DIET AND NUTRITIONAL STATUS OF THE ADULT WITH THE SYMPTOMS OF SPINAL PAIN ATTENDING IN SELECTED HOSPITAL

Master of Philosophy (MPhil) in Community Nutrition
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Registration: 304
Session: 2011 – 2012

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DECLARATION

I do, hereby humbly declare that the thesis work entitled **'Diet And Nutritional Status Of The Adult With The Symptoms Of Spinal Pain Attending In Selected Hospital'**, a requirement for the degree of Master of Philosophy (MPhil) in Community Nutrition under Bangladesh Institute of Health Sciences, was carried out by me under the supervision of Prof. Dr. Md Asirul Hoque, Head of the Dept. of Community Nutrition, Bangladesh Institute Of Health Sciences (BIHS).

No part of the work has been submitted elsewhere for any other purpose.

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CERTIFICATE

This is to certify that **S.M Belal** has completed his thesis work entitled **'Diet And Nutritional Status of The Adult With The Symptoms of Spinal Pain Attending In Selected Hospital'**inBangladesh Institute Of Health Sciences (BIHS), Dhaka, under my guidance and supervision as a partial fulfillment of the requirement for the degree of Master of Philosophy (MPhil) in Community Nutrition, Session: 2011 – 2012.

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The undersigned certify that they have carefully read, examined the student on this thesis and being satisfied, recommendedto Bangladesh Institute of Health Sciences (BIHS) for acceptance of this thesis entitled **'Diet And Nutritional Status of The Adult With The Symptoms of Spinal Pain Attending In Selected Hospital'** submitted by S. M Belal in partial fulfillment of the requirement for the degree of Master of Philosophy (MPhil) in Community Nutrition for of Session: 2011– 2012.

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Dedicated to My Parents

Content

LIST OF TABLES

ABBREVIATIONS

BADAS	Bangladesh Diabetic Somiti
BIRDEM	Bangladesh Institute of Research & Rehabilitation in Diabetes, Endocrine and Metabolic Disorders
BDT	Bangladeshi Taka
BMD	Bone Mineral Density
BMI	Body Mass Index
BUHS	Bangladesh university of health sciences
CI	Confidence Interval
CMD	Chronic Medical Disorder
CVD's	Cardiovascular Diseases
DALYs	Disability-adjusted life Years
DM	Diabetes Mellitus
FFQ	Food Frequency Questionnaire
GNI	Gross National Income
HbA1C	Glycated Hemoglobin
HC	Hip Circumference
ID	International Dollars
IDF	International Diabetes Federation
MDD	Major Depressive Disorder
MDE	Major Depressive Episode
NSAIDs	Non steroidal Anti-Inflammatory Drugs
NDs	Naturopathic doctors
PAL	Physical Activity Level
RDA	Recommended Dietary Allowances
SD	Standard Deviation
SEA	South East Asia
SPSS	Statistical package for the social sciences
TEE	Total Energy Expenditure
T2DM	Type2 Diabetes Mellitus
US	United States
VAS	Visual Analogue Scale
WB	World Bank
WC	Waist Circumference

WDD	Word Diabetes Day
WHR	Waist Hip Ratio
WHO	World Health Organization

ACKNOWLEDGEMENTS

ABSTRACT

Background: Spinal pain is an important health issue for adult resulting in functional limitations for many and increasing the risk of spinal pain in adulthood and aging. Whilst human studies suggest nutrition could influence spinal pain, this has not been investigated in adult. The objective of this exploratory cross sectional study was to evaluate associations between diet and adult spinal pain.

Methods: Cross- sectional study was conducted among Adults having spinal pain subjects from a Attending in Selected Hospital. This study surveyed the spinal pain (neck and back) and nutrition (specific nutrients, broad food groups, diet quality and dietary pattern) of 384 male and female adult at aged of (M±SD) 36.56±13.18 were studied. Face to face interview was done. 24 hour recall method and food frequency questionnaire was used for dietary assessment. Data were expressed as mean ± SD (standard deviation), median (range) and/or percentage (%) as appropriate. Chi square was performed as $p< 0.05$ level of significance SPSS software (version #18) was used for statistical analysis.

Results: Most of the respondents came from upper middle income families. The majority of the study subjects were bear normal nutritional status. More than half of the adults were live with moderate pain. Most of the respondents fulfill their daily energy requirement. A large number of the respondents were unsuccessful to meet Protein according to RDA. Calcium intake was satisfactory. All respondent trends to avoid of took Riboflavin and vitamin B_{12} rich foods for their daily need. Vitamin B_6 and foliate intake was adequate level. This study shows that less intake of calcium and Vitamin B_{12} groups are more suffering from spinal pain and significant association was found between spinal pain and dietary calcium and Vitamin B_{12} intake ($p=<0.0001$). No association was found between spinal pain and Vitamin D intake.

Conclusions: The findings of this study suggest that certain aspects of diet may have an association with spinal pain in adult.

1. Introduction

1.1. Background

Pain felt in the neck, back and thorax that usually originates from the muscles, nerves, bones, joints or other structures in the spine is called spinal pain. In Bangladesh 20.1% general people are sufferer from low back pain[1].

Spinal pain is a serious problem for adolescents, with over half having experienced some form of back or neck pain by mid adolescence[2, 3] and a third experiencing a reduction in function[4]. Adolescent spinal pain also appears to be a precursor to adult spinal pain[5-7], which has well-documented personal and societal costs[8].

However, another potentially important lifestyle factor, nutrition, has only been sparingly investigated. In the only studies to our knowledge concerning adolescent spinal pain and nutrition, Ghandour et al.[9] reported that back pain was related to high caffeine intake in adolescent girls, and Molcho et al.[10] documented that adolescents who reported going to bed hungry because there was insufficient food in the house were more likely to have back pain, even after adjustment for parental social class. Despite the dearth of information, it is likely that nutrition is an important factor relating to musculoskeletal health for adolescents, as healthy growth and development is nutrition dependent[11, 12]. Furthermore, a possible link in adolescents is suggested by some adult evidence. Certain dietary patterns have been shown to reduce general pain sensitivity in adults, specifically greater intakes of sucrose and omega 3 fatty acids[13], and lower intakes of saturated fats [13].

Spinal column pain is one of the most common pains of human beings and is a prevalent musculoskeletal problem. It is one of enormous social, psychological, and economic burden also[1]. Most people have experienced this type of pain at least once during their life. So, it can be considered as a part of normal life. Spinal pain afflicts all ages, from adolescents to the elderly, and is a major cause of disability in the adult working population. Risk factors for developing spine pain are multidimensional; physical attributes, socioeconomic status, nutritional status, general medical health and psychological state, and occupational environmental factors all contribute to the risk for experiencing pain[1]. About 19 in 20 cases of sudden-onset (acute) low back pain are classed as nonspecific. This is the type of back pain that most people will have at some point in their life.

Conversely higher intakes of omega 3 fatty acids[14] are linked to lower levels of such factors, and it has been suggested that fruit and vegetables may reduce Inflammatory Processes through an anti oxidant effect[15]. Although such influences on inflammation are likely to be short-term in themselves, effects are likely to be continuous, as food intake is repeated.

An adequate supply of vitamin D is important to maximise bone mineral gains during puberty, as up to 50% of the total adult bone mass is accrued at this age of life[16]. Vitamin D plays an integral role in bone mineralisation by promoting calcium absorption in the small intestine, and aids in maximising skeletal health from birth to death[17]. Dietary intake of vitamin D has been associated with significantly reduced risk of chronic diseases, such as osteoporosis, CVD, diabetes and some cancers[18].

Vitamins of the B group are known for their established therapeutical role in neurologic diseases related to a deficiency of these essential nutritional factors. Besides that, therapeutical benefits of B-vitamins given in high dose, and in particular vitamin B_{12}, in painful disorders of spinal nerve roots in the absence of typical signs of a nutritional deficiency have already been demonstrated. From a clinical standpoint, several studies have documented the positive influence of Bvitamins of painful symptoms due to degenerative disorders of the lumbar spine, and have indicated that less nonsteroidal anti-inflammatory drugs (NSAIDs) are needed for pain relief when combined with B-vitamins1[9,20]. Further investigations conformed the efficacy of Vitamin B_{12} in the treatment of peripheral neuropathy[21].

1.2. Rationale of the study:

Different studies show that spinal pain is also responsible for dietary pattern of individuals. Altogether these findings suggest that there may be links between spinal pain and nutrition in adults. But in Bangladesh this kind of study has not done yet regarding nutritional factors and spinal pain in adults. Given the lack of prior research in this area, our study aims to be exploratory in nature, and to investigate the links between a range of nutritional and dietary factors and adult spinal pain. Based on the limited prior evidence, the objective was that adult with spinal pain will have a poorer quality diet and dietary pattern.

