Faculty of Medicine

University of Dhaka

RISK FACTORS OF MECHANICAL NECK PAIN AMONG STUDENTS

Tahsin Khan

Bachelor of Science in Physiotherapy (B.Sc. in PT)

DU Roll No: 919

Registration No: 3625

Session: 2015-2016

BHPI, CRP, Savar, Dhaka

Bangladesh Health Professions Institute (BHPI)

Department of Physiotherapy

CRP, Savar, Dhaka – 1343

Bangladesh

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We the undersigned certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for the acceptance of this dissertation entitled

RISK FACTORS OF MECHANICAL NECK PAIN AMONG STUDENTS

Submitted by **Tahsin Khan**, for the partial fulfilment of the requirement for the degree of Bachelor of Science in Physiotherapy (B.Sc. PT).

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Kazi Md. Amran Hossain
Lecturer, Department of Physiotherapy
BHPI, CRP, Savar, Dhaka
Supervisor

.....

Prof. Md. Obaidul Haque
Vice-Principal
BHPI, CRP, Savar, Dhaka

.....

Mohammad Anwar Hossain
Associate Professor, Department of Physiotherapy, BHPI
Senior Consultant & Head of Physiotherapy Department
CRP, Savar, Dhaka

E. Rah

.....

Ehsanur Rahman
Associate Professor & MPT Coordinator
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

Shofiq

.....

Md. Shofiqul Islam
Associate Professor & Head
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

DECLARATION

I declare that the work presented here is my own. All sources used have been cited appropriately. Any mistakes or inaccuracies are my own. I also declare that for any publication, presentation, or dissemination of information of the study, I would be bound to take written consent from the Department of Physiotherapy of Bangladesh Health Professions Institute (BHPI).

Signature: Tahsin Khan **Date:** 15.11.2021

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Acknowledgement

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Acronyms

ADLs	Activity of Daily Livings
BHPI	Bangladesh Health Professions Institute
BMI	Body Mass Index
WHO	World Health Organization
NSP	Neck Shoulder Pain
NDI	Neck Disability Index
PCID	Prolapse cervical intervertebral disc
ICD	International Classification of Diseases

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Abstract

Purpose: The purpose of the study was to determine the risk factors of mechanical neck pain for undergraduate students. ***Objectives:*** The objective of the study was to find out the risk factors of mechanical neck pain, socio-demographic information, association between neck pain and students, behavior, lifestyle, physical factors, educational factors, characteristics of neck pain and to perceive neck pain disability index. ***Methodology:*** The dissertation was an observational study with a case-control design. 200 participants responded to an online survey from 20th June 2021 to 20th September 2021. Inclusion criteria for the case group were having neck pain for at least 3 months and for the control group was not having neck pain for the last 5 years. The exclusion criteria for the case group was pathological neck pain. A structured questionnaire was used that had socio-demographic information, behavior and lifestyle, educational factors part. Neck disability index (NDI) and pain numeric rating scale (NPRS) were used to determine the factors. The statistical test has been conducted as per the distribution of data. Descriptive statistics were performed by the mean, standard deviation, frequency and percentage. Interferential statistics has been performed by chi-square, Pearson's correlation, independent t-test, and one-way ANOVA. Binary logistic regression has been performed using cases, presence of pain, and higher intensity of pain as a predictor variable. P-value was set as <.05. ***Results:*** Among 200 participants 100 were in the case group and 100 were in the control group. Mean± SD of overall age was 22.65± 2.049 and BMI. Among them prevalence of neck pain in male was (38%) and in female was (62%). Association found between neck pain with chair height, stress level, physical exercise, using laptop, duration of laptop using, phone using, television watching, video game playing, repetitive neck pain, prolong sitting, doing homework and bag weight. Risk factors were found with positive relation- chair height (OR- 4.846), using laptop (OR- 3.802), repetitive neck movement (OR- 3.313), television watching (OR- 2.948), video games playing (OR- 2.252), Phone using duration (OR- 1.822), bag weight (OR- 1.700) and with inverse relation physical exercise (OR- .736), posture during homework (OR- .325) and maintaining posture (OR- .276) were related to neck pain. ***Conclusion:*** Many factors were causing mechanical neck pain but among them using digital devices causes mechanical neck pain in most of them.

Key words: Risk factor, mechanical neck pain, students.

CHAPTER – I INTRODUCTION

1.1 BACKGROUND

The neck is an important part of our body. The neck is made up of vertebrae that extend from the skull to the upper torso. There are seven vertebrae in the neck, called cervical vertebrae. Cervical discs absorb shock between the bones. Our head is supported by bones, ligaments, and muscles. They also allow movement of the head. Neck pain is a common complaint. Neck pain is a pain that starts from the neck and can be associated with radiating pain down one or both of the arms. Any abnormalities, inflammation, or injury can cause neck stiffness or neck pain. Some so many people experience neck pain or stiffness occasionally. In most cases, it is due to poor posture or overuse. Sometimes neck pain is caused by injury from a fall from height, heavy weight lifting, contact sports, or whiplash (Hakala et al., 2006).

Characteristics of neck pain usually involve one or more of the following symptoms and signs- sharp pain, stiffness of the neck, headache, difficulty in neck movement, radicular pain, trouble with gripping objects, and loss of hand function. In a study it is found that neck pain is associated with headache 65%, upper limb pain 80%, upper back pain 64%, lower back pain 39%, dizziness 31%, and nausea 23% (Cagnie et al., 2007).

We live in an age of the modern era. Technology has never been so accepted universally as the modern era has. Here, we will hardly find someone who doesn't use a smartphone. Rapid technological developments, especially in the use of smart phone have affected young people (Hoy et al., 2014).

Neck pain is discomfort or more intense forms of pain that are localized to the cervical region, generally the posterior or lateral region of the neck. The most common neck pain is non-specific mechanical neck pain caused by muscle strain, ligament sprain, spasm, or from the activity of daily livings. Neck muscle can be strained from poor posture (Hanvold., 2015).

The second greatest cause of disability and the fourth greatest impact on overall health, nowadays the musculoskeletal disorders are a major problem globally (Vos et al., 2010). In recent years neck pain has become a problem in many countries.

In 2002 a research has been conducted in Bangladesh about neck pain. The research shows that among 6476 patients 1350 patients presented with neck pain. It was about 21.01%. 54.44% were male and 45.55% were female and among them 26.08% were workers, 23.43% were housewives and 14.08% were retired (Shakoor et al., 2002).

The Prevalence of neck pain was 86(76.8%) among the students. The prevalence of neck pain was higher among female students at 51(59.8%) than male 35(40.2%) students. The highest prevalence was found among computer or other electronic device users (63.4%) and long duration of studying hours (58.9%). 45.5% of participants said that their neck pain was due to the long duration of attending class and 67.9% of participants said poor ergonomic factor was responsible for neck pain (Johora et al., 2016)

The global point prevalence of neck pain was 4.9% (95% CI 4.6 to 5.3). Disability-adjusted life years increased from 23.9 million (95% CI 16.5 to 33.1) in 1990 to 33.6 million (95% CI 23.5 to 46.5) in 2010. Out of all 291 conditions studied in the Global Burden of Disease 2010 Study, neck pain ranked 4th highest in terms of disability as measured by YLDs, and 21st in terms of overall burden (Hoy et al., 2014).

A recent occupational cohort study has confirmed that psychosocial factors and a previous history of pain are important predictors of incident neck pain (Leclerc et al., 1999). Many of these associations are not specific to neck pain but are found to regional pain syndromes generally (Makela et al., 1991).

A study in Norway has been found that musculoskeletal pain, injuries, disorders are the cause of more than 40% of all sick leave and 30% of all disability pensions (Hanvold., 2015).

The rate of neck pain for the adult people in a 1-year prevalence ranging from 16.7% to 75.1% (Fejer et al., 2006). Approximately 16.5% of females and 10.7% of males in the tame side population of the United Kingdom reported neck pain at least once per month (Webb et al., 2003). As the largest developing country with 1.3 billion people, China also experiences neck pain. The cases of neck pain have become a heavy burden on the affected individuals and society. In many studies, it has been found that the incidence of neck pain is high among the adolescent population (Hakala et al., 2006).

Mechanical and psychosocial workplace factors have both been related to neck pain (Luime et al., 2005). Individual factors such as physical capacity and gender may also be of importance (Cagnie et al., 2007). Studies on middle-aged and older workers have shown that both mechanical workload (Hamberg et al., 2006) and psychosocial factors at work may increase the risk of neck and shoulder pain. It has been found that there is a close relation between neck pain and the use of mobile phones. Poor body posture and long hours spent with this device can cause health hazards like neck pain (Hannan et al., 2005).

Neck pain is common. In European and North American populations about one-third of adults will experience neck pain in 1 year, and about 5±10% of adults will have a significantly disabling neck problem (Bovim et al., 1994).

The prevalence is higher in women and rises with age (Andersson et al., 1993), and cultural variation is suggested by a lower reported prevalence in Asian populations (Lau et al., 1996).

In cross-sectional studies of neck pain has been associated with self-reported poor general health status, psychological distress, and previous neck injury, in addition to a range of other factors such as occupational tasks and obesity (Makela et al., 1991).

The total prevalence of neck pain observed in general population samples (Bovim et al., 1994) is similar to the prevalence of neck pain reported in follow-up studies of unselected populations of injured subjects (Schrader et al., 1996).

Neck pain is common among adults in developed countries and contributes importantly to the demand for medical services and the economic burden of absence from work due to sickness. Population-based studies suggest a lifetime prevalence of over 70% and a point prevalence of between 12 and 34%. Work-related neck disorders are common problems in office workers, especially among those who are intensive computer users. The worldwide trend is for people to use computers for longer periods daily, due to increased computer-based tasks at work as well as during leisure activities. The introduction of the computer into the workplace has meant changes in work organization, and different use of worker physical and mental potential (Hannan et al., 2005).

It is generally agreed that the etiology of work-related neck disorders is multidimensional which is associated with, and influenced by, a complex array of individual, physical and psychosocial factors. Among these various risk factors, work-related psychosocial factors appear to play a major role (Hannan et al., 2005).

The identification of factors for neck pain early in working life is important as it could improve intervention strategies aimed at reducing pain development and increase the possibility for young workers to sustain their working careers.

1.2 JUSTIFICATION

Nowadays neck pain is a common musculoskeletal disorder in young people (Hamberg et al., 2006). In another country, there is much research regarding factors contributing mechanical neck pain but there is very little research such as this in our country. So, this is important to identify the actual causes of mechanical neck pain among students of our country.

Several studies have been conducted in an attempt to identify risk factors for neck pain. However, most of these studies focus only on one or a few factors and do not take physical factors, psychosocial factors, and individual characteristics into account. Identifying factors that predispose individuals to persistent neck problems may contribute to primary or secondary prevention (Hamberg et al., 2006).

