental College and Hospital
BHPI: Bangladesh Health Professions Institute
CRP: Centre for the Rehabilitation of the Paralysed
MSD: Musculoskeletal Disorder
MSS: Musculoskeletal Symptoms
SNQ: Standard Nordic Questionnaires
REBA: Rapid Entire Body Assessment
WRMSD: Work Related Musculoskeletal Disorder

CHAPTER 1
INTRODUCTION

1.1. Background

Musculoskeletal Symptoms (MSS) are on the rise worldwide. These symptoms have numerous effects at the individual level to decreased workplace effectiveness and productivity affecting quality of life. Musculoskeletal symptoms are a major cause of absence from work in many occupations all over the world. One reason is the frequent occurrence of work situations with longstanding or long sitting static or repetitive load on the neck, shoulder and arms (Sakzewski and Naser-ud-Din, 2012). Oral health care professionals (oral Surgeon, general Dentist, cosmetic dentists, orthodontist, periodontics) are also reported high rates of musculoskeletal symptoms around their working environments as well as their performance of work over a long period of time (Rolander *et al.*2005).Musculoskeletal symptoms are significant and high workplace problems affecting occupational health, productivity and the careers of the working population including pain, weakness and paresthesia and as well as others associated symptoms in a wide range of professionals like Dentists (Jabbar, 2008).

Dentists are among the workers who are more often vulnerable to musculoskeletal symptoms (MSS)in their work includes risk factors that may lead to many pathologies such as tendinitis, synovitis, tenosynovitis, and bursitis. Occupational diseases have not only physical, psychological, and social values, but also financial and security impacts when they reach a level of severity that directly affects work capacity, causing absences and early retirement has occurred by dentists in their working sectors. Doing work in their working area dental surgeons as well as dentists often cannot avoid prolonged static postures. They sustained long time awkward postures during treatment session. They even stay in seated postures for a long time during treated a patients, more than one-half of the muscles of the body are contracted statically and there is little movement of the vertebral joints. This may result in damaging physiological changes that can lead to back, neck, or shoulder pain or musculoskeletal symptoms (MSS) among dentists (Shaik *et al.* 2011).

Musculoskeletal symptoms among dentists have been considered a significance of the workload of dental practice. Dentists' work includes some familiar risk factors for musculoskeletal symptoms in general and specifically for upper as well as lower back

pain. A higher prevalence of musculoskeletal symptoms and back pain of upper back and lower back among dentists had shown 30 to 70 percent of musculoskeletal pain among dentists than other occupational groups. The following postures among dentists are considered as risk factors: Forward bent sitting posture, accompanied with bending and twisting, and the relative static work. Those postures are affecting the dentists work efficacy as well as their working performance in their working area, among the postures not only sitting and twisting postures has been affecting their health through back pain but also the amount of sitting and twisting postures in a seating positions has a great impact on musculoskeletal pain (Ratzon *et al.* 2000).

In the study of New Zealand dentists, has a high annual prevalence of musculoskeletal symptoms, with 63% of participants experiencing symptoms in the lower back or neck, 49% in the shoulders, and 42% in the wrists/hands (Palliser*et al.* 2007). The annual prevalence of neck pain varied across occupations, ranged from 10.2% in France to 27.1% in Norway to 33.7% in the UK and to 47.8% in Quebec, Canada. The one week prevalence of neck pain was variably reported from 7.3% in office workers to 53% in female plant workers exposed to repetitive work and dentists are at high risk for developing many work-related disorders particularly neck and back pain and among them neck pain was reported as the most prevalent musculoskeletal symptoms at 57.5% in Queensland, Australia (Rahmani *et al.*2013).

Dental hygienists with Musculoskeletalsymptoms reported reducing days worked, reduced speed and quality of work, and increased use of sick leave and MSS are numerous contributors to decisions to leave the dental hygiene profession and according to a survey of 10,000 US hygienists, 18% of those who permanently left the profession cited work-related disability, in particular MSS, as leading in the decision to leave; a similar U.K survey found 30% of those that left attributed it to MSS (Morse, Bruneau and Dussetschleger, 2009). In the study of New Zealand dentists has a high prevalence of musculoskeletal symptoms among dentists in other studies, with annual prevalence's ranging from 40-67% for neck and shoulder symptoms, 67% for the lower back and 15-20% for the wrists/hands and about one-third of dentists in this New Zealand study had musculoskeletalsymptoms in the last 12 months that prevented normal activities (Palliser *et al.*2007). The study about MSS in Iranian

dentists had described that neck pain is a common musculoskeletal problem in both the developed and developing countries (Rahmani *et al.*2013).

Dentists are inclined to suffer from musculoskeletalsymptoms due to continuous contact to occupational health hazards. While working, dentists usually assume uncomfortable static postures and maintain their head in a rotated position, with the neck flexed and shoulders/upper arm abducted, or sustain other awkward positions for a long period sustaining a static awkward posture for long periods can lead to chronic muscular fatigue, discomfort or pain (Liang *et al.*2014) .

Musculoskeletal symptoms among dentists have been considered a value of the workload of dental practice. Dentists' work includes some well known risk factors for musculoskeletal symptoms in general and specifically for low back pain. The following common postures among dentists are considered risk factors: forward bent sitting posture, accompanied with bending and twisting, and the relative static work (Ratzon *et al.*2000). The risk factors associated with MSS in dentists include: continuous static awkward postures, repetitive movements, sub-optimal lighting, genetic predisposition, number of years in practice, age and sex all of which appear to affect more female than male dentists. Psychological factors may also be involved. These factors include; mental stress due to unexpected procedural events, the conditions of patients and time limitations on treatment sessions for patients (Memarpour *et al.*2013).Static awkward posture, particularly those with isometric contractions of the trapezius, has been identified as a risk factor particular to these dental professions. MSS risk factors for dentists are multifactorial, including static and awkward postures, repetition and force (more commonly related to hand and arm conditions), poor lighting (both intensity and positioning), improper positioning of both patient and dental worker, individual characteristics. Biomechanical risk factors limited range of motion resulting in isometric muscle contractions, difficulties in direct visualization (which causes awkward posture), visual demands requiring static postures, repetitive tasks for long periods including scaling and endodontic or orthodontic procedures, long surgical procedures, forceful clinical tasks such as scaling, and high precision and flexion for instrumentation. Static postures, particularly of the trapezius muscle, have been noted as particular problems for dental

workers in relation to neck and shoulder conditions, based on laboratory and other studies (Morse, Bruneau and Dussetschleger, 2009).

Individual factors that have been studied include age, gender, smoking, fitness level, marital status and education. Physical factors to MSS's has been well documented, these are repetition, forceful exertions, awkward and prolonged static posture and vibration with MSS's of the neck, upper extremity and lower back. Psychosocial factors fall into three different categories; those associated with the internal work environment, external work environment and the individual characteristics of the worker. Firstly the internal work environment involves workload, repetitiveness, amount of job control, mental demands of the job and job clarity. It also includes organizational characteristics, interpersonal relationships, timing of work (length of working day, shift work, breaks), financial or economic aspects and community support these demands are all considered risk factors for MSS's and are harmful for the individual. External work demands reflect the role of the individual outside of work and their duties relating to parents, children, spouses or friends. Lastly, there are individual worker factors which comprise three different aspects, which may be categorized as genetic, acquired and dispositional aspects. Also the personality and attitude will influence a person's ability to handle potential stressors in the work environment (Sakzewski and Naser-ud-Din, 2012).

MSS have a wide range of impacts on the work and life of dentists but it appears that dentists are provided with little information on the importance of MSS and how to prevent these. MSS's may result in discomfort, difficulty in performing treatment, absence from work, low work efficacy, economic impact due to reduced working hours and the costs of medical treatment, effects on daily life and premature retirement from the profession (Memarpour*et al.*2013).Dentist is a subject to a wide variety of physical and psychological ailments that are provoked or motivated by the work environment and they greatly affect the health of dental professionals (Puriene, *et al.*2007).

Changing position commonly is a key to avoid occupational related musculoskeletal problems. Static forces involve holding the body in one position and have been shown to be much more taxing than dynamic forces. More than 50% of the body's muscles

must be in contraction during static position to sustain the position and resist the force of gravity. Dynamic movements operate muscles of opposite groups, reducing fatigue and as well as pain (Ratzon *et al.*2000).

1.2. Significance of the study

In Bangladesh dental profession many dental professionals are working as dentists and they also suffer from different kind of musculoskeletal symptoms. So it has needed to find out and explain broadly about the ergonomic physical risk factors and it's prevalence among dentists in Bangladesh. This has identified those ergonomic physical risk factors, that related with dentists health and for that they cannot perform their best.

The study has focusede the improving quality of life of dentists in their everyday life. So this study is very helpful for other professionals to know more information about dental professionals if they work with them. Occupational therapist has needed to develop knowledge about ergonomical intervention for the Dental professionals. Musculoskeletal symptoms are a major cause of absence from work in many occupations all over the world and dentists has a high risk of Musculoskeletal symptoms. To increase the knowledge about ergonomical fit environment for dentists and to reduce postural risk levels among dentists, this study is helpful for the dentists in Bangladesh.

An Occupational Therapist works in ergonomics and in ergonomics postural risk level has identified then ergonomic intervention will be provided to the affected group. If an Occupational Therapist wanted to develop their knowledge about Dental ergonomic then this study is helpful for those groups of people who work in Dental profession. This study will be benefited for those workers who are already affected by MSS and different type of disorder and chance to develop MSS in future. Because when they know about the postural risk level then they will try to maintain this and try to prevent this.

This study is very helpful for Occupational Therapist and other professionals to know the exact prevalence of MSS and postural risk level of dentists with more information about this if they wanted to work with them in future. This study is helpful to

identifying the factors associated with the occurrence of these musculoskeletal symptoms can help to develop ergonomic recommendations for the dental profession in Bangladesh. This study, therefore, aims to investigate the prevalence of work related musculoskeletal symptoms and identify potential risk levels for occurrence in the dental professionals in Bangladesh.

Many studies have provided evidence of MSS among various groups of working population, but in Bangladesh few researches have studied about the relationship between MSSs and dentists. In Bangladesh the dental professionals has high risks of MSS in work area but the amount of study in Bangladeshi dental professionals related with ergonomical risk levels based study is very few.

So this type of research is helpful for the dentists in Bangladesh and also helpful for those person who wants to and needs to work with the dental profession in future. So the researcher has conducted this research with some aims and objectives . So the aim and objectives are:

1.3. Aim of the study

To identify the prevalence and its associated physical risk levels for developing musculoskeletal symptoms among dentists.

1.4. Objectives

- To determine the prevalence of musculoskeletal symptoms among dentists in last 12 months.
- To know the association between demographic factors and MSS in last 12 months.
- To determine the rate of activities of daily living disruption due to MSS in last 12 months among dentists.
- To identify the risk level due to awkward posture among dentists.

