PREVALENCE OF LOW BACK PAIN AMONG THE PERSONS USING ERGONOMICALLY CORRECTED WORKSTATION SETTING FACILITY

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

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PREVALENCE OF LOW BACK PAIN AMONG THE PERSONS USING ERGONOMICALLY CORRECTED WORKSTATION SETTING FACILITY

Submitted by **Aisha Aktar Rumi,** for the partial fulfillment of the requirements for the degree of Bachelor of Science in Physiotherapy, Session: 2007-2008.

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Declaration

I declare that the work presented here is my own. All source used have been cited appropriately. Any mistakes or inaccuracies are my own. I also declare that for any publication, presentation or dissemination of the study. I would be bound to take written consent from my supervisor.

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Acronyms

ADL	Activities of Daily Living
BHPI	Bangladesh Heath Professions Institute
BMI	Body Mass Index
CPP	Combined physical and psychological intervention
CRP	Center for the Rehabilitation of the Paralyzed
LBP	Low Back Pain
MSD	Musculoskeletal disorder
NSAIDs	Non-steroidal anti-inflammatory drugs
OSS	Occupational health and safety
PENS	Percutaneous electrical nerve stimulation
SPSS	Statistical Package of Social Science
UK	United Kingdom
USA	United States of America
VAS	Visual Analogue Scale
WHO	World Health Organization
WMSD	Work related musculoskeletal disorder

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Abstract

Purpose: To identify the prevalence of low back pain among the persons using ergonomically corrected workstation setting facility atIntertek Bangladesh Limited.*Objectives:* To find out prevalence of low back pain beforeusing ergonomically corrected workstation setting facility; to identify the percentage that how many persons experience of low back painafter using ergonomically corrected workstation setting facility; to explore the influencing socio-demographic factors of the affected groupafterusing ergonomically corrected workstation setting facility;to measure and compare the severity of pain by using VAS scalebefore and afterusing ergonomically corrected workstation setting facility; to determinevulnerable age group of LBPafter using ergonomically corrected workstation setting facility andto evaluate the possible causes that might responsible for persistingLBP even after using ergonomically corrected workstation setting facility. *Methodology:* A quantitative cross-sectional study design was chosen to accomplish the objectives of the study. Sixty-fiveparticipants were selected as sample that was selected conveniently from Intertek Bangladesh limited at Dhaka. A structural questionnaire was developed through searching of literature. The participants were requested to answer according to the developed format of the question. The answers were entered into SPSS 16 software and analyzed as descriptive statistics. *Results*: The study showed that83.07% (n=54) participants had low back painbefore using ergonomically corrected workstation setting facility and21.54% (n=14) participants had low back pain after using ergonomically corrected workstation, the most of the participants 64.29% (n=9) who had low back pain in between 36-41 years of age group. Out of 14 participants, 9 participants were smoker and all the participants were married. Among the 65 participants mean age was 34.60and most of the participants 78.5% (n=51) had Masters degree and 60% (n=31) were male, all of the participants worked in front of the computer andworking posture was sitting 100% (n=65). *Conclusion:* The result of the study demonstrates that the prevalence of low back pain was 21.54% (n=14) after using ergonomically corrected workstation setting facilityandthe present study provided evidence that married persons, smoking had a positive effect on the LBP among the participants.

Key words: Low back pain, Ergonomic, Workstation

CHAPTER-I: INTRODUCTION

1.1Background

Low Back Pain (LBP) represents one of the most leading musculoskeletal causes of disability and is the most frequently reported condition for which people receive outpatient physiotherapy. It has been referred to as a 20th century enigma which continues to cause disability and distress in a large proportion of the adult population (Odole et al., 2010).

In worldwide estimates of lifetime prevalence of LBP vary from 50 to 84%. A point prevalence of 15–30% among international surveys of LBP report and a 1-month prevalence of LBP between 19 and 43%. In a general working population in Sweden, ~5% sought care because of a new LBP episode during a 3-year period. Work-related factors associated with LBP that are physical and psychosocial in origin. The consequences of LBP are far-reaching and associated with increased absence from work, lost productivity and corresponding increase in economic costs (Ghaffari et al., 2006).

United States of America (USA) and Australia that such of developed countries, prevalence of LBP ranges from 26.4% to 79.2%andin developed countries lifetime prevalence of LBP is reported to be up to 85%(Louw et al., 2007). Cassidy et al. reported thatamong adult Canadians, prevalence of LBP was 28.4% and 84.1% of Saskatchewan adults had experienced LBP at some point during their lifetime (Alkherayf, 2010). Another study of a Belgian survey found that an almost identical lifetime prevalence of 59%. Reports published that industrialized countries have indicated prevalence rates among the general population ranging from 21% in Hong Kong and 39% in Bradford, UK to 69% in Denmark andless industrialized countries are few but it is generally believed that the prevalence is much lower than the industrialized countries (Omokhodion, 2002). LBP number is more than 20%in Bangladeshand it has a great harmful effect on health, employment and daily activities of living (Rashid et al., 2012).

In worldwide, LBP problems are commonly reported by office workers and these disorders can have detrimental effects on workers' health and productivity (Mahmud et al., 2011).Prevalence of LBP is high among females in general population, literature showed that (Bener et al., 2002) and also showed that LBP was more common in married women, smokers and housewives. With prevalence of LBP,there was no significant relation among height, weight, BMI, exercise program, level of calcium, phosphor and vitamin D (Ali et al., 2008).

In Britain 1988 to 1989 found that back problem are one of the most common causes of chronic sickness about 3% to 4% of those aged 16 to 44years and 5 to 7% of those aged 45 to 65 years report back pain as chronic sickness, it's a general house hold survey (Waddell, 1998) and it is a major cause of sickness absence and work disability. Due to back pain return to work quickly,the majority of workers who take sick leave. But many will continue to experience pain and between 18% and 44% will have a further episode of absence within the year(Coole et al., 2010).LBP has been established as one of the most common reasons for sick leave in the western world (Odole et al., 2010). Valkenburg and Haanenreported that lifetime recurrences of up to 85%, whereas 1987in Sweden, the 1-year recurrence of sick-listing for low-back pain was 44%and recurrence rates of 20% in 1 year and 36% over 3 years that show data from Canada (Andersson, 1999).

In Canada was $8.1 billion in Canadian dollars, the estimated cost of back and spine disorders in 1994 (Alkherayf, 2010).Now days LBP become an universal problem and it has been referred as a 20^{th}century disaster. While the population increased only 7%, disabling low back pain episodes increased 26%from 1974 to 1978in the United States. In 1998 in the U.S. total incremental direct health care very costly attributable to low back pain were estimated at $26.3 billion (Licciardone, 2008)andeach year it incurs billions of dollars in medical expenditures (Louw et al., 2007).

According to WHO (2003) a major portion of people staying away from work or visiting a medical practitioner due toLBP and estimated that 70 to 80% of the world's population has at least one episode of back pain in their lifetime. In between ages 25 and 50 years generally, incidents of back pain most commonly occur **(**Charoenchai et al., 2006**)**. LBP is a multi-factorial disorder, soit involves most active individuals of

the society and leads to many social and economic problems and many risk factors effect incidence and durability of LBP, some of which can be changeable and reversible (Sadigi et al., 2008).For physician office visits,low back problems are among the highest ranking reasons and are costly in terms of medical treatment, lost productivity and non-monetary costs such as diminished ability to perform or enjoy usual activities (Charpe, 2009).

The employees had a rate of acute low back injuries of 30.6 per million working hours, before implementation of a company ergonomic intervention by wide back support policy and this rate fell to 20.2 per million working hours, after implementation that show a significant reduction of 34% (Jess et al., 1996). To test the effectiveness of the intervention,before-and-after surveys were conducted. Results show that the ergonomic intervention reduced the prevalence of musculoskeletal symptoms (the most common MSDs are in the low-back area) by an average of 40% (Rudakewych et al., 2001).Exercise (stretching program) is an important part of ergonomics intervention. By ANOVA analysis found a significant reduction in back pain of 72% ($p<0.001$) for the computer-generated, stretching program (Marangoni, 2010).After 12 months of follow-up, the chair-with-training intervention lowered symptom growth over the workday (P=0.012) (Amick et al., 2003).

The proposed ergonomics interventions effectively reduced low back pain and improved body posture thatalso found inearlier studies (Levanon et al., 2012) andrecent studies on office ergonomics by Mahmud et al., (2011) also found positive results in reducing LBP by applyingergonomics intervention.

1.2 Rationale

The aim of the study is to find out the prevalence of low back pain among the persons using ergonomically corrected workstation setting facility. Because Low back pain is a serious health problem affecting 80% of people at some time in their life andapproximately 40% adults aged between 20-50 years develop LBP, which is the most productive period of a person. It has been identified as one of the most costly and disabling disorders. ACross-sectional study about Greek office workers shows that of the 771 office workers, 648 responded (84% return rate). The majority of the participants were women (75.8%). Among all responders 33%, 37.8%, 41.8%, and 61.6% presented with point, one-year, two-year, and lifetime prevalence respectively.The incidence of LBP status is significantly associated with some anthropometric, ergonomic, and psychosocial factors. In our country in which ergonomics the office worker are worked and which types of work are done by them, these make them more prone to develop different musculoskeletal problems; among these musculoskeletal problems LBP is the most common. So most of this LBP can be minimized or even reduced only by using ergonomically corrected workstation setting during their office work.Literature showed that prolong static posture like sitting, stooping, bending, proposed to be associated with LBP. So, the office workers are the more vulnerable group to develop LBP in not only our country but also in the world.So the investigator is interested in these topics to focus, by considering the problems of the office workers.