Neck pain is assumed to be a multifactorial disease, and therefore it is assumed that several risk factors are contributing to its development. Risk factors can be work-related or non-work-related, and they can be divided roughly into 3 categories (e.g. physical, psychosocial, and individual risk factors). Many studies have been conducted in an attempt to identify the risk factors for neck pain. Most of these studies focus on only one or a few risk factors, or a single category of risk factors. Several reviews on risk factors for neck pain have also been carried out (Hannan et al., 2005).

Neck pain is a common condition that causes substantial disability. With aging global populations, further research is urgently needed to better understand the predictors and clinical course of neck pain, as well as how neck pain can be prevented and better managed (Hoy et al., 2014).

There is a close relation between neck pain and physical activity. People who perform regular physical exercise lead a more healthy life than others. Physical exercise stretch muscle, increase blood flow thus decreasing the pain mediators like prostaglandins. So physical exercise plays a vital role in the reduction of pain and increasing the chance of getting a healthy life (Hoy et al., 2014).

Being a physiotherapist our duty is not only to treat the patient but also prevention of disease.

The identification of factors for neck pain early in working life is important as it could improve intervention strategies aimed at reducing pain development and increase the possibility for young workers to sustain their working careers.

If we can find out the cause of mechanical neck pain among the students we will be able to lower the rate of mechanical neck pain in our country. It would be a great achievement for us.

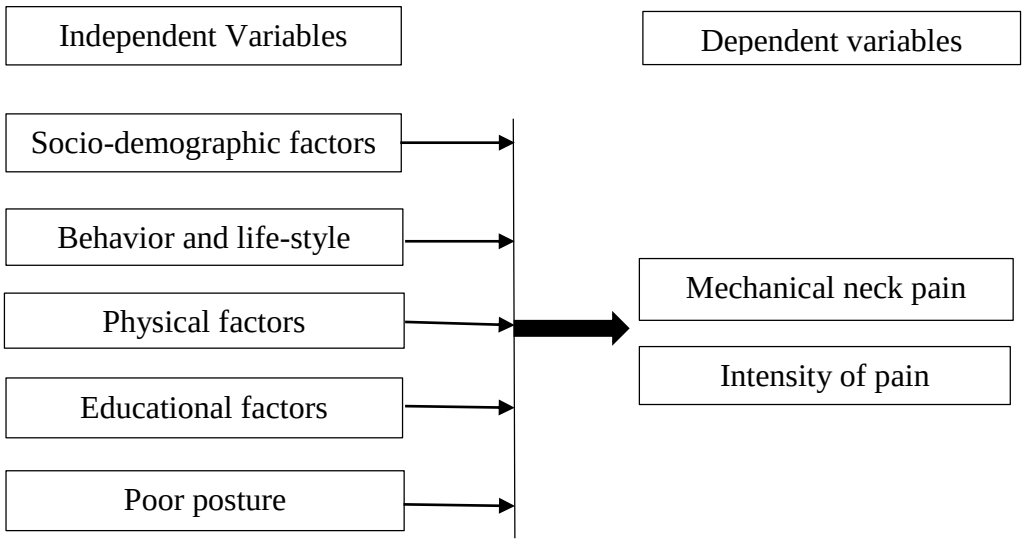
1.3 Aim

The study aims to evaluate the risk factors of mechanical neck pain among the students.

1.4 Objectives

- To obtain socio-demographic information
- To identify behavior, lifestyle and other factors of sufferers and non-sufferers
- To observe neck pain for students
- To detect association among variables
- To perceive neck pain related disability for sufferers
- To identify the risk factors of neck pain for students
- To organize the risk factors according to severity

1.5 Conceptual framework



CHAPTER – II LITERATURE REVIEW

Neck pain is a sensation of pain that may be felt anywhere from the base of the skull at ear level to the upper part of the back or shoulder or arm and sometimes it radiates up to the finger when there is a nerve root engaged in both hands or a single one (Sabeen et al., 2013).

A study has been showing- neck pain is common among adults, which affects 14-71% young population at some time in their lives, and among them, 19-37% of neck pain patients develop chronic neck pain. With that, the study also showed that neck pain causes personal discomfort due to pain, disability. This impaired quality of life and may affect ADLs (Kanchanomai et al., 2011).

Here is another study approach that neck pain has the highest prevalence rate. About 64.3% of respondents reported trouble in the neck area during the past year and those who had felt neck pain; almost two-thirds (65.4%) reported that their pain lasted for more than 2 days and over 50% (53.1%) experienced neck pain which affected their activities of daily life (Hayes et al., 2009). Health professional students have a high prevalence of disorder of musculoskeletal such as the neck, shoulder, or back pain (Lorusso et al., 2010).

In Korea the prevalence of musculoskeletal pain among students was 73.3%, in Japan it was about 36.9% and in China, the rate was 67.6%. China has a higher rate of musculoskeletal pain among students rather than Korea and Japan (Alshagga et al., 2013).

A study revealed that health care professionals' students were the most affected group due to musculoskeletal pain such as the neck, shoulder, arm, hand, back, etc. The rate of mechanical pain was higher in students rather than in another aged group of people (Lorusso et al., 2010).

Most of the musculoskeletal pain was felt on the mentioned area on the neck it is about 25.42%, on the back, it is about 37.29% and the rate for the upper back is 18.64% (Bharadva et al., 2014).

Ayanna and his friends researched the causes of neck pain. They did the research based on self-perception about the causes of mechanical neck pain. They found the mentioned

causes such as sitting in the classroom without any back support, prolonged duration of reading, long time computer uses, the previous history of neck pain, bad posture, type of pillow that is used during sleeping, prolonged writing, excessive physical exercise, stress level, driving and sometimes menstruation is found to be associated (Ayanniyi, Mbaba & Iroko, 2010).

Many researchers had been searched for the past decades for the association between neck pain and students, they find that there is a close relationship between students, workers, and neck pain, and also students are the highly affected group among all of them (Diepenmaat et al., 2006).

In this modern world, the requirement for computers in every aspect of our life has been increasing day by day. The rate of computer users is increasing proportionately to the rate of students. Students are now almost dependent on computers for their everyday tasks related to education, recreation like video games playing, watching a movie, series, etc.

Nowadays computer has become an important component of education. A subject named computer education has been added to the educational curriculum to become familiar with the usage of computers. Students are also depending on artificial intelligence for their daily life activities. Colleges and universities are giving access to students in the computer lab for useful learning and to develop skills that are essential for their future careers. So that the students are spending a lot of time on the computer and other devices. Thereby increasing their exposer to risk factors like musculoskeletal pain (Cooper et al., 2008).

A constant significant relation has been found between prolonged sitting posture and neck pain. In a previous study, researchers found that for people who sat more than 95% of their work time the risk of the neck was twice that of those who hardly ever worked in a sitting position. The increased risk of neck pain is proportionate to the time spent in the workplace in a sitting position. That is pointing to a clear relationship between prolonged sitting posture and neck pain (Gross et al., 2010).

Musculoskeletal problem is the second greatest cause of disability and the fourth greatest impact on health. The musculoskeletal problem is a major problem globally (Vos et al., 2010). Recently neck pain has become a concerning problem in many countries. A study was conducted in Norway and they found that almost 40% of people

take sick leave due to musculoskeletal pain, injuries and in 30% it has become a disability to pension holders (Hanvold, 2015).

The rate of neck pain for adult people is ranging from 16.7% to 75.1% in a year (Fejer et al., 2006). In the United Kingdom (UK) among the tame side population, approximately 16.5% female and 10.7% male reported their neck pain at least once per month (Webb et al., 2003). China is one of the largest developing countries with 1.3 billion people also experiencing neck pain. Neck pain has become a burden to the sufferers and society. In several studies, it was found that the incidence of neck pain is high in adolescence (Hakala et al., 2006).

Neck pain is also found relatable to psychosocial factors and mechanical workplace (Luime et al., 2005). Mechanical workload correlates with neck pain that is found in a study (Hamberg et al., 2006). Other factors like physical capacity are equally important (Cagnie et al., 2007). Nonmodifiable factors like gender, especially females itself a risk factors that contribute to neck pain due to their body structure (Cagnie et al., 2007). A study was done between middle-aged and older workers and they found the association between them to neck pain (Hannan et al., 2005).

Neck pain is more common in students especially those aged from 22 to 28 years old and the mean age is 23 years old (Silva et al.,2016). Many studies have been showing that students are highly affected group from the past decades due to neck pain and there is a close relation between neck pain and working factor (Diepenmaat et al., 2006). During the study period, 80% of the students reported musculoskeletal pain and the most common site of pain was the necks, back, shoulder, and hand (Madaan and Chaudhari, 2012). A survey occurred in Finland about neck and shoulder pain. In that survey, they found that almost 26% of people around 14-18 years old people felt pain at least once a week (Shan et al., 2013). Nowadays using a computer is very common in students (Kanchanomai et al., 2011). It has been perceived that neck pain among the students is occurring due to inappropriate back support during class lectures, prolong sitting in the classes, long time use of a computer, previous history of neck pain, poor posture during the study, prolonged standing position, type of pillow that they are using during sleeping, no or excessive physical exercise, driving position (Ayanniyi, Mbaba & Iroko, 2010). Physiotherapy has a wide range of roles in all stages of neck pain. Physiotherapy helps people with neck pain to return to their normal activity of daily life

(Moffett & Mclean, 2006). There is a close relation between sleeping in an awkward position and neck pain. Neck pain is also associated with prolonged use of a computer (Barbuto et al., 2008).

Factors that are physical workloads such as repetitive motion, static posture, awkward posture, and neck flexion or rotation have a significant association with neck pain additionally, it is also associated with poor posture, neck strain, occupational injuries, or sporting injuries, four to five hours of daily computer use is considered as a risk factor for neck pain in adolescents (Sabeen et al., 2013).

Many students also reported that they maintained poor sitting positions during their lessons, in addition, only some of the students used an assisting device while reading or stretched regularly, moreover most of the students had their cell phones, they used them continuously for up to 40 min, mostly in poor ergonomic positions, so repetitive and prolonged static postures have been found to initiate or exacerbate the neck-shoulder pain (NSP) according to (Koh et al., 2012). A significant positive relation was found between sitting posture and neck pain, previous studies found that workers who sat for more than 95% of the working time the risk of neck pain was twice as high as for workers who hardly ever worked in a sitting position and the risk for neck pain increases with the time spent working in a sitting position, suggesting a clear relation between sitting posture and neck pain (Gross et al., 2010). Some of the perceived causes of neck pain among students are seats without back supports in lectures, long hours of reading, computer use, history of neck pain, the posture assumed during lectures, long sitting hours, prolonged standing, type of pillow used when sleeping, prolonged writing, excessive physical activity, stress, prolonged driving and menstruation (Ayanniyi, Mbada & Iroko, 2010). Hakala et al., (2006) mentioned that the following work-related psychosocial factors showed a positive association with neck pain, mental tiredness at the end of the workday, shortage of personnel, not being rested after a break; no variation at work, doing the same work all day, getting annoyed about others where women have an almost two-fold risk compared with men furthermore persons older than 30 years have more than two and one-half times more chance of having neck pain than younger individuals, being physically active decreases the likelihood of having neck pain.