1.3 Conceptual Framework:

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┌─────────────────────────────┐
│ Socio-demographic variables │
│                             │
│   (Age, Sex, Marital Status,│
│ Education, Occupation, Family│
│ Income, Religion)           │
└─────────────────────────────┘

┌─────────────────────────────┐
│ Nutritional status          │
│                             │
│ (BMI, WC, HC) etc..)        │
└─────────────────────────────┘
                                      ┌──────────────────┐
┌─────────────────────────────┐       │ Spinal Pain      │
│ Dietary intake              │  ───► │                  │
│                             │       │ (back & neck pain)│
│ (FFQ, Food groups& diet     │       └──────────────────┘
│ quality)                    │
└─────────────────────────────┘

┌─────────────────────────────┐
│ Lifestyle Factors           │
│                             │
│ (Smoking, PA))              │
└─────────────────────────────┘

┌─────────────────────────────┐
│ Degenerative change (X-     │
│ ray)                        │
└─────────────────────────────┘
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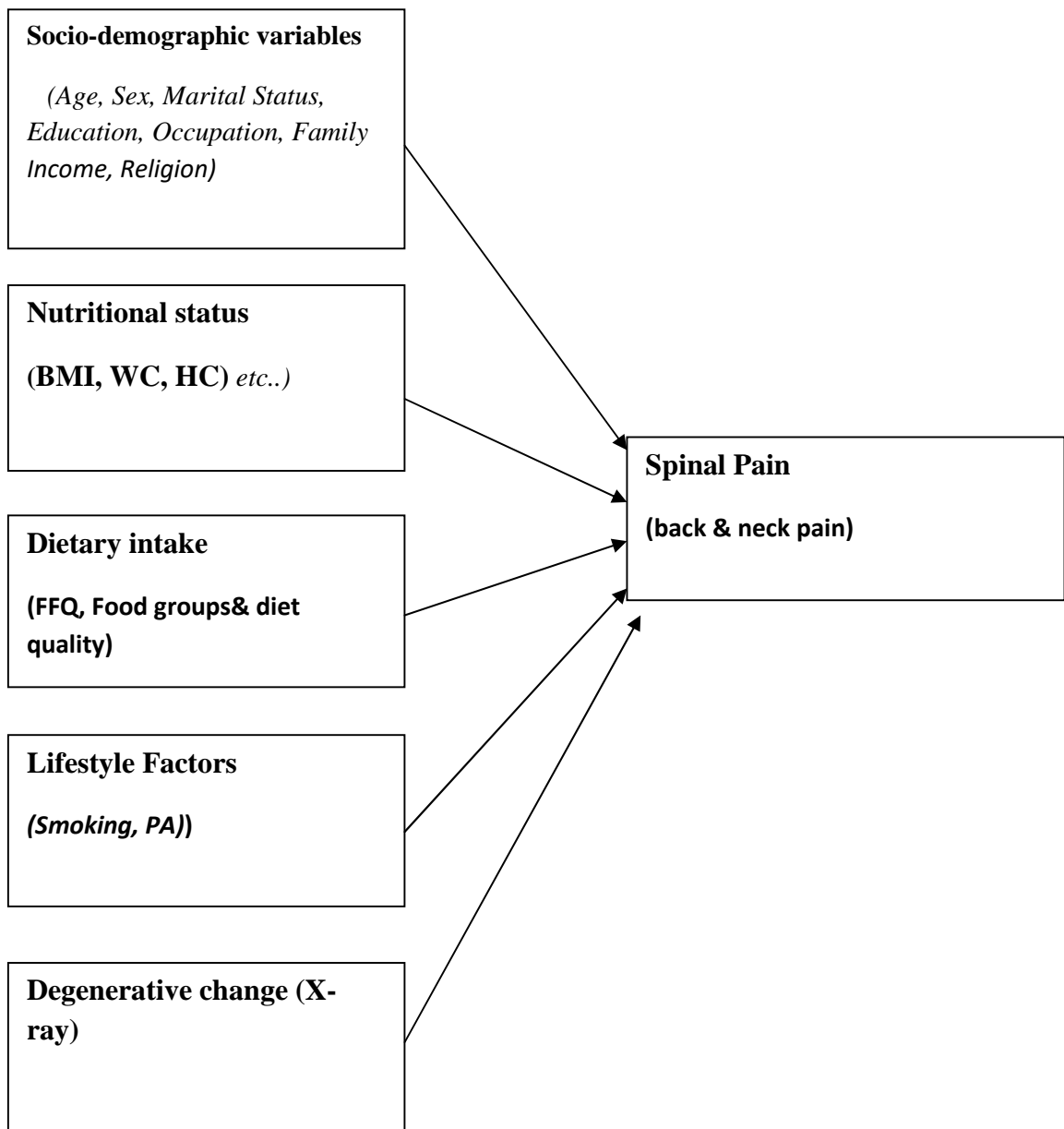
1.4 Operational Definition:

1. **Spinal pain:** Pain at different region of spine specially lower back, thorax and neck region and suffering from more than 3 months

2. **Diet:** Diet is the sum of food consumed by a person or other organism.

3. **Nutritional status:** nutritional status the condition of the body in those respects influenced by the diet; the levels of nutrients in the body and the ability of those levels to maintain normal metabolic integrity.

4. **Adult:** Age between 18 to 70 years

2.Objectives:

2.1 Research Question:

What is the relation between nutritional status and spinal pain among adults?

2.2 General objective:

To evaluate association between diet and spinal pain among adult population

2.3Specific objective:

1. To determine the socio-demographic pattern of the respondents

2. To determine the spinal pain pattern of the respondents

3. To determine the dietary pattern of the respondents

4. To evaluate the association between diet and spinal pain of the respondents

3 LITERATURE REVIEW

Different Types of Back Pain

The beginning of a back pain issue is usually unforeseen and can be sudden or worsen over a period of time. Knowing the type of pain you are experiencing can go a long way in getting the right treatment. The pain can be classified according to the area the pain is radiating from and the intensity of the pain.

3.1 Upper and middle back pain

Upper back pain is caused by injury to the tendons and ligaments that have been overworked either during an accident or in daily activities. The wear and tear could result in severe upper back pain. There are also lifestyle causes to this type of back pain like poor posture and obesity. The posture can eventually cause pain to the neck, arms and the upper back.

Some activities can cause the muscles to contract and increase the pain as a result. A simple pain killer can get rid of the pain but if the pain progresses, visit a chiropractor or a physician who will recommend the best treatment. Most of the time the doctor will recommend adjusting your posture and therapy to help release the muscle tension.

3.2 Lower back pain

This is mostly as a direct result of injury or trauma, heavy lifting or increased tension at the lower back. The tension can cause back pains and in some cases even muscle spasms. The tension can be relived through therapy and exercise to strengthen the back and weakened abdominal walls.

3.3 Neck pain

This is pain extending from the base of your skill to the shoulders and arms. In some cases, it can include the upper back. This pain causes stiffness and headaches in some cases. It develops in people over 50 as a result of strained neck muscles but sleeping in a bad position or sitting in front of your computer for long hours is also likely to cause the same effect.

3.4 Sciatica (buttocks and legs)

It is as a result of compression to the sciatic nerve. It is the longest nerve in the body running from the pelvic base all the way to the legs and ending at the feet. Irritation to this nerve can cause pain radiating from your lower back and is also felt in your legs.

The most common cause is a ruptured disc in your vertebrae. It will most likely pass without extensive treatment but in prolonged cases; your physical therapist will recommend selected exercise for you to help in easing the pain.

3.5 Chronic and acute back pains

All of the above pains can occur in different measures but they can all be chronic or acute. This is determined by the period they have occurred. Acute pain is short term and is usually less severe while chronic pain has prolonged over a period of time.

If you experience any of the symptoms below, it is important to visit a doctor immediately as they could indicate increased severity.

- A high temperature 100°F and above
- Constant back pain even after resting
- Pain radiating to your chest and upper back
- If you have or have had cancer
- Loss of bowel, bladder control or ability to pass urine
- Pain below your knees and down your legs
- Recent back injury

3.6 Common Types of Back Pain to Be Aware

If you've ever woken up with back pain for no apparent reason or tweaked your back after a long day of gardening or picking up your kid the wrong way, you know how unexpectedly debilitating even a short-term backache can be.

Back pain is incredibly common: About 80 percent of adults experience low back pain at some point, according to the National Institute of Neurological Disorders and Stroke. In a large survey, more than a quarter of adults reported experiencing low back pain during the past three months. Back pain is the most common cause of job-related disability and a leading reason for skipping work.

Sometimes figuring out the cause of your back pain is obvious: After 12 hours of packing and moving heavy boxes from one house to another, your back is likely to throb. But sometimes, especially when back pain is chronic, discovering the cause of your back pain can be more of a fishing expedition.

Your spine is a column of bones held together by muscles, tendons, and ligaments. A problem in any part of the spine can cause back pain. Some back pains might be mild and just create an annoyance, but others can cause excruciating pain.

Usually, patients notice back pain after overexertion, heavy or improper lifting, sudden movements, or falling. (Here's the safe way to lift heavy objects.) Back pain can also be caused by more subtle triggers, like getting your period or your sleeping position.

The nine most common types of back pain:

1. **Bulging or slipped disc**. One of the soft discs between the vertebrae extends out over the edge.

2. **Pinched nerve**. The nerve is pressed right up against the bone.

3. **Arthritis**. The discs in your spine have lost their ability to absorb shock, so the bones rub together and create bone spurs.

4. **Osteoporosis**. Brittle, weak bones may break or collapse and create compression fractures.

5. **Referred pain**. Intense pain in another part of the body creates pain in the low back or groin. This is a common symptom of kidney stones, for example.

6. **Sciatica**. The sciatic nerve—which starts in the lower back and runs down the back of each leg—becomes pinched and creates lower back pain and a sharp pain in one or both legs, especially when sitting.

7. **Pregnancy**. This one is a little self-explanatory: Carrying all that extra weight in the front can put a lot of strain on the back.

8. **Fibromyalgia**. This chronic pain condition creates discomfort not only in the back but all throughout the body.

9. **Cancer**. Patients may experience back pain if they have cancer of the spine or in nearby organs.

3.7 Neck pain

There is general agreement that the frequency of neck pain in various populations isquite high and this symptom greatly affects the person's quality of life and need forhealth care [22]. Neck problems also account fora large proportion of occupational illness and disability and place a heavy load on thecompensation insurance systems).The prospective studies onprevalence of neck pain are not entirely comparable because of differences in

theirdesigns.The epidemiology of neck pain is important for several reasons. More knowledge about the size and extent of this problem would facilitate accurate predictions of theneed for physiotherapy direct resources. Moreover, the prevalence of neck pain in thebank workers is essential for determining the relation between age and occupation). Neck pain is common among adults in developed countriesand contributes importantly to the demand for medical services and the economicburden of absence from work due to sickness. Population based studies suggest alifetime prevalence of over 70% and a point prevalence of between 12% and 34%[23,24].Neck pain, although felt in the neck, can be caused by numerous other spinalproblems. Neck pain may arise due to muscular tightness in both the neck and upperback and pinching of the nerves emanating from the cervical vertebrae. Jointdisruption in the neck creates pain, as a joint disruption in the upper back (Wikipedia).Neck pain causes considerable personal discomfort due to pain, disability, andimpaired quality of life, and may affect work. The economic consequences of treatingdisabling neck pain are significant For people who spend a great deal of time using computers, neck pain is a commonproblem. There has been a great technological advance in computers along with anindustrial shift to a more service oriented economy.This has led tomore sedentary jobs as the downsizing of the number of employees is used tominimize losses in corporate profits and resulting increased demands in productivityfor those who remain with a company and an increase in sick leave resulting fromneck pain. This means more people use computers for work and recreation and wemust find better ways of coping with neck pain associated with extended use ofcomputers[22].