From this study investigator may able to identify the prevalence of LBPamong the persons using ergonomically corrected workstation setting facility and ergonomics how to helps to develop appropriate measures to reduce the LBP among the office workers.This study may also help to improve their awareness of a person, especially about their posture when working in anoffice. This study also may helpful for the students to do further research as the foundation of the study on this area. So it mayhelpful for physiotherapist in working in this area for delivering treatment service. Thus the study might create a future prospect of physiotherapy profession in Bangladesh. As there is ergonomically corrected workstation setting initiative, it is vital to know how due setting is putting impact on the LBP problems of the users.

1.3 Research Question

- What is the prevalence of low back pain among the persons using ergonomically corrected workstation setting facility?

1.4 Objectives of study

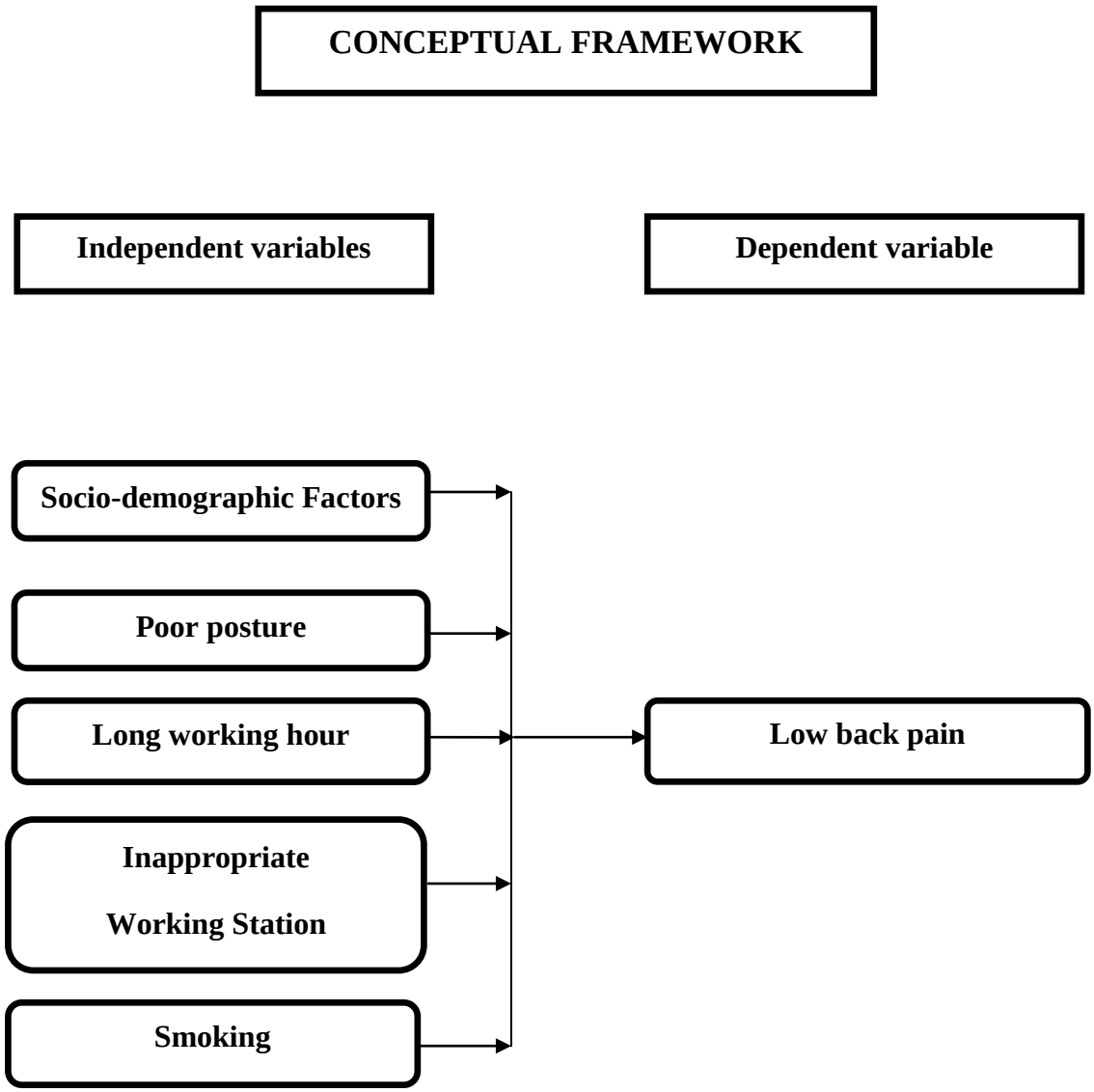
1.4.1 General objective

- To identify the prevalence of low back pain among the persons using ergonomically corrected workstation setting facility atIntertek Bangladesh Limited.

1.4.2 Specific objectives

- To find out prevalence of low back pain beforeusing ergonomically corrected workstation setting facility.
- To identify the percentage that how many persons experience of low back painafter using ergonomically corrected workstation setting facility.
- To explore the influencing socio-demographic factors of the affected groupafterusing ergonomically corrected workstation setting facility.
- To measure and compare the severity of pain by using VAS scalebefore and after using ergonomically corrected workstation setting facility.
- To determinevulnerable age group of LBPafter using ergonomically corrected workstation setting facility.
- To evaluate the possible causes that might responsible for persistingLBP even after using ergonomically corrected workstation setting facility.

1.5 List of variables



1.6 Operational definition

Prevalence

Prevalence is the total number of cases of a disease present in a given population at a specific time.

Low back pain

Low back pain means feeling of pain in the lumber region with or without radiation to the lower limb. It may also have back stiffness, decreased movement of the lower back, and difficulty standing straight.

Acute trauma

The word "acute" means sudden or rapid. Thus, sudden traumas are injuries sustained in a vehicle accident, fall, crushing injuries, work-related tasks, sudden blows as in fights etc. Acute trauma or injuries to the back include an injury to the ligaments or muscles in the back, such as a sprain or a strain**,** a fracture or dislocation of the spine, a torn or ruptured disc and compression of nerves in the lower back.

Musculoskeletal disorders

Musculoskeletal disorders are the disorders of muscles, tendons, ligaments and nerves that develop due to work related factor such as repetitive work or activities and physical factors. Some examples of musculoskeletal disorders include, back pain, neck pain, carpal tunnel syndrome, OA, tendonitis and tenosynovitis etc.

Workstation

An area where work of a particular nature is carried out, such as specific location on a computer desk at an office.

Ergonomics

Ergonomics is the science of fitting workplace conditions and job demands to the capability of the working population.It considers the physical and mental capabilities and limits of the worker as he or she interacts with tools, equipment, work methods, tasks and the working environment.

CHAPTER-II: LITERETURE REVIEW

We know that pain is a defense mechanism of the body to create an awareness of the subject to protect the injured part from further damage and it is an individual, multi-factorial experience influenced by culture, previous pain experience, belief, mood and ability to cope and it may be an indicator of tissue damage but may also be experienced in the absence of an identifiable cause. There is individual variation in response to methods to alleviate pain andsimilarly the degree of disability experienced in relation to the experience of pain varies (National Health and Medical Research Council, 2004).

The area bounded by the bottom of the rib cage and the buttock creases that commonly called lower back (Savigny et al., 2009). LBP is neither a disease nor a diagnostic entity of any sort and this term refers to pain of variable duration in an area of the anatomy afflicted so often that it is has become a paradigm of responses to external and internal stimuli - for example, "Oh, my aching back" is an expression used to mean that a person is troubled. World over the incidence and prevalence of low back pain are roughly the same (Ehrlich, 2003) and it was defined as any "non-traumatic musculoskeletal disorder affecting the low back"(Punnett et al., 2005)andalso defined as pain and discomfort, localized below the costal margin and above the inferior gluteal folds, with or without leg pain (Burton et al., 2004). It included lumbar disk problems (displacement, rupture) and sciatica but excluded cervical spine problems, such as neck pain or neck torsion problems (Punnett et al., 2005).

Low back pain not attributed to recognisable, known specific pathology (e.g. infection, tumour, osteoporosis, ankylosing spondylitis, fracture, inflammatory process, radicular syndrome or caudaequina syndrome)is called non-specific (common) low back pain (Burton et al., 2004) and 95% of low back disorders are termed "non-specific"(Beeck&Hermans, 2000).

Low backdisorders include spinal disc problems such as hernias and spondylolisthesis, muscle and soft tissue injuries and in addition to the normal

degenerative aging process, epidemiological studies reveal that poor ergonomicfactors in the workplace contribute to low back disorders in a healthy back or accelerate existing changes in an already damaged back. Increase the load or strain on the back if it is poor ergonomic work factors and thismay arise from many situations, for example lifting, twisting, bending, awkward movements, stretching and static postures (Purdue pharma, 2012).

Two terms those are usually used to describe the phenomenon of low back pain,one study mentions that. Low back pain is any back pain between the ribs and top of the leg, from any cause. Work-related low back pain is any back pain originating in the context of work and considered clinically to have been probably caused, at least in part, or exacerbated by the claimant's job. It is often impossible to distinguish back pain "caused" by work from pain of uncertain origin that makes the patient's work impossible to carry out,in practiceandthe origins of low back pain are grouped under four categories: discogenic/neurological, muscular/ligamentous, structural, and other disorders (Beeck&Hermans, 2000).