There is a lack of data about neck pain in physiotherapy students of Bangladesh. There is no such evidence that neck pain can affect the educational performance of students in Bangladesh. For this reason, the researcher felt interested in this issue. It is also necessary for physiotherapy students because physiotherapists play a vital role in managing or treating this condition and to increase the study about this issue for using the data in future studies in Bangladesh.

CHAPTER–III METHODOLOGY

3.1 Study design

A perspective case-control study has been conducted. There was an equal number of cases and control i.e. case: control was 1:1.

3.2 Goal

- To find out the prediction of neck pain among the students having neck pain
- To elicit the clinical variable among case and control

3.3 Setting

3.3.1 Target population

University students have been selected for the study. A student with mechanical neck pain was selected for the case group and a student without mechanical neck pain was selected for the control group.

3.3.2 Study area

Universities of Dhaka city area.

3.3.3 Study period

The study period was from 7th June 2021 to 15th November 2021.

3.4 Eligibility criteria

3.4.1 Inclusion criteria for case

- University students with mechanical neck pain
- Both male and female
- Age: >18 Years (Padez, 2003)
- Neck pain is present for at least more than 3 months
- Pain is associated with neck movement
- Pain can be central or refer to a distal segment of the body
- The activity of daily living is being hampered for neck pain
- Neck pain is causing disability

3.4.2 Exclusion criteria for case

- Unwilling to participate
- Any kind of pathological condition such as spondylosis, spondylolisthesis, osteoarthritis, listhesis, PCID, tumor, malignancy, pigget's disease, sryingomyelia, chiari malformation, cervical stenosis
- **According to ICD-10:**

✓ The intensely discomforting, distressful, or agonizing sensation associated with trauma or disease, with well-defined location, character, and timing.

✓ Pain is a feeling triggered in the nervous system. Pain may be sharp or dull. It may come and go, or it may be constant. You may feel pain in one area of your body, such as your back, abdomen, or chest or you may feel pain all over, such as when your muscles ache from the flu. Pain can help diagnose a problem. Without pain, you might seriously hurt yourself without knowing it, or you might not realize you have a medical problem that needs treatment. Once you take care of the problem, the pain usually goes away. However, sometimes pain goes on for weeks, months, or even years. This is called chronic pain. Sometimes chronic pain is due to an ongoing cause, such as cancer or arthritis. Sometimes the cause is unknown. Fortunately, there are many ways to treat pain. Treatment varies depending on the cause of pain. Pain relievers, acupuncture, and sometimes surgery are helpful.

✓ Pain that comes on quickly, can be severe but lasts a relatively short time.

✓ Physical suffering or distress, to hurt

✓ The sensation of unpleasant feeling indicating potential or actual damage to some body structure felt all over, or throughout the body.

✓ Severe pain of limited duration

✓ The sensation of discomfort, distress, or agony, resulting from the stimulation of specialized nerve endings.

✓ Unpleasant sensation induced by noxious stimuli and generally received by specialized nerve endings.

✓ Unpleasant sensory and emotional experience arising from actual or potential tissue damage or described in terms of such damage (international association

for the study of pain); sudden or slow onset of any intensity from mild to severe with an anticipated or predictable end and duration of fewer than 6 months

- ✓ Unpleasant sensory and emotional experience associated with actual or potential tissue damage.

3.4.3 Inclusion criteria for control

- University students without neck pain
- Both male and female
- Age: >18 Years (Padez, 2003)
- Who had not been suffered from neck pain within the last 5 years
- Who has never been treated for neck pain
- Who share the same exposure criteria that the case group has but not suffering from neck pain

3.4.4 Exclusion criteria for control

- Unwilling to participate

3.5 Sample size calculation

$$n = \left(\frac{r+1}{r}\right) \frac{(p)(1-p)(Z\beta+Z\frac{\alpha}{2})^2}{(P1-P2)^2}$$

Where,

n = Sample size in the case group

r = ration of controls to cases

p = A measure of variability

Zβ = Represents the desired power (typically .84)

Zα/2 = Represent the desired level of statistical significance (typically 1.96)

(P1-P2) = Effect size (the difference in proportions)

r = 1

Odd ratio = 2.0

So the equation stands,

$P\ case\ exp = \frac{ORP\ control\ exp}{Pcontrols \exp(OR-1)+1}$

- $P\ case \exp = \frac{2 \times (0.16)}{(0.16)(2-1)+1} = \frac{0.32}{1.16} = 0.276$

Average proportion exposed = $\frac{(0.276+0.16)}{2} = \frac{0.436}{2} = 0.218$

Again,

n = $(\frac{r+1}{r}) \frac{(p)(1-p)(Z\beta+Z\frac{\alpha}{2})^2}{(P1-P2)^2}$

- n = $(\frac{1+1}{1}) \frac{(0.218)(1-0{,}218)(0.84+1.96)^2}{(0.276-0.16)^2} = 2 \times \frac{0.218 \times 0.782 \times 7.84}{(0.116)^2} = 2 \times \frac{1.336}{0.0134} = \frac{2.672}{0.0134} = 200$

Therefore, n = 200

So, 100 cases and 100 controls.

3.6 Selection of case

The research was started by identifying a group of people who had mechanical neck pain, typically called cases to conduct a case-control study. The researcher selected cases to find in predefined criteria. The patients with mechanical neck pain at universities of Dhaka city area were used as the cases for this study.

3.7 Selection of control

The researcher selected the controls that were free from neck pain. The relatively comparable sources of controls included the students of the university. So similarly the investigator selected the controls who had not been affected by mechanical neck pain.

3.8 Sampling technique

The researcher chose a university-based random sampling technique. Considering the inclusion-exclusion criteria and the number of students it was difficult to find the expected number of subjects. This technique was feasible and suitable for the researcher to obtain relevant information according to study objectives.

3.9 Data collection tools

A non-structured questionnaire was used for data collection by online interview. The questions were divided into key seven sections which almost covered all issues regarding risk factors of mechanical neck pain including age, gender, educational status, marital status, residential area, hobby, educational environment, smoking habit, the activity of daily living (ADL), obesity, lifestyle, interior designing of the institute, posture.

3.10 Measurement of relative risk factors

To evaluate the relative risk factors case group was considered as the dependent variable and other factors were considered as the independent variables. With the help of SPSS version 20, we analyzed data through regression. In regression odd ratio and 95%, CI was also calculated to evaluate the relationship. 95% CI was applied to show the significance between the two variables. The odds ratio was computed to determine how much risk there was in the presence of certain exposure compared to those who didn't have that exposure.

3.11 Statistical Test

3.11.1 Determination of the nature of data

The variables were determined as nominal, ordinal, interval, and ratio data and considered their parametric or non-parametric properties based on data type, normality test, and standard procedure (Hicks, 1999).

Table 01.3.11.1 Data category and normality test of data

Variable	**Description**	**Data type**	**Normality test**	**Data distribution**
Age overall	18-26 years	Ratio	P= (.001), (.001)	Parametric
Age in category	18-20 years, 21-23 years, 24-26 years	Ordinal	-	Non-parametric

Gender	Male, female	Nominal	-	Non-parametric
Marital status	Married, Unmarried	Nominal	-	Non-parametric
Education	Undergraduate, Graduate	Ordinal	-	Non-parametric
Residential area	Rural , Urban , Semirural	Nominal	-	Non-parametric
Hobby	Gardening, Reading, Watching television, Video games, Fishing	Nominal	-	Non-parametric
BMI	(18-30)	Interval	P= (.001), (.001)	Parametric
Stress level	Low, Medium, High	Nominal	-	Non-parametric
Physical exercise	(Hours)	Ratio	P= (.001), (.001)	Parametric
Using laptop	Yes, No	Nominal	-	Non-parametric
Laptop using duration	(Hours)	Ratio	P= (.001), (.001)	Parametric
Phone using duration	(Hours)	Ratio	P= (.001), (.001)	Parametric
Television watching duration	(Hours)	Ratio	P= (.001), (.001)	Parametric
Games playing duration	(Hours)	Ratio	P= (.001), (.001)	Parametric
Repetitive neck movement	Yes, No	Nominal	-	Non-parametric

Prolong sitting	(Hours)	Ratio	P= (.001), (.001)	Parametric
Maintain posture	Yes, No	Nominal	-	Non-parametric
Family history	Yes, No	Nominal	-	Non-parametric
Reading duration	(Hours)	Ratio	P= (.001), (.001)	Parametric
Bag weight	(Kg)	Ratio	P= (.001), (.001)	Parametric
Carrying bag	On the single shoulder, On both shoulder, Handheld	Nominal	-	Non-parametric
Sitting duration in class	(Hours)	Ratio	P= (.001), (.001)	Parametric
Chair height	Appropriate, Inappropriate	Nominal	-	Non-parametric
Doing homework	Sitting on the chair and table, Sitting on the floor, Lying on the floor	Nominal	-	Non-parametric
Having pain	Yes, No	Nominal	-	Non-parametric
Cause of pain	None, Reading, Using a computer, Poor posture, Prolong sitting, Type of pillow	Nominal	-	Non-parametric
Limiting from	Not limiting, Reading, Housework,	Nominal	-	Non-parametric

	Concentration, Sleeping, Recreational activity			
Pain severity	(0-5), (6-10)	Ordinal	-	Non-parametric
Total NPDI	(0-100)%	Interval	P= (.001), (.001)	Parametric

(Hicks, 1999)

3.11.2 Data category

Table 01 shows the data types of different variables. There are two types of data, categorical and continuous data. Categorical includes nominal and ordinal data. Continuous data includes interval and ration data.

Here, gender, marital status, residential area, hobby, self-perceived stress level, using computer, repetitive neck movement, maintenance of proper posture, family history, carrying style of bag, chair height, the way of doing homework, having pain or not, cause of pain and pain limiting any activity or not all those are nominal data.

Categories of age, education, and pain severity are ordinal data.

Overall age, physical exercise doing duration, duration of using a computer, watching television, phone using, playing video games, prolong sitting, reading, sitting in class and bag weight all of these is ratio data.

Body mass index (BMI) and total score of NPDI are interval data.