CHAPTER 2
Literature review

Literature review describes, based on key terms and the key terms for the study are:

2.1.Dentistry

The science concerned with the prevention, diagnosis, and treatment of diseases of the teeth, gums, and related structures of the mouth and including the repair or replacement of defective teeth (Medical Dictionary). The field of dentistry offers many different types of jobs and career options at a variety of educational and professional levels. Dentists and other dental professionals enjoy career stability and a choice of many career opportunities. Dentistry is widely considered important for overall health. Dental treatment is carried out by the dental team, which often consists of a dentist and dental auxiliaries (dental assistants, dental hygienists, dental technicians, and dental therapists). Most dentists work in private practices (primary care), although some work in hospitals (secondary care) and institutions (prisons, armed forces bases, etc.). Dentistry involves a broad range of professionals, from doctorate level to administrative level people. All of these dental professionals work together to provide oral care and dental health maintenance services from cleanings to more specialized procedures and surgeries.It is the branch of medicine that is involved in the study, diagnosis, prevention, and treatment of diseases, disorders and conditions of the oral cavity, commonly in the dentition but also the oral mucosa, and of adjacent and related structures and tissues, particularly in the maxillofacial (jaw and facial) area (Dentistry, 2014).

In a brief overview of some of the career options in the field of dentistry and doctorate Level Careers in Dentistry has given below:

General Dentist (DDS)

A general dentist is similar to the primary care doctor of medicine. The general dentist provides cleanings and general dental health care prevention and maintenance such as teeth cleaning, fluoride treatments, cavity fillings, and root canals (DDS, 2015).

Cosmetic Dentists

A cosmetic dentist specializes in aesthetic dentistry, intended to approve appearance more than to improve the patient's health. Cosmetic dentists may also practice general or primary dentistry in addition to cosmetic dentistry. Some of the most common cosmetic dentistry procedures are teeth whitening, veneers, and bonding of teeth.

Orthodontist

An orthodontist specializes in the jaw alignment and positioning of the teeth. Orthodontists utilize a variety of methods and oral appliances to help straighten and realign crooked or misaligned teeth. Braces, retainers, and other devices help correct and straighten patients' teeth. Orthodontists primarily treat younger patients, while they are growing and the teeth are easier to move, but patients of all ages may consult an orthodontist as well.

Periodontics

A periodontics is a dentist who specializes in care of the gums and tissue surrounding the teeth.

Oral Surgeon

An oral surgeon provides surgical care for the teeth, jaws, and facial bones. Patients are typically referred to an oral surgeon by a general dentist or other healthcare professional that may identify the need for oral surgery.

Allied and Mid-Level Careers in Dentistry:

Dental Assistant

Dental assistants help dentists with a variety of tasks but are not qualified to do full cleanings and identify cavities as are dental hygienists. Dental assistants can obtain training at a technical school with a brief diploma program, or on-the-job.

Dental Hygienist

Dental hygienists can provide some basic dental care under the supervision of a licensed dentist. More education is required to become a hygienist than an assistant, and therefore hygienists earn about twice as much money as dental assistants.

Dental Lab Technician

Dental lab technicians play a non-clinical role, meaning they do not work directly with patients. Dental lab techs work in a lab, behind the scenes, manufacturing crowns and other dental prostheses which require custom specifications. Dentists use molds and x-rays to provide the specifications to the lab for a custom fit (Branches of Dentistry, 2015).

2.2. Prevalence

The proportion of individuals in a population having a disease or characteristic.The total number of cases of a disease in a given population at a specific time. Prevalence is a statistical concept referring to the number of cases of a disease that are present in a particular population at a given time, whereas incidence refers to the number of new cases that develop in a given period of time. Here the researchers try to find out the musculoskeletal symptoms prevalence among Dentists in last 12 months.

2.3. Musculoskeletal symptoms

Musculoskeletal symptoms are for example, the awkward work postures and manual material handling of working population increased risk for musculoskeletal symptoms. So musculoskeletal symptoms related with working population and Dentists have musculoskeletal symptoms in different body parts that mean pain, soreness, numbness, discomfort, ache is present in different body parts(Pain Management Health Center, 2015).

2.4. Ergonomics

Ergonomics (or human factors) is the scientific discipline concerned with the understanding of the interactions among humans and other elements of a system, and the profession that applies theoretical principles, data and methods to design in order to optimize human well-being and overall system performance. Practitioners of ergonomics, ergonomists, contribute to the planning, design and evaluation of tasks, jobs, products, organizations, environments and systems in order to make them compatible with the needs, abilities and limitations of people. Ergonomics is the scientific study of human work conditions, especially the interaction between man and machine. It is a term taken from the Greek work "ergon," meaning work, and

"nomos," meaning natural laws. The goal of ergonomics is to make work easier and to advance in both health and productivity. It is a science of designing the job, products, and place to fit the worker. In ergonomic psychology, industrial engineering, computer science, biomechanics, and safety engineering all play a role. (Definition and Domains of ergonomics, 2015).

2.5. Ergonomic risk factors

Ergonomic risk factors are the aspects of a job or task that impose a biomechanical stress on the worker. Ergonomic risk factors are the synergistic elements of MSS hazards. In the Health Effects section of this preamble, OSHA discusses the large body of evidence supporting the finding that exposure to ergonomic risk factors in the workplace can cause or contribute to the risk of developing an MSS. This evidence, which includes thousands of epidemiological studies, laboratory studies, and extensive reviews of the existing scientific evidence by NIOSH and the National Academy of Science, shows that the following ergonomic risk factors are most likely to cause or contribute to an MSS: Force, Repetition, Awkward postures, Static postures, Vibration, Contact stress, Cold temperatures, these risk factors, evidence in the Health Effects chapter shows that force (forceful exertions), repetition, and awkward postures, especially when occurring at high levels or in combination, are most often associated with the occurrence of MSS(Risk Factors, 2013).

CHAPTER 3
METHODOLOGY

3.1 Study Design

Cross-sectional studies are carried out at one time point to or over a short period and it can be helpful to estimate the prevalence of the outcome of interest for a given population and to collect data on individual characteristics, including exposure to risk factors, alongside information about the outcome. In this way cross sectional studies will be helpful to provide the outcome and the characteristics associated with it, at a specific time point (Palliser *et al.*2007). Cross-sectional studies are carried out at one time point to or over a short period. They are usually conducted to estimate the rate of the outcome of interest for a given population, commonly for the purposes of public health planning. Data can also be collected on individual characteristics, including exposure to risk factors, alongside information about the outcome. In this way cross sectional studies provide a 'snapshot' of the outcome and the characteristics associated with it, at a specific point in time.

This study was observed by the data collection procedure of the participants Musculoskeletal problem in 9 body parts with about the prevalence of individual self-reported MSS in different body parts, normal activities disruption because of MSS in last 12 months, which body parts are more affected than other body parts and postural risk level of the dentists and the data was collected from those participants, who was interested to participate in this study. This was happened with in a specific point of time and data was collected from each individual. When the study was observed asked questions to the participants by using the questionnaires that was selected before and then collected data in a defined time. By using the data the MSS prevalence of dentists was collected, that means outcome of the data. So here the study was giving a snapshot of prevalence of MSS with normal activities disruption in last 12 months and postural risk level in last 12 months in dentists (Levin, 2006).

3.2 Study Participants

The study populations are those people who are dentists; it is the profession that based on the knowledge of science concerned with the prevention, diagnosis, and treatment of diseases of the teeth, gums, and related structures of the mouth and including the repair or replacement of defective teeth. In the field of dentistry dentists offers many

different types of jobs and career options at a variety of educational and professional levels. Dentists and other dental professionals enjoy career stability and a choice of many career opportunities. Dentistry involves a broad range of professionals, from doctorate level to administrative level people. All of these dental professionals work together to provide oral care and dental health maintenance services from cleanings to more specialized procedures and surgeries. There are some inclusion and exclusion criteria for select participant. These are:

3.3. Inclusion criteria

•Age group 25 to 60 years.

•Participants who has at least 12 months working experience.

•Participants who work at least 8 hours per day

3.4. Exclusion criteria

•Participants who are suffering from spinal deformities (e.g. scoliosis), malignancy, osteoporosis, multiple sclerosis

•Participants who are suffering from any fracture, trauma or disorders in the head or the neck or having any inflammatory conditions

3.5. Study settings

The study was conducted in three areas and the areas these are dentists of Dhaka Dental College and Hospital (Mirpur), City Dental College and Hospital (Mallibug) and Sapporo Dental College and Hospital (Uttora).

Dhaka Dental College and Hospital (DDCH)

It is the largest dental educational institution in modern Bangladesh. It was the first dental college of Bangladesh, established in 1961. 200 bed hospitals. Every year after passing H.S.C top applicants from all over the country sit for the medical-dental college entrance examination. The top 100 students get the opportunity to study in Dhaka Dental College. Different batches of Dhaka Dental College are named with the prefix D, as for example batch D-50 which is the latest batch in DDC arena. In order to 4 year B.D.S course (under Dhaka University) M.S. course is included. Under

Bangladesh College of Physician and Surgeon (BCPS) FCPS course is also included (Dhaka Dental College and Hospital, 2014).

City Dental College and Hospital (CDCH)

Degree offered: Bachelor of Dental Surgery by University of Dhaka and It is approved by the Governmental, approved by Bangladesh Medical & Dental Council and the Degree is offered by University of Dhaka which is recognized by all over the world. Prof. Md. Emadul Haq (Principal), Dr. A.S.M. Badruddoza (Project Director & Chief Administrator) and this is a Non-Gov. Dental College and Hospital (City Dental College, 2014).

Sapporo Dental College and Hospital (SDCH)

The establishment of Sapporo Dental College for uplifting the quality of dental education and service in true sense was the brain- child of Prof. Dr. Mohiuddin Ahmed. The need of a privet dental college was initially felt while Dr. Ahmed and Dr. Hannan were students in Dhaka Dental College- the only Dental institution in the country in late nineteen seventies. During that period Oral Health care delivery system was in its primary stage and there was a certain lack of quality dental education in the country. The true implementation of the dream began with the establishment of "Sapporo Dental Care" in 1993 with an aim to provide service to the patient in multi-disciplinary team approach. Dr. Mohiuddin Ahmed and Dr. M. A. Hannan First started working in the clinic and gradually Dr. M. A. Sikder, Dr. M. U. Chowdhury and Dr. Asaduz-Zamanjoined the team of "Sapporo Dental Care" after completing their graduate school at Hokkaido University. Since its inception, Sapporo Dental College is making continuous endeavor to make it a center of excellence for training undergraduate dental students and have plans to start as a post-graduate training center in near future (The History of Sapporo Dental College and Hospital, 2013).

3.6 Sampling Procedure

Convenient sampling had used in this study for the sampling size of 200 dentists. In convenient sampling also referred to as accidental, volunteer or opportunistic sampling involves the enrollment of available subject as they enter the study until the desired sample size is reached. The investigator at first has established inclusion and

exclusion criteria for selecting those individual who were fit with these criteria and volunteer to participate in the study. So the researcher had selected dentists from Dhaka Dental College and Hospital, and then go to City Dental College and Hospital (Mallibug) and Sapporo Dental College and Hospital (Uttora) and described them about the purpose of the study and selected those dentists who were agreed to participate willingly. In this way researcher had selected the participant. So all the dentists was selected as a participant because the participant was available then asked them they were interested or not to participate in this study and then asked at first socio-demographic factors then Nordic Questionnaires in last 12 months in doing normal activities disruption because of MSS in last 12 months and then identified postural risk level by using REBA and last sign in the consent form of the participants.