Low back pain is categorizedconventionally,according to its duration as acute (<6 weeks), sub-acute (6 weeks-12 weeks) and chronic (>12 weeks) (Savigny et al., 2009). Back pain that lasts for longer than 7-12 weeks that is sometimes calledchronic low back painand others define it as pain that lasts beyond 'the expected period of healing'. Recover quickly and without residual functional loss, 60-70% recovers by 6 weeks, 80-90% by 12 weeks, overall most patients with back painand fewer than half of those individuals disabled for longer than 6 months return to work and, after 2 years of absence from work, return-to-work rate is close to zero (Beeck&Hemans, 2000).It seems to be part of its natural historythat the recurrence rate of low-back pain is so high and lifetime recurrences of up to 85% were reported by Valkenburg and Haanen (Andersson, 1999).

Mechanical and non-mechanicalthese twocategorized of LBP, divideddepending on the nature of painand mechanical low back pain occurs due to an anatomical or functional abnormality rather than underlying disease, malignant neoplasm or manifestation of visceral disease (John &Licciardone, 2004) andabout 15-20%, the annual incidence of mechanical LBP and according to sex criteria, female are affected

more than the male (Malmivaara et al., 1995). Accounting more than 12 million cases annually in the USA, it is one of the most common complaints. About two thirds of adult's populations are affected by mechanical low back pain at some point in their lives; research results reveal that (Rashid et al., 2012). It typically gets worse after activity due to strain on the moving parts of the spine and pain is usually felt in the back but it may spread into the buttocks, hips, thighs and rarely goes down below the knees (Ehrlich, 2003).

Risk factorsthat are non-modifiablefor LBP include increasing age, number of children, a previous episode of LBP, history of LBP during pregnancy, current pregnancy (Third trimester), socio-economicstatus, marriage status, educational level, and major scoliosisandrisk factorsthat are modifiable for LBP, classified as lifestyle (physical inactivity, poor muscle strength, obesity, smoking, opioid consumption, alcohol intake) and occupational (heavy lifting, twisting, bending, pulling, pushing, kneeling, squatting, stooping, prolonged sitting, awkward posture at work, monotonous work, Job dissatisfaction, previous history of injury to the area) (Vindigni et al., 2005).

Epidemiology of low back pain, estimates of the prevalence of low back pain vary considerably between studies- up to 33% for point prevalence, 65% for 1- year prevalence, and 84% for lifetime prevalence. There is no convincing evidence that age affects the prevalence of back pain (Savigny et al., 2009).Over 70% in industrialized countries (one-year prevalence 15% to 45%, adult incidence 5% per year), lifetime prevalence of low back pain is reported and prevalencerate during school age approaches that seen in adults, increasing from childhood to adolescence, and peaking betweenages 35 and 55 (Burton et al., 2004).2%-7% of people develop chronic pain butacute low back pain is usually considered to be self-limiting (recovery rate 90% within 6 weeks)and recurrent and chronic back pain iswidely acknowledged to account for a substantial proportion of total workers' absenteeism.The most frequently reported risk factors are heavy physical work, frequent bending, twisting, lifting, pulling and pushing, repetitive work, static postures and vibrations and about half the days lost from work are accounted for by the 85% of people away from workfor short periods (<7 days) (Burton et al., 2005). In modern societies such as the

UK, USA and Canada,the incidence of low back pain has continued to increase (Odole et al., 2010).

There are some controversies about which gender was more affected by LBP and the prevalence of low back disorders in the European Union is equal among men and women. Especially for sciatica, some studies report higher rates of severe disorders among the male population.Current and past physical and psychosocial occupational factors seemed to be gender specific, one study found that. For that reason psychosocial factors alone seemed to be of less importance in women, but "poor job satisfaction" and "mostly routine work without possibilities of learning" increased in men (Beeck&Hermans, 2000).

Bear more stress with sitting than standing or most other activities ofour back including the discs, ligaments and muscles. Adverse effects on muscles with prolonged low-level static loading on the back with prolonged sitting,other studies have demonstrated that and prolonged activity (even low-level activity as may be associated with sitting) leads to impaired oxygenation of muscle tissues and has been implicated as a cause of back pain. The problem has never been clearly resolved so, although much attention has been paid to the best ergonomic sitting posture.To prevent back discomfort during prolonged sitting required both, more frequent postural changes and more frequent periods of relaxation of parts of the extensor musculature have been indicated. Tissue oxygenation in the lumbar extensor muscles is reduced as a function of contraction intensity, even at levels as low as 2% a maximum contraction; Stuart McGill et al. demonstrated thatand another study by McLean et al. looked at the issue of micro breaks in relationship to sitting and "micro breaks had a positive effect on reducing discomfort in all areas studied [neck, upper back and lumbar spine]" andit's to be most effective when taken at 20 minute intervals (Mangrum, 2006).

Smoking should be considered a weak risk indicator but not a cause of low back pain it's concluded by review of 47 studies and there must also be the strong confounding influence of socio-economic status and therefore type of job (manual workers smoke more than non-manual workers) and the link between stress and higher smoking could be a bias (Beeck&Hermans, 2000).

A year, total direct costs of chronic low-back pain-related health care utilization is estimated to be $96 million. However, 96% of total costs for chronic low-back pain with a neuropathic component accountedand the mean annual cost of care per patient was 160% higher than chronic low-back pain patients without a neuropathic component ($2,577 vs. $1,007).About 60% higher than those without,on average health care expenditures for individuals with back pain have been estimated. The largest proportion of direct medical costs for low-back pain are physical therapy and inpatient services, followed by pharmacy and primary care,one review of published literature found that (Purdue pharma, 2012).

Diagnosis for patients, presenting with a new episode, or exacerbation, of low back pain consideration needs to be given to the possibility that there is a specific cause for their pain and general approach to the treatment for acute non-specific low back pain is advice to stay active and to avoid bed rest, plus pain relieving medications such as paracetamol, weak opioids or NSAIDs.The possibility of a specific cause needs to be re-considered, for those with pain that continues for longer than six weeks or who further deteriorate between six weeks and one year and for this causes, here the possibility of chronic inflammatory conditions such as ankylosing spondylitis or other inflammatory disorders need to be considered (Savigny et al., 2009).

The overall objective that follow for the early management of non-specific low back pain (lasting six weeks to one year) is to ensure that an episode of low back pain does not result in long-term withdrawal from normal activities, including sickness absence from paid employmentand there areavailable a plethora of treatments for the non-specific low back pain. Have a strong theoretical underpinning, not all of the treatments usedandin the literature,the differences and similarities between different therapeutic approaches are not always clearly explicatedand for many of the individual treatment approaches used any therapeutic benefit is the result of both the specific treatment modality used and the non-specific effects of the therapist delivering the treatment (Savigny et al., 2009).

In non-specific low back pain, the treatments have been used that are education/information including advice from practitioners regarding exercise and/or causes of back pain, written educational material with formal education

sessions,group and individual supervised exercise (both land and water based), manual therapies (manipulation, massage, mobilization), othernon-pharmacological interventions (interferential, laser, lumbar supports, transcutaneous electrical nerve stimulation, traction, ultrasound), Psychological interventions(a variants of cognitive behavioral therapy and self-management), combined physical and psychological interventions (CPP) these include the components seen in some types of back school and multidisciplinary rehabilitation programs, Pharmacological interventions (antidepressants, non-steroidal anti-inflammatory drugs or NSAIDs, opioids, and paracetamol), Invasive procedures (acupuncture, electro-acupuncture, nerve blocks, neuroreflexotherapy, percutaneous electrical nerve stimulation or PENS), injection of therapeutic substance into the spine, Surgical referral (Savigny et al.,2009).

In workplace,prevent low back disorders by reduction of physical demands, improvements in work organization, education/training (as part of an integratedapproach), medical treatment and rehabilitation (as part ofan integrated approach), cognitive and behavioral strategies (forexample coping strategies) (Beeck & Hermans, 2000).

Application of scientific knowledge to the work place in an effort to improve the well being and efficiency of workers is called ergonomics.Ergonomics is the science that designing the job to fit the worker, rather than physically forcing the worker's body to fit the job (Occupational Safety and Health Administration, 2000).Thescientific study of human work is also called ergonomicsandit also considers the physical and mental capabilities and limits of the worker as he or she interacts with tools, equipment, work methods, tasks and the working environment (WISHA Services Division and Washington State Department of Labor and Industries, 2002).To reduce stress and eliminate injuries and disorders associated with the overuse of muscles, bad posture, and repeated tasks that are the main goal of ergonomics. In Ergonomics, a number of factors play a role; these include body posture and movement (sitting, standing, lifting, pulling and pushing) and environmental factors (noise, lighting, temperature, humidity) (Health and Safety Authority, N.D.).

In present condition, practically impossible to find an office or a shop floor without a computer workstation andneed to use computers increases as computer technology

advances and software and computer packages are being developed. As a result, continuously increasingthe occupational health and safety problems andobviously, can lead to reduced performance and dissatisfaction. So by ergonomics intervention fitting the activities and environment to the abilities, dimensions, and needs of people to improve performance while enhancing comfort and health and safety and efficiency of human-computer interaction, comfort, health, and the user's safety can be improved by applying ergonomic principles. Eason developed a classical ergonomic framework and identified factors that affect human performance and these factors include task characteristics, user issues, environmental factors, and human-computer interaction (Shikdar& Al-Kindi, 2007).