3.11.3 Normality test

Normality test was done for interval and ratio data to see whether these data were normally distributed or not. Test result of these data were for overall age P= (.001), (.001); physical exercise doing duration P= (.001), (.001); duration of using computer P= (.001), (.001); watching television P= (.001), (.001); phone using P= (.001), (.001); playing video games P= (.001), (.001); prolong sitting P= (.001), (.001); reading P= (.001), (.001); sitting in class P= (.001), (.001); bag weight P= (.001), (.001); body mass index (BMI) P= (.001), (.001) and total score of NPDI P= (.001), (.001).

3.11.4 Data description

Categorical data including nominal and ordinal are non-parametric data. Continuous data including interval and ratio data are parametric data.

Category of age, gender, marital status, education, residential area, hobby, self-perceived stress level, using computer, repetitive neck movement, maintenance of proper posture, family history, carrying style of bag, chair height, the way of doing homework, having pain or not, cause of pain, pain limiting any activity or not and pain severity are non-parametric data.

Overall age, physical exercise doing duration, duration of using a computer, watching television, phone using, playing video games, prolong sitting, reading, sitting in class and bag weight, body mass index (BMI) and total score of NPDI are referred to as parametric data as they are interval and ratio data.

3.12 Determination of statistical test

The statistical has been performed as descriptive and inferential statistics based on parametric or non-parametric properties. The descriptive statics was performed as frequency and percentage in nominal or ordinal data. Mean and standard deviation has been calculated for interval or ratio data.

A descriptive and interferential statistical analysis had been conducted to find out the desired result. In the descriptive section, the categorical (nominal and ordinal) variables were measured in percentage and they were shown by using different bar diagrams, pie charts, and tables. The central tendency and measure of the dispersion of continuous (interval and ratio) variables were calculated through mean and standard deviation. In the interferential section Normality test, Chi-square, Pearson's correlation, Independent t-test, One-way Anova, and binary regression were used to find the association between different dependent and independent variables.

Table 02.3.12: The inferential statistics has been performed as follows:

Purpose	Variables	Statistical test
Relationship	2 Categorical data (non-parametric)	Chi square test

	One categorical (non-parametric) and one parametric data	Independent t-test (independent bivariate data)
		One way ANOVA (independent tri-variate data)
		Chi-square test (independent multivariate data)
	2 parametric data	Pearson correlation test
Regression of relationship	Dependent variable as categorical data (Bivariate)	Binary logistic regression

(Hicks, 1999)

3.13 Quality control and assurance

The thesis has been checked by the supervisor in both hard and soft copy.

The investigator has enough knowledge in the designated study, hence the study area and underneath issues has been keenly explored. The format of the questionnaire will purely be structured, thus it has to enable a definitive answer. The questionnaire will be developed according to the literature search and peer review for a reliable questionnaire.

The investigator will be tried to avoid selection bias due to strictly maintained inclusion and exclusion criteria.

Both cases and controls has been well defined in this study to avoid conflict in the selection of the case and control.

3.14 Ethical considerations

- The whole process of this research project will be conducted by following the guidelines of the Institutional Review Board (IRB) of Bangladesh Health Professions Institute (BHPI).
- Informed consent has been taken from all participants
- Confidentiality has been strictly maintained
- Participant's rights and privileges will be ensured
- No harmful act has been taken and the participant can withdraw themselves within 3 months of submission
- Clinical trial registration has been done

CHAPTER – IV RESULTS

4.1 Socio-demographic information

Table 03.4.1: Descriptive analysis of socio-demographic information

Variables	Total (%)	Case (%)	Control (%)
Overall age			
18-26 years	22.65± 2.049	22.50± 2.018	22.89± 2.081
Age			
18-20 Years	35(18%)	18(18%)	17(17%)
21-23 Years	81(40%)	44(44%)	37(37%)
24-26 Years	84(42%)	38(38%)	46(46%)
Gender			
Male	84(42%)	38(38%)	46(46%)
Female	116(58%)	62(62%)	54(54%)
Marital status			
Married	20(10%)	13(13%)	7(7%)
Unmarried	180(90%)	87(87%)	93(93%)
Educational Status			
Undergraduate	145(73%)	72(72%)	73(73%)
Graduate	55(27%)	28(28%)	27(27%)
Residential area			
Rural	43(21%)	31(31%)	12(12%)
Urban	123(62%)	55(55%)	68(68%)
Semirural	34(17%)	14(14%)	20(20%)
Hobby			
Gardening	37(18%)	18(18%)	19(19%)
Reading	75(38%)	37(37%)	38(38%)
Watching television	35(18%)	14(14%)	21(21%)
Playing games	51(25%)	30(30%)	21(21%)
Fishing	2(1%)	1(1%)	1(1%)
BMI	22.737± 4	23± 4.9	22.3± 2.98

Physical exercise duration	2.11± 1.993	1.55± 1.9	2.66± 1.928
Computer user-			
Yes	142(71%)	84(84%)	58(58%)
No	58(29%)	16(16%)	42(42%)
Computer using duration	2.19± 2.388	2.78± 2.398	1.60± 2.238
Stress level-			
Low	56(28%)	16(16%)	40(40%)
Medium	112(56%)	55(55%)	57(57%)
High	32(16%)	29(29%)	3(3%)
Phone uses duration	3.96± 2.127	4.92± 2.219	2.99± 1.514
Maintenance of correct posture-			
Yes	75(37.5%)	23(23%)	52(52%)
No	125(62.5%)	77(77%)	48(48%)
Family history-			
Yes	55(27.5%)	36(36%)	19(19%)
No	145(72.5%)	64(64%)	81(81%)
Reading time	2.84± 1.750	3.23± 1.938	2.44± 1.445
Bag weight	1.80± 1.166	2.12± 1.085	1.47± 1.159
Carrying bag-			
On single shoulder	79(39.5%)	48(48%)	31(31%)
On both shoulder	111(55.5%)	48(48%)	63(63%)
Handheld	10(5%)	4(4%)	6(6%)
Duration of sitting in a classroom	3.94± 1.844	4.22± 1.554	3.65± 2.063
Chair height-			
Appropriate	145(72.5%)	58(58%)	87(87%)
Inappropriate	55(27.5%)	42(42%)	13(13%)

Doing homework-			
Sitting on table and chair	134(67%)	55(55%)	79(79%)
Sitting on floor	37(18.5%)	30(30%)	7(7%)
Lying on floor	29(14.5%)	15(15%)	14(14%)
Video game play	1.72± 1.307	2.26± 1.375	1.18± 0.976
Pain intensity-			
1	6(3%)	6(%)	0(%)
2	3(1.5%)	3(3%)	0(0%)
3	15(7.5%)	15(15%)	0(0%)
4	21(10.5%)	21(21%)	0(0%)
5	23(11.5%)	23(23%)	0(0%)
6	13(6.5%)	13(13%)	0(0%)
7	7(3.5%)	7(7%)	0(0%)
8	9(4.5%)	9(9%)	0(0%)
9	3(1.5%)	3(3%)	0(0%)
10	0(0%)	0(0%)	0(0%)
Cause of neck pain-			
Using computer	14(7%)	14(14%)	0(0%)
Poor posture	15(7.5%)	15(15%)	0(0%)
Poor sitting	58(29%)	58(58%)	0(0%)
Type of pillow	13(6.5%)	13(13%)	0(0%)
Neck pain limits you from-			
Not limiting	111(55.5%)	11(11%)	100(100%)
Reading	30(15%)	30(30%)	0(0%)
Housework	11(5.5%)	11(11%)	0(0%)
Concentration	19(9.5%)	19(19%)	0(0%)
Sleeping	22(11%)	22(22%)	0(0%)
Recreational activity	7(3.5%)	7(7%)	0(0%)
Repetitive neck movement			
Yes	95(47.5%)	62(62%)	33(33%)

No	105(52.5%)	38(38%)	67(67%)
NDI	6.58± 4.928	10.11± 4.488	3.05± 1.872

4.1.1 Overall age of the participants

200 participants' mean± SD of overall age (18-26 years) was 22.65± 2.049. For the case group, mean± SD was 22.50± 2.018 and for the control group, mean± SD was 22.89± 2.081.

4.1.2 Age in category

The study was conducted with 200 participants. Among them, 100 were selected as cases who had neck pain and 100 were selected as control who had no neck pain. Their mean age and standard deviation were (22.65± 2.049). The age was categorized into three divisions. From 18-20 years there were 35(17.5%) participants, 21-23 years there were 81(40.5%) participants, and 24-26 years there were 84(42%) participants.

4.1.3 Gender

Among 200 participants 84(42%) were male and 116(58%) were female. In the case group, the number of males was 38 and 62 females. In the control group, the number of males was 46 and females were 54.

4.1.4 Marital status

10% of the participants were married and 90% were unmarried among 200 participants. In the case group, there were 13% married and 87% unmarried participants. In the control group, there were 7% married and 93% unmarried participants.

4.1.5 Educational status

Overall 73% of participants were undergraduate and 27% of participants were graduates among 200 participants. In the case and control group, the number of undergraduate participants was 725 and 73% and the graduate participant numbers were 28% and 27%.

4.1.6 Residential area

Among 200 people 62% were from urban areas, 21% from rural areas, and 17% from the semirural areas. In the case and control group, the number of participants who lived in rural areas was 31% and 12%, in urban areas 55% and 68%, in semirural areas 14% and 20%.

4.1.7 Hobby

Of 200 participants 18% of people like to do gardening, 38% likes reading, 18% watch television, 25% playing games, and the rest 1% likes fishing. In the case and control group, the percentages of their hobby are gardening (18%, 19%), reading a book (37%, 38%), watching television (14%, 21%), playing video games (30%, 21%) and fishing (1%, 1%).

4.1.8 BMI

Mean ± SD is 22.737± 4. For the control group, it is 22.3± 2.98 and for the case group 23± 4.9.

4.1.9 Physical exercise duration

The mean± SD of 200 participants was 2.11± 1.993. For the control group, it was 2.66± 1.928 and in the case group, it was 1.55± 1.9.

4.1.10 Computer user

71% of people use a computer while 29% of people don’t use a computer.

4.1.11 Duration of computer uses

The average mean± SD was 2.19± 2.388. For the case group, it was 4.92± 2.219 and for the control group, it was 1.60± 2.238.

4.1.12 Stress level

Among all the participants 28% (n=56) felt low stress, 56% (n=112) medium stress, 16% (n=32) high stress. In case group 16% felt low, 55% medium and 29% high. In control group 40% felt low, 57% medium and 3% high stress.

4.1.13 Duration of phone using

The average mean± SD was 3.96± 2.127. For the case group, it was 4.92± 2.219 and for the control group, it was 2.99± 1.514.