The computer helps a company minimize inefficiencies in the workplace byeliminating wasteful tasks as office workers no longer need to leave the desk toretrieve mail, copy or file documents. This streamlining and increase in productivitythrough elimination of inefficiencies related to specific tasks has some unfortunateconsequences for the worker; there is a reduction in the number of breaks availablefrom repetitive or static job tasks which help to restore health.

3.8 Type of neck pain

Neck pain includes general pain and stiffness in the neck region, which can includethe neck, shoulders, arms, hands, or head. The muscles can be sore and tense. Patientsoften report of mild to severe headaches. Most pain is due to the aging of the spine.As the spine ages, the discs can degenerate and herniated. The joints may becomearthritic, stenos is can occur (narrowing of the spinal canal), and instability maydevelop[25].There are three types or classifications of neck pain:Axial neck pain: Axial pain is Musculoskeletal, and is pure neck or soft tissue pain.

Whiplash or muscle strain is an example.Radiculopathy: Cervical radiculopathy refers to neck and arm pain due to nerve rootcompression. Symptoms include arm pain, numbness or weakness.Myelopathy: Myelopathy refers to pressure on the spinal cord, also referred to spinalcord compression. Symptoms include: neck pain with arm and/or leg weakness,numbness, or walking problems .

The types of neck pain can be Acute or Chronic. Acute pain occurs suddenly from aninjury or stress. Most of the time neck pain will resolve itself within 7-10 days withrest, ice, and over the counter pain relievers. For symptoms that persist longer than afew weeks, a thorough evaluation by a primary care physician is recommended. Thephysician will generally obtain x-rays and MRIs, and prescribe conservative therapy.Chronic pain is defined as neck pain lasting longer than three months. People whohave not found relief through conservative treatments, and suffer from chronic painmay benefit from pain management or surgical intervention[26].

3.9 Causes of neck pain

Neck pain can result from a variety of causes, ranging from overuse injuries andwhiplash to diseases such as rheumatoid arthritis and meningitis. Muscles strains-Overuse, such as too many hours hunched over a steering wheel, often triggers musclestrains. Neck muscles, particularly those in the back of your neck, become fatiguedand eventually strained. When you overuse your neck muscles repeatedly, chronicpain can develop. Even such minor things as reading in bed or gritting your teeth canstrain neck muscles. Worn joints-Just like all the other joints in your body, your neckjoints tend to experience wear and tear with age, which can cause osteoarthritis inyour neck. Nerve compression-A variety of problems in your neck's vertebrae canreduce the amount of space available for

nerves to branch out from the spinal cord.Examples include: Stiffened disks- As you age; the cushioning disks between yourvertebrae become dry and stiff, narrowing the spaces in your spinal column where thenerves exit. Herniated disks-This occurs when the inner gel-like material of a diskprotrudes through the disk's tougher outer covering. The protrusion can press onnerves exiting the spinal column, causing arm pain or weakness, or on the spinal corditself. Bone spurs. Arthritic joints in your neck can develop bony growths that maypress on nerves. Injuries-Rear-end collisions often result in whiplash injuries, whichoccur when the head is jerked forward and then backward, stretching the soft tissuesof the neck beyond their limits [26].

3.10 Risk factor of Neck pain

We can see some trends for those of us who are at risk and take some measures tohelp prevent neck pain or use as a guide for intervention. A total of 45.5% of thepopulation studied reported neck pain in the past 12 months, of which 18.1%complaint of continuous neck pain. A total of 64.3% of the patients reported that therewas a relation between their current job and the neck complaints. A total of 56.2%even mentioned that their complaints started during the current job. A total of 10.2%reported sick leave due to neck complaints. The work place and equipment wereadapted in 24% of the patients due to neck pain. Work time was changed due to thesame reason.

3.11 Spinal Pain

The spine is not something that usually comes to mind when one thinks about nutrition - but it should. Nutrition is important in having a healthy spine. Good nutrition also helps control pain and disability when we are suffering from many different types of spine conditions.

This guide will help you understand

what nutrition is

- how nutrition affects the spine
- how nutrition affects injury, inflammation, and pain
- how to use good nutrition to get ready for and recover from spine surgery

How you eat and exercise (or don't exercise) will make you more or less likely to have problems with your bones, joints, and connective tissue. This guide will help you learn how to use nutrition for healing after an injury. We will describe how you can make

simple changes to your diet and other lifestyle habits. These changes can be helpful if you have a painful spine condition. You will learn how to tell if you have given the changes enough time to work for you. You'll learn to know if it's time to move on to other health care solutions for your problem.

3.12 NUTRITION

What is nutrition?

Nutrients are the chemical elements that make up a food. Nutrients are the basics of what you eat that give your body what you need for "running the show", that is, for metabolism. Certain nutrients such as carbohydrates, fats, and proteins provide energy. Other substances such as water, electrolytes, minerals, and vitamins are needed for metabolic processes.Nutrition is all of the internal chemical changes that happen as a result of what we eat (or do not eat) each day. Good nutrition means that what we are swallowing is something that adds to our health. Once we have digested it, food has an important job to do in our body.Good nutrition is needed for tissue growth and repair. We get good nutrition by eating foods and taking supplements that contain all the proper and necessary ingredients. We also get good nutrition by being able to completely digest the things we swallow. Then we must be able to absorb the nutrients into the blood and other body fluids. With the right nutrients given to the cells, *metabolism*, or the work of the body, can occur in the most efficient and healthy way By the definition above, we know that a lot of what we eat is not nutritional. When we eat a purple pill or swallow a blue-colored sports drink, what we are taking in has no job to do in our body. That purple or green coloring is not a chemical your body has any use for. The same is true for things like the preservatives added to your cereal. These chemicals are put in so that the cereal doesn't get moldy in the box. The same thing is true for traces of hormones and antibiotics left in our meat and dairy foods. When you eat French fries from a fast-food restaurant, the oil they have been cooked in has changed into a type of fat that can't be used by your body. In fact, it has become something called a *trans-fat*. Trans-fats damage the walls of your body's cells. This will make more work for your body.

3.13 METABOLISM

What is metabolism?

Metabolism refers to all of the physical and chemical changes that are taking place in your body every moment. Making energy in the body is part of metabolism. All the physical work that occurs inside your cells is part of this process, too. It includes all the work and chemical changes that happen every day in your bones, connective tissues,

body fluids, and organs.Metabolism refers to the work of changing the chemical energy in nutrients into mechanical energy or heat in your cells.

Metabolism involves two basic processes. There is *anabolism* (building up) and *catabolism* (disintegration or breaking down). During anabolism the body works to change simple chemicals from what you have eaten into complex parts, like blood, bone, or connective tissue. During catabolism, complex parts are broken into simpler pieces. One catabolic process is the breaking down of an apple you have chewed and swallowed. It is broken down into water, fiber, vitamins, and minerals. The end of catabolism is usually something being passed out of the body. We are healthy when both anabolismand catabolism are in proper balance.Our bodies have very good ways to know when food we eat is not useful and to get rid of it. But it takes up a lot of good nutrients to sort out what's good and what's not. Getting rid of damaging things you eat uses up energy in the cells, too.

3.14 NUTRACEUTICALS

If you have aches and pains, if your joints are inflamed, or if you are overweight, your diet may not have enough good nutrition to get all the necessary work done. That is why *nutraceuticals* have become so important.

Nutraceutical is a new word, invented by Dr. Stephen DeFelice in 1989. It is a combination of the words *nutritional*and *pharmaceutical*. Nutraceuticals are dietary supplements that are sometimes also called *functional foods*. Many people take nutraceuticals to offset an inadequate or unhealthy diet.

Even with a good diet of fruits and vegetables, whole grains, and the right amount and kind of protein, the standard American diet usually does not have enough nutrition for all the work your body needs to get done. We grow our fruits and vegetables with lots of fertilizers. Chemicals from the fertilizers remain on it when it's part of your meal. The same is true for pesticides and herbicides sprayed on the plants before harvest.We harvest fruits and vegetables when they are not quite ripe. Then they are trucked thousands of miles to our stores. Food that is not quite ripe when picked means it doesn't have its full nutritional value. Food harvested too early will not bruise as easily when it is loaded on and off trucks. It will look good when you buy it, but it won't have all the nutrition you need to get from eating it.

3.15 PROPER BALANCE

We face challenges our grandparents never knew. There are extra chemicals in our food and water. Our food supply just is not as nutrient-rich as we need it to be. A proper balance between protein and high fiber, starchy foods is important for good nutritional health.

It is important to understand that nutrients always work together. Nutraceuticals can help when you aren't able to eat a perfectly balanced diet. The same is true when you can't eat everything organic. Supplemental vitamins, minerals, amino acids, and fatty acids are the way to help yourself meet all the needs of your body. This includes growth and repair after injury. It's also true for the metabolic work needed to feel good, be strong, and live well.

Healthy fats are needed to grow and repair normal connective tissue, bones, and body fluids. The fiber and carbohydrates in whole grains and fresh produce are what your body is designed to thrive on. The fats found in olive oil, deep ocean fish (like salmon and sardines), and nuts and seeds are all part of good nutrition.

Organically raised beef, poultry, and wild ocean fish give the best protein. When you can't eat organically raised meats, you can decrease your exposure to damaging chemical residues. You can do this by removing all visible fat from the meat before you cook it. Specific problems can be related to not enough (or too much) of a single vitamin or mineral. But the proper function of the human body requires the right amounts of all the nutrients. You can think of it like a recipe. Your soup will taste good when all the ingredients are there in the right balance. Having too much of some of the spices, or not enough salt, will make a pot of otherwise really good food taste terrible. The same is true for the nutrient "soup" in your body. You need to have the right amounts in the correct proportions to have all your body systems work at their best. Every vitamin, mineral, amino acid, and fatty acid has hundreds of jobs to do. None of these nutrients can work well if it is not in the right relationship with all of the other nutrients.