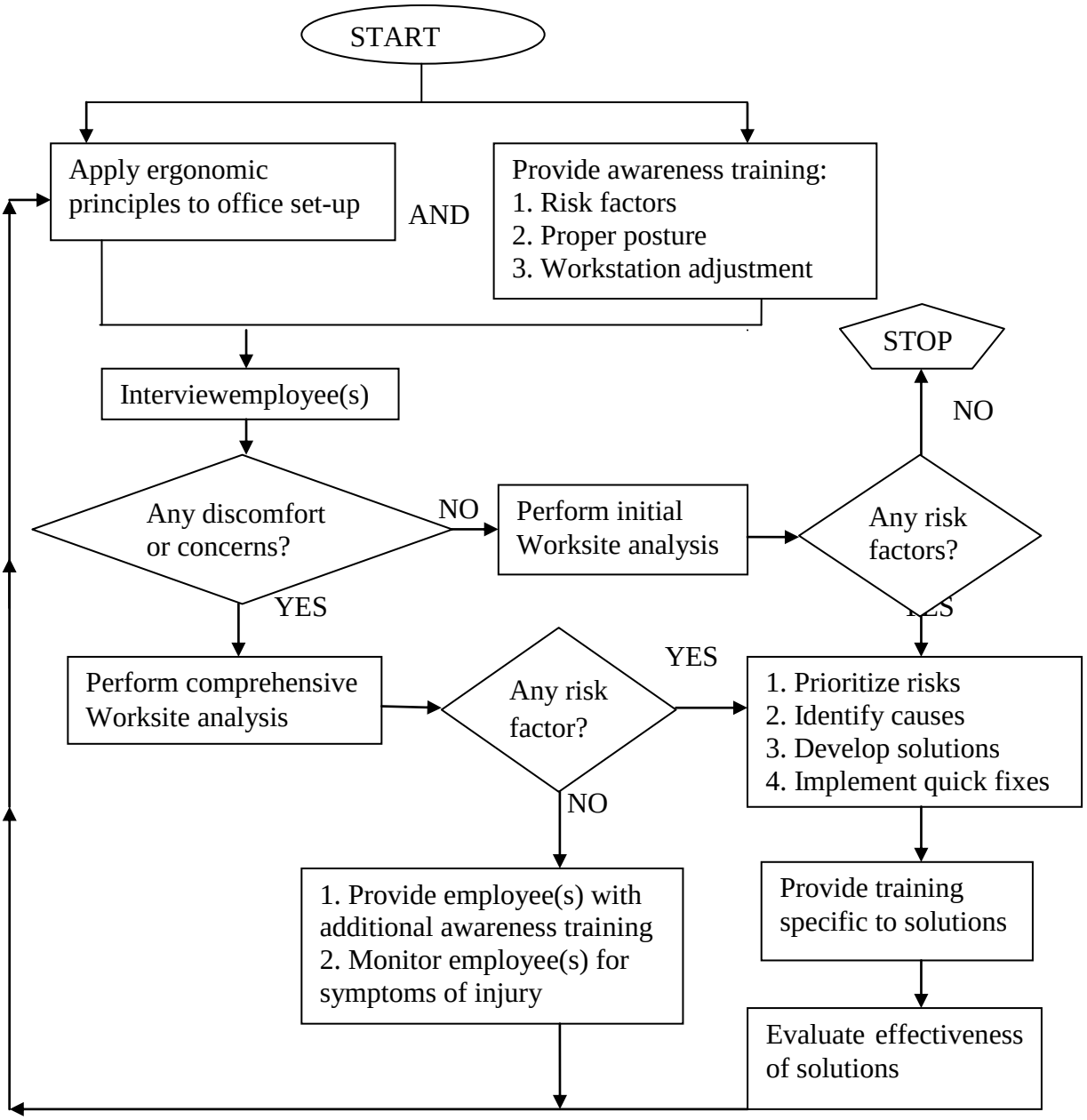
OfficeErgonomics is the branch of ergonomics that dealing specifically with the office environment andthe main focus of office ergonomics has been on computer work due to the rapid increase in computer use in the modern office and the associated increase in injuries, in recent years (WISHA Services Division and Washington State Department of Labor and Industries, 2002).The effectiveness of ergonomics depends on the full participation of workers and it interventions are based on a "holistic" or systems approach that considers the effect of the equipment, the work environment and the work organization as well as the worker (Beeck&Hermans, 2000).

The officeworkers who are an essential part of every business process and without that worker critical to delivering quality products and services, so prevention from injury is very necessary and it is easily possible by ergonomics intervention.When a person becomes injured or ill given both these direct costs and the loss of the valuable services provided by the person,is especially costly. So, ergonomics is a tool which business owners and managers can use to help prevent these injuries in the office, it reduces the risk of injury by adapting the work to fit the person instead of forcingthe person to adapt to the work, in addition to injury prevention, ergonomics is also concerned with enhancing work performance, by removing the barriers that exist in many work places that prevent employees from performing to the best of their abilitiesand therefore, another benefit of applying ergonomics to office work is that it helps people work more effectively, efficiently, and productively at their jobs.The application of ergonomics in your workplace is a creative process, and to be

successful it may require all of the available expertise within your company(WISHA Services Division and Washington State Department of Labor and Industries, 2002).

Organization of the office by ergonomics, it deals with many issues, starting with a single employee and their workstation, and expanding out to include an entire department or organization and it started with worksite Analysis, implementing Solutions, training and education,ended with evaluation(WISHA Services Division and Washington State Department of Labor and Industries, 2002).

Ergonomics process flow chart:



Flow chart: Ergonomics process (WISHA Services Division and Washington State Department of Labor and Industries, 2002).

Ergonomics intervention providing a workplace free from ergonomic hazards by do, lower injury rates as MSD incidences go down andincrease productivity by making jobs easier and more comfortable for workers, improve worker safety and increase worker comfort, reduce worker fatigue and improve worker morale, improve product quality because fewer errors will be made when using automated processes that demand less physical effort, reduce absences because workers will be less likely to take time off to recover frommuscle soreness, fatigue, and MSD-related problems (Occupational Safety and Health Administration, 2000).

The following all features are part of a good ergonomicoffice chair. A chair is only "ergonomic" when adjust it to fit individual person and we can make the adjustments quickly and confidently by this chair. Dynamic office chairs" is a good ergonomicoffice chair that allow movement of the chair seat and back support independently andthis type of chair has the potential to decrease low back pain,several studies have suggested that. A study by van Dieen et al. demonstrated decreased spinal shrinkage when working on dynamic office chairs as opposed to more standard office chairs with a fixed back support (Mangrum,2006).

Ergonomically corrected workstation that include an acceptable and well supported seated position that meanssitting with the body close to the desk, the head and neck are in a forward facing and midline position (i.e. no backward arching of the neck or forward extension of the chin), the shoulders are relaxed and symmetrical and elbows slightly closer to the side of the body, using the preferred keying posture, depending on the style of keying used (i.e. traditional style or with forearm support, the back is supported by the chair backrest). The curved lower part of the backrest should fit into the lower back or the lumbar curve, having an open angle of 100-120 degrees (slightly more than a right angle) at the hip and this can be achieved by adjusting the seat pan tilt and the backrest, having knees at a height lower or level with the hips, ensuring a gap of 2-3 finger widths between the front of the chair and the back of the kneesandhaving feet flat on the floor or footrest (Mangrum, 2006). This feature reduces the need to order chairs with different sized seats to suit shorter or taller workers, a five-point base. A chair with five casters is less likely to tip over than one

with four castersand comfortable cushioning and covering on the seat and backrest (Workplace Health and Safety Queensland, 2012).

Backrests should support the upper and lower back and be adjustable in height and by raising or lowering it, it should be adjusted so that the lumbar support fits snugly against the curve of the lower back and it should also be adjustable in the forward/backward direction. If the angle is 100-120degrees (i.e. slightly more than a right angle) between the trunk and thighs then it enables better spinal posture and this can be achieved by adjusting the backrest angle in combination with the seat pan tilt, where jobs are highly sedentary, and the user may benefit from a 'free-floating' back support mechanism incorporated into the backrest. This enables the backrest to move through a pre-set range as the back moves andwhile still remaining in a supported seated position, the user is able to move through a range of acceptable postures (Workplace Health and Safety Queensland, 2012).

Armrests help the users when lowering into and rising from the chairand also provide forearm support. On the armrests, forearms should rest comfortablywith shoulders relaxed. Chairs can be purchased with or without armrests and when purchasing new chairs, consideration should be given to the design of and need for armrests. Armrests should be height adjustable and able to be turned inwards or outwardsand trialed before purchase to check that they can be adjusted to suit the user.Armrests generally should be removed if theyprevent the user from getting close to the desk and at a comfortable distance from the keyboard and screen andinterfere with using the keyboard, mouse (or other input devices), prevent the user from turning the chair or getting up from the chair easily, are not adjustableandresult in the back bending sideways when leaning on the armrest and this means that the armrests are too low for the user (Workplace Health and Safety Queensland, 2012).

The Computerworkstation should have a flat smooth surface for the keyboard and mouse so they can be used on the same level and space to position all the equipment.So that posture or vision is not compromised when completing tasks, a suitable height (e.g. 680-720 mm when measured from the top of the workstation to the floor)and adequate clearance for legs under the desktopandsufficient space under the desk to comfortably stretch legs.Set up the monitor by there is no single correct viewing position for the computer screen and the main considerations include the

neck is not arched back and the chin does not extend forwards, the screen characters can be seen clearly and comfortablyandit is suitable for the specific eyewear worn by the user (Workplace Health and Safety Queensland, 2012).

By these general guidelines apply, set up the keyboard and position the keyboard straight in front of the user to avoid twisting the neck or body, use a keyboard without a numeric key pad to reduce the width of the keyboard. By folding or unfolding the small legs under the keyboard, this allows the mouse to be positioned closer to the bodyandadjust the angle and height of the keyboard (Workplace Health and Safety Queensland, 2012).