4.1.14 Maintenance of posture

About 37.5% of people maintain their posture and 62.5% of people don't maintain their posture correctly during activity.

4.1.15 Family history

27.5% of people had a family history of neck pain. In the case group, 36% had a positive family history and in the control group, only 19% had a family history of neck pain.

4.1.16 Reading time

In the overall population, the mean± SD was 2.34± 1.750. In the case group the mean± SD 3.23± 1.938 was an in the control group the mean± SD was 2.44± 1.445.

4.1.17 Bag weight

In the overall population, the mean± SD 1.80± 1.166 was. In the case group the mean± SD 2.12± 1.085 was an in the control group the mean± SD was 1.47± 1.159.

4.1.18 Carrying bag

Among all participants, 39.5% of people carry their bags on a single shoulder, 55.5% on both shoulders, and 5% on the handheld. In the case group, 48% were on a single shoulder, 48% were on both shoulders and 4% were handheld. In the control group, 31% were on a single shoulder, 63% on both shoulders, and 6% on the handheld.

4.1.19 Duration of sitting in a classroom

In the overall population, the mean± SD was 1.72± 1.307. In the case group, the mean± SD was 2.26± 1.375 and in the control group, the mean± SD was 1.18± 0.976.

4.1.20 Chair height

Among 200 people 72.5% felt that their chair is appropriate. In the case group, 58% of people felt appropriate, and in the control group 87% of people.

4.1.21 Doing homework

Overall 67% of people do their homework sitting on a table and chair, 18.5% on the floor, and 14.55 people do lying on the floor. In the case group, 55% do their homework sitting on a table and chair, 30% sit on the floor and 15% do it lying on the floor. In the control group, 79% of people do their homework sitting on the table, 7% sit on the floor and 14% lying on the floor.

4.1.22 Video game playing duration

In the overall population, the mean± SD was 1.72± 1.307. In the case group, the mean± SD was 2.26± 1.375 and in the control group, the mean± SD was 1.18± 0.976.

4.1.23 Pain intensity

68% of people feel mild to moderate pain while 32% of people feel severe pain.

4.1.24 Cause of neck pain

11% reported their neck pain has no cause, 30% felt pain due to prolong reading, 11% due to computer use, 19% due to video game playing, 7% due to type of pillow.

4.1.25 Neck pain limiting

Neck pain is limiting 30% people from prolonged reading, 11% from doing housework, 19% from concentrating, 22% from sleeping, 7% from joining any recreational activities, and not limiting 11% people.

4.1.26 Repetitive neck movement

About 47.5% of people usually do repetitive neck movement and 52.5% don’t do repetitive neck movement.

4.1.27 NDI

Among 200 participants the average mean± SD was 6.58± 4.928. 3.05± 1.872 for the control group and 10.11± 4.488 for the case group.

4.2 Observe neck pain of students

Table 04.4.2: Observe neck pain of students

NPRS	Total (%)	Case (%)	Control (%)
Pain intensity-			
1	6(3%)	6(%)	0(0%)
2	3(1.5%)	3(3%)	0(0%)
3	15(7.5%)	15(15%)	0(0%)
4	21(10.5%)	21(21%)	0(0%)
5	23(11.5%)	23(23%)	0(0%)
6	13(6.5%)	13(13%)	0(0%)
7	7(3.5%)	7(7%)	0(0%)
8	9(4.5%)	9(9%)	0(0%)
9	3(1.5%)	3(3%)	0(0%)
10	0(0%)	0(0%)	0(0%)

Most of the people feel moderate pain in their neck. 23% people's pain intensity is 5, 21% people's 4 like this 3 for 15%, 2 for 3%, 1 for 6%, 6 for 13% 7 for 7%, 8 for 9%, 9 for 3% people and there was no one in rating 10. No one felt most severe pain in their neck.

4.3 Relationship

To analyze the data Chi-square, Independent t-test, One-way ANOVA was done. The test value and P-value are shown below on the table-

Table 05.4.3.1: Association between pain and other variables

Dependent Variable: Pain (present/absent)			
Socio-demographic information			
Independent Variables	**Test name**	**Test value**	**P-value**
Age overall	Independent t-test	1.001	.318
Age in category	Chi-square	1.395	.498
Gender	Chi-square	1.314	.316
Marital status	Chi-square	2.00	.238
Educational status	Chi-square	.025	1.00
Residential area	Chi-square	10.828	**.004****
Hobby	Chi-square	5.029	.324
Physical Factor			
BMI	Independent t-test	1.225	.211
Stress level	Chi-square	31.446	**.0001*****
Physical exercise	Independent t-test	-4.092	**.0001*****
Using laptop	Chi-square	16.416	**.0001*****

Laptop using duration	Independent t-test	3.592	**.0001*** **
Phone using duration	Independent t-test	7.185	**.0001*** **
TV watching duration	Independent t-test	6.034	**.0001*** **
Games playing duration	Independent t-test	6.405	**.0001*** **
Repetitive neck movement	Chi-square	16.862	**.0001*** **
Prolong sitting	Independent t-test	6.320	**.0001*** **
Maintain posture	Chi-square	17.941	**.0001*** **
Family history	Chi-square	7.248	**.01***
Educational factor			
Reading duration	Independent t-test	3.269	**.0001*** **
Bag weight	Independent t-test	4.095	**.0001*** **
Carrying bag	Chi-square	6.085	**.048***
Sitting duration in class	Independent t-test	2.207	**.028***
Chair height	Chi-square	21.091	**.0001*** **
Doing homework	Chi-square	18.630	**.0001*** **
Pain-related information			
Cause of pain	Chi-square	200.00	**.0001*** **

Limiting from	Chi-square	160.360	**.0001*** **
NDI			
Total NDI	Independent t-test	14.520	**.0001*** **

P value *= <.05, **= <.01, ***= <.001**.**

Here, the dependent variable was pain. The pain was highly significant (P= .0001) with the variables like stress level, physical exercise, using a laptop, duration of laptop uses, phone using duration, watching television, playing video games, repetitive neck movement, maintenance of proper posture, duration of prolonged sitting, duration of reading, bag weight, chair height, posture during doing homework, self-perceived cause of neck pain, pain limiting different activities and with a total score of NPDI.

The pain was moderately significant (P= <.01) in a residential area.

Pain was comparatively less significant (P= <.05) with family history (P= <.01), carrying bag (P= .048), sitting duration in class (P= .028).

The pain was found not associated with overall age, age in the category, gender, marital status, educational status, hobby, and BMI. These factors were found not significant (P= >.05).

Table 06.4.3.2: Association between pain intensity and other variables

Dependent variable: pain intensity			
Socio-demographic information			
Independent Variables	**Test name**	**Test value**	**P-value**
Age overall	Independent t-test	-.409	.683
Age in category	Chi-square	.943	.489
Gender	Chi-square	.030	1.00

Marital status	Chi-square	9.524	**.006****
Educational status	Chi-square	.903	.389
Residential area	Chi-square	1.259	.533
Hobby	Chi-square	33.276	.902
Physical factor			
BMI	Independent t-test	1.083	.280
Stress level	Chi-square	17.542	**.0001*****
Physical exercise	Independent t-test	1.985	**.049***
Using laptop	Chi-square	1.944	.204
Laptop using duration	Independent t-test	-.798	.426
Phone using duration	Independent t-test	-3.292	**.0001*****
TV watching duration	Independent t-test	-3.117	**.002****
Games playing duration	Independent t-test	-3.163	**.002****
Repetitive neck movement	Chi-square	14.327	**.0001*****
Prolong sitting	Independent t-test	-2.841	**.005****
Maintain posture	Chi-square	3.968	**.049***
Family history	Chi-square	.605	.521

Educational factor			
Reading duration	Independent t-test	-.802	.424
Bag weight	Independent t-test	-1.419	.157
Carrying bag	Chi-square	1.842	.398
Sitting duration in class	Independent t-test	-1.055	.293
Chair height	Chi-square	7.173	**.010***
Doing homework	Chi-square	4.226	.121
Pain-related information			
Cause of pain	Chi-square	249.782	**.0001****
Limiting from	Chi-square	248.854	**.0001****
NDI			
Total NDI	Independent t-test	-9.081	**.0001****

P value *= <.05, **= <.01, ***= <.001

Here, the dependent variable is the intensity of pain which is non-parametric data as it has been categorized in (0-5) and (6-10).

The intensity of pain is highly significant (P= <.001) with stress level, duration of phone use, repetitive neck movement, self-perceived cause of pain, pain limiting different activities, and total score of NPDI. Alpha (α) value is (P= < .001) which indicates highly significance of the variables. Pain intensity is moderately significant (P= <.01) with marital status (P= .006), duration of watching television (P= .002), game playing duration (P= .002), prolong sitting duration (P= .005). On the other hand intensity of

pain is mild significant (P= <.05) with physical exercise (P= .049), chair height (P= .010).

Table 07.4.3.3: Association between Group and other variables

Dependent variable: Group (Case and Control)			
Socio-demographic information			
Variables	**Test name**	**Test value**	**P-value**
Age in category	Chi-square	1.395	.498
Gender	Chi-square	1.314	.316
Marital status	Chi-square	2.00	.238
Educational status	Chi-square	.025	1.00
Residential area	Chi-square	10.828	**.004****
Hobby	Chi-square	5.029	.412
Physical factor			
BMI	Independent t-test	1.255	.211
Stress level	Chi-square	31.446	**.0001*****
Physical exercise	Independent t-test	-4.092	**.0001*****
Using laptop	Chi-square	16.416	**.0001*****
Laptop using duration	Independent t-test	3.592	**.0001*****

Phone using duration	Independent t-test	7.185	**.0001*** **
TV watching duration	Independent t-test	6.034	**.0001*** **
Games playing duration	Independent t-test	6.405	**.0001*** **
Repetitive neck movement	Chi-square	16.862	**.0001*** **
Prolong sitting	Independent t-test	6.320	**.0001*** **
Maintain posture	Chi-square	17.941	**.0001*** **
Family history	Chi-square	7.248	**.011***
Educational factor			
Reading duration	Independent t-test	3.269	**.0001*** **
Bag weight	Independent t-test	4.095	**.0001*** **
Carrying bag	Chi-square	6.085	**.048***
Sitting duration in class	Independent t-test	2.207	**.028***
Chair height	Chi-square	21.091	**.0001*** **
Doing homework	Chi-square	18.630	**.0001*** **
Pain-related information			

Neck pain	Chi-square	200.00	**.0001*** **
Cause of pain	Chi-square	200.00	**.0001*** **
Limiting from	Chi-square	160.360	**.0001*** **
NDI			
Total NDI	Independent t-test	14.520	**.0001*** **

P value *= <.05, **= <.01, ***= <.001

Here, the group (Case and Control) was the dependent variable. These analyses were used to find out the association between the group and other variables.