3.16 NUTRITION AND THE SPINE

How does nutrition affect the spine?Nutrition will determine how strong your teeth, bones, and connective tissue are. We begin to build our skeleton and connective tissue before we are born. Our diet in childhood has a major effect on how strong we are as

adults. What you eat during your whole life will decide how able you are to repair bones, cartilage, ligaments, tendons, and muscles.Everyone has to replace body tissues due to normal every day wear and tear. Some of us also have repair work to do after injuries or surgery. The raw material for repair comes from our diet. Vitamin C, all of the B vitamins, vitamin D, vitamin K and the minerals calcium, magnesium, copper, zinc, boron and manganese are especially important for bone and connective tissue health. Drinking enough water is also essential.Your spine is your backbone. The bony pieces of the spine are called *vertebrae*. There are 33 of these bones. Between each vertebra is a disc made of tough cartilage with a fluid center. These discs provide the cushion that allows your backbone to bend and twist. Discs also act like shock absorbers as we walk, run, and jump. Each vertebral segment consists of bone next to bone with a cartilage cushion between. They are tied together with connective tissue, ligaments, and tendons. Related Document:

3.17A Patient's Guide to Lumbar Spine Anatomy

Degenerative disc disease is an example of damage to connective tissue that is affected by nutrition. Everyone is going to have a certain amount of damage to the spine. This occurs throughout a lifetime. The discs can flatten, and protrude from between the bones. In time, most people will have small tears in the outer layers of these discs. You are more likely to have injuries if you have poor nutrition. And you're less likely to have good healing.

Poor nutrition means not getting enough vitamins C, A, B_6 and E, as well as the minerals zinc and copper. Daily wear and tear plus injuries from work, sports, or accidents can damage your spinal discs. Good nutrition and adequate hydration (getting enough fluids) play a vital role in your bodyâ   s ability to repair the damage and recover from the inflammation that causes the pain of back injury.

Connective tissue, like the cartilage between your joints and the ligaments and tendons that hold them together is made mostly of collagen. Collagen is a type of protein and water. Strong collagen fibers require a steady supply of dietary protein. They also need vitamin C along with vitamins A, B_6, and E, and the minerals zinc and copper.

3.18 BUILDING BONE WITH GOOD NUTRITION

Joints are made and maintained, repaired, and protected with proper nutrition. Bone is made of minerals like calcium, phosphorus, magnesium, and boron. Bones also contain water and collagen. The upkeep and repair of bone and connective tissue requires the right amounts of vitamins and other nutrients working together.

Another diet and nutrition-related bone disease is called *osteoporosis*. Osteoporosis means the bones are weakened, brittle, and can break easily. Lifestyle and nutritional factors can lead to the bone loss of osteoporosis. This includes what you eat during bone-building stages in childhood and adolescence. Nutrition throughout the adult years is also important to maintain good bone density. Calcium intake is a major factor for building bone density. You will find yourself with weakened bones if you do not get enough calcium. The same is true if you do not absorb or properly metabolize the calcium you do eat. You can also lose too much calcium through the urine because of dietary choices. Other conditions like chronic mental or emotional stress that cause inflammation of the digestive tract can prevent calcium absorption. A lack of proper acidity in the digestive tract can also make calcium pass through unabsorbed.Vitamin D is essential for maintaining and regulating the health of bones and teeth along with many other functions in the body. It is a compound that is more of a hormone than a nutrient or vitamin and thus has an important role in regulating immune function and cell growth. Vitamin D is needed to absorb calcium from the gut. It prevents bone loss and helps rebuild new bone. Vitamin D is needed for the enzymes that strengthen collagen. Collagen is a major component of bone and connective tissue. Vitamin D has also been shown to aid in nerve and muscle (neuromuscular) function.

How can you get enough vitamin D to ensure good body and bone health? Sunlight will produce vitamin D in your skin. Exposure of the skin to sunlight for five to 30 minutes between 10 am and 3 pm (in most geographical locations) twice a week is usually enough to make your own Vitamin D. As you get older, your capacity to produce vitamin D from sunshine slows down.Diet may aid you but not with natural foods. Except for cod liver oil and some types of fish (salmon, tuna, mackerel, sardines), vitamin D is not found in what we eat. Only foods that have been fortified with vitamin D (e.g., milk, cereal, yogurt, orange juice) have any significant amounts of this vitamin.

A very low fat diet will make it harder for you to absorb vitamin D from your food. Lack of sunshine and limited consumption of foods fortified with Vitamin D may mean you need to take a nutritional Vitamin D supplement. Your physician will help you decide what kind and how much to take for your age, health, and risk factors. Vitamin D supplementation may be based on current levels of vitamin D in your blood.

You may be someone who does not rebuild bone as quickly as you lose it. Nutritional deficiencies can make this problem worse. Caffeine-containing drinks like coffee and colas will cause increased loss of calcium through the urine. Cola drinks with high levels of phosphorus also disrupt calcium metabolism and healthy bones.Magnesium is as essential as calcium for strong bones. As much as 50 per cent of your magnesium is found in your bones. Magnesium is required to move calcium into bone. Magnesium is also needed to make vitamin D active. A typical American diet contains much less than the recommended daily requirement for magnesium.Magnesium is lost through the urine. This happens when people are stressed. Studies have shown something as common as loud noise levels will increase the loss of magnesium. Alcohol and many drugs used for heart disease and high blood pressure also cause magnesium loss. Bone repair calls for amounts of magnesium usually much higher than the recommended daily allowance.L-lysine is an amino acid that you need to activate intestinal absorption of calcium. You will lose too much calcium through your kidneys if you do not have enough lysine. Lysine is an essential element for building the collagen framework. Minerals like calcium and magnesium weave into collagen to create bone.

You may need supplementation with these minerals, vitamins, and amino acids. This applies to you if you work indoors or don't get out in the sun much. You are also at risk if you are elderly, or are a sedentary person who drinks a lot of coffee or cola drinks. If you do not digest well, or if you eat a very low fat diet, it may be important to use a good quality supplement to protect your bones.Specific nutritional factors that will increase your risk of pain and inflammation are

- not enough omega 3 fatty acids from ocean fish
- not enough fruits and vegetables in the diet
- not enough vitamin D from sun exposure or fortified foods

- risk factors for vitamin D deficiency (e.g., older age, dark skin, use of sunscreen, obesity, kidney disease, liver disease, use of some medications, milk intolerant)
- not enough of the minerals potassium and magnesium
- not enough protein and high quality fat in the diet to control enzymes that produce inflammation
- too many sweets and starches in the diet, leading to weight gain and to excess insulin
- too many free radical ions from rancid and hydrogenated fats, low nutrient refined foods, chemical additives and residues

3.19 NUTRITION AND INFLAMMATION

Inflammation is most often thought of as the redness, warmth, swelling, and pain that occur with an injury. The body responds this way whether it's a surgical incision or a spider bite. Inflammation is also present in an infection like a strep throat or the achy, hot finger joints of rheumatoid arthritis.Wound healing and fighting infection are just some of the ways inflammation is activated. Inflammation is happening all the time in more or less obvious ways in your body. Medical science has begun to understand the connection between inflammation and most of the chronic degenerative diseases. Some of these diseases - like cancer, heart disease, or diabetes - develop quietly for many years before causing problems. We aren't even aware they are present. Pain isn't always a part of these diseases. People can be pain free even when a lot of tissue damage has occurred. Others conditions, like osteoarthritis, gall bladder disease, or degenerative disc disease, make their presence known. Pain with these conditions can range from mild to unbearable.

These conditions all have one thing in common. The tissues of the body parts involved are inflamed. The process of inflammation depends on a number of different chemical elements. These are called *inflammatory mediators*. Chemical mediators are released from certain kinds of white blood cells. These white blood cells are part of our immune system. First they travel to a target area. Then they cause a series of reactions that create the tissue changes we refer to as inflammation. At first this process is actually a repair response to some sort of injury or insult to the tissue. Later, the inflammatory process can become chronic and the cause of further injury.

3.20 INFLAMMATION AND BACK PAIN

Healthy repair depends on good nutrition. Poor nutrition can lead to damaging inflammation in the joints of your spine. Inflammation causes the loss of the cellular framework that holds bone and connective tissues together. Studies show that some people with osteoarthritis have more rapid damage to their joints. This is because they have more inflammatory chemistry in their bodies. Back pain may or may not be present in people with bone or cartilage changes in their spine. For instance many people have x-ray images that show they have flat and bulging discs. Or they may have brittle bones. Yet they have no pain. It is inflammation that causes the tissue changes that create the sensation of pain.

Inflammation stimulates the growth of new blood vessels in joint tissues. This growth process also causes new nerves to grow in areas around joint cartilage. Doctors think this new nerve growth may be why back pain goes along with inflammation. The increased tissue activity and the swelling that comes with inflammation can make the new nerves very sensitive. All of the steps in this inflammatory process (new blood vessel growth, new nerve growth) keep each other going in a never-ending cycle. Stopping inflammation will relieve pain and slow down joint damage.

3.21 BACK PAIN AND OBESITY

Abdominal obesity adds to spine problems in very important ways. Fat around your middle can cause strain on the muscles and ligaments that support your spine. The joints of your spine are especially vulnerable to daily wear and tear from lack of support. Most of us get fat by eating too much of the kind of starchy, refined foods that call up more insulin. Insulin will signal enzymes in your body. These enzymes increase levels of inflammatory cells. They also increase cholesterol and *constrict* (close down) blood vessels. All of these actions help increase the levels of pain you feel from all over your body. Abdominal fat is made of the type of cells most active at making the kind of chemistry that causes damaging inflammation to all of your joints. The more belly fat you have, the more inflammatory chemistry you are making. Some lean people are also at risk.