Some tips when using a mouse or other pointing devices such as track pads, styluses, tablets, and trackballs. Keep the device at the same height and as close to the keyboard as possible andensure the mouse fits comfortably in the hand to minimize any undue pressure on the wrist and forearm, also consider operating the device with the non-dominant hand. On the basis of computer settings,change this operating preference andset the tracking speed of the pointer to suit the user, the task and the number of monitors used, have enough space and a flat smooth surface so that the wrist can be kept straight, and take hands off the keyboard and mouse when not in use. This assists in reducing muscle fatigue from hovering over the equipment musttake a breaks from the computer to do other jobs that don't involve using pointing devices, use keyboard short cuts to decrease use of the deviceandmove the device towards the centre of the desk and temporarily reposition the keyboardif the device is used for long periods (Workplace Health and Safety Queensland, 2012). One study show that among workers who have a high work strain, longer mouse and keyboard use, perceived high muscle tension that workers higher risk of developing LBP and factors that predict the risk of developing LBP problems can be divided into individual, ergonomic, and psychosocial factors (Mahmud et al., 2011).

A footrest shouldhave a non-slip surface large enough for both feet to rest comfortably (about 30 x 30 cm) with an adjustable slope (10-20 degrees) so it does not slide or move because it allow a comfortable ankle position when feet are resting on itandbe stable enough (Workplace Health and Safety Queensland, 2012).

Rest periods during working in a computer workstation are an essential part of ergonomic intervention. When the persons are continuously writing or keying, make sure have a short break (5–10 minutes) each hour. A 30-second break every tenminutes is preferable that mention in some study. The exact length of the break will depend on theintensity of the work that the persons are doing and break could involve doing another activity related to the work, such asmaking phone calls or doing exercises to refresh and relax the muscles. So we follow rule of thumb to relax the muscles and that are performed in this way. Whatever you do often and for long periods of time, do theopposite during a break and move around. For example, playing card games on your computer during your breaks means you are not having a proper break from the constraints of working at the computer (Reading, 2005).

In ergonomics intervention another important part is exercise programs that have shown positive effects in reducing LBP and also reducing computer workstationSymptoms. The exercise program was effective in producing positive changes in workstation configuration and posture, and reducing the severity of symptoms and also an improvement in productivity(Shikdar& Al-Kindi, 2007).Exercise programs may include aerobic activity, movement instruction, muscle strengthening, postural control andstretching (Savigny et al., 2009).

Benefits ofergonomically designed workplaces arehealthy workforce, enhanced Productivity, reduced number of sick days reported, savings (Aggarwal, 2008). ‘A highly adjustable chair or ergonomics chair coupled with office ergonomics training reduced musculoskeletal symptom growth over the workday’. In 1990, research found that a 17.5% productivity increase in subjects working in anergonomically optimal setting compared to one which was ergonomically suboptimal. In 2003, research found that a 17.7% productivity increase in participants that received ahighly adjustable chair and office ergonomics training (Handbook, 2005).

CHAPTER-III: METHODOLOGY

3.1 Study design

This study aimed to find out the prevalence of low back pain among the persons using ergonomically corrected workstation setting facility. For this reason, to accomplish the research objectives, a cross sectional study was chosen because the cross sectional study is the best way to determine prevalence.

3.2 Study site

Data were collected from Intertek Bangladesh Limited, Dhaka. This organization was appropriate to obtain desire data for the study because this office workstation is ergonomically corrected by a Physiotherapist and Ergonomist. More ever this center was convenient for the investigator.

3.3 StudyPopulationand sampling

The persons who are using ergonomically corrected workstation setting facilities who are the population of this study. Subjects weretaken by using convenience sampling.

3.4 Sampling Procedure

65 participants with or without LBP were selected fromIntertek Bangladesh Limited. Convenient sampling technique was used, considering the inclusion- exclusion criteria.

3.5 Sample size

The equation of sample size calculation are given below-

$$n = \left\{\frac{Z\left(1-\frac{\alpha}{2}\right)}{d}\right\}^2 \times pq$$

Here,

$Z\left(1-\frac{\alpha}{2}\right)$ = 1.96

n = required sample size

p = prevalence of LBP after ergonomic intervention,in literature (p=0.49).

q= 1-p

=1-0.49

=0.51

d= 0.05

According to this equation the sample should be more than 346 people but due to the resource constrain study was conducted with 65 samples, after following inclusion and exclusion criteria.

3.6 Selection Criteria

3.6.1 Inclusion criteria

- Those office workers, who already have ergonomically corrected workstation facility (more than 1.5 years).
- The desk workers who may have or have not previous history of low back pain.
- Both male and female persons were selected.
- Persons of all age group selected- to explore the relationship between age and prevalence of LBP among the persons.

3.6.2Exclusion criteria

- The office workers would be excluded, who have not availed the ergonomically corrected workstation facility due to later date joining.
- History of acute trauma to back which can produce pain as an acute inflammatory reaction.

3.7 Method of data collection

In this study, data were collected by face to face interview using structured questionnaire (included close ended question). This questionnaire was developed after reviewing literature about the prevalence of low back pain among the persons using ergonomically corrected workstation setting facility. In the questionnaire, participants demographic information including age, sex, marital status, level of education, job pattern, any static activity, duration/working hour, work off due to LBP, severity of LBP, state of LBP after ergonomically correction.For data collection,firstlywent topersons who are working at Intertek then, introduced herself and describe the

project study as well its purpose.Also provided consent form to the participant and explained that to build a trustful relationship. After obtaining consent by sign, asked pre-determine question to the participant andgave time to understand the questions fully so that they could be answered accurately and then the investigator filled the questionnaire form according to participants answer. For data collection, used only questionnaire in English with the possible easiest wording. Because all of the participants were educated.

3.8 Materials used for the research project

Questionnaire, consent forms, pen, file, visual analog scale (VAS scale), papers, SPSS (Statistical Package for the Social Sciences) software and computer were the materials used in the study.

3.9 Data analysis

Data was analyzed with the software named Statistical Package for Social Science (SPSS) version 16. Descriptive statistic was used for data analysis which wasdisplayed through table, pie chart and bar chart.

3.10 Informed Consent

Written consent (appendix) was given to all participants prior to completion of the questionnaire andexplained to the participants about his or her role in this study. Then it was received a written consent from every participants including signature. So the participant assured that they could understand about the consent form and their participation was on voluntary basis. The participants were informed clearly that their information would be kept confidentialand assured the participants that the study would not be harmful to them. It was explained that there might not a direct benefit from the study for the participants but in the future cases like them might get benefit from it. The participants had the rights to withdraw consent and discontinue participation at any. Information from this study was anonymously coded to ensure confidentiality and was not personally identified in any publication containing the result of this study.

3.11 Ethical consideration

It should be ensured by the investigator that it would maintain the ethical issue at all aspects of the study because it is the crucial part of the all form of research.The proposal of the study is approved by the ethical committee of the member of faculty of Physiotherapy Department. The study had done by following the guideline given by local ethical review committee and also followed WHO and BMRC guidelines. Strictly maintained the confidentialityandinformedconsent would be taken. It was purely an observational study. So, it had limited ethical issues.

3.12 Limitations

It is anundergraduate study, so there may have some limitations and barrier during on conduction of this study and it isherfirst research project. So the investigator has limited experience with techniques and strategies in terms of the practical aspects of research. The limitation of this study includes taking small sample size. It is taken only 65 samples and the samples are collected only from the selected organization of Intertekso the result of the study cannot be generalized to the whole population of office workers who are used ergonomically corrected workstation in Bangladesh.This study has provided for the first time data on the prevalence of LBP among the persons using ergonomically corrected workstation settings facility. No research has been done before on this topic. So there is little evidence to support the result of this project in the context in Bangladesh.Another major limitation is time. The time period was very limited to conduct the research project on this topicwhich had a great deal of impact on the study. If enough time was available knowledge on the thesis could be extended.

CHAPTER-IV: RESULTS

The aim of this study was to explore the prevalence of low back pain among the persons using ergonomically corrected Work station setting facility. Data were numerically coded and analysis the data by using an SPSS 16.0 version software program and the result captured in Microsoft Excel. Then collected the descriptive data and calculated as percentages and presented by using table, bar and pie charts. These data analysis and description are as follows-

Prevalence of LBP

65 participants have been taken as sample. Among themthe prevalence of LBP was 83.07% (n=54) before using ergonomically corrected workstation setting facility and21.5% (n=14) participants reported LBP after using ergonomically corrected workstation setting facility. So the prevalence of low back pain among the participants was 21.5% (n=14) and another 78.5% (n=51) participants did not complain of low back painafter using ergonomically corrected workstation setting facility. So here we can understand that ergonomically corrected workstation setting is effective for reducing low back pain.