Association was highly significant (P= <.001) between the group and stress level (P= .0001), physical exercise (P= .0001), using laptop (P= .0001), duration of laptop using (P= .0001), phone using (P= .0001), watching television (P= .0001), playing games (P= .0001), repetitive neck movement (P= .0001), prolong sitting (P= .0001), maintenance of posture (P= .0001), reading duration (P= .0001), bag weight (P= .0001), chair height (P= .0001), posture during homework (P= .0001), neck pain (P= .0001), cause of neck pain (P= .0001), pain limiting any activities (P= .0001), total score of NPDI (P= .0001). Group found to be moderately significant (P= <.01) with residential area (P= .004) and less significant (P= <.05) with family history (P= .011), carrying bag (P= .048), duration of sitting in the class (P= .028).

4.4 Perceive neck pain related disability for sufferers

Table 08.4.4: Perceive neck pain related disability

Neck Disability Index	Frequency	Percentage (%)
No disability (0-4)	9	9%
Mild disability (5-14)	75	75%
Moderate disability (15-24)	16	16%

Severe disability (25-34)	0	0%
Complete disability (35-50)	0	0%

75% people is in mild disability category of Neck Disability Index (NDI). 16% contribute in moderate disability and 9% has no disability. No one has severe or complete disability.

4.5 Regression

Regression of data was done to evaluate the association between predictor variables with other variables.

Table 09.4.5.1: Binary regression of pain with other variables

Predictor variables	**Dependent variable: Presence of pain**				
	Nagelkerke R^2	**β**	**P-value**	**OR**	**95% CI (Lower, upper)**
Chair height	.138	1.578	**.0001*** **	4.846	2.394, 9.810
Using laptop	.108	1.335	**.0001*** **	3.802	1.953, 7.400
Repetitive neck movement	.109	1.198	**.0001*** **	3.313	1.245, 5.514
TV watching duration	.209	1.081	**.0001*** **	2.948	1.956, 4.443
Total NDI	.729	.841	**.0001*** **	2.320	1.809, 2.974
Games playing duration	.235	.812	**.0001*** **	2.252	1.673, 3.033
Phone using duration	.289	.600	**.0001*** **	1.822	1.483, 2.239

Bag weight	.105	.531	**.0001*** **	1.700	1.290, 2.240
Prolong sitting duration	.229	.412	**.0001*** **	1.510	1.295, 1.759
Posture during homework	.085	-1.030	**.0001*** **	.325	.174, .605
Maintaining posture	.117	-1.288	**.0001*** **	.276	.150, .507
Family history	.048	.875	**.008** **	2.398	1.062, 4.572
Reading duration	.070	.284	**.002** **	1.329	1.110, 1.590
Laptop using duration	.083	.230	**.001** **	1.259	1.100, 1.442
Carrying bag	.040	.720	**.015***	2.055	1.153, 3.660
Duration of class	.032	.172	**.030***	1.188	1.017, 1.388
Residential area	.024	-.553	.06	.575	.323, 1.023
Stress level	.001	-.081	.776	.922	.357, 1.541

P value *= <.05, **= <.01, ***= <.001**.**

The residential area and stress level was found not associated (P= >.05) with the presence of pain. Presence of pain was associated (P= <.05) with the variables physical exercise, using the laptop, laptop using duration, duration of phone uses, television watching duration, duration of games playing, prolong sitting duration, repetitive neck movement, maintenance of posture, family history, reading duration, the weight of the bag, carrying style of bag, duration of the class, chair height and total score of NDI.

A positive association was found and was significant (P= <.05) with the presence of pain with using a laptop, duration of laptop uses, duration of the phone using, television watching, video game playing, prolong sitting, repetitive neck movement, family history, reading duration, bag weight, carrying style of bag, duration of the class, chair height, posture during homework and total score of NDI.

A reverse relation has been found and was significant (P= <.05) with maintaining proper posture (β= -1.288) and posture during homework (β= -1.030).

Table 10.4.5.2: Binary logistic regression of higher intensity of pain with other variables

Predictor variables	**Dependent variable: Higher intensity of pain**				
	Nagelkerke R^2	**β**	**P-value**	**OR**	**95% CI (Lower, upper)**
Repetitive neck movement	.123	1.609	**.0001*** **	5.00	2.048, 12.206
Total NDI	.418	.319	**.0001*** **	1.376	1.240, 1.525
Chair height	.056	1.038	**.009** **	2.824	1.295, 6.158
TV watching duration	.074	.629	**.003** **	1.876	1.234, 2.853
Games playing duration	.074	.412	**.003** **	1.511	1.150, 1.985
Prolong sitting duration	.060	.192	**.007** **	1.212	1.054, 1.392
Phone using duration	.079	.260	**.002** **	1.297	1.099, 1.531
Marital status	.064	-1.466	**.004** **	.231	.086, .623
Physical exercise	.037	-.229	**.053***	.796	.631, 1.003
Maintaining posture	.036	-.887	**.051***	.412	.169, 1.006
Stress level	.020	-.588	.131	.556	.259, 1.191

P value *= <.05, **= <.01, ***= <.001**.**

The intensity of pain was found associated (P= <.05) with marital status, physical exercise, phone use duration, duration of television watching, duration of video games playing, prolong sitting duration, repetitive neck movement, maintenance of posture, chair height, and total score of NDI.

The intensity of pain is not associated (P= >.05) with stress levels.

A positive relation was found and was significant (P= <.05) with the phone using duration, duration of television watching, video game playing duration, prolong sitting duration, repetitive neck movement, chair height, and total score of NDI.

Inverse relation has been found and was significant (P= <.05) with marital status (β= -1.466), physical exercise (β= -.229), and maintaining posture (β= -.887).

4.6 Risk factors related to mechanical neck pain

Table 11.4.6.1: Binary regression of group with other variables

Predictor variables	**Dependent variable: Group (Case and Control)**				
	Nagelkerke R^2	**β**	**P-value**	**OR**	**95% CI (Lower, Upper)**
Chair height	.138	1.578	**.0001*** **	4.846	2.394, 9.810
Using laptop	.108	1.335	**.0001*** **	3.802	1.953, 7.400
Repetitive neck movement	.109	1.198	**.0001*** **	3.313	1.854, 5.918
TV watching duration	.209	1.081	**.0001*** **	2.948	1.956, 4.443
Games playing duration	.235	.812	**.0001*** **	2.252	1.673, 3.033
Phone using duration	.286	.600	**.0001*** **	1.822	1.482, 2.239
Bag weight	.105	.531	**.0001*** **	1.700	1.290, 2.240
Prolong sitting duration	.229	.412	**.0001*** **	1.510	1.295, 1.759
Physical exercise	.104	-.306	**.0001*** **	.736	.628, .863
Posture during homework	.085	-1.124	**.0001*** **	.325	.174, .605
Maintaining posture	.117	-1.288	**.0001*** **	.276	.150, .507
Family history	.048	.875	**.008** **	2.398	1.258, 4.572
Reading duration	.070	.284	**.002** **	1.329	1.110, 1.590

Laptop using duration	.083	.230	**.001****	1.259	1.100, 1.442
Carrying bag	.040	.720	**.015***	2.055	1.153, 3.660
Duration of class	.032	.172	**.030***	1.188	1.017, 1.388
Stress level	.001	-.081	.776	.922	.527, 1.612
Residential area	.024	-.553	.060	.575	.323, 1.023

P value *= <.05, **= <.01, ***= <.001**.**

Group (Case and Control) is associated (P= <.05) with physical exercise, use of laptop, laptop using duration, watching television, video game playing, prolong sitting duration, repetitive neck movement, maintenance of posture, family history, reading duration, bag weight, carrying style of bag, duration of the class, chair height and posture during homework.

Group (Case and Control) was not associated (P= >.05) with the residential area and stress level.

A positive relation was found and was significant (P= <.05) with chair height, using laptop, repetitive neck movement, television watching, video games plying, phone using duration, bag weight, prolong sitting duration, family history, reading duration, laptop using duration, carrying bag and duration of the class.

A reverse relation has been found and was significant (P= <.05) with physical exercise (β= -.306), posture during homework (β= -1.124), and maintaining posture (β= -1.288).

CHAPTER – V DISCUSSION

The global point prevalence of neck pain was 4.9% (95% CI 4.6, 5.3). Disability-adjusted life years increased from 23.9 million (95% CI 16.5, 33.1) in 1990 to 33.6 million (95% CI 23.5, 46.5) in 2010. Out of all 291 conditions studied in the Global Burden of Disease 2010 Study, neck pain ranked 4th highest in terms of disability as measured by YLDs, and 21st in terms of overall burden (Hoy et al., 2014).

Neck pain is more common in students especially those aged from 22 to 28 years old and the mean age is 23 years old (Silva et al.,2016). In my research, it has been found that people from 21-26 years old age felt neck pain than another age category. 18% of people were 18-20 years old, 44% from 21-23 years and 38% were from 24-26 years. A wide range of people was from 21-26 years who felt pain in the neck and that is the range where all people are students. So students are the group of people of neck pain sufferers. But age was found not associated with the intensity of neck pain.

The study found that the neck was the most affected area among students. Respondent's mean age was 21.3 years (SD= 7). Their mean Body Mass Index (BMI) was 23.51 kg/m^2 (SD = 3.74) (Hossain et al., 2018). In this study, the researcher found that the mean age was 22 years (SD= 2.018) and BMI was (mean± SD= 22.737± 4), which is almost similar to the study researcher Hossain did. This indicates people whose BMI is almost 22-23 are the group who suffers from neck pain. There is an association between neck pain and BMI. There is a linear relation between neck pain and BMI.

In the United Kingdom (UK) among the tame side population, approximately 16.5% female and 10.7% male reported their neck pain at least once per month (Webb et al., 2003). On the another study the prevalence of neck pain was 41.1%, with more girls 44.2% reporting having neck pain than boys 37.7% (Silva et al., 2016). The researcher found 62% female and 38% male were affected. 62% of females felt neck pain where only 38% felt neck pain at least once in 3 months. Females are a more affected group in terms of neck pain than males. Almost 62% of female students are suffering from neck pain whereas only 38% of the male are suffering from neck pain. Although the percentage of the male is not so minor to be ignored.

A study in China was conducted related to neck pain. They found neck pain is related to physical exercise (0R- .55, 95% CI- .35, .86) (Yue et al., 2012). On another study

they found physical inactivity (OR = 1.85, 95% CI 1.14–2.99) was related to neck pain (Cagnie et al., 2007). The researcher found on regression the association (P= <.05) of neck pain with physical exercise (OR-.736, 95% CI- .628, .863). Which result is close to the research done in China.