3.22 HOW DOES NUTRITION AFFECT HEALING AFTER INJURY OR SURGERY?

Good circulation is needed to build and repair a surgical incision, injured bone, or connective tissue like cartilage and ligaments. Your blood vessels carry all the raw materials needed to maintain proper strength and function of your bone and connective tissues. Your blood vessels also carry away from these body parts all the waste material from normal wear and tear as well as from injuries. A diet that has too much starch and sweets, and not enough protein and healthy fats, will cause blood vessels to constrict. Then there is less blood flow to the areas that are injured and need repair.All of the chemical reactions that make up the work of growth and repair require good nutrition. Herbs, fruits, and vegetables contain the dietary sources of antiinflammatory chemistry needed for tissue healing. Plant foods have antioxidants that decrease the chemistry that triggers inflammation. This type of plant is called a *flavonoid*. Flavonoids are plants that have biologic and metabolic properties in the body. They also strengthen the healing process. They do this by knitting collagen fibers into tightly woven connective tissue. The result is well-knitted skin and blood vessels; dense bone; and strong, elastic ligaments and tendons.What changes can you make to your diet and supplement choices if you have a spine condition? It can be confusing to try to sort out what supplements to take. It's not always easy to know what foods to eat or not eat to help with a spine-related problem. Different musculoskeletal conditions will have some different nutritional requirements. The form of each supplement will also be important, in terms of how useful it is for yourcondition.For example, powdered nutrients in capsules or liquid forms are much more likely to be fully digested and absorbed. Tablets are often less expensive. But they don't break down in many people's digestive tracts.Osteoporosis is an example of a spine-related condition with a clear link to nutritional status. Most people with osteoporosis will be advised to take at least a calcium/magnesium supplement. The best quality mineral supplements for osteoporosis are powdered and in the citrate form (for example, calcium citrate). Vitamin D should always be included in an osteoporosis formula.Inflammatory conditions benefit from antioxidant nutrients like vitamin E. It must be natural vitamin E, not synthetic. It should always have mixed *tocopherols* in order to be most effective. Any inflammatory condition can be improved with the

addition of at least five fish meals a week. A good, pure fish oil supplement taken daily can also help.Here are some changes you can make to improve your spine condition. Most people will notice results in less than two weeks by following these general rules

- Drink at least eight large glasses of water or herbal tea daily. Avoid fruit juices or other beverages with coloring and preservatives added. This includes soda pop.
- Eliminate simple sugars. Get rid of sweets and starchy, refined white flour foods from your diet.
- Avoid packaged foods with added preservatives and colorings
- Take a high quality multiple vitamin/mineral supplements three times daily with each meal
- If you have any form of arthritis or any inflammatory condition, take a pure fish oil supplement. Most people are helped by one to three grams of combined omega 3 fatty acids daily. Look for EPA and DHA on the label.
- Add vitamin D_3 to your supplements; make sure you are get 800 IU to 1000 IU daily. You may need more if you have a history of malabsorption (e.g., celiac disease, inflammatory bowel disease, cystic fibrosis, gastric bypass surgery)

Long-term dietary changes can benefit your spine condition. If you are overweight, ask a health professional to help you lose weight, especially abdominal fat. Most people can do this safely by

- eating fresh, raw, or steamed vegetables every day
- eating two or three pieces of fresh fruit every day
- eating five to seven fish meals a week
- eat three to six ounces of clean, lean beef, poultry, lamb, or game meat daily -- eggs are also an excellent source of protein for most people
- use olive oil on salads and for cooking daily
- Enjoy fresh nuts and seeds. Almonds, walnuts, and pumpkin seeds give us high quality, healthy fats

If you do not have a regular habit of exercise, invest in instruction with a professional who can teach you how to strengthen your muscles and protect your joints. Certain

exercises will be very good for some spine conditions, and possibly harmful for others. An exercise professional is your best choice for guidance to design a safe, effective program just for your needs.

3.23 HOW LONG DOES IT TAKE TO SEE RESULTS FROM THESE CHANGES?

Many people who change their diets see results right away. The difference in body pain levels can be noticed in a matter of days. Reducing inflammation by stopping the triggers that sweets and starches create can be felt very quickly. The effects of diet changes are even more when added to the supportive chemistry of antioxidants. Dietary supplements can encourage your healing even more dramatically.It can take some months of steady supplementation to rebuild your tissues after illness or injury. It depends on how deficient you are in certain nutrients. It may take three to six months for to experience the benefits of a specific supplement program. This time frame may vary based on your condition. Your doctor can advise you about this.For expert help to start a nutrition plan for your spine health, see a nutritionist or contact a licensed naturopathic physician. Specially trained nutritionists may be available in your area. Many registered dietitians and conventionally trained nutritionists are limited in their ability to give personalized attention to in-hospital patients. You may have to look for an independent practitioner with more advanced training. The ongoing support of a progressive nutritionist can help you start new, healthy habits that will become a permanent part of your daily life. Naturopathic doctors (NDs) are also available to help patients develop healthier nutritional habits for the spine. Naturopathic physicians practice the art and science of natural health care. They are trained at accredited medical colleges. Partnerships between medical doctors and naturopathic physicians are becoming more common all over the U.S.andCanada.

7 symptoms that indicate your body lacks calcium

Calcium deficiency is slowly becoming a pandemic due to poor nutritional choices. Find out whether you too are suffering from it.

Do you think drinking a glass of milk is enough to get your daily dose of calcium? But in reality, it is not. Although calcium plays a key role in the maintenance of strong and healthy bones, it also helps in blood clotting, early developmental growth

and muscle contraction and relaxation. This mineral can be easily obtained from natural food sources like leafy vegetables, yoghurt, nuts and cheese. But most Indians (particularly in the age group of 14-20 years) suffer from calcium deficiency due to lack of efficient absorption. Here are some signs and symptoms of calcium deficiency you need to be aware of.

Muscle cramps: Despite an adequate level of hemoglobin and sufficient water intake, if you suffer from recurring muscle cramps, you could have low calcium levels. Muscle cramps followed by muscle aches, especially in the thighs and calf muscles, is an early indication of low calcium levels. To load up your calcium intake, include these 5 calcium-rich vegetables in your diet without fail.

Lowered bone density: Calcium is required for mineralisation of bones to keep them strong as you grow old. Therefore, low calcium levels directly affect the bone density and increases susceptibility to osteoporosis and fractures.

Brittle nails: Like your bones, your nails also need calcium deposits for maintaining their integrity. Lack of adequate levels of calcium could make your nails extremely weak and susceptible to breaks. You can try these 9 kitchen ingredients to strengthen brittle nails.

Toothache: Around 99% calcium present in your body is stored in your bones and teeth. Naturally, if your calcium levels drop, you'll be susceptible to toothache and decay. Also, you'll be at a greater risk of suffering from periodontal disease. In children, calcium deficiency has been linked to delayed and defective teething.

Premenstrual cramps: Women suffering from calcium deficiency have to go through a lot of pain during their menstruation. The exact mechanism by which calcium could be relieving menstrual pain is not yet clear but its role in muscle contraction and relaxation seem to be crucial. Apart from pre-menstrual cramps, calcium deficiency is also linked to irregular menstruation and excessive bleeding in women. Calcium is also involved in normal development of the uterus and ovarian hormones in women.

Frequent illness: Calcium seems to play an important role in maintaining a healthy immune system as well. It has been observed that those deficient in calcium are

more likely to acquire common respiratory and intestinal infections. Deficiency of calcium reduces body's resistance against pathogen attack. Here are 5 amazing tips to improve your immunity.

Fatigue: Bone and muscle aches generally causes weakness in calcium deficient people. But low calcium levels are also linked to insomnia, fear and mental derangements that increase stress and fatigue. You may look pale and feel tired or lazy all the time. Fatigue is also a common symptom in women who develop calcium deficiency after childbirth. They are more likely to suffer from lack of breast milk, poor concentration and extreme tiredness. Therefore, it is advisable that pregnant women should get a regular supply of 1000-1200 mg calcium every day.

4. Subjects and Methods

4.1 Study design

A **Cross- sectional** study was conducted among Adults having spinal pain subjects from a Attending in Selected Hospital.

4.2 Place of the study

The study was conducted in Ashian Medical college Hospital Dhaka, BIHS Hospital Dhaka.

4.3 Study Subjects

All Adults having spinal pain subjects from a Attending in Selected Hospital.

4.3.1 Inclusion Criteria

- Patient of spinal pain (back & neck)
- Age range is >18years to 70 years

4.3.2 Exclusion Criteria

- Traumatic injury of spine
- Have systemic diseases

4.4 Study period

The study period was from April, 2014 to May, 2017. The study was started with protocol preparations and finished with final report submission.

4.5 Determination of sample size

This study was followed for calculating the sample size using this formula.

Sample size were adopted based on unknown prevalence (50%)

$$n = \frac{z^2 \times p \times q}{e^2}$$

Therefore the estimated sample size is *n =*

$$\frac{(1.96)^2 \times .5 \times .5}{(0.05)^2} = 385$$

So the study sample was collected 385

4.6 Sampling technique

Purposive sampling technique was used during data collection and hospital was also selected purposively.

4.7 Data collection technique

Selection of study area was done according to convenience of researcher. Institute authorized formal letter and protocol of the study were submitted to the institute authority. Some undergraduate medical students were recruited as interviewer. Overall idea of the study protocol, training and responsibility were disseminated to them before data collection. Before interview willingness to participate was sought and consent was taken from the subjects.

Face to face interview: Information related to socio-demographic characteristics, diabetes mellitus, behavioral characteristics, depression, diet and physical activity were recorded using face to face interview technique. Approximately each participant took 45 minutes to complete the interview session.

4.8 Data collection tools

- Weight machines were used to measure body weight.
- Measuring tapes were used to measure waist and hip circumference.
- Standiometer were used to measure body height.

4.9 Socio economic information

The socio-economic classification in this study was made according to 2006 Gross National Income (GNI) per capita per month and using the calculation of World Bank (WB)[27] (The groups were: low-income $75.41 or less (BDT 5360), lower middle-income $75.5 - $299.58 (BDT 5361-21270), upper middle-income $299.68 - $926.25 (BDT 21271-65761) and high-income $926.33 or more (BDT 65762).