3.7. Methods of data collection

The data had collected after getting the verbal consent of the participant through face to face interview. Then researcher had used standard Nordic questionnaire. By using this modified Nordic Musculoskeletal Questionnaire (NMQ) the researcher had asked Nordic questionnaire to the participant and collect data on 12 months of cumulative pain among dentists musculoskeletal symptoms in nine anatomical sites and the side is neck, shoulders, upper back, lower back, elbow, fingers/wrists, hips/ thighs, knees, and ankles/feet and store this information. It helped to describe the purpose of the study to each participant and then ask question to them and fulfill the questionnaire. The researchers had collected the Participants respond towards the ‘‘yes/no’’ questions, such as: ‘‘within the past twelve months, have you experienced ache, pain or discomfort in any of the nine anatomical sites?’. Then ask the participant during last 12 months have you been prevented from carrying out normal activities like job, housework, leisure activities etc. because of this trouble and also recorded this result. And according to REBA (Rapid Entire Body Assessment) it had helped to find out the risk factors and observe the angular management of the body parts and evaluating the body parts during work. That mean it helped to observe the trunk of the workers during his/her work, how many flexion and extension or over extension of the trunk that is harmful for them and it was needed to observe and measured by goniometer and give a score of the abnormal posture. In this way another part had needed to

observe and add a score of those abnormal movements. And depend on this score, severity had depended. So who had got more point he/she will be at high risk level. If anyone got 1 point, in the REBA scores then the risk level was Negligible for the workers and in this way severity had measured.

3.8. Data collection Tools

•Consent form
•Demographic questionnaire
•Standard Nordic Musculoskeletal Questionnaire
•Rapid Entire Body Assessment (REBA)
Here researcher has used 2 standard questionnaire instruments for the study. And the questionnaires are:

Nordic musculoskeletal questionnaire (NMQ)

Nordic Musculoskeletal Questionnaire describes the outcome of any dieses condition and describes the annual prevalence and weekly prevalence of selected population. In Nordic musculoskeletal questionnaire cover nine body parts of the selected populations that mean whole body and complete three questions before moving from one part to another part of the body. In Nordic musculoskeletal questionnaire there are yes or no box for answering questions and separate box for different body parts. Every questions answer had used by using tick in every box and there are 3 column the first column of this questionnaire has described that have you at any time during the last 12 months had trouble (such as ache, pain, discomfort, numbness) in different body parts like neck, shoulder, knee, ankle etc. Last column describe that during the last 12 months have you been prevented from carrying out normal activities (e.g. Job, household, hobbies) because of this trouble.

REBA (Rapid Entire Body Assessment)

REBA (Rapid Entire Body Assessment) is aimed to divide the body into segments to be coded individually with reference to movement planes. It provides a scoring system for muscle activity caused by static, dynamic, rapid changing or unstable postures. It reflects that coupling is important in handling of the loads but may not always be via the hands. It also gives an action level with an indication of urgency.

This method had specifically developed to be useful for assessing MSS risks/working postures found in healthcare and other service industries. However, it can be used to assess a variety of tasks, in any setting, where: the whole body is being used, the posture is static, dynamic, rapidly changing, or unstable, or animate or inanimate loads are being handled either frequently or infrequently.

Action level	**REBA score**	**Risk level**	**Action (including further assessment)**
0	1	Negligible	None necessary
1	2-3	Low	May be necessary
2	2-7	Necessary	Necessary
3	8-10	High	Necessary soon
4	11-15	Very high	Necessary now

REBA (Rapid Entire Body Assessment) was developed by Hignett, S. and McAtamney which was published in2000 and it is essential for providing a quick and easy observational postural analysis tool for whole activities (static and dynamic) giving musculoskeletal risk action level. The development of REBA is aimed to divide the body into segments to be coded individually with reference to movement planes. It provides a scoring system for muscle activity caused by static, dynamic, rapid changing or unstable postures. It reflects that coupling is important in handling of the loads but may not always be via the hands. It also gives an action level with an indication of urgency. This method was specifically developed to be useful for assessing musculoskeletal symptoms (MSS) risks/working postures found in healthcare and other service industries. However, it can be used to assess a variety of tasks, in any setting, where: the whole body is being used, the posture is static, dynamic, rapidly changing, or unstable, or animate or inanimate loads are being handled either frequently or infrequently.

REBA tool can be used for rapid Assessment of entire bodies as evaluation of musculoskeletal loads due to posture, repetition and force. It aids in evaluating jobs or tasks that may expose workers to entire body disorders (wrist, upper and lower arms, neck, trunk, and legs). In the REBA tool, the whole body parts are classified into two

groups A and B. The group A consisted of neck, legs, and trunk; and group B comprised of lower arms, upper arms, and wrist. Initially, for anybody region, the corresponding score is obtained with respect to positions, movements, and gestures of each body region from the relative table On the one hand, by knowing the group A score obtained from table A and the force/load score, the final group A score is calculated; and on the other the final group B score is calculated by knowing the group B score gained from table B and the coupling/grip score Also the score C is obtained from table C and knowing the final groups A and B scores. As there is a static posture, or action repetitiveness (more than 4 times per minute), or rapid posture changings or instability, score 1 is added to the score C as and activity score. Finally, the REBA score is calculated by adding score C to the "Activity score". REBA accomplishes the aforementioned goals by providing a "Grand Score" which can be compared to five Action Levels. REBA is an observational method and did not need to ask anyone any type of question about this awkward posture. So, in this study the researcher was fulfilling this section alone so she did not need any translation for this format (Nojankola, 2012).

3.9. Data analysis strategy

The study data was analyzed by using the Statistical Package for Social Science that means (SPSS) with the new version was 17.0. In data analyzed sector participants musculoskeletal prevalence in last 12 months in any one body part was calculated manually and activities interruption in this time was calculated manually. Then prevalence of MSS with most communally affected body parts in the Standard Nordic Questionnaires 1st row that is activities interruption because of MSS in last 12 months in different body parts in 3rd row was identified by SPSS. Association between Socio-demographic factors and MSS was identified by using Chi-square test and risk level of awkward posture was identified by SPSS.

3.10. Ethical consideration

- Permission and approval was taken from Bangladesh Health Professions Institute.
- Researcher got permission from the authority of Standard Nordic Questionnaires and REBA to collect the data.
- Researcher was informed the participants about the purpose of this study and at first she got permission from the participants than started work.
- Clear explanation of this study was provided by the researcher and the researcher answered all of the questions if the participant had any quarry.
- Researcher was assured them that their personal identity would be kept confidential and all documents were being kept in a safe place.
- Researcher was ensured that participant had right in refusing to participate or stop.
- Researcher was collected information when the participants given time to the researcher and the time were being suitable for both of them.

CHAPTER 4
RESULT

Result

The current study result section had shown the general socio-demographic characteristics of the study participants. Relationship between participants MSS with socio-demographic and related factors, prevalence of MSS in most commonly affected body parts and normal activities disruption in last 12 months in different body parts and postural risk level of awkward posture of the participants and the activities of daily living problem those are associated with the Dentists.

4.1. General Socio-demographic characteristics of the participants

Table 01 show that, total 200 dentists was participated in this analysis part in which 59.5% was male and 40.5% were female. In age characteristics 83.5% was 25-45 years and 16.5% 46 years or more. In this table 87% participants were married and 13% were unmarried. According to participants statement 52% had smoking habit and 48% had not smoking habit. The dentist's years of experience in variables 1-6 years had 65.5% and in the variable of 7years or more, it had shown 34.5%. In dentists working days per week 6 days had 61.5% and 7 days had 38.5%. Working hours in a day 6-8 hours had 57.0% and 8 hours or more had 43.0% In how many patients has been treated in a day in variables 1-9 patients had 61% and 10 or more had 39%. The duration of Treatment session for one patient through the variables30-60 min had 95% was involved and another more than 60 min had 5%. Duration of break time after one patient treatment session for 5 min the frequency of the dentists had 95.5% and for the 10 min or more break time the frequency of the dentists had 4.5%. The table of general socio-demographic characteristics of the participants has given below:

Table – 01: Socio-demographic characteristics of the participants

Variables	Frequency (n)	%
Gender :		
male	119	59.5
female	81	40.5
Age:	167	83.5
25-45 years	33	16.5
46 years or more		
Mean± SD age	33.805±8.721	
Marital status:		
married	174	87.0
unmarried	26	13.0
Smoking habit:		
Yes	104	52.0
No	96	48.0
Years of experience:		
1-6 years	131	65.5
7 years or more	69	34.5
Mean± SD age	7.050±2.97181	
Working days per week:		
6 days	123	61.5
7 days	77	38.5
Mean± SD age	7.645±.7222	

Working hours in a day:		
6-8 hours	114	57.0
8 or more	86	43.0
Mean± SD age	9.361±1.833	
How many patients has been treated in a day:		
1-9 patients	122	61.0
10 or more	78	39.0
Treatment session for one patient:		
30-60 min	190	95.0
More than 60 min	10	5.0
Duration of break time after one patient treatment session:		
5 min	191	95.5
10 min or more	9	4.5

4.2. Relationship between participant's Socio-demographic factors and MSS in different body parts of last 12 months

Socio-demographic factors like gender, age, marital status, smoking habit, years of experience, working days per week, working hours in a day, how many patients has been treated, treatment session for one patient and break time after one treatment session those variables in table no. 2 with MSS in last 12 months with p value: In this table Socio-demographic factors like gender, age, marital status, Smoking habit, years of experience, how many patients has been treated in a day, treatment session for one patient, break time after one treatment session did not show any significant association with MSS in last 12 months except working days per week and working hours in a day, in table 02. Among the general socio-demographic factors, working days per week and working hours in a day, had a significant relationship with musculoskeletal symptoms (MSS) in last 12 months, because among them working days per week chi-square value is 9.500 and its p value is .002 that is greater than .05.And the general socio-demographic factors working hours in a day chi-square value is 9.761 and its p value is .002 that is greater than .05. So the general socio-demographic factors, working days per week and working hours in a day, had a significant relationship with musculoskeletal symptoms (MSS) in last 12 months. The table of relationship between participants Socio-demographic factors with musculoskeletal symptoms (MSS) has given below:

Table – 02: Relationship between participants Socio-demographic factors with MSS

Socio-demographic factors	**MSS in last 12 months**			
	Yes	***No***	***Chi-square value***	***P value***
Gender:			.128	
male	109	10		.721
female	73	8		
Age:				
25-45 years	150	17	1.720	.190
46 years or more	32	1		