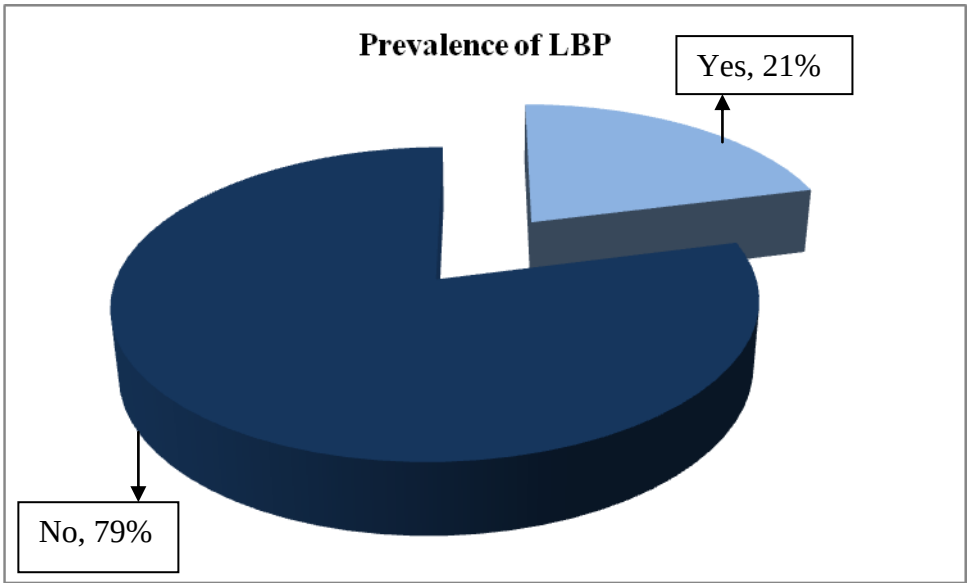


Figure-1: Show the percentage of LBP per 65 persons who are using ergonomically corrected workstation setting facility.

Age range

Among the 65 participants mean age were 34.60 with standard deviation (± 4.889). Median was 34.00 and mode was 34.

Vulnerable age group

Still 14 participants are suffering from LBP though the ergonomically correction had been done. Among the 14 participants age, 24-29 years were 0%, 30-35 years were 21.43%, 36-41 years were 64.29% and 42-45 years were 14.29%. So the most vulnerable age group is 36-41 years (Table-1).

Age	Number	Percent
30-35 years	3	21.43
36-41 years	9	64.29
42-45 years	2	14.29
Total	**14**	**100**

Table-1: Vulnerable age groupafter using ergonomically corrected workstation

Male and female ratio

Out of 65 participants 39 were male and 26 were female.

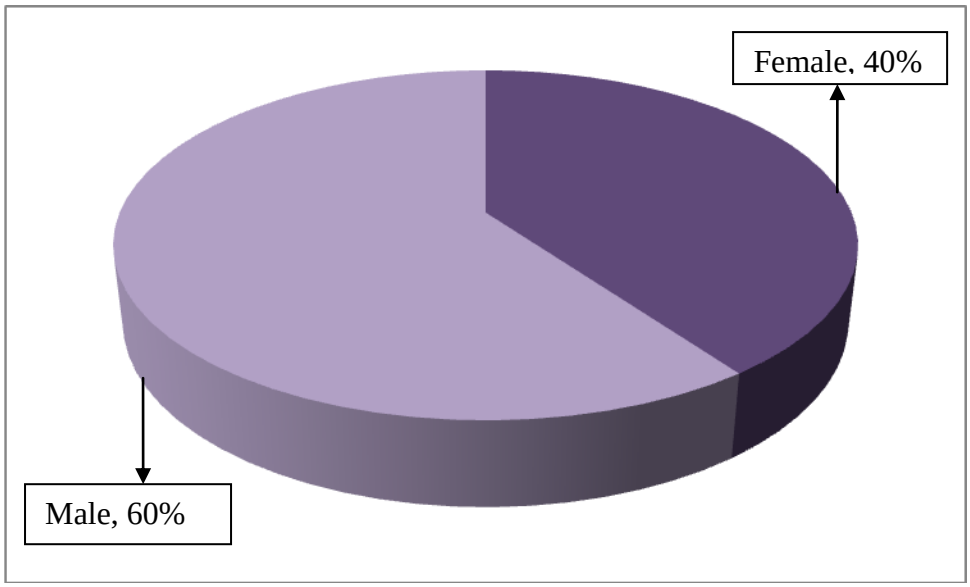


Figure-2: The pie chart shows that 65participants, among them male were 60% and female were 40%.

Genderand LBP

Most affected gender before using ergonomically corrected workstation

Among the 65 participants 40% (n=26) were female and 60% (n=39) were male. 83.07%(n=54) participants were affected by LBP before ergonomically workstation correction, among them35.38% (n=23) female and 47.69% (n=31) male.The rest 11 participants didn't have any pain, among them 4.62% (n=3) female and 12.30% (n=8) male, total 16.92% (n=11).

Low back pain of the Participants	Gender of the participants		**Total**
	Male	Female	
Yes	31(47.69%)	23(35.38%)	54(83.07%)
No	8(12.30%)	3(4.62%)	11(16.92%)
Total	**39(60%)**	**26(40%)**	**65(100%)**

Table-2: Most affected gender before using ergonomically corrected workstation

Most affected gender after using ergonomically corrected workstation

21.54% (n=14) participants were affected by LBP after ergonomically workstation correction, among them7.69% (n=5) female and 13.85% (n=9) male.The rest 51 participants didn't have any pain, among them 32.31% (n=21) female and 46.15% (n=30) male, total 78.46% (n=51). If we compare the male female ratio then find out that male are more affected by LBP than female.

Low back pain of the Participants	Gender of the participants		**Total**
	Male	Female	
Yes	13.85%	7.69%	21.54%
No	46.15%	32.31%	78.46%
Total	**60%**	**40%**	**100%**

Table-3: Most affected genderafter using ergonomically corrected workstation

Marital Status

Among the 65 participants 77% (n=50) participants were married, 23% (n=15) participants were single.

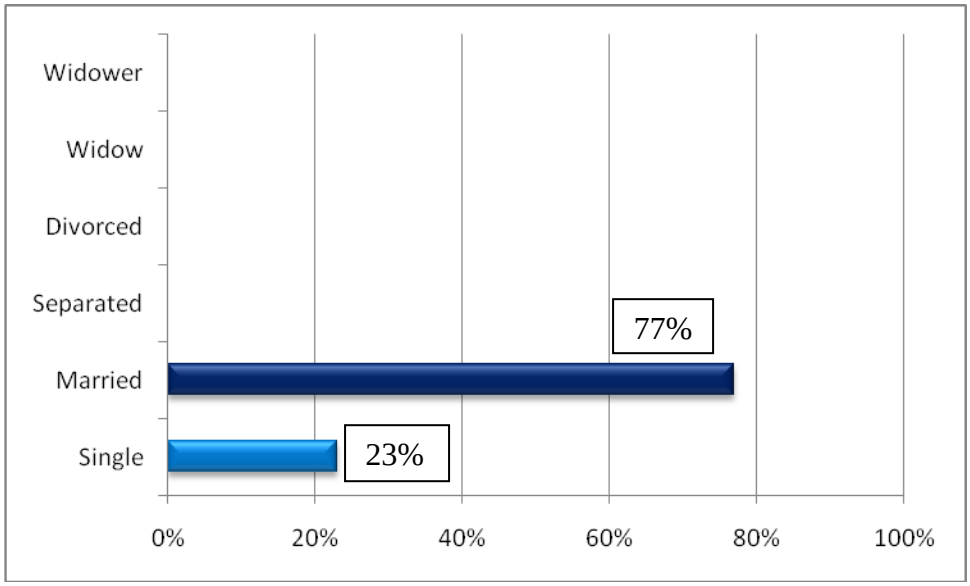


Figure-3: Marital Status of the participants

Marital Status and low back pain

Before using ergonomically corrected workstation, out of 65 participants 54 participants had low back pain. Here 13.85% (n=9) were single and 69.23% (n=45) were married.

After using ergonomically corrected workstation, among all participants 14 participants had low back pain. Here 0% (n=0) were single and 21.54% (n=14) were married. The study shows that married persons were more affected by LBP than single or unmarried (Table-4).

Low back pain of the Participants	Marital Status of the participants		**Total**
	single	married	
Yes	0	14	14
No	15	36	51
Total	**15**	**50**	**65**

Table-4: Marital Status and low back pain

Smoker

Among the 65 participants 21.5% (n=14) participants were Smoker, 78.5% (n=51) participants were non-Smoker.

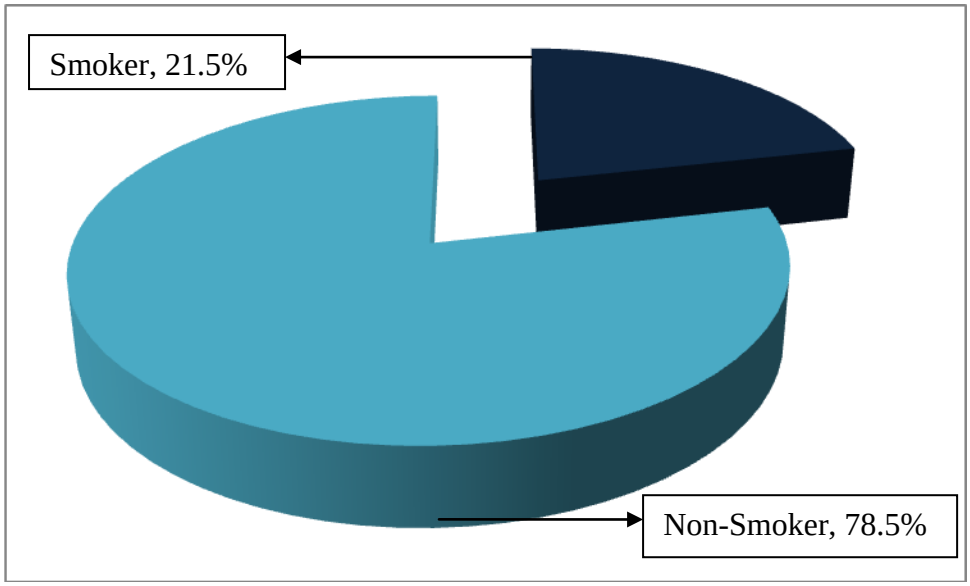


Figure-4: Shows that the percentage of smokerand non-smoker

Smoking and low back pain

The total participants of this study were 65, among them 14 participants had the habit of smoking and 51 participants had no habit of smoking. Before using ergonomically corrected workstation, out of 14 participants (Smoker) 12 participants had low back pain.