4.10 Dietary Assessment:

The dietary energy intake of the study subjects was determined by a 24 hr recall method questionnaire and food intake pattern was measured by a specific food frequency questionnaire (FFQ) for 3 days.[28,29] The nutrient value of Bangladeshi food was calculated by using food composition data published by HKI.[30]

Anthropometric measurements and clinical examination:

4.11Anthropometric measurements

4.11.1 Height (m)

The standing height was measured with a standiometer with minimal cloths. A standiometer consist of a metric tape affixed to a vertical surface and a movable headpiece attached to the vertical surface that can be brought down to the crown of the head. The position of the eyes and ear lobes were horizontal, feet were together, knees straight and heels, buttocks and shoulder blades were in contact with vertical surface of standiometer. Arms were hanging freely at the sides with palm facing the thighs. The subjects were asked to inhale deeply and maintained a fully erect position. The headpieces were brought down until it touched the head; sufficient pressure was applied to compress the hair. Three measurements were taken three times and if the difference among reading was less than 1 cm, the mean measurement was taken and recorded to the nearest 0.1 cm. If the reading fell between two values, the lower reading was recorded.

4.11.2 Weight (kg)

The body weight was measured using a platform beam scale. The beam of the platform scale must be graduated so that it can be read from both sides; the calibration of the scale should also be done before taking the weight. The subjects stand still over the center of the platform with body weight evenly distributed between both feet with light indoor clothing. Weight was recorded to the nearest 0.1 kg.

4.8.3 Waist and hip

Waist and hip circumferences were measured to the nearest 0.5 cm with a soft non-elastic measuring tape. The tape was snug, but not so tight as to cause skin indentation or pinching. The waist circumference was taken to the nearest standing horizontal circumference between the lower border of the 12th rib and the highest point of the iliac crest on the mid-axillary line at the end of normal inspiration. The hip circumference was taken as the maximum standing horizontal circumference of the buttocks. Waist-to-hip ratio (W/H ratio) was calculated as the ratio of waist circumference divided by the hip circumference.

4.12 Physical activity

Physical activity level in the calculations make determining energy expenditure possible and achieving energy balance a more realistic goal. However, physical activity level is often difficult to measure and accurate assessment of energy expenditure not always possible. We used an easy way to calculate daily EERs for adults based on physical activity level. We use the EER equation of the DRI Committee and provide a spreadsheet template for the calculation of physical activity level. This technique accounts for all factors and measurements to determine physical activity level and energy expended from daily physical activity. It should prove a useful approach in research, clinical, and public health settings.

How the calculation works:

After the required data fields were entered, the template spreadsheet automatically calculates the BEE written as follows:

For men:

BEE = 293 3.8 × age (years) + 456.4 × height (meters) + 10.12 × weight (kg)

For women:

BEE = 247 2.67 × age (years) + 401.5 × height (meters) + 8.6 × weight (kg)

The next step were the automatic calculation of the impact of each reported physical activity on energy expenditure (PAL). This formula, set in the template, is as follows:

$$PAL = \frac{(METs - 1) \times [(1.15/0.9) \times Duration \ (minutes)]/ \ 1440)}{BEE/ \ [0.0175 \times 1440 \times weight \ (kg)]}$$

After the PAL were calculated for each physical activity, the physical activity category (PAL: sedentary, low active, active, or very active) were determined based on the basal activity impact on energy expenditure (a factor of 1.1) and the sum of all activities (sum of PAL). This factor accounts for TEF and post exercise increase in energy expenditure. The PAL were automatically calculated as PAL = 1.1 + sum of PALi, where PALi is the list of each reported activity impact on energy expenditure.

The PAL were automatically calculated from the sum of   PALi and used to determine the PA based on the following criteria:

For men:

Sedentary: PA = 1.0, when $1.0 < PAL < 1.4$

Low active: PA = 1.12, when $1.4 < PAL < 1.6$

Active: PA = 1.27, when $1.6 < PAL < 1.9$

Very active: PA = 1.54, when $1.9 < PAL < 2.5$

For women:

Sedentary: PA = 1.0, when $1.0 < PAL < 1.4$

Low active: PA = 1.14, when $1.4 < PAL < 1.6$

Active: PA = 1.27, when $1.6 < PAL < 1.9$

Very active: PA = 1.45, when $1.9 < PAL < 2.5$

The formula to determine the PA for men using the Microsoft Excel logic function is:

IF (PAL >=1.9, "1.54", IF (PAL>=1.6,"1.27", IF (PAL>=1.4,"1.12", IF (PAL>=1,"1"))

The formula to determine the PA for women using the Microsoft Excel logic function is:

IF (PAL >=1.9, "1.45", IF (PAL>=1.6,"1.27", IF (PAL>=1.4,"1.14", IF(PAL>=1,"1",)

After the template spreadsheet determines the PA, it is used to automatically calculate the TEE as:

For men:

TEE = $864 - 9.72 \times$ age (years) + PA $\times$ [(14.2 x weight (kg) + 503 $\times$ height (meters)]

For women:

TEE = $387 - 7.31 \times$ age (years) + PA $\times$ [(10.9 x weight (kg) + 660.7$\times$ height (meters)] [31]

4.13 Pain measurement

The visual analogue scale and graphic rating scale. The visual analogue scale (VAS) consists of a line, usually 100 mm long, whose ends are labeled as the extremes ('no pain' and 'pain as bad as it could be'); the rest of the line is blank.[32] The patient is asked to put a mark on the line indicating their pain intensity (at the present time, over the past week, or over the past 2 weeks, etc.). The distance between that mark and the origin is measured to obtain the patient's score. Sometimes descriptive terms, such as 'mild',

'moderate' and 'worst', or numbers are provided along the scale for guidance, as shown below, and the scale is then referred to as a graphic rating scale.[32, 33.]
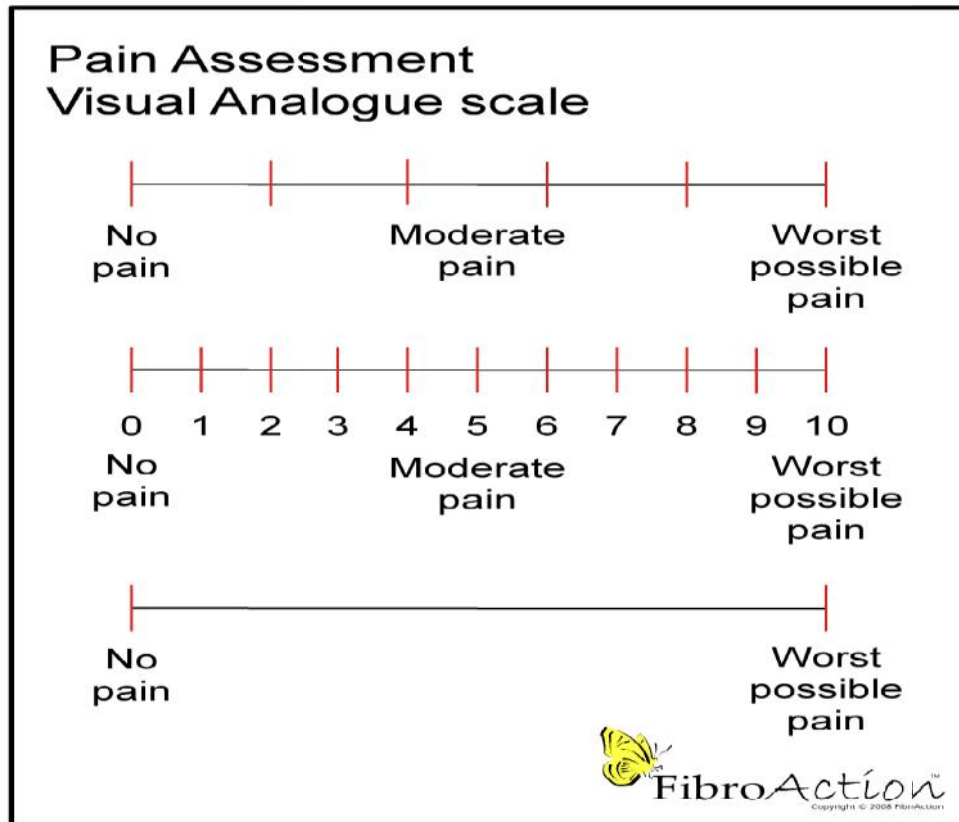
4.14 Checklists:

Checklists were used for anthropometric variables (height, weight, waist circumference and hip circumference). Checklists were prepared in English.

4.15 Data processing

Individual questionnaire were checked and cleaned to avoid any possible mistakes**.** During data processing time the information collected during data collection period were converted into other variables which would be more informative during analysis, whose calculation and classification are as follows:

4.16 Data analysis

Data were expressed as mean ± SD (standard deviation), median (range) and/or percentage (%) as appropriate. Chi square was performed as $p < 0.05$ level of significance. SPSS software (version #18) was used for statistical analysis.

4.17 Ethical consideration

Informed written consent was taken from all subjects after full explanation of the nature, purpose, and potential risks of all procedures used for the study. All ethical issues, which are related to the research concerning human subjects, were followed according to the guideline of BADAS Ethical Review Committee.

5. RESULTS

5.1 Socioeconomic characteristics of the study subjects (Table 1)

A total of 384 Adults having spinal pain aged of (M±SD) 36.56±13.18 were studied. Males were 70.4% while females were 29.6%. In terms of religion, 88.0% were Muslim and 12.0% were Hindu. About 54.3% respondents were non schooling, 22.2% were primary level, 19.3% were secondary level and 3.7% were educated up to graduation level.

Table showed that 47.1% respondents were in govt. job; private service 20.1% and 16.7% were unemployed. Most of the (70.3%) respondent was married. Maximum (85.9%) of the study subject were involved sitting work. The families of the respondents were arbitrarily classified into low income (up to taka 5360), upper middle income (5360-21270 taka) and high income (21271-65761 taka) group. About 81% of the family came from upper middle income families. The rest of 13% were high income group families.