Marital status: married unmarried	157 25	17 1	.969	.325
Smoking habit: yes no	95 87	9 9	.032	.859
Years of experience: 1-6 years 7 years or more	122 60	9 9	2.103	.147
Working days per week: 6 days 7 days	118 64	5 13	9.500	.002
Working hours in a day: 6-8 hours more than 8 hours	110 72	4 14	9.761	.002
How many patients has been treated in a day: 1-9 patients 10 or more	113 69	9 9	1.006	.316
Treatment session for one patient: 30-60 min more than 60 min	173 9	17 1	.013	.910
Break time after one treatment session: 5 min 10 min or more	174 8	17 1	.051	.821

4.3. Most affected body parts due to MSS and normal activities disruption due to MSS in different body parts:

Through a bar chart it had shown dentists has high prevalence in upper back, than lower back and after that wrists and hand. Upper back is the most affected body parts due to MSS and normal activities disruption due to MSS among different body parts. After that lower back and then wrists/hand are affected body parts due to MSS. The prevalence of upper back is 55.55%, than wrists/hand prevalence is 22.22%, lower back prevalence is 11.11% than shoulder and knee had both 5.56% prevalence. This bar chart of Prevalence of MSS and normal activities disruption prevalence during last 12 months of participants has given below:

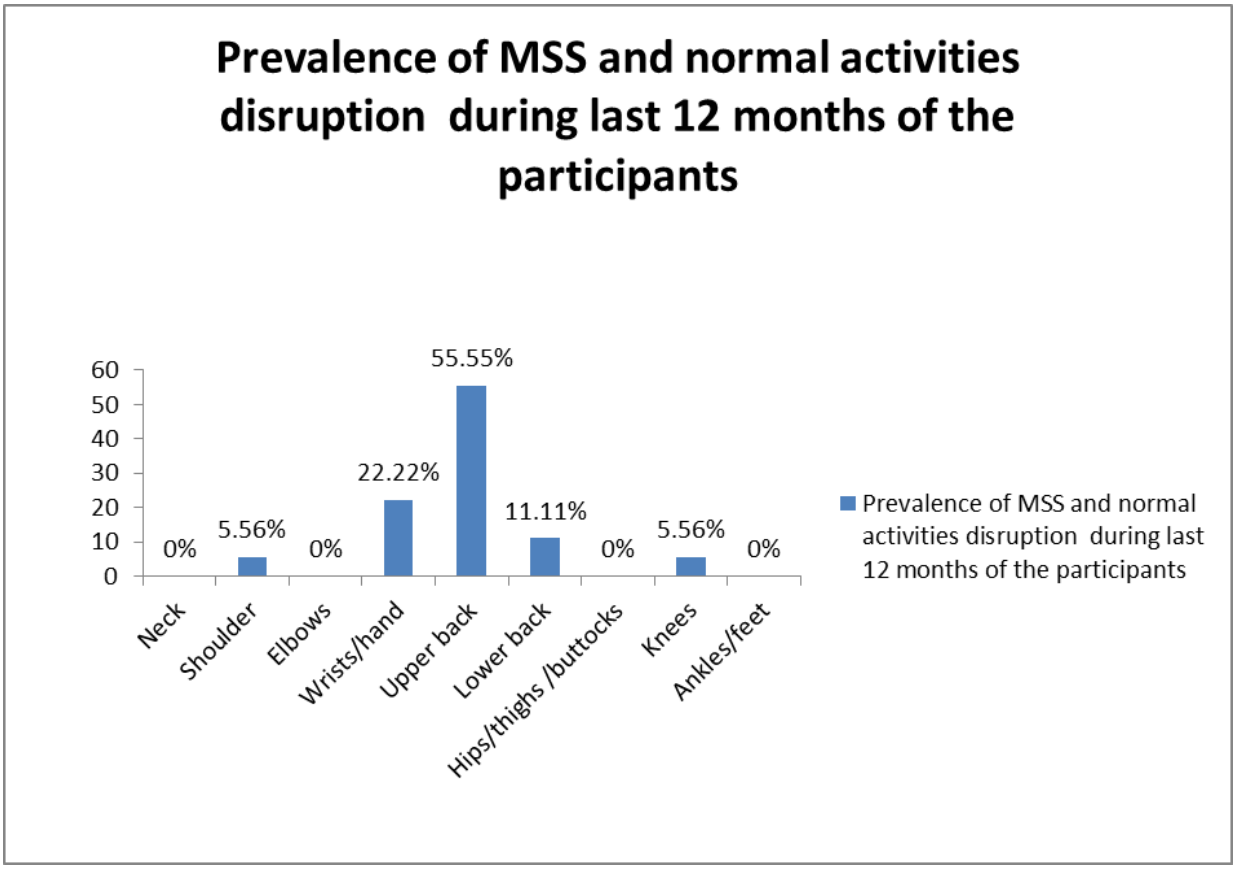


Fig 1: Prevalence of most affected body parts due to MSS and normal activities disruption due to MSS in different body parts during last 12 months of the participants.

4.4. Prevalence of MSS and normal activities disruption in last 12 months Standard Nordic Questionnaires were used in this study for analysis, to find out the prevalence of MSS in last 12 month. Prevalence of last 12 month at least one body region 182 dentists had said yes 91% and said no 18 dentists 9%. In those dentists 47 dentists had disrupted normal activities due to MSS during last 12 months 23.5% and 153 dentists said no and the frequency is 76.5%. Those results have given below in table no.3:

Table - 03: prevalence of MSS and normal activities disruption in last 12 months

Variables	Frequency (n)	%
Prevalence of last 12 month at least one body region :		
yes	182	91.0
no	18	9.0
Normal activities disruption due to MSS during last 12 months:		
yes	47	23.5
no	153	76.5

4.5. Risk level of awkward posture of the participants

Dentists are doing different types of work so by using REBA (Rapid Entire Body Assessment) the postural alignment of the body in various tasks performance was identified in this analysis sectors. Table 04 shows that 54.5% participants had medium risk level that means further investigate, change soon.45.5% participants had high risk level that means investigate and implement change. The table no. 4 has given below:

Table - 04: Postural risk levels of the participants

REBA levels	Frequency (n)	%
4-7=Medium Risk, Further Investigate, Change Soon	109	54.5
8-10=High Risk, Investigate and Implement Change	91	45.5

CHAPTER 5
DISCUSSION

In this study the prevalence of MSS in last 12 months; Standard Nordic Questionnaires were used in this study for analysis. According to these studies the most commonly affected body parts is upper back and the prevalence is 58%, second wrists/hand 33.5% , third neck 26.5% and fourth shoulder 11.5%, fifth elbow 7.5%, next one is lower back 7%, next one knees 2.5%, next is hips/thighs/buttocks 1.5% and last one is ankles/feet 0.5%. A high percentage (75%) of dentists experienced musculoskeletal symptoms (MSS) in at least one region of the body during the last year and 44.2% of dentists complained of shoulder pain and 29.9% of back pain, although responses to our survey did not accurately discriminate between pain only from MSS and that intensified by other factors. But in present studies has shown that upper back high prevalence and that is 58%, then hand/wrists 33.5% and neck 26.5% (Memarpour *et al.*2013).

In this study has shown a high prevalence of musculoskeletal symptoms on upper back 55.55% than wrists 22.22% and after that lower back 11.11%. The upper back prevalence is high than the other body region and this study had also shown that the highly significant relationship between socio demographic characteristics and musculoskeletal symptoms of the dentists in last 12 months and among them one is working days per week and working hours in a day

In this study Socio-demographic factors like gender, age, marital status, Smoking habit, years of experience, how many patients has been treated in a day, treatment session for one patient, break time after one treatment session did not show any significant association with MSS in last 12 months except working days per week and working hours in a day, in table 02. Among the general socio-demographic factors, working days per week and working hours in a day, had a significant relationship with musculoskeletal symptoms (MSS) in last 12 months, because among them working days per week chi-square value is 9.500 and its p value is .002 that is greater than .05. And the general socio-demographic factors working hours in a day chi-square value is 9.761 and its p value is .002 that is greater than .05. So the general socio-demographic factors, working

days per week and working hours in a day, had a significant relationship with musculoskeletal symptoms (MSS) in last 12 months.

The study showed that 6.6% dental surgeons always experienced shoulder pain, while 83.3% dental surgeons sometimes experienced back pain and 70% sometimes experienced neck pain. Majority of the dental surgeons (73.3%) experienced stiffness in the back and 23.3% experienced severe pain in their neck (Shaik, Rao, Husain & D'sa, 2011) and in this present study had shown dentists has high prevalence in upper back, than lower back and after that wrists and hand. Upper back is the most affected body parts due to MSS and normal activities disruption due to MSS among different body parts. After that lower back and then wrists/hand are affected body parts due to MSS. The prevalence of upper back is 55.55%, than wrists/hand prevalence is 22.22%, lower back prevalence is 11.11% than shoulder and knee had both 5.56% prevalence.

In the present study, dentists who adopted a bent Posture or awkward posture and causes stress on upper back and experienced significantly more pain than those who did not, although some of the respondents were unable to classify their posture during dental treatment meaning that incomplete data was received in some cases. And in the upper back prevalence among dentist has shown high prevalence then other body region. According to study of New Zealand dentists has found a high annual prevalence of musculoskeletal symptoms, with 63% of participants experiencing symptoms in the lower back or neck, 49% in the shoulders, and 42% in the wrists/hands (Palliser *et al.*2007).

Self-reported 15-20% prevalence of pain was most common in the neck, shoulders, arms and lower back and the prevalence calculations for neck (77.8%) shoulder (72.6%) and lower back (69.8%) (Botha *et al.* 2014). In this study prevalence of MSS in upper back is most, than lower back and after that hand /wrists. In New Zealand study of MSS among dentists had shown that dentists have high prevalence of MSS in upper back. In the South African Dental Journal prevalence of MSS in neck, shoulder and lower back.

According to Nordic musculoskeletal questionnaire (NMQ) in this study for analysis, has shown the prevalence of MSS in last 12 month. Prevalence of last 12 month at least one body region 182 dentists had said yes 91% and said no 18 dentists 9%. In those dentists 47 dentists had

disrupted normal activities due to MSS during last 12 months 23.5% and 153 dentists said no and the frequency is 76.5%.

In the other study of MSS symptoms of Netherland dentists indicated a strong relationship between the implementation of recommendations, in particular for work posture, and the reduction of their complaints Jonsson (2004). And in the present study has shown two associations with p value. In the present studies has shown that prevalence of the body parts is showing in the table. Because of upper back problem 10%, second wrists/hand 0.5% , third neck 11.0% and fourth shoulder 100%, fifth elbow 1.0%, next one is lower back 0.5%, next one knees 100.0%, next is hips/thighs/buttocks 0.5% and last one is ankles/feet 0.5%. Dentists were carrying out from normal activities like job, household work, hobbies etc. As the dentists are doing different types of work so by using REBA (Rapid Entire Body Assessment) the postural alignment of the body in various tasks performance was identified in this analysis sectors. Table 04 shows that 54.5% participants had medium risk level that means further investigate, change soon.45.5% participants had high risk level that means investigate and implement change.