People who usually don't maintain the neck posture or repeatedly move their neck may have neck pain. In Europe, a researcher found that mal-posture of neck may cause neck pain (OR = 1.85, 95% CI 1.14–2.99) (Cagnie et al., 2007). The researcher found on this study that there is a linear relationship between neck pain and repetitive neck movement (OR- 3.313, 95% CI- 1.854 to 5.918).

In a study, it has been mentioned that 82.6% carried their bags over both shoulders and association of neck pain with gender, family history, bag weight, carrying style of the bag weight (Shan et al., 2014). The researchers found 55.5% carry bags on both shoulders. Sex(Male- 38%, female- 62%) and family history (36%) of neck pain were independent risk factors for neck pain, and neck pain was positively associated with family history (P= <.05, OR- 2.398, 95% CI- 1.062, 4.572), bag weight (P= <.05, OR- 1.700, 95% CI- 1.290, 2.240) and different methods of carrying bags (P= <.05, OR- 2.055, 95% CI- 1.153, 3.660). Students who were uneasy with their chair height 21.4% had higher incidences of neck pain. In this study, 42% of people reported neck pain due to inappropriate chair height (P= <.05, OR-4.846, 95% CI- 2.394, 9.810).

Physical workload such as repetitive neck movement, static posture, and awkward posture has a significant association with neck pain. It is also associated with poor posture, neck strain, occupational injuries, four to five hours of daily computer use is considered as a risk factor for neck pain in students (Sabeen et al., 2013). Researcher found people who repeatedly move their neck (OR- 3.313, 95% CI- 1.854 to 5.918), don't maintain proper position (OR- .276, 95% CI- .150, .507), uses more computer (OR- 3.802, 95% CI- 1.953, 7.400) having neck pain than others who maintain posture and uses less computer in the appropriate position.

In binary logistic regression researcher found a linear relationship between case group and repetitive neck movement (β= 1.198), using computer (β= 1.335) and duration of using computer (β= .230).

Schooling factors, including inappropriate chair height, insufficient class recess, long sitting time, using a computer for more than 1.5 hours per day remained associated with neck pain. Computer use can increase the incidence of neck pain and reported working on a computer for 6 to 10 hours per week was a risk factor (Shan et al., 2014). The researchers found in this study that neck pain is associated with a computer using duration (P= <.05, OR- 1.259, 95% CI- 1.100, 1.442); people who use computer 4.9±2 hours are more suffering from neck pain.

Neck pain is related to prolonged use of a computer (Barbuto et al., 2008). The researcher found in this study that people who use a computer (β= 1.335, OR= 3.802, 95% CI= 1.953, 7.400) are mostly affected by neck pain. There is a positive relationship between the presence of neck pain and the use of computers. A linear relation has been found in this study between the higher intensity of neck pain and duration of using computer using (β= .230, OR= 1.259, 95% CI= 1.100, 1.442). That means the longer you will use the computer the more pain in the neck you will feel.

Students who reported using a computer for entertainment > 70% were at lower risk of experiencing persistent neck pain compared with those whose use was < 70% (OR- 0.44, 95% CI- 0.21-0.95) (Kanchanomai et al., 2016). The researcher also found that people who use a computer are more affected by neck pain than those who don't use a computer. Among 100 participants 84% (OR- 3.802, 95% CI- 1.953, 7.400) of people who reported neck pain who uses a computer.

A study conducted in Europe and found prolong sitting (OR = 2.06, 95% CI 1.17–3.62) like during prolong reading can be a risk factors of mechanical neck pain (Hoy et al., 2014). In this study the researcher found prolong sitting duration (OR- 1.510, 95% CI- 1.295, 1.759), duration of the class (OR- 1.188, 95% CI- 1.017, 1.388) and reading duration (OR- 1.329, 95% CI- 1.110, 1.590) was associated to the neck pain. Researcher found a positive relationship between neck pain and duration of sitting (β= 1.510), class (β= 1.188) and reading (β= 1.329).

Stress level of a person has an effect on pain, especially on neck pain. In a study it has been found that mental stress can cause neck pain. The rate was higher in people who are in mental stress (OR = 2.05, 95% CI 1.29– 3.26) rather than people who has lesser stressful life (Cagnie et al., 2007). Another researcher found association between neck

pain and stress. The odd ratio he found for higher stress level was 6.4 and 95% confidence interval was 3.1 to 13.00 (Viikari et al., 2001). Researcher showed in this study that people who lead moderate to severe stressful life are having more neck pain than people who lead less stressful life. Among 100 people 55% people mentioned about moderate stress and 29% mentioned about severe stress who had neck pain. They also found an association between neck pain and stress (OR- .922, 95% CI- .527, 1.612) level. In binary logistic regression the researcher found the relation of neck pain and stress level insignificant and a negative relation between stress level (β= -.081) of a person with neck pain.

Limitation

Due to the covid-19 situation, it was not possible to collect data on face-to-face interviews. So that I collected all of my data online. Maybe it would be possible to find more factors related to neck pain if we could collect data by face-to-face interview.

The researcher had to collect more data from a concentrated population.

There were more female participants than male as the researcher were female so she had more contact with female than male.

Response rate was unable to assess as questionnaire was given on social media.

CHAPTER –VI CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The researcher conducted this study with 200 participants. In the case group, there were 100 participants and in the control group, there were 100 participants. In total 42% (n= 84) male and 58% (n= 116) female participated on the study. 18% people were within 18-20 years old, 40% from 21-23 years, and 42% people from 24-26 years of age. Among them, 61.5% of people were from urban areas, 21.5% from rural and 17% from the semirural areas. 73% of people were undergraduates whereas only 27% of people were graduates. The mean± SD of BMI was 22.737± 4. The BMI of the case group were about (mean± SD = 23± 4.9) and for the control group the BMI were (mean± SD = 22.3± 2.98). Of 200 participants 18% of people like to do gardening, 38% likes reading, 18% watch television, 25% playing games, and the rest 1% likes fishing. In the case and control group, the percentages of their hobby are gardening (18%, 19%), reading a book (37%, 38%), watching television (14%, 21%), playing video games (30%, 21%) and fishing (1%, 1%). Among all the participants 28% (n=56) felt low stress, 56% (n=112) medium stress, 16% (n=32) high stress. In the case group 16% felt low, 55% medium, and 29% high. In the control group, 40% felt low, 57% medium, and 3% high stress. 71% of people use a computer while 29% of people don't use a computer. 11% reported their neck pain has no cause, 30% felt pain due to prolong reading, 11% due to computer use, 19% due to video game playing, 7% due to type of pillow. About 37.5% of people maintain their posture and 62.5% of people don't maintain their posture correctly during activity.

This study was done to evaluate factors that are associated with mechanical neck pain. The factors that have been found associated with mechanical neck pain are physical exercise, using a laptop, laptop using duration, duration of the phone use and television watching, video games playing duration, prolong sitting duration, repetitive neck movement, maintaining correct posture, family history, reading duration, bag weight, carrying style of the bag, duration of the class, chair height and posture during homework. A significant level was found (P= <.05).

6.2 Recommendation

After completing the study the researcher found some issues regarding this study. The researcher should take more sampling to conduct the study and to increase the reliability and validity of the study. A structured question is needed to know the depth of the relation of variables with mechanical neck pain. After that researcher could conclude a decision about the risk factors.

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APPENDIX

Informed Consent **Code No.**

Greetings!

My name is Tahsin Khan. I am conducting this study which is part of my course curriculum and my thesis title is **"Risk factors of mechanical neck pain among students"**. For the fulfillment of my study, I would like to know some information about social, ergonomic, behavioral, and lifestyles among mechanical neck pain suffered people. So, I need to ask you some questions in this regard and this will take approximately 10-15 minutes.

I am assuring you that this is a pure professional study and this will not create any harm or unpleasant experiences for you. The information you will provide will be treated as confidential, and in event of any report or publication, the source of this information will be kept anonymous. I would like to inform you that your participation in this study will be considered voluntary and there will not be any kinds of financial dealings.

As a part of this study or by the rights of the participants you can withdraw yourself at any time from this study or if you will want to skip any questions that you don't want an answer to, you can proceed. If you further have any questions on this study, please feel free to ask researcher Tahsin Khan, 4th-year student, Physiotherapy Department, Bangladesh Health Professions Institute(BHPI), CRP, Savar, Dhaka-1343, or my research supervisor Kazi Md. Amran Hossain, Lecturer of Physiotherapy, BHPI, CRP, Savar, Dhaka-1343.

May I start the interview?

Yes	No

Signature of the Participant's: _____

Signature of the Interviewer's: _____

Research questionnaire for control

Title: Risk factors of mechanical neck pain among students

Part - 1: Participant's identification

1.1	Participants Identification No.
1.2	Participant's Name :
1.3	Address : Village/ Street No: Post-office: Thana: District:
1.4	Contact number :
1.5	Date of interview :

Part – 2: Socio-demographic Information

No.	Questions	Variables	Answer
2.1	Age(years)		
2.2	Gender	1. Male 2. Female	
2.3	Marital status	1. Married 2. Unmarried	
2.4	What is your educational status?	1. Undergraduate 2. Graduate	
2.6	What is your hobby?	1. Gardening 2. Reading 3. Watching TV 4. Video Games 5. Fishing 6. Others	
2.7	Residential area	1. Rural 2. Urban 3. Semirural	

Part – 3: Body Mass Index and hereditary factors

3.1	Weight (kg)		

3.2	Height (ft)		

Part – 4: Behavior and lifestyle

4.1	Smoking habit	1. Yes 2. No	
4.2	How many in a day?		
4.3	What is your self-perceived stress?	1. Low 2. Medium 3. High	

Part – 5: Physical factors

5.1	How long do you take physical exercise in a week?		
5.2	Do you use Laptop or Tablet?	1. Yes 2. No	
5.3	How long do you use Laptop or Tablet?		
5.4	How long do you use your mobile phone per day?		
5.5	How long do you watch television in a day?		
5.6	How long do you play video games in a day?		

5.7	Do you do repetitive neck movement?	1. Yes 2. No	
5.8	How long do you stay in a prolonged sitting position?		
5.10	Do you maintain your posture correctly?	1. Yes 2. No	

Part – 6: Educational Factors

6.1	How long do you read?		
6.2	How heavy is the bag that you carry usually?		
6.3	How do you carry your bag?	1. On the single shoulder 2. On both shoulder 3. Handheld	
6.4	What is your perception of your bag weight?	1. Lightweight 2. Heavy 3. Very heavy	
6.5	How long do you seat in the class in a day?		
6.7	What do you think about your chair height in class?	1. Appropriate 2. Inappropriate	

6.9	How do you do homework at home?	1. Sitting on the chair and table 2. Sitting on the floor 3. Lying on the floor	

Neck Disability Index

This questionnaire has been designed to give us information as to how your neck pain has affected your ability to manage in everyday life. Please answer every section and mark in each section only the one box that applies to you. We realize you may consider that two or more statements in any one section relate to you, but please just mark the box that most closely describes your problem.