Table 1: Socioeconomic characteristics of the study subjects (n=384)

Characteristics	Number (%)
Age (M±SD)	36.56±13.18
Gender	
Male	270 (70.4)
Female	114 (29.6)
Religion	
Muslim	338 (88.0)
Hindu	46 (12.0)
Education of the respondents	
No schooling	203(54.3)
Primary	83(22.2)
Secondary	73(19.3)
Secondary-Higher Secondary	0(0)
Up to Graduation	15(4.0)
Occupation of the respondents	
Service in govt	181 (47.1)
Service Private sector	77 (20.1)
self employment	4 (1)
Un employment	64 (16.7)
Retired	57 (14.8)
Student	1 (0.3)
Marital status	
Married	270 (70.3)
Single	112(29.2)
Un married	2(0.5)
Types of work	
Sitting	330 (85.9)
Standing	13(3.4)
Moving	41(10.7)
Monthly income(BDT)	
Lower income (< 5360)	23(6.0)
Upper middle income (5360-21270)	311(81.0)
High income (21271-65761)	50(13.0)

Results were expressed as number and percentage

5.2 Healthy practice of the respondents (Table 2)

Most of the (97.7%) them were took safe water and maximum respondents were received health facilities from different health center. Some of them (31%) were habituate are like smoking.

Table 2: Healthy practice of the respondents (n=384)

Characteristics	Number (%)
Safe water	
Yes	375(97.7)
No	9(2.3)
Health facility	
Yes	364(94.8)
No	20(5.2)
Smoking habits	
Yes	119 (31.0)
No	265(69.0)

Results were expressed as number and percentage

5.3 Health condition of the study subjects (Table 3)

About 36.5% of the study subjects were suffering from changing of bone degeneration. More than half of the respondents (56.5%) were sufferer from waist pain. Where, the causes of pain were Traumatic (41.9%), Systematic (39.6%) and Degenerative (16.4%). Respondents were suffering the pain from last one month (45.1%) and 33.1% were suffering for 2-5 months.

Table 3: Health condition of the study subjects (n=384)

Characteristics	Number (%)
Changing of bone degeneration	
Yes	140 (36.5)
No	244(63.5)
Site of pain	
Waist	217(56.5)
Neck	167(43.5)
Cause of pain	
Traumatic	161 (41.9)
Systematic	152 (39.6)
Degenerative	63 (16.4)
Others	8 (2.1)
Duration of pain	
1month	173 (45.1)
2-5months	127 (33.1)
6-11months	31 (8.1)
1year	23 (6.0)
2yrears	16 (4.2)
5yearrs	9 (2.3)

Results were expressed as number and percentage

5.4 Condition of spinal pain of the study subjects (Table 4)

More than half (58.2%) of the respondents were living with moderate pain, 25.3% were suffering worst pain and only 16.5% study subjects notice that they had no pain.

Table 4: Condition of spinal pain of the study subjects (n=384)

Condition of Pain	Number (%)
No pain	63 (16.5)
Moderate pain	223 (58.2)
worst positive pain	98 (25.3)

Results were expressed as number and percentage

5.5 Nutritional status among study population (Table-5)

This table revealed that BMI according to proposed for the Asian people, BMI was found 58.6% acceptable risk, 4.2% under weight, 28.6% increased risk and 8.3% were high risk group.

According to the Western cutoff value (WHO), BMI status was found 70.3% in normal level, 4.4% under weight, 23.7% overweight and 1.6% obese group.

By the calculation of mid upper arm circumference Most of the respondents (90.63%) were in normal range and only 9.37% were lean.

Table5: Nutritional status among study population (n=384)

Nutritional status	Number (%)
BMI (According to Asian People)	
Under Weight (<18.5)	17 (4.4)
Acceptable weight (18.5-23)	225 (58.6)
Increased Risk (>23-27.5)	110 (28.6)
High Risk (>27.5)	32 (8.3)
BMI (According to Western People)	
Under weight (<18.5)	17 (4.4)
Normal (18.5-24.9)	270 (70.3)
Overweight (25-29.9)	91 (23.7)
Obese (>=30)	6 (1.6)
Waist Circumference	
Underweight	36 (9.37%)
Normal	349 (90.63%)

Results were expressed as number and percentage

5.6 Physical activity level among the study subjects (Table-6)

Most of the cases (89.8%) physical activity level was moderate where as only 10.2% respondents physically activities were less than their required.

Table 6: Physical activity level among the study subjects (n=384)

Physical activity level	Number (%)
Low activity	39 (10.2%)
Moderate activity	345 (89.8%)

Results were expressed as number and percentage

5.7 Food security level by food access survey tool (FAST) (Table 7)

The food access survey tool for this cases shows that, Food secure was 61.4% while 38.3% were food insecure without hunger and only 1% were food insecure with hunger.

Table 7: Food security level by food access survey tool (FAST)

Classifications	Number (%)
Food secured	236 (61.4%)
Food insecured without hunger	147 (38.3%)
Food insecured with hunger	1 (0.3%)

Results were expressed as number and percentage

5.8 Dietary intake pattern compare with Recommended Dietary Allowance (RDA) according to ICMR guideline of study Subjects (table 8)

Most of the respondents (95.2%) fulfill their daily energy requirement and only 4.8% were not met their daily energy need. Most of the respondents (93.2%) failed to meet their Protein needs according to RDA. Calcium intake was satisfactory (96.3%). All respondent trends to avoid of took Riboflavin and vitamin B_{12} rich foods for their daily need. Vitamin B_6 and folate intake was adequate level.

Table 8: Dietary intake of the study subjects according to ICMR guideline

Food Groups	Number (%)
Energy	
Yes	366 (95.2%)
No	18 (4.8%)
Protein	
Yes	26 (6.8%)
No	358 (93.2%)
Fat	
Yes	110 (28.7%)
No	274 (71.3%)
Calcium	
Yes	370 (96.3%)
No	14 (3.7%)
Iron	
Yes	56 (14.6%)
No	328 (85.4%)
Retinol	
Yes	384 (100%)
Beta Carotenes	
Yes	105 (27.3%)
No	279 (72.7%)
Vitamin B$_1$	
Yes	161 (42.0%)
No	223 (58.0%)
Riboflavin	
Yes	0 (0%)
No	384 (100%)
Niacin	
Yea	376 (98.0%)
No	8 (2.0%)
Vitamin B$_6$	
Yes	384 (100%)
Vitamin C	
Yes	30 (7.9%)
No	354 (92.1%)
Folate	
Yes	384 (100%)
Vitamin B$_{12}$	
Yes	42 (10.94%)
No	342 (89.6%)
Magnesium	
Yes	363 (94.6%)
No	21 (5.4%)
Zinc	
Yes	329 (85.6%)
No	55 (14.4%)

Results were expressed as number and percentage

5.9 Weekly dietary intake pattern of the study subjects (Table 9)

Table 9 shows that, in carbohydrate group, majority (77.5%) of the study subjects were taking rice in 2-3times/day. In pulse and legume group, majority (54.9%) of the study subjects were taking lentil and in 1times/day. In protein group, majority (47.6%) of the study subjects were taking milk in 2-3times/week, whereas meat was taken 51.0% in 2-3times/week. In Fruits & Vegetables group majority (49.3%) of the study subjects were taking leafy-vegetables in 1time per day. In Fats & Oil group, majority of the study subjects never taken Ghee. In Snacks group, 27.3% were took singara 2-3times/week and 49.3% were took soft drinks 1time/week.

Table 9: Weekly dietary intake pattern of the study subjects (n=384)

Food items	2-3/day n (%)	1/day n (%)	2-3/week n (%)	1/week n (%)	Never n (%)
Cereals					
Rice	298 (77.5%)	86 (22.5%)	0 (0%)	0 (0%)	0 (0%)
Ruti	15 (3.9%)	76 (19.7%)	9 (2.3%)	46 (12.1%)	238(62.0%)
Parata	0 (0%)	208 (53.2%)	112 (29.3%)	48 (12.4%)	17 (4.5%)
Muri	0 (0%)	81 (21.1%)	180 (47.0%)	101 (26.2%)	22 (5.6%)
Pulse & Legumes					
Lentil	0 (0%)	211 (54.9%)	57 (14.9%)	64 (16.6%)	52 (13.5%)
Simibichir dal	0 (0%)	62 (16.1%)	217 (56.6%)	83(21.7%)	22 (5.6%)
Kheshari dal	4 (1.1%)	88 (22.8%)	96 (25.1%)	170 (44.2%)	26 (6.8%)
Motor dal	0 (0%)	70 (18.3%)	103 (26.8%)	178 (46.5%)	33 (8.5%)
Mascolai	0 (0%)	57 (14.9%)	105 (27.3%)	178 (46.5%)	43(11.3%)
Milk, Fish, Meat& Egg					
Milk	4 (1.1%)	49 (12.7%)	183 (47.6%)	98 (25.6%)	50 (13.0%)
Fish	4 (1.1%)	51 (13.2%)	148 (38.6%)	180 (47.0%)	0 (0%)
Meat	38 (9.9%)	0 (0%)	196 (51.0%)	146 (38.0%)	4 (1.1%)
Egg	13 (3.4%)	161(39.7%)	149 (42.0%)	57 (14.9%)	0 (0%)
Fruits & Vegetables					
Leafy-Vegetables	52 (13.5%)	190 (49.3%)	94 (24.5%)	49 (12.7%)	0 (0%)
Vegetables	35 (9.0%)	65 (17.2%)	96 (25.1%)	179 (46.5%)	9 (2.3%)
General –Fruits	0 (0%)	56 (14.7%)	96 (25.1%)	192 (50.0%)	40 (10.2%)
Deshi Fruits	60 (15.5%)	0 (0%)	94 (24.5%)	193 (50.4%)	37 (9.6%)

Table 9: Weekly dietary intake pattern of the study subjects (n=384)

Food items	2-3/day	1/day	2-3/week	1/week	Never
	n (%)	n (%)	n (%)	n (%)	n (%)
Fats & Oil					
Ghee	0 (0%)	53 (13.8%)	81 (21.1%)	83 (21.7%)	167 (43.4%)
Butter	0 (0%)	55 (14.3%)	81 (21.0%)	174 (45.4%)	74 (19.2%)
Snacks					
Singara	0 (0%)	58 (14.9%)	104 (27.3%)	67 (18.9%)	149 (38.9%)
Puri	0 (0%)	59 (15.5%)	95 (24.5%)	217 (56.6%)	13 (3.4%)
Noodles	0 (0%)	209 (54.6%)	109 (28.5%)	61 (15.8%)	5 (1.1%)
Biscuit	5 (1.1%)	56 (14.6%)	78 (20.3%)	128 (33.2%)	117 (30.7%)
Soft drinks	0 (0%)	8 (2.0%)	27 (7.0%)	189 (49.3%)	160 (41.7%)

Results were expressed as number and percentage

5.10 Dietary nutrient intake with spinal pain (table 10)

This table shows that lowest calcium and Vitamin B_{12} intake groups are more sufferer from spinal pain and significant association was found between spinal pain and dietary calcium and Vitamin B_{12} intake (p=<0.0001). No association was found between spinal pain and Vitamin D intake.