The annual prevalence of neck pain varied across occupations, ranged from 10.2% in France to 27.1% in Norway to 33.7% in the UK and to 47.8% in Quebec, Canada (Rahmani, Amiri, Bandpei, Mohsenifar & Pourahmadi, 2013).

Rahmani et al.(2013,p. 10) Studies suggest that the annual prevalence of neck pain varied across occupations, ranged from 10.2% in France to 27.1% in Norway to 33.7% in the UK and to 47.8% in Quebec, Canada. The one week prevalence of neck pain was variably reported from 7.3% in office workers to 53% in female plant workers exposed to repetitive work. Dentists are at high risk for developing many work-related disorders particularly neck and back pain. Neck pain was reported as the most prevalent musculoskeletal symptoms at 57.5% in Queensland, Australia. In a recent study conducted on 220 dentists in Poland, over 92% of dentists.200 dentists were participated in this analysis part in which 59.5% was male and 40.5% were female. In age characteristics 83.5% was 25-45 years and 16.5% 46 years or more (SD± 8.721). In this study had shown dentists have high prevalence in upper back, than lower back and after that wrists and hand. Upper back is the most affected body parts due to MSS and normal activities disruption

due to MSS among different body parts. After that lower back and then wrists/hand are affected body parts due to MSS. The prevalence of upper back is 55.55%, than wrists/hand prevalence is 22.22%, lower back prevalence is 11.11% than shoulder and knee had both 5.56% prevalence.

Here 87% participants were married and 13% were unmarried. According to participants statement 52% had smoking habit and 48% had not smoking habit. Years of experience 1-6 years had 65.5% and 7years or more had 34.5% (SD±2.971). In dentists working days per week 6 days had 61.5% and 7 days had 38.5% (SD±.7222). Working hours in a day 6-8 hours had 57.0% and 8 hours or more had 43.0% (SD± 1.833). In how many patients has been treated in a day in variables 1-9 patients had 61% and 10 or more had 39%. In Treatment session for one patient in variables 30-60 min had 95% and another more than 60 min had 5% (.20782). Duration of break time after one patient treatment session for 5 min frequency had 95.5% and 10 min or more had 4.5%, experienced MSS, especially in the neck (47%) and lower back (35%) and it has similiaritis with the study of MSS in Netherland dentists.

In the present study had shown general Socio-demographic factors like gender, age, marital status, smoking habit, years of experience, working days per week, working hours in a day, how many patients has been treated, treatment session for one patient and break time after one treatment session those variables in table no. 2 with MSS in last 12 months with p value: In those general Socio-demographic factors like gender, age, marital status, Smoking habit, years of experience, how many patients has been treated in a day, treatment session for one patient, break time after one treatment session did not show any significant association with MSS in last 12 months except working days per week and working hours in a day. Among the general socio-demographic factors, working days per week and working hours in a day, had a significant relationship with musculoskeletal symptoms (MSS) in last 12 months, because among them working days per week chi-square value is 9.500 and its p value is .002 that is greater than .05. And the general socio-demographic factors working hours in a day chi-square value is 9.761 and its p value is .002 that is greater than .05. So the general socio-demographic factors, working days per week and working hours in a day, had a significant relationship with musculoskeletal symptoms (MSS) in last 12 months. A another study had shown that 6.6% dental surgeons always experienced shoulder pain, while 83.3% dental surgeons sometimes experienced back pain and 70% sometimes experienced neck pain. Majority of the dental surgeons (73.3%)

experienced stiffness in the back and 23.3% experienced severe pain in their neck. It was observed that the number of patients attended per day by the dental surgeons had a significant association (*P = 0.024*) with the pain they experienced in their hip/thigh region. The frequency of pain experienced by the dental surgeons in the hip/thigh and knee joints also showed a significant association (*P = 0.037*) with the height of the dental surgeons (Shaik *et al.* 2011).

In this study through a bar chart it had shown dentists has high prevalence in upper back, than lower back and after that wrists and hand. Upper back is the most affected body parts due to MSS and normal activities disruption due to MSS among different body parts. After that lower back and then wrists/hand are affected body parts due to MSS. The prevalence of upper back is 55.55%, than wrists/hand prevalence is 22.22%, lower back prevalence is 11.11% than shoulder and knee had both 5.56% prevalence. Through the Standard Nordic Questionnaires (NMQ) were used in this study for analysis, to find out the prevalence of MSS in last 12 month. Prevalence of last 12 month at least one body region 182 dentists had said yes 91% and said no 18 dentists 9%. In those dentists 47 dentists had disrupted normal activities due to MSS during last 12 months 23.5% and 153 dentists said no and the frequency is 76.5%. And last of all in this study Dentists are doing different types of work so by using REBA (Rapid Entire Body Assessment) the postural alignment of the body in various tasks performance was identified in this analysis sectors. In this objectives result had shown that 54.5% participants had medium risk level that means further investigate, change soon.45.5% participants had high risk level that means investigate and implement change.

CHAPTER 6
Limitations, Recommendations, Conclusion

6.1. Limitations of the study

This study was about prevalence of self-reported musculoskeletal Symptoms (MSS) and its associated physical risk levels among dentists in Bangladesh the identification of prevalence and postural risk level for developing Musculoskeletal Symptoms (MSS) among Dentists. For some limitations researcher was always keen about these limitations and considering these limitations when she prepared this project. And the limitations are:

- The overall sample size is relatively small
- As it is a cross sectional study the causal relationship is not founded through this study.
- The result of the study may not be generalized

There was not enough resource found of the prevalence and postural risk level for developing musculoskeletal symptoms (MSS) among dentists' workers in Bangladesh. Related article was found but it was different countries but in Bangladesh basis article has not found.

6.2. Recommendations of the study

- Recommends is that future similar research will be conducted in the area with large number of sample size.
- It also needed to document all information safely.
- Ergonomic intervention is immediately needed for those people.

6.3. Conclusion

Now a day's all over the world MSS are one of the common problems in working population and many people are already affected by different type of disorder and many people are become affected. This disorder affected their activities of daily living and their performance that mean quality of life. This study had shown the prevalence of musculoskeletal symptoms among dentists in Bangladesh and through this study it has found that the dentists had high prevalence

of musculoskeletal symptoms (MSS) on upper back. This study had also shown that the significant relationship between socio-demographic risk factors and musculoskeletal symptoms among dentists among three selected dental college and hospitals in Bangladesh with 200 dentists concerns. This current study had also focused the risk levels of musculoskeletal symptoms (MSS) among dentists in Bangladesh perspective. So this study will be helpful for not only occupational therapist but also all members who will work with the dental profession as a professional dentist in future to know the prevalence of musculoskeletal symptoms (MSS) among dentists in Bangladesh and its associated physical risk levels. This study will be more helpful in future to get more information about prevalence of musculoskeletal symptoms, associated physical risk levels of dentists and also the significant relationship between socio-demographic factors with musculoskeletal symptoms (MSS).Musculoskeletal symptoms among dentists have been considered a value of the workload of dental practice.Dentists are inclined to suffer from musculoskeletal symptoms due to continuous contact to occupational health hazards. The findings of the present study had shown that the prevalence of upper back pain and the results also highlight the significant relationship among socio-demographic factors and MSS among dentists in Bangladesh. This study will be helpful in future to provide further information about musculoloskeletal symptoms among dentists in Bangladesh perspective.

References

- Alexopoulos, E, Shathi, L & Charizani, F, (2004). 'Prevalence of musculoskeletal disorders in dentists', *Biomed Central Musculoskeletal Disorder.* 16 (5). Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC441388/ [Accessed 5 July 2014].
- Anton, D, Rosecrance, J, Merlino, L, & Cook, T, (2002). 'Prevalence of musculoskeletal symptoms and carpal tunnel syndrome among dental hygienists', *American Journal of Industrial Medicine,* 42 (3), pp. 248–257. Available at: http://onlinelibrary.wiley.com/doi/10.1002/ajim.10110/pdf[Accessed 4 May 2014].
- Botha, P, Chikte, U, Barrie, R & Esterhuizen, T, (2014). 'Self-reported musculoskeletal pain among dentists in South Africa: A 12-month prevalence study', *South African Dental Journal,* 69 (5). Available at: http://www.scielo.org.za/scielo.php?pid=S0375-15622014000500008&script=sci_arttext [Accessed 5 July 2014].
- Chamani, G, Zarei, M, Momenzadeh, A, Safizadeh, H & Rad, M, (2012). 'Prevalence_of_Musculoskeletal_Disorders_among_Dentists_in_Kerman_Iran', *Journal of Musculoskeletal Pain,* pp.1-6. Available at: http://www.researchgate.net/publication/262791136_Prevalence_of_Musculoskeletal_Disorders_among_Dentists_in_Kerman_Iran[Accessed 5 July 2014].
- Choobineh, A, Soleimani, E, Daneshmandi, H, Mohamadbeigi, A &Izadi, K, (2012). 'Prevalence of musculoskeletal disorders and posture analysis using RULA method in Shiraz general dentists in 2010', *Journal of Islamic Dental Association of IRAN (JIDAI) winter,* 24 (4), pp. 244-249. Available at: http://www.jidai.ir/files/site1/user_files_85bc48/eng/admin-A-10-1-642-98fcbcc.pdf [Accessed 5 July 2014].
- Droeze, E& Jonsson, H, (2005). 'Evaluation of ergonomic interventions to reduce musculoskeletal disorders of dentists in the Netherlands', 25, pp. 211-220. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16179770 [Accessed 10 April 2014].
- Feng, B, Liang, Q, Wang, Y, Andersen, L & Szeto, G, (2014). 'Prevalence of work-related musculoskeletal symptoms of the neck and upper extremity among dentists in China', *British Medical Journal,* 4(12). Available at:

http://bmjopen.bmj.com/content/4/12/e006451.full?g=w_oem_open_tab[Accessed 5 July 2014].

- Hayes, M, Smith, D & Taylor, J, (2013). 'Musculoskeletal disorders and symptom severity among Australian dental hygienists', *Biomed Central Journal*, 6, Available at: http://www.biomedcentral.com/1756-0500/6/250[Accessed 10 April 2014].
- Jabbar, T, (2008). 'Musculoskeletal Disorders among dentists in Saudi Arabia', *Pakistan Oral & Dental Journal*, 28 (1), PP. 135-144. Available at: http://www.podj.com.pk/Jul_2008/24-Podj.pdf [Accessed 10 June 2014].
- Kozak, A, Schedlbauer, G, Peters, C & Nienhaus, (2014). 'Self-Reported Musculoskeletal Disorders of the Distal Upper Extremities and the Neck in German Veterinarians: A Cross-Sectional Study', 9 (2). [Accessed 10 June 2014].
- Kumar, V, Kumar, S & Baliga, M, (2013). 'Prevalence of work-related musculoskeletal complaints among dentists in India: A national cross-sectional survey', *Indian Journal of Dental Reserch*, 24 (4), pp. 428-438. Available at: http://www.ncbi.nlm.nih.gov/pubmed/24047834 [Accessed 10 June 2014].
- Leggat, P & Smith, D, (2006). 'Musculoskeletal disorders self-reported by dentists in Queensland, Australia', *Australian Dental Journal*, 51 (4), pp. 324-327. Available at: http://www.ada.org.au/App_CmsLib/Media/Lib/0612/M43676_v1_633020328450646250.pdf [Accessed 4 May 2014].
- Marshall, E, Duncombe, L, Robinson, R & Kilbreath, S, (1997). 'Musculoskeletal symptoms in New South Wales dentists', *Australian Dental Journal*, 42(4), pp. 240-246. Available at: http://www.ncbi.nlm.nih.gov/pubmed/9316311[Accessed 4 May 2014].
- Melis, M,Abou-Atme, Y, Cottogno, L & Pittau, R, (2004). 'Upper Body Musculoskeletal Symptoms in Sardinian Dental Students', *Journal of the Canadian Dental Association* 70 (5), pp. 306–10. Available at: http://www.cda-adc.ca/jcda/vol-70/issue-5/306.pdf [Accessed 10 June 2014].
- Moen, B & Bjorvatn, K, (1996). 'Musculoskeletal symptoms among dentists in a dental school', *Occupational Medicine*, 46(1), pp. 65-68, Available at: http://occmed.oxfordjournals.org [Accessed 10 April 2014].