1.	Pain intensity	1. I have no pain at the moment 2. The pain is very mild at the moment 3. The pain is moderate at the moment 4. The pain is fairly severe at the moment 5. The pain is very severe at the moment 6. The pain is the worst imaginable at the moment	
2.	Personal care (washing, dressing, etc.)	1. I can look after myself normally without causing extra pain 2. I can look after myself normally but it causes extra pain 3. It is painful to look after myself and I am slow and careful	

		4. I need some help but can manage most of my personal care 5. I need help every day in most aspects of self-care 6. I do not get dressed, I wash with difficulty and stay in bed	
3.	Lifting	1. I can lift heavy weights without extra pain 2. I can lift heavy weights but it gives extra pain 3. Pain prevents me lifting heavy weights off the floor, but I can manage if they are conveniently placed, for example on a table 4. Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned 5. I can only lift very light weights 6. I cannot lift or carry anything	
4.	Reading	1. I can read as much as I want to with no pain in my neck 2. I can read as much as I want to with slight pain in my neck	

		3. I can read as much as I want with moderate pain in my neck 4. I can't read as much as I want because of moderate pain in my neck 5. I can hardly read at all because of severe pain in my neck 6. I cannot read at all	
5.	Headaches	1. I have no headaches at all 2. I have slight headaches, which come infrequently 3. I have moderate headaches, which come infrequently 4. I have moderate headaches, which come frequently 5. I have severe headaches, which come frequently 6. I have headaches almost all the time	
6.	Concentration	1. I can concentrate fully when I want to with no difficulty 2. I can concentrate fully when I want to with slight difficulty	

		3. I have a fair degree of difficulty in concentrating when I want to 4. I have a lot of difficulty in concentrating when I want to 5. I have a great deal of difficulty in concentrating when I want to 6. I cannot concentrate at all	
7.	Work	1. I can do as much work as I want to 2. I can only do my usual work, but no more 3. I can do most of my usual work, but no more 4. I cannot do my usual work 5. I can hardly do any work at all 6. I can't do any work at all	
8.	Driving	1. I can drive my car without any neck pain 2. I can drive my car as long as I want with slight pain in my neck 3. I can drive my car as long as I want with moderate pain in my neck 4. I can't drive my car as long as I want because of moderate pain in my neck	

		5. I can hardly drive at all because of severe pain in my neck 6. I can't drive my car at all	
9.	Sleeping	1. I have no trouble sleeping 2. My sleep is slightly disturbed (less than 1hr sleepless) 3. My sleep is mildly disturbed (1-2hrs sleepless) 4. My sleep is moderately disturbed (2-3hrs sleepless) 5. My sleep is greatly disturbed (3-5hrs sleepless) 6. My sleep is completely disturbed (5-7hrs sleepless)	
10.	Recreation	1. I am able to engage in all my recreation activities with no neck pain at all 2. I am able to engage in all my recreation activities, with some pain in my neck 3. I am able to engage in most, but not all of my usual recreation activities because of pain in my neck	

		4. I am able to engage in a few of my usual recreation activities because of pain in my neck 5. I can hardly do any recreation activities because of pain in my neck 6. I can’t do any recreation activities at all	
Total sore			

Code No:

Informed Consent

Greetings!

My name is Tahsin Khan. I am conducting this study which is part of my course curriculum and my thesis title is **"Risk factors of mechanical neck pain among students"**. For the fulfillment of my study, I would like to know some information about social, ergonomic, behavioral, and lifestyles among mechanical neck pain suffered people. So, I need to ask you some questions in this regard and this will take approximately 10-15 minutes.

I am assuring you that this is a pure professional study and this will not create any harm or unpleasant experiences for you. The information you will provide will be treated as confidential, and in event of any report or publication the source of this information will be kept anonymous. I would like to inform you that your participation in this study will be considered voluntary and there will not be any kinds of financial dealings.

As a part of this study or by the rights of the participants you can withdraw yourself at any time from this study or if you will want to skip any questions that you don't want to an answer to, you can proceed. If you further have any questions on this study, please feel free to ask researcher Tahsin Khan, 4th-year student, Physiotherapy Department, Bangladesh Health Professions Institute(BHPI), CRP, Savar, Dhaka-1343, or my research supervisor Kazi Md. Amran Hossain, Lecturer of Physiotherapy Department, BHPI, CRP, Savar, Dhaka-1343.

Please read the facts mentioned below and avoid proceeding further if you have these symptoms.

According to ICD-10:

- ✓ The intensely discomforting, distressful, or agonizing sensation associated with trauma or disease, with well-defined location, character, and timing.
- ✓ Pain is a feeling triggered in the nervous system. Pain may be sharp or dull. It may come and go, or it may be constant. You may feel pain in one area of your body, such as your back, abdomen, or chest or you may feel pain all over, such as when your muscles ache from the flu. Pain can help diagnose a problem. Without pain, you might seriously hurt yourself without knowing it, or you might not realize you have a medical problem that needs treatment. Once you take care of the problem, the pain usually goes away. However, sometimes pain

goes on for weeks, months, or even years. This is called chronic pain. Sometimes chronic pain is due to an ongoing cause, such as cancer or arthritis. Sometimes the cause is unknown. Fortunately, there are many ways to treat pain. Treatment varies depending on the cause of pain. Pain relievers, acupuncture, and sometimes surgery are helpful.

- ✓ Pain that comes on quickly, can be severe but lasts a relatively short time.
- ✓ Physical suffering or distress, to hurt
- ✓ The sensation of unpleasant feeling indicating potential or actual damage to somebody structure felt all over, or throughout the body.
- ✓ Severe pain of limited duration
- ✓ The sensation of discomfort, distress, or agony, resulting from the stimulation of specialized nerve endings.
- ✓ Unpleasant sensation induced by noxious stimuli and generally received by specialized nerve endings.
- ✓ Unpleasant sensory and emotional experience arising from actual or potential tissue damage or described in terms of such damage (international association for the study of pain); sudden or slow onset of any intensity from mild to severe with an anticipated or predictable end and a duration of fewer than 6 months
- ✓ Unpleasant sensory and emotional experience associated with actual or potential tissue damage.

May I start the interview?

Yes	No

Signature of the Participant's: _____

Signature of the Interviewer's: _____

Research questionnaire for case

Title: Risk factors of mechanical neck pain among students

Part - 1: Participant's identification

1.1	Participants Identification No.
1.2	Participant's Name :
1.3	Address : Village/ Street No: Post-office: Thana: District:
1.4	Contact number :
1.5	Date of interview :

Part – 2: Socio-demographic Information

NO.	Questions	Variables	Answer
2.1	Age(years)		
2.2	Gender	1. Male 2. Female	
2.3	Marital status	1. Married 2. Unmarried	
2.4	What is your educational status?	1. Undergraduate 2. Graduate	
2.5	What is your hobby?	1. Gardening 2. Reading 3. Watching TV 4. Video Games 5. Fishing	
2.6	Residential area	1. Rural 2. Urban 3. Semirural	

Part – 3: Behavior, life style and co-morbidity

3.1	What is your self-perceived stress?	1. Low 2. Medium	

		3. High	
3.2	Height (ft)		
3.3	Body weight (kg)		
3.4	BMI		

Part – 4: Physical factors

4.1	How long do you take physical exercise in a week?		
4.2	Do you use Laptop or Tablet?	1. Yes 2. No	
4.3	How long do you use Laptop or Tablet?		
4.4	How long do you use your mobile phone per day?		
4.5	How long do you watch television in a day?		
4.6	How long do you play video games in a day?		
4.7	Do you do repetitive neck movement?	1. Yes 2. No	
4.8	How long do you stay in a prolonged sitting position?		
4.9	Do you maintain your posture correctly?	1. Yes 2. No	

4.10	Does your parent have neck pain?	1. Yes 2. No	

Part – 5: Educational Factors

5.1	How long do you read?		
5.2	How heavy is the bag that you carry usually?		
5.3	How do you carry your bag?	1. On the single shoulder 2. On both shoulder 3. Handheld	
5.4	How long do you seat in the class in a day?		
5.5	What do you think about your chair height in class?	1. Appropriate 2. Inappropriate	
5.6	How do you do homework at home?	1. Sitting on the chair and table 2. Sitting on the floor 3. Lying on the floor	

Part – 6: Characteristics of Neck pain

6.1	Do you have neck pain?	1. Yes 2. No	

6.2	Do you currently have any feelings of discomfort in your neck/arm/hand?	1. Yes 2. No	
6.3	What do you think is the cause of your neck pain?	1. Prolong reading 2. Using a computer 3. Posture assumed during lectures 4. Prolong sitting 5. Type of pillow used when sleeping	
6.4	Does your neck pain limit you from	1. Sleeping 2. Reading 3. Concentrating on education 4. Social recreational activity 5. Housework 6. Not limiting any activity	

Part – 7: Functional Test

Pain numeric rating scale is a scale that is used to measure pain intensity. It is on a scale of 0 to 10. Where 0 indicates no pain, 5 indicates moderate pain and 10 indicates severe pain.

Rate your neck pain on a scale of (0–10) pain numeric rating scale-

Scale	Answer
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Neck Disability Index

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BANGLADESH HEALTH PROFESSIONS INSTITUTE

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

Ref: CRP/BHPI/IRB/06/2021/464 Date: 16/06/2021

To
Tahsin Khan
B.Sc. in Physiotherapy
Session: 2015-16, Student ID: 112150292
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal "**Risk Factors of Mechanical Neck Pain among Students**" by ethics committee.

Dear Tahsin Khan,
Congratulations.
The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above-mentioned dissertation, with yourself, as the Principal investigator. The Following documents have been reviewed and approved:

Sr. No. Name of the Documents
1. Dissertation Proposal
2. Questionnaire (English version)
3. Information sheet & consent form

The purpose of the study is to find out the risk factors of neck pain among students in Dhaka city. The study involves use of a questionnaire to explore risk factors of neck pain that may take 15 to 20 minutes to answer and there is no likelihood of any harm to the participants. Data collectors will receive informed consents from all participants. Any data collected will be kept confidential. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 8:30AM on 1st March, 2020 at BHPI (23rd 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
Assistant Professor, Dept. of Rehabilitation Science
Member Secretary, Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

CRP-Chapain, Savar, Dhaka-1343, Tel : 7745464-5, 7741404
E-mail : principal-bhpi@crp-bangladesh.org, Web: bhpi.edu.bd, www.crp-bangladesh.org