From the table it is observed, among the 14 participants (Smoker) 9 participants had low back pain after using ergonomically corrected workstationandfrom thiscould conclude that the smokers were more suffered from the LBP and smoking is one of the possible causes that might responsible for persistingLBP even after using ergonomically corrected workstation setting facility.

Low back pain of the Participants	Smoking of the participants		**Total**
	Smoker	Non-smoker	
Yes	9	5	14
No	5	46	51
Total	**14**	**51**	**65**

Table-5: Smoking and low back pain

Daily working hours

Result showed that among all of the (65) participants, 65(100%) participants had worked above 8 hours and still 14 participants are suffering from LBP after using ergonomically corrected workstation so, long working hours or working above 8 hours is a predisposing factors for LBP.

Daily working hours	Frequency	Percent
Above 8 hours	65	100
Below 8 hours	0	0

Table-6: Daily working hours of the participants

Working posture

All participants maintained sitting posture during the activity. Prolonged static sitting position is a predisposing factors for LBP and after the ergonomically correction office worker still suffering for LBP but comparatively less than before because maintain intervention about ergonomically corrected workstation.

Working posture	Percent
Sitting	100
Standing	0
Walking	0
Total	**100**

Table-7: Working posture of the participants

Before using ergonomically corrected workstation pain on VAS scale

Among the affected participants who were suffering from LBP before using ergonomically corrected workstation setting facility, the severity of pain in VAS scale was in between 1-3(mild pain) in 3.1% (n=2) participants, in between 4-6(moderate pain) in 58.5%(n=38) participants and in between 7-10(severe pain)in 21.5% (n=14)participants and11(16.9%) participants felt no pain.

Pain severity in VAS scale	Frequency	Percent
1-3(Mild pain)	2	3.1
4-6(Moderate pain)	38	58.5
7-10(severe pain)	14	21.5
No pain	11	16.9
Total	**65**	**100**

Table-8: Information about the severity of pain of the Participants before using ergonomically corrected workstation setting facility.

After using ergonomically corrected workstation pain on VAS scale

Among the affected participants who were suffering from LBP After using ergonomically corrected workstation setting facility, the severity of pain in VAS scale was in between 1-3(mild pain) in 10.8% (n=7) participants, in between 4-6(moderate pain) in 10.8% (n=7) participants and there were no participant who had score in between 7-10(severe pain) in VAS scaleand78.5%(n=51) participants felt no pain.

Pain	Frequency	Percent
1-3(Mild pain)	7	10.8
4-6(Moderate pain)	7	10.8
7-10(severe pain)	0	0
No pain	51	78.5
Total	**65**	**100**

Table-9: Information about the severity of pain of the Participants after using ergonomically corrected workstation setting facility.

Comparing severity of pain on VAS scale before and after

Chart shows, 83.1%(n=54) participants were suffering from LBP before ergonomically correction was done and the rest 11 participants didn't have any pain.21.5% (n=14) participants were suffering from LBP after ergonomically correction was done and the rest 51 participants didn't have any pain.

So, the participants who were suffering from LBP got satisfactory level of improvement in their pain status after using ergonomically corrected workstation setting facility.

Pain severity in VAS scale	Before	After	**Total**
1-3(Mild pain)	3.1%	10.8%	0%
4-6(Moderate pain)	58.5%	10.8%	69.3%
7-10(severe pain)	21.5%	0%	21.5%
Total	**83.1%**	**21.6%**	**104.7%**

Table-10: Comparing severity of pain on VAS scale before and after using ergonomically corrected workstation setting facility

Frequency of taking treatment

Chart shows that after using ergonomically corrected workstation setting facility, among the affected participants who were suffering from LBP, 12.3%(n=8) participant took treatment and remaining9.2%(n=6) participants did not take any treatment for their pain. Among participants who took treatment for their LBP, 4.6%(n=3) participants took Physiotherapy, 7.7%(n=5) participants took medication and there were no participants who got surgical treatment for their LBP. Others 78.5% (n=51) participants who were not suffering from LBP.

Treatment take or not	Type of treatment	Frequency (n)	Percentage (100)	**Total**
Yes	Physiotherapy	3	4.6	12.3%
	Medication	5	7.7	
	Surgery	0	0	
	Others	0	0	
No		6	9.2	9.2%
Not applicable		51	78.5	78.5%
Total		**65**	**100**	**100%**

Table-11: Information about the available treatment taking by the participants

CHAPTER-V: DISCUSSION

The study was conducted in Intertek Bangladesh Limited (Organization) and received data from their office employee. Although the sample size was small, it represented an ergonomically corrected computer workstation and the results obtained are applicable to office employees.

In this study it was found that before using ergonomic intervention the prevalence of LBP was 83.07%. Some study revealed that worldwide estimates of lifetime prevalence of LBP vary from 50 to 84% (Ghaffari et al., 2006). In developed countries such as the United States of America (USA) and Australia, LBP prevalence ranges from 26.4% to 79.2%. The lifetime prevalence of LBP in developed countries is reported to be up to 85% (Sharing Best Evidence, 2012).

In the study used a cross sectional study to find out the prevalence of LBP among the persons using ergonomically corrected workstation setting facility.The result of this study showed that 21.5% participants suffered from LBP after using ergonomically corrected workstation in this company during the course of the study. A similar study was carried out by (Driessen et al., 2011) which was one of the first studies that explored after 12 month of ergonomics intervention, reducing the prevalence of low-back or reducing pain intensity and duration. These were nearly similar to the result of this study. Another study found thatafter implementation of a company ergonomic intervention by wide back support policy that show a significant reduction of 34% (Jess et al., 1996). So, here we can understand after implementation of ergonomically corrected workstation the percentage of low back pain sufferers had decreased and this setting is effective for reducing low back pain.

In this study it was found that before using ergonomically corrected workstation among the sufferer group most of the participants weresuffered from severe pain (21.5%), Moderate pain (58.5%), and Mild pain (3.10%). The severity which was measured by using VAS scale, most of the participantswas suffered moderate type back pain. Cassidy et al. (2005) revealed that out of 327, 230(70.3%) persisted with mild LBP, 39 (11.9%) with in- tense LBP, and 58 (17.7%) with disabling LBP and

this study was also found that after using ergonomically corrected workstation among the sufferer group most of the participants were suffered from Mild pain (10.8%), Moderate pain (10.8%) and no one suffered from severe pain (0%). So,the participants who were suffering from LBP got satisfactory level of improvement in their pain status, intensity and severity after using ergonomically corrected workstation. After ergonomically correction of workstations the severity of LBP among the workers had decreased.

The analysis showed that information on the participants- here the group comprised of 60% of men and 40% of women and total participants was 100%(n=65). Their education ranged from bachelor (21.5%) to masters (78.5%) degrees. Normal office hours were between 8 a.m. and 5 p.m. with a lunch and two coffee breaks. All of the participants were used computer workstation. Among the 65 participants 77%(n=50) participants were married, 23% (n=15) participants were single. After using ergonomically corrected workstation, out of 65 participants 14 participants have low back pain. Here 0% was single and 21.54% were married. The study shows that married persons were more affected by LBP than single or unmarried.

This study also found that among the affected participants (14) who were suffering from LBP, 8 (12.3%) participant took treatment and remaining 6 (9.2%) participants did not take any treatment for their pain. Among participants who took treatment for their LBP, 3 (4.6%) participants took Physiotherapy, 5(7.7%) participants took medication and there were no participants who got surgical treatment for their LBP. Earlier some study shows that Ten (34.5%) participants responded that they would communicate with the physiotherapist only, 3 (10.3%) responded that they would communicate with the occupational therapist, 5 (17.2%) responded that they would communicate with the staff member, 2 (6.9%) responded that they would communicate with the head of department and personnel department, 1 (3.4%) each responded that they would communicate with the personnel department, orthopedic surgeon, head of department and physiotherapist, and personnel and staff member, respectively, while 5 (17.2%) said that they do not know whom to communicate with in the case of a staff member taking sick leave because of LBP(Punnett et al., 2005).

It was also found that after using ergonomically corrected workstation the LBP among the participants was more common in 36-41 years, so it was the most vulnerable age group. Before using ergonomically corrected workstation the LBP among the participants was more common in 36-41 years andamong the 65 participants mean age were 34.60 with standard deviation (± 4.889). Median was 34.00 and mode was 34.The prevalence rate during school age approaches that seen in adults, increasing from childhood to adolescence and peaking between ages 35 and 55 (Andersson, 1999)and the prevalence of LBP was related to age in both sexes.

There are some controversies about which gender was more affected by LBP. Majority of the respondents of this study was male and the analysis showed that among participants with LBP fewer (35.38%) were female and more (47.69%) were male before using ergonomically corrected workstation. Gender differences in the prevalence of LBP are frequently observed, but might differ in degree from country to country. This study found that In United States, a higher prevalence of back pain in male workers was reported, and a study on LBP in Japan showed that the incidence in male workers was four times greater than that in female workers. In both the cases, the results are different from our observations (Ghaffari et al., 2006). Earlier study also revealed that the prevalence LBP is high among females in general population (Ali et al., 2008).Generally, men had higher exposure due to higher rates of participation in the labor force and occupation with heavy lifting (Punnett et al., 2005).