- Morse, T, Bruneau, H & Dussetschleger, J, (2010). 'Musculoskeletal disorders of the neck and shoulder in the dental professions', 35, pp. 419–429. Available at: http://www.ncbi.nlm.nih.gov/pubmed/20448321 [Accessed 10 April 2014].
- Memarpour, M, Badakhsh, S, Khosroshahi, S & Vossoughi, M, (2013). 'Work-related musculoskeletal disorders among Iranian dentists', National Health Service, 43, pp. 465-474. Available at: http://www.hello.nhs.uk/documents/lit_search_archive/2014/Manual%20Handling%20and%20Dentistry.pdf [Accessed 10 April 2014]
- Palliser, C, Firth, H, Feyer, A &Paulin, S, (2005). 'Musculoskeletal discomfort and work related stress in New Zealand dentists', *British Medical Journal,* 19 (4), pp. 351-359. Available at: http://www.tandfonline.com/doi/abs/10.1080/02678370500421064 [Accessed 10 April 2014].
- Puriene, A, Janulyte, V, Musteikyte, M, & Bendinskaite, R, (2007). 'General health of dentists. Literature review', *Stomatologija, Baltic Dental and Maxillofacial Journal,*9, pp. 10-20. Available at: http://www.sbdmj.com/071/071-02.pdf [Accessed 10 June 2014].
- Rahmani, N, Amiri, M, Bandpei, M, Mohsenifar, H & Pourahmadi, M, (2013). 'Work related neck pain in Iranian dentists: An epidemiological study',*Journal of Back and Musculoskeletal Rehabilitation* 26, pp. 9-15. Available at: http://www.researchgate.net/publication/235628882 [Accessed 10 April 2014].
- Rambabu, T &Suneetha, K, (2014). 'Prevalence of work related musculoskeletal disorders among physicians, surgeons and dentists: A comparative study', *Annals of Medical & Health Sciences Research,* 4(4), pp. 578-582. Available at: http://www.amhsr.org /text.asp?2014/578/139327[Accessed 10 June 2014].
- Ratzon, N, Yaros, T, Mizlik, A, &Kanner, T, (2000). 'Musculoskeletal symptoms among dentists in relation to work posture', *British Medical Journal,* 15, pp. 153-158. Available at: http://www.ncbi.nlm.nih.gov/pubmed/12441484 [Accessed 4 May 2014].
- Rolander, B, Karsznia, A, Jonker, D, Oberg, T & Bellner, A, (2005). 'Perceived contra observed physical work load in Swedish dentists', 25, pp. 253–262. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16179774 [Accessed 10 February 2014].

- Sakzewski, L, & Naser-ud-Din, (2012). 'Work-related musculoskeletal disorders in dentists and orthodontists: a review of the literature', *British Medical Journal*, pp. 1-6. Available at: http://www.ncbi.nlm.nih.gov/pubmed/24004769[Accessed 4 May 2014].
- Shaik,S, Rao, S, Husain, A &D'sa, J, (2011). 'Work-related musculoskeletal disorders among dental surgeons: A pilot study', *Contemporary Clinical Dentistry*, 2(4), pp. 308-302. Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3276858/ [Accessed 5 July 2014].
- Shetty,S, Shetty, S, Hegde, A, &Babu, N, (2015). 'Prevalence of Neck and Back Pain among Pediatric Dentists', *Nitte University Journal of Health Science*, 5 (1), pp. 45-47. Available at: http://nitte.edu.in/journal/december2014/pona.pdf [Accessed 5 July 2014].
- Warren, N (2010). 'Causes of musculoskeletal disorders in dental hygienists and dental hygiene students: A study of combined biomechanical and psychosocial risk factors', *Dental Hygienist Professionals Online*, 35 (441–454), Available at: http://www.ncbi.nlm.nih.gov/pubmed/20448323 [Accessed 10 April 2014].
- Lowa State University, 2013.Risk Factors. Available at:http://www.ehs.iastate.edu/occupational/ergonomics/risk-factors[Accessed 5 July 2014].
- Human factors and Ergonomics Society, 2000. Educational Resources. Available at:http://www.hfes.org/Web/EducationalResources/HFEdefinitionsmain.html[Accessed 5 July 2014].
- International Ergonomics Association, 2015. Definition and Domains of ergonomics. Available at: http://www.iea.cc/whats/[Accessed 5 July 2014].
- Dentistry, 2015. Dentistry. Available at: http://en.wikipedia.org/wiki/Dentistry[Accessed 5 July 2014].
- Dental Health Info, 2015. Available at: DDS. http://www.1800dentist.com/dds/ [Accessed 5 July 2014].
- What are the Branches of Dentistry? 2015. What are the Branches of Dentistry? Available at:http://swathi180.hubpages.com/hub/Branches-of-Dentistry[Accessed 5 July 2014].
- Branches of Dentistry, 2015. Dentistry Branches. Available at:http://www.juniordentist.com/branches-of-dentistry.html[Accessed 5 July 2014].

- Prevalence, 2015. Prevalence. Available at: http://dictionary.reference.com/browse/prevalence. [Accessed 5 July 2014].
- Pain Management Health Center, 2015.Pain Management: Musculoskeletal Pain. Available at: http://www.webmd.com/pain-management/guide/musculoskeletal-pain [Accessed 5 July 2014].

Appendix

1. BHPI Permission letter

Permission Letter

Date: 22July2014
To
The Head of the Department,
Department of Occupational Therapy
Bangladesh Health Professions Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343.

Subject: Prayer for seeking permission to conduct the research project.

Sir,
I am Umme Mahzabin Hossain 4th year student of Bachelor of Science in Occupational Therapy program at Bangladesh Health Professions Institute (under the medical faculty of Dhaka University), the academic institute of Centre for the Rehabilitation of the Paralysed (CRP). As I am a student of 4th year, I have to do a dissertation for my research purpose. My dissertation title is "Prevalence of Self-reported Musculoskeletal Symptoms (MSS) and Its Associated Physical Risk Levels among Dentists". The aim of the study is to identify the prevalence and its associated physical risk levels for developing musculoskeletal symptoms among dentists. I need seeking permission to conduct my research project as a part of requirement to fulfill the degree of B.Sc.in occupational therapy.
So, I therefore hope that you would be kind enough to give me the permission to continue the research project for my study.

Sincerely yours,
Umme Mahzabin Hossain

Umme Mahzabin Hossain

4th year B. Sc in Occupational Therapy
Bangladesh Health professions Institute (BHPI)
Center for the Rehabilitation of the Paralysed (CRP).
P.O: CRP-Chapain, Saver, Dhaka-1343, Bangladesh.

Approved by	Signature
Head of the Department Nazmun Nahar Assistant Professor and Head of the Department Department of Occupational Therapy BHPI, CRP-Chapain, Saver, Dhaka-1343.	As per supervisor's recommendation it may allow to conduct this study.
Supervisor Md. Monjurul Habib Lecturer in Occupational Therapy Department of Occupational Therapy Bangladesh Health Professions Institute (BHPI) CRP, Chapain, Saver, Dhaka-1343.	This proposal can be approved for further proceeding. 22/Jul/2014

2. Dhaka Dental College and Hospital (DDCH) Permission letter

গণ-প্রজাতন্ত্রী বাংলাদেশ সরকার
অধ্যাক্ষের দপ্তর
ঢাকা ডেন্টাল কলেজ, মিরপুর-১৪, ঢাকা ।

স্মারক নং-ঢাডেক/এইচ-১/২০১৪/ তারিখঃ / /২০১৪ইং ।

প্রতি,
অধ্যাপক ডাঃ এম এ কাদের
অধ্যক্ষ
বিএইচপিআই, সিআপি
সাভার , ঢাকা ।

বিষয়ঃ বিএসসি ইন অকুপেশনার থেরাপি কোর্সের উপর রিসার্চ সংক্রান্ত কাজের তথ্য সংগ্রহের অনুমতি প্রসংগে।

বাংলাদেশ হেলথ প্রফেশন্স ইনষ্টিটিউট এর ৪র্থ বর্ষ বিএসসি ইন অকুপেশনল থেরাপি,কোর্সের ছাত্রী উম্মে মেহজাবিন কে অধ্যক্ষ,বিএইচপিআই, সিআপি,সাভার , ঢাকা হইতে অত্র কলেজের নিবন্ধন নং- ১৩৭৩ তারিখঃ ১৮/১০/২০১৪ইং মোতাবেক অকুপেশনার থেরাপি কোর্সের উপর রিসার্চ সংক্রান্ত কাজের তথ্য সংগ্রহের জন্য প্রেররন করা হইয়াছে। উক্ত পত্রের আলোকে উল্লেখিত ছাত্রীকে তাহার সুবিধাজনক সময়ে অত্র কলেজের বিভিন্ন বিভাগে তথ্য সংগ্রহের অনুমতি প্রদান করা হইল ।

উক্ত ছাত্রীকে তথ্য সংগ্রহে সার্বিক সহযোগীতা করার জন্য সকল বিভাগকে অনুরোধ করা হইল ।

(অধ্যাপক ডাঃ এস,এম,ইকবাল হোসেন)
অধ্যক্ষ
ঢাকা ডেন্টাল কলেজ, মিরপুর-১৪,ঢাকা-১২০৬।

স্মারক নং-ঢাডেক/এইচ-১/২০১৪/ ১৬০৪ তারিখঃ ২৬/ ১০/২০১৪ইং ।

অনুলিপি অবগতির জন্য প্রেরন করা হইল ঃ-
উম্মে মেহজাবিন, ৪র্থ বর্ষ বিএসসি ইন অকুপেশনল থেরাপি,কোর্সের ছাত্রী, বিএইচপিআই,সিআপি, সাভার , ঢাকা ।

২৬/১০/১৪.
(অধ্যাপক ডাঃ এস,এম,ইকবাল হোসেন)
অধ্যক্ষ
ঢাকা ডেন্টাল কলেজ, মিরপুর-১৪,ঢাকা-১২০৬।

3. City Dental College and Hospital Permission letter (CDCH)

বাংলাদেশ হেল্‌থ প্রফেশন্স ইনষ্টিটিউট (বিএইচপিআই)

BANGLADESH HEALTH PROFESSIONS INSTITUTE (BHPI)

(The Academic Institute of CRP)

CRP-Chapain, Savar, Dhaka, Tel: 7745464-5, 7741404 , Fax: 7745069

BHPI-Mirpur Campus, Plot-A/5, Block-A, Section-14, Mirpur, Dhaka-1206. Tel: 8020178,8053662-3, Fax: 8053661

তারিখ ঃ ২৪.০৯.২০১৪

প্রতি

অধ্যক্ষ

সিটি ডেন্টাল কলেজ হাসপাতাল

ঢাকা।

বিষয় ঃ রিসার্চ প্রজেক্ট (dissertation) এর জন্য আপনার প্রতিষ্ঠান সফর প্রসঙ্গে।

জনাব,

আপনার সদয় অবগতির জন্য জানাচ্ছি যে, পক্ষাঘাতগ্রস্তদের পুনর্বাসন কেন্দ্রে-সিআরপি'র শিক্ষা প্রতিষ্ঠান বাংলাদেশ হেল্‌থ প্রফেশনস্ ইনষ্টিটিউট (বিএইচপিআই) ঢাকা বিশ্ববিদ্যালয় অনুমোদিত বিএসসি ইন অকুপেশনাল থেরাপি কোর্স পরিচালনা করে আসছে।

উক্ত কোর্সের ছাত্রছাত্রীদের কোর্স কারিকুলামের অংশ হিসাবে বিভিন্ন বিষয়ের উপর রিসার্চ ও কোর্সওয়ার্ক করা বাধ্যতামুলক।

বিএইচপিআই'র ৪র্থ বর্ষ বিএসসি ইন অকুপেশনাল থেরাপি কোর্সের ছাত্রী উম্মে মেহজাবিন তার রিসার্চ সংক্রান্ত কাজের জন্য আপনার সুবিধাজনক সময়ে আপনার প্রতিষ্ঠানে সফর করতে আগ্রহী।

তাই তাকে আপনার প্রতিষ্ঠান সফরে সার্বিক সহযোগীতা প্রদানের জন্য অনুরোধ করছি।

ধন্যবাদান্তে

অধ্যাপক ডাঃ এম এ কাদের
অধ্যক্ষ
বিএইচপিআই।

4. Sapporo Dental College and Hospital (SDCH) Permission letter

বাংলাদেশ হেল্‌থ প্রফেশন্স ইনষ্টিটিউট (বিএইচপিআই)

BANGLADESH HEALTH PROFESSIONS INSTITUTE (BHPI)

(The Academic Institute of CRP)

CRP-Chapain, Savar, Dhaka, Tel: 7745464-5, 7741404 , Fax: 7745069

BHPI-Mirpur Campus, Plot-A/5, Block-A, Section-14, Mirpur, Dhaka-1206. Tel: 8020178,8053662-3, Fax: 8053661

তারিখ ঃ ২৪.০৯.২০১৪

প্রতি

অধ্যক্ষ

সাপ্পোরো ডেন্টাল কলেজ এন্ড হাসপাতাল

ঢাকা।

বিষয় ঃ রিসার্চ প্রজেক্ট (dissertation) এর জন্য আপনার প্রতিষ্ঠান সফর প্রসঙ্গে।

জনাব,

আপনার সদয় অবগতির জন্য জানাচ্ছি যে, পক্ষাঘাতগ্রস্তদের পুনর্বাসন কেন্দ্রে-সিআরপি'র শিক্ষা প্রতিষ্ঠান বাংলাদেশ হেলথ্ প্রফেশনস্ ইনষ্টিটিউট (বিএইচপিআই) ঢাকা বিশ্ববিদ্যালয় অনুমোদিত বিএসসি ইন অকুপেশনাল থেরাপি কোর্স পরিচালনা করে আসছে।

উক্ত কোর্সের ছাত্রছাত্রীদের কোর্স কারিকুলামের অংশ হিসাবে বিভিন্ন বিষয়ের উপর রিসার্চ ও কোর্সওয়ার্ক করা বাধ্যতামুলক।

বিএইচপিআই'র ৪র্থ বর্ষ বিএসসি ইন অকুপেশনাল থেরাপি কোর্সের ছাত্রী উম্মে মেহজাবিন তার রিসার্চ সংক্রান্ত কাজের জন্য আপনার সুবিধাজনক সময়ে আপনার প্রতিষ্ঠানে সফর করতে আগ্রহী।

তাই তাকে আপনার প্রতিষ্ঠান সফরে সার্বিক সহযোগীতা প্রদানের জন্য অনুরোধ করছি।

ধন্যবাদান্তে

Bangladesh Health Professions Institute (BHPI) CRP-Chapain, Savar, Dhaka-1343

অধ্যাপক ডাঃ এম এ কাদের

অধ্যক্ষ

বিএইচপিআই।

অনুমতি দেওয়া হল।

PROF. DR. MOHIUDDIN AHMED
BDS, FCPS, Ph.D
Principal
Sapporo Dental College & Hospital

5. REBA Permission

Title:	Rapid Entire Body Assessment (REBA)
Author:	Sue Hignett,Lynn McAtamney
Publication:	Applied Ergonomics
Publisher:	Elsevier
Date:	3 April 2000

Logged in as:
umme mahzabin

Custom Permission Request

Review the details below and click 'Submit Request'.
Elsevier will review and respond within ten business days.

Licensed content publisher	Elsevier
Licensed content publication	Applied Ergonomics
Licensed content title	Rapid Entire Body Assessment (REBA)
Licensed content author	Sue Hignett,Lynn McAtamney
Licensed content date	3 April 2000
Licensed content volume number	31
Licensed content issue number	2
Number of pages	5
Type of Use	reuse in a thesis/dissertation
Portion	figures/tables/illustrations
Number of figures/tables /illustrations	4
Format	electronic
Are you the author of this Elsevier article?	No
Will you be translating?	No
Title of your thesis/dissertation	Prevalance of self reprted masculoskeletal symptoms (MSS) and its associated physical risk factors among dentists
Expected completion date	Feb 2015
Estimated size (number of pages)	120
Elsevier VAT number	GB 494 6272 12
Permissions price	Not Available
VAT/Local Sales Tax	Not Available
Total	Not Available

Edit Order Details

6. Nordic Permission

Title:	Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms
Author:	I. Kuorinka,B. Jonsson,A. Kilbom,H. Vinterberg,F. Biering-Sørensen,G. Andersson,K. Jørgensen
Publication:	Applied Ergonomics
Publisher:	Elsevier
Date:	September 1987

Logged in as:
umme mahzabin

Permission Request Submitted

Your request is now under review.
You will be notified of the decision via email.
Please print this request for your records.

Get the printable order details.

Order Number	500895821
Order Date	Aug 07, 2014
Licensed content publisher	Elsevier
Licensed content publication	Applied Ergonomics
Licensed content title	Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms
Licensed content author	I. Kuorinka,B. Jonsson,A. Kilbom,H. Vinterberg,F. Biering-Sørensen,G. Andersson,K. Jørgensen
Licensed content date	September 1987
Licensed content volume number	18
Licensed content issue number	3
Number of pages	5
Type of Use	reuse in a thesis/dissertation
Portion	figures/tables/illustrations
Number of figures/tables /illustrations	4
Format	electronic
Are you the author of this Elsevier article?	No
Will you be translating?	No
Title of your thesis/dissertation	Prevalance of self reprted masculoskeletal symptoms (MSS) and its associated physical risk factors among dentists

Expected completion date	Feb 2015
Elsevier VAT number	GB 494 6272 12
Permissions price	Not Available
VAT/Local Sales Tax	Not Available
Total	Not Available

7. Socio-demographic Questionnaires of the participants (Dentists)

"জনসংখ্যাভিত্তিক প্রশ্নাবলী"

১। লিঙ্গ ঃ পুরুষ / মহিলা।

২। বয়স ঃ ২৫-৪৫ / ৪৬ বছর বা তার বেশি বছর।

৩। বৈবাহিকঅবস্থা ঃ বিবাহিত / অবিবাহিত।

৪। ধুমপানের অভ্যাস ঃ আছে / নাই।

৫। কত বছর ধরে দন্ত চিকিৎসা করছেন ঃ ১-৬ বছর / ৭ বছর বা তার বেশি।

৬। সপ্তাহে কত দিন কাজ করেন ঃ ৬ / ৭ দিন।

৭। একদিনে কত ঘন্টা কাজ করেন ঃ ৬-৮ ঘন্টা / ৮ ঘন্টার বেশি।

৮। একদিনে কতগুলো রোগী দেখেন ঃ ১-৯ / ১০ বা বেশি।

৯। একজন রোগী দেখার পর কতক্ষণ বিরতি নেন ঃ ৫ মি. / ১০ মি.।

১০। একজন রোগী দেখার সময় কতক্ষণ নেন ঃ ৩০-৬০ মি. / ৬০ মি. বা তার বেশি।

8. Consent Form

i. Consent Form in Bengali for the participants

<u>সম্মতিপএ অংশগ্রহনকারীর জন্য</u>

গবেষনাকারী…….....হচ্ছে বাংলাদেশ হেলথ্ প্রফেশন্স ইনস্টিটিউট এর অধীনে, বি,এস,সি ইন অকুপেশনাল থেরাপী বিভাগের একজন ছাত্রী, আমি একটি গবেষনা করতে চাই যে 'কি কি ঝুকির পর্যায়গুলোর কারনে, দন্ত চিকিৎসকদের অস্তিপেশীর রোগগুলি হয়ে থাকে এবং তা কতটুকু প্রকোপ' । গবেষনাকারীর উদ্দেশ্য হচ্ছে, 'কি কি ঝুকির পর্যায়গুলো আছে এবং তা কতটুকু প্রকোপ দন্ত চিকিৎসকদের জন্য, তা খুঁজেবের করা ।

পরস্পর সাক্ষাত এ অংশগ্রহন করার জন্য, অংশগ্রহনকারীর কাছে থেকে অনুমতি নিচ্ছে গবেষনাকারী । আপনাদের তথ্যগুলো অন্য কারো সাথে আলোচনা করা হবে না । এই গবেষনায় অংশগ্রহনকারীরা কোন ধরনের লাভবান বা ক্ষতির সম্মখিন হবে না গবেষনার মাধ্যমে । যে সব তথ্য সংগ্রহ করা হবে সাক্ষাত এর মাধ্যমে সেগুলো খুব গোপনীয়তার সাথে রাখা হবে । অংশগ্রহনকারীরা যে কোন সময় এই গবেষনা ছেড়ে চলে যেতে পারবেন ।

এই গবেষনায় আমি .....একজন অংশগ্রহনকারী এবং এই গবেষনার উদ্দেশ্য সম্পকে খুব ভালোভাবে জানি । আমি নিজের আগ্রহে এই গবেষনায় অংশগ্রহন করতে চাই । আমার অধিকার অছে যে কোন সময় এই গবেষনার অংশগ্রহন করা থেকে চলে যাওয়ার । এই জন্য আমি আমার উত্তর দিতে দ্বিধাগ্রস্থ নয় । গবেষনাকারী গবেষনা সংক্রাগবেষনায়ন্ত যে কোন প্রশ্নের উত্তর যে কোন সময় দিতে প্রস্তুত । সুতরাং আমি আমার সজ্ঞানে এই গবেষনায় অংশগ্রহন করতে ইচ্ছুক ।

(যারা লেখাপড়া করতে পারে না, তাদের সামনে পড়ে শুনানো হবে)

অংশগ্রহনকারীর নাম/সাক্ষর	তারিখ:
গবেষনাকারীর নাম/সাক্ষর	তারিখ:
অংশগ্রহণকারী সাক্ষী / ফিঙ্গার প্রিন্ট নাম ও সাক্ষর:	তারিখ:

ii.Consent form in English for the participants

The researcher ---------- is a B.Sc. student of Occupational Therapy Department of Bangladesh Health Professions Institute (BHPI), want to conduct a research about **'Prevalence of Self-reported Musculoskeletal Symptoms and Its Associated Physical Risk Levels among Dentists in Bangladesh'** .The aim of the study is to identify the prevalence and its associated physical risk levels for developing musculoskeletal complaints among Dentists.