In this study it was also found that among participants with LBP still fewer (7.69%) were female and more (13.85%) were male after using ergonomically corrected workstation but the number of total affected participants were significantly decreased in comparison to previous history. Cassidy et al. (2005) explore one report that 10% of females and 13% of males show improvement each year.

The present study provided evidence that among the 65 participants 21.5% participants were Smoker, 78.5% participants were non-Smoker.The researcher observed that the total participants of this study were 65, among them 14 participants had the habit of smoking and 51 participants had no habit of smoking. After using ergonomically corrected workstation, out of 14 participants (Smoker) 9 participants

had low back pain. In cross-sectional studies, current smoking was associated with increased prevalence of low-back pain in the past month, low-back pain in the past 12 months, seeking care for low-back pain, chronic low-back pain, and disabling low-back pain. Former smokers had a higher prevalence of low-back pain compared with never smokers, but a lower prevalence of low-back pain than current smokers (Purdue pharma, 2012). Omokhodion found that LBP was significantly associated with smoking in office workers. Also in O'Connor research in military basic trainers similar results were obtained. The investigator could conclude from this that the smokers were more suffered from the LBP than the non-smokers.

In this study it was also found that, the employees are working the same 8 hours with or without breaks in front of the computers in dynamic sitting position ordynamic office chairs.Several studies have suggested that this type of chair has the potential to decrease low back pain (Mangrum, 2006). Ghaffari et al. (2006) state that in accordance with other studies, heavy lifting, static sitting position and repetitive work were significant risk factors for LBP. Musculoskeletal problems could be due to poor computer facilities, workstation layout, and long hours in the same posture, and inadequate rest breaks (Shikdar& Al-Kindi, 2007). "Dynamic office chairs" or chairs that allow movement of the chair seat and back support independently so by used the chair and maintained other ergonomic intervention significantly reduced low back pain, in this study.

CHAPTER-VI: CONCLUSION& RECOMMENDATIONS

6.1 Conclusion

This study was done to explore the prevalence of LBP among the persons using ergonomically corrected workstation setting facility. The study found that office ergonomic intervention reduced LBP and improved body posture among office workers and the results will benefit the office employee and office employer because it demonstratespositive impact on the safety and health of the office workers after using ergonomic workstation. Office management can actively participate in both training and investing in adjustable equipments for office workers. As they had followed it punctually so their pain had reduced remarkably.

6.2 Recommendations

The practical implications of this and future research could aid practitioners in their attempts to more effectively implement office ergonomic programs and behavior-based safety processes. So, organizations should adopt behavioral technology to enhance and support their ergonomic programs. It is important to recognize that ergonomic interventions provide the opportunity for employees to work safely, and thus they should not be replaced by behavioral interventions. Rather, behavioral interventions should be used to ensure that tools and equipment are used correctly. Just as, or even more, importantly, however, is that safety improvements, even those that workstation changes, may not persist in the absence of behavioral supports. Thus, once again, the importance of imbedding behavioral supports within a system or safety culture in organizations in order to achieve real and lasting safety benefits.To generalize the result of the research it is also recommended that more subjectsand more organizations should be chosen for the furtherstudy which will make itmore valid and reliable.

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Appendix

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

তারিখঃ ২২.০৫.২০১৩

প্রতি
কান্ট্রি ডাইরেক্টর
ইন্টারটেক বাংলাদেশ লিঃ
হোসনে টাওয়ার (৭ম ফ্লোর)
ঢাকা।

বিষয় ঃ রিসার্চ প্রজেক্ট (dissertation) এর জন্য আপনার প্রতিষ্ঠান সফর ও তথ্য সংগ্রহ 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 ফিজিওথেরাপী 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 ফিজিওথেরাপী কোর্সের ছাত্রী আয়শা আক্তার রুমি তার রিসার্চ সংক্রান্ত কাজের তথ্য সংগ্রহের জন্য আপনার সুবিধামত সময়ে আপনার প্রতিষ্ঠানে সফর করতে আগ্রহী। তার রিসার্চ শিরোনাম "Prevalence of low back pain among the persons using ergonomically corrected work station setting facility."

তাই তাকে আপনার প্রতিষ্ঠান সফর এবং প্রয়োজনীয় তথ্য প্রদান সহ সার্বিক সহযোগীতা প্রদানের জন্য অনুরোধ করছি।

ধন্যবাদান্তে

মোঃ ওবায়দুল হক
সহযোগী অধ্যাপক ও বিভাগীয় প্রধান
ফিজিওথেরাপী বিভাগ
বিএইচপিআই।

Ok Permitted

Ronald Biswas
Director
Intertek Bangladesh Limited
Husney Tower (7th Floor)
3/A, Kazi Nazrul Islam Avenue
Dhaka-1215

VERBAL CONSENT FORM

(Please read out to the participant)

Assalamualaikum, my name is Aisha AktarRumi,I am conducting this study for partial fulfillment of Bachelor of Science in Physiotherapy degree, titled **"prevalence of LBP among the person using Ergonomically corrected workstation settings facility"** from Bangladesh Health Professions Institute (BHPI) under medicine faculty of University of Dhaka.

The aim of this study is to find out the prevalence of LBP among the person using Ergonomically corrected workstation settings facility. The objectives of this study is to establish the prevalence of LBP, the exposure group in relation to socio-demographic factor, poor posture, long working hour, inappropriate working station which causes LBP, the presenting complaints and identify the necessity of Ergonomically corrected workstation settings and physiotherapy treatment towards office workers /person.

I would like to inform you that this is a purely academic study and will not be used for any other purpose. The participation must be voluntary. You have the right to withdraw consent and discontinue participation at any time. You might be benefited or not, but in future may benefit and would not harmful. I am assuring you to give accurate information ensure confidentiality and will not personally identify this research. This project is only for the development of the profession. If you have any query about the study or you right as a participant, you may contact with meand/or Muhammad MillatHossain, Lecturer, BHPI, CRP, Savar, Dhaka-1343.

I (participant) have read and understand the contents of the form.I agree to participant in the research without any force.

Do you have any questions before I start?

So may I have your consent to proceed with the interview?

YES ☐ NO ☐

Signature of the participant _____ Date:

Questionnaire form

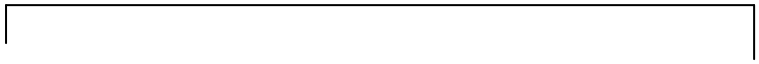
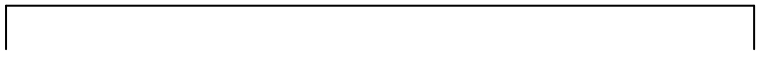
Title: Prevalence of low back pain among the persons using Ergonomically corrected workstation setting facility

Data collection instrument: Questionnaire

Part-1: Patient's Identification	
1.1	Identification Number:
1.2	Name of respondents:
1.3	Address:
1.4	Occupation or job title:
1.5	Consent Taken: Yes No
1.6	Date of interview:
1.7	Diagnosed condition (if present):

Part 2: sample related question

QN	Questions and filters	Response	Code
2.1	Age (in year)	…… Years	
2.2	Sex	Male.....	01
		Female……	02
2.3	What is your marital status?	Married……	01
		Unmarried……	02
		Divorced……..……	03
		Separated……..……..……	04
		Widow……..……	05
		Widower……..	06
2.4	What is your educational status?	Completed secondary education...	01
		Higher secondary ……	02
		Bachelor …….....	03
		Masters…….....	04
		Other (Specify): …….	05
2.5	Are you smoker?	Yes……..	01
		No……...	02
2.6	If yes, then which forms describe you better?	Occasional……...	01
		Regular……	02
		Heavy……..	03
2.7	Daily working hours	Below 8 hours……...	01
		Above 8 hours…….	02
2.8	Do you work in front of computer or a desk?	Yes…….…….	01
		No……..…….	02
2.9	Working posture-	Sitting…….……	01
		Standing……..……	02
		Walking……..……	03

2.10	Did you suffer low back pain before using Ergonomically corrected workstation setting facility?	Yes……..	01
		No……	02
2.11	If yes, what was the status of pain on VAS Scale  0 10 (No)(Worse)		
	1-3(Mild pain)……		01
	4-6(Moderate pain)…….		02
	7-10(severe pain)……		03
2.12	At that time , Work off because of complaint of low back pain	Yes ……	01
		No……..	02
2.13	If yes, how many days	1-3days……	01
		<1week…….	02
		>1 week…….....	03
		< 1month……	04
2.14	Still present the back pain?	Yes……	01
		No…….	02
2.15	If yes, then when do you notice the back pain?	During work……..	01
		After work……	02
		During rest……	03
2.16	How severe is your pain on VAS Scale  0 10 (No)(Worse)		
	1-3(Mild pain)……		01
	4-6(Moderate pain)…….....		02
	7-10(severe pain)……..		03

2.17	Taken any treatment for this pain -	Yes……..……	01
		No……..….....	02
		Not applicable……...…….	03
2.18	If yes, then what kind of treatment do you receive?	Physiotherapy……..……..…….	01
		Medication……...……..	02
		Surgery……..…….	03
		Others……..…....	04
		Not applicable……..…..	05
2.19	How long do you use the Ergonomically corrected workstation settings facility?	<6 months …….	01
		>6 month but <1 year……	02
		>1 year……	03
2.20	How do you explain your work performance after using Ergonomically corrected workstation setting facility?	Improved……	01
		Deteriorated.…….	02
		Unchanged ……	03

****