Researcher will receive permission from participant to take part in the interview. Their information will not share with others. Participant of the study will not benefit or harm from this study. They are free to decline answering any question during interview. All the information that is collected from the interview would be kept safety and maintained confidentiality. Participants can withdraw from the study at any time.

In this study I am…… a participant and I have been clearly informed about the purpose of the study . I am willing to participant in this study and I will have the right to refuse in taking part any time at any stage of the study. For this reason I will not to be bounded to answer to anybody. The researcher will be available to answer any study related question or inquiry to the participant. So with my best knowledge I agree to participant willingly with my full satisfaction in this study.

(It will be read in front of the illiterate participant)

Name & Signature / finger print of participant: Date:

Name & Signature of Researcher: Date:

9. Standard Nordic Questioner (NMQ)

C E DICKINSON, K CAMPION, A F FOSTER, S J NEWMAN, A M T O'ROURKE AND P G THOMAS

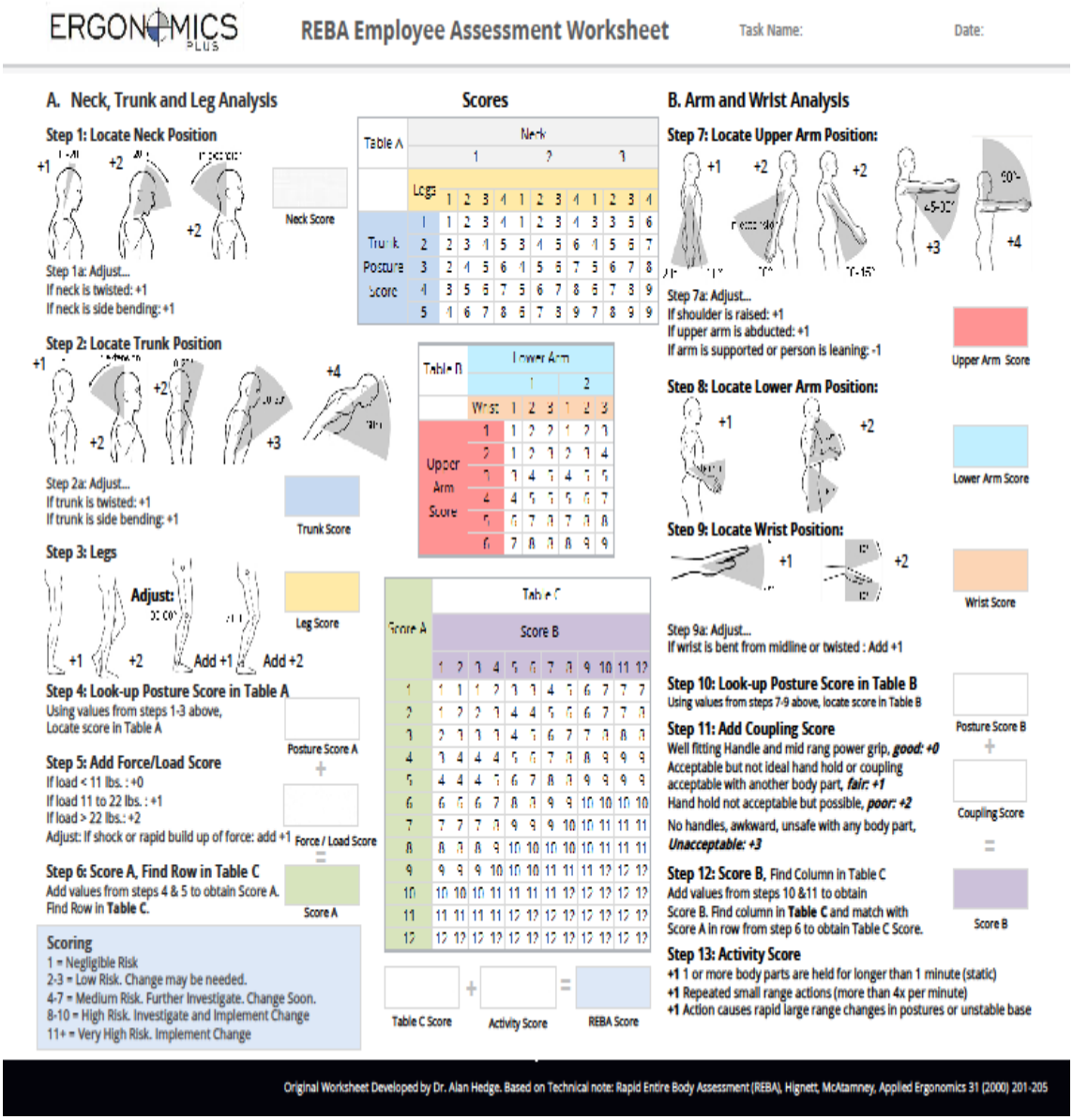
Please answer by using the tick boxes ☑
– *one tick for each question*

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

10. REBA Questioner (Rapid Entire Body Assessment)



ERGONOMICS PLUS

REBA Employee Assessment Worksheet

Task Name: Date:

A. Neck, Trunk and Leg Analysis

Step 1: Locate Neck Position

+1 +2 +2

Neck Score

Step 1a: Adjust...
If neck is twisted: +1
If neck is side bending: +1

Step 2: Locate Trunk Position

+1 +2 +2 +3 +4

Step 2a: Adjust...
If trunk is twisted: +1
If trunk is side bending: +1

Trunk Score

Step 3: Legs

Adjust:

+1 +2 Add +1 Add +2

Leg Score

Step 4: Look-up Posture Score in Table A

Using values from steps 1-3 above,
Locate score in Table A

Posture Score A

+

Step 5: Add Force/Load Score

If load < 11 lbs. : +0
If load 11 to 22 lbs. : +1
If load > 22 lbs.: +2
Adjust: If shock or rapid build up of force: add +1

Force / Load Score

=

Step 6: Score A, Find Row in Table C

Add values from steps 4 & 5 to obtain Score A.
Find Row in **Table C**.

Score A

Scoring

1 = Negligible Risk
2-3 = Low Risk. Change may be needed.
4-7 = Medium Risk. Further Investigate. Change Soon.
8-10 = High Risk. Investigate and Implement Change
11+ = Very High Risk. Implement Change

Scores

Table A

Neck	1				2				3			
Legs	1	2	3	4	1	2	3	4	1	2	3	4
Trunk Posture Score 1	1	2	3	4	1	2	3	4	3	3	5	6
Trunk Posture Score 2	2	3	4	5	3	4	5	6	4	5	6	7
Trunk Posture Score 3	3	2	4	5	6	4	5	6	7	5	6	7	8
Trunk Posture Score 4	4	3	5	6	7	5	6	7	8	6	7	8	9
Trunk Posture Score 5	5	4	6	7	8	6	7	8	9	7	8	9	9

Table B

Lower Arm	1			2		
Wrist	1	2	3	1	2	3
Upper Arm Score 1	1	2	2	1	2	3
Upper Arm Score 2	2	1	2	3	3	4
Upper Arm Score 3	3	3	4	4	5	5
Upper Arm Score 4	4	4	5	5	6	7
Upper Arm Score 5	5	6	7	8	8	8
Upper Arm Score 6	6	7	8	8	9	9

Table C

Score A	Score B 1	2	3	4	5	6	7	8	9	10	11	12
1	1	1	1	2	3	3	4	5	6	7	7	7
2	1	2	2	3	4	4	5	6	6	7	7	8
3	2	3	3	3	4	5	6	7	7	8	8	8
4	3	4	4	4	5	6	7	8	8	9	9	9
5	4	4	4	5	6	7	8	8	9	9	9	9
6	6	6	6	7	8	8	9	9	10	10	10	10
7	7	7	7	8	9	9	9	10	10	11	11	11
8	8	8	8	9	10	10	10	10	10	11	11	11
9	9	9	9	10	10	10	11	11	11	12	12	12
10	10	10	10	11	11	11	11	12	12	12	12	12
11	11	11	11	11	12	12	12	12	12	12	12	12
12	12	12	12	12	12	12	12	12	12	12	12	12

Table C Score + Activity Score = REBA Score

B. Arm and Wrist Analysis

Step 7: Locate Upper Arm Position:

+1 +2 +2 +3 +4

Step 7a: Adjust...
If shoulder is raised: +1
If upper arm is abducted: +1
If arm is supported or person is leaning: -1

Upper Arm Score

Step 8: Locate Lower Arm Position:

+1 +2

Lower Arm Score

Step 9: Locate Wrist Position:

+1 +2

Wrist Score

Step 9a: Adjust...
If wrist is bent from midline or twisted : Add +1

Step 10: Look-up Posture Score in Table B

Using values from steps 7-9 above, locate score in Table B

Posture Score B

+

Step 11: Add Coupling Score

Well fitting Handle and mid rang power grip, ***good: +0***
Acceptable but not ideal hand hold or coupling acceptable with another body part, ***fair: +1***
Hand hold not acceptable but possible, ***poor: +2***
No handles, awkward, unsafe with any body part, ***Unacceptable: +3***

Coupling Score

=

Step 12: Score B, Find Column in Table C
Add values from steps 10 &11 to obtain Score B. Find column in **Table C** and match with Score A in row from step 6 to obtain Table C Score.

Score B

Step 13: Activity Score

+1 1 or more body parts are held for longer than 1 minute (static)
+1 Repeated small range actions (more than 4x per minute)
+1 Action causes rapid large range changes in postures or unstable base

Original Worksheet Developed by Dr. Alan Hedge. Based on Technical note: Rapid Entire Body Assessment (REBA), Hignett, McAtamney, Applied Ergonomics 31 (2000) 201-205