Table 10: Dietary nutrient intake with spinal pain

Nutrient intake met to RDA	Spinal Pain			Total	^{2}	P value
	No Pain	Moderate pain	Worst pain			
Calcium					89	<0.0001
Yes	58 (18.1%)	211(65.7%)	52 (16.2%)	321(100%)		
No	5 (7.9%)	12(19.0%)	46 (73.0%)	63 (100%)		
Vitamin D					0.150	0.928
Yes	28 (17.0%)	94 (57.0%)	43 (26.1%)	165 (100%)		
No	35 (16.4%)	129 (58.1%)	55 (25.5%)	35 (100%)		
Vitamin B_{12}					29.8	<0.0001
Yes	23 (37.1%)	35 (56.5%)	4 (6.5%)	62 (100%)		
No	40 (12.4%)	188 (58.4%)	94 (29.2%)	322 (100%)		

Results were expressed as number (%), 2 test was performed and P<0.05 was level of significance.

6. DISCUSSION

We have investigated the association between diet and spinal pain among adult population. This study substantiate that spinal pain is a big problem for adult. Most of the respondents came from upper middle income families. The majority of the study subjects were bear normal nutritional status. More than half of the adults were live with moderate pain. Most of the respondents fulfill their daily energy requirement. A large number of the respondents were unsuccessful to meet Protein according to RDA. Calcium intake was satisfactory. All respondent trends to avoid of took Riboflavin and vitamin B_{12} rich foods for their daily need. Vitamin B_6 and folate intake was adequate level.

In terms of associations between spinal pain and specific nutrients and food groups - vitamin B_{12}, egg, cereal and meat consumption were related to spinal pain. For females low egg consumption and high meat consumption were related to a reduced risk of back and neck pain respectively. A low intake of vitamin B_{12} was related to an increased risk of neck pain in females. In addition, the lack of consistency probably reflects the fact that any individual nutrient, in contrast to a dietary pattern, may usually only contribute minimally to any effects on spinal pain[34].

This study shows that low calcium and Vitamin B_{12} intake groups are more sufferer from spinal pain and significant association was found between spinal pain and dietary calcium and Vitamin B_{12} intake (p=<0.0001). No association was found between spinal pain and Vitamin D intake.In terms of associations between spinal pain and diet quality and dietary pattern, there were no significant univariate results. These results therefore do not support our second hypothesis that diet quality and dietary pattern are related to adolescent back pain[34]. Various studies of the clinical effects of Vitamin B_{12} on painful vertebral syndromes, indicating that this vitamin contribute to saving of NSAIDs by shortening the treatment time and reducing daily NSAID dosage, have been reported[35,36,37]. The benefits of Vitamin B_{12} and its congenershas also been demonstrated in metabolic polyneuropathies, such as alcoholic polyneuropathy[38]. The investigation showed a high prevalence of hypovitaminosis D (S-25OHD, 50 nmol/l) in the study subjects, 16% of whom were found to have vitamin D deficiency[39].

Hypovitaninosis D is a common risk factor for increased bone remodeling and low bone mass [40]. Subclinical vitamin D deficiency is considered to be a risk factor for osteoporosis and fractures[41].

Studies have indicated that the intake of calcium in Bangladeshi women is very low (300 mg/d) [37, 42]. Low calcium intake, coupled with long periods of elevated calcium requirements as well as high prevalence of vitamin D insufficiency and low peak bone mass could be the underlying causes of the present status of BMD in the subjects of that study[39]. Low peak bone mass could also lead to a high risk of osteoporosis in adult life.

Whilst our findings suggest that diet in adult may be related to spinal pain, the cross-sectional nature of the findings does not allow causality to be assumed. Further longitudinal studies should be undertaken to examine causality. If diet is shown to contribute to spinal pain, then the burden of adult spinal pain may be lessened by greater and more successful attempts to improve nutrition in adult. Furthermore, because adult spinal pain is a risk factor for spinal pain, improvements the diet may have beneficial effects into adulthood, reducing the overall burden of spinal pain on society.

7.1 CONCLUSIONS

Most of the respondents came from upper middle income families. The majority of the study subjects were bear normal nutritional status. More than half of the adults were live with moderate pain. Most of the respondents fulfill their daily energy requirement. A large number of the respondents were unsuccessful to meet Protein according to RDA. The findings of this exploratory study suggest that certain aspects of diet (Vitamin B_{12}, Calcium, eggs, cereals and meat) may have an association with spinal pain in adults.

These results provide important initial evidence that diet and adolescent spinal pain may be associated, but further work is needed to explore potential relationships and mechanisms.

7.2 RECOMMENDATIONS

- Prevention and early treatment of different level of spinal pain

- Spinal pain prevention and management training should be developed in physiotherapy center.

- Therefore more effort should be given towards the implementation of pain measuring, counseling & educational programs focused on effected people.

7.3 LIMITATIONS

- Chance error could have been reduced if more sample size was taken

- Some error may have done for the pain measurement

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Annexure - 1

QUESTIONNAIRE

Diet and Nutritional Status of the Adult with the Symptoms of Spinal Pain Attending in Selected Hospital

Informed Consent Paper

I am S. M. Belal student of MPhil in Community Nutrition (CN), Bangladesh University of Health Sciences under Faculty of Biological Science, University of Dhaka; wish to study on "**Diet and Nutritional Status of the Adult with the Symptoms of Spinal Pain Attending in Selected Hospital**". I hopefully expect necessary information from you to fulfill the questionnaire. I also like to assure you that, this data will be used for the study purpose and will be kept fully confidential. Therefore please feel free to response to the questions asked and help the research aimed for the save of suffering humanity. You will not be provided with any sort of travel or refreshment cost for participating in this study. You have to freedom to quit from this research work at any time.

Thank you for your kind co-operation.

……………………………….
…………………………...
Signature & Name of Respondents   Signature of interviewers

Date……………………

Name of Hospital ……………………………..

Contact no…………………………………

Annexure - 2

Diet and Nutritional Status of the Adult with the Symptoms of Spinal Pain Attending in Selected Hospital

ID No: ☐☐☐   **Date:** ☐☐☐☐☐☐

SECTION: A

(Personal and Socio-economic Characteristics)

Question	Coding category	Code No.
1. What is your name? ………………………………………………………		
2. How old are you?	In year	☐☐
4. Gender	0 = Male 1 = Female	☐
5. educational status	0 = Illiterate 1 = Non-formal education 1,2,3… = Completed year of education	☐☐
9. How many members do you have in your family?	Total family members	☐
10. Family income	……………….tk	☐
11. Marital Status	0=Married 1=Unmarried 3= Widow	☐
12. Residential area	0 = Urban 1 = Rural	☐
13. Occupation	0=Un Employed 1=Service in Private sector 2=Self Employed 3=Retired 4=Student 5=House Wife 6=Other (specify)	☐
14. Type of work	0= Sitting 1=Standing 2= Moving	☐
15. Smoking habit	0 = No 1 = Yes	☐
16. Degenerative change	0 = No 1 = Yes	☐

SECTION: B

Question	Coding category	Code No.
13. Physical Status of pain?	0 = Back pain 1 = Neck pain	
14. Cause of pain?	0 = Trauma 1 = Systemic disorder 2 = Degenerative 3 = Other	
17. Duration of Pain?	0 = 1 month 1 = 2 to 5 months 2 = 6 to 11 months 3 = 1 year 4 = 2 year 5 = 5 years 6 = Other	

SECTION: C

Nutritional Status

Question	Coding category	Code number
Height	……………….cm	
Weight	………………kg	
Waist Circumference	…………. …. cm	
Hip Circumference	……………….cm	

Section – E

Three days recall method for dietary history

Time	Food Item	Descriptions of foods	Unit (household measurement)	Weight (gm)
Breakfast Time:				

Time	Food Item	Descriptions of foods	Unit (household measurement)	Weight (gm)
Mid morning **Time:**				
Lunch **Time:**				
Afternoon snacks **Time:**				
Dinner **Time:**				
Bed time Time:				
Oil/ Month (Family)				

Food Frequency Questionnaire-

How often do you eat foods from each of the following categories (please put (√)

Food groups	Name of food	2-3 / day	1/day	2-3 /week	1 / week	never
Cereals	Rice					
	Ruti					
	Parata					
	Muri					
Milk, Fish,Meat &Egg	Milk					
	Fish					
	Meat					
	Egg					
Fruits &vegetables	Leafy vegetables					
	vegetables					
	General fruits					
	Deshi fruits					
Fats & Oil	ghee					
	butter					
	Soya bean					
Pulse& legumes	Lentil					
	Simibichir dal					
	Kheshari dal					
	Motor dal					
	Mascolai					
Snakes	Singara					
	Puri					
	Noodles					
	Biscuit					
	Soft drinks					

Ten Question Food Access Survey Tool (FAST) for Bangladesh

N0	QUESTION	RESPONSE	RESPONSE OPTIONS
1	How often did you eat three 'square meals' (full stomach meals) a day in the past 12 months (not a festival day)?		1. Mostly (3 meals each day) 2. Often (3 at least a few times each week) 3. Sometimes (3 per day 7-12 times this year) 4. Rarely (3 per day only 1-6 times this yr) 5. Never
2	In the last 12 months, how often did you or any of your family have to eat wheat (or another grain) although you wanted to eat rice (not including when you were sick)?		6. Never 7. Rarely (only 1-6 times this yr) 8. Sometimes (7-12 times this yr) 9. Often (a few times each month) 10. Mostly (most days/weeks)
3	In the last 12 months how often did *you yourself* skip <u>entire meals</u> due to scarcity of food?		11. Never 12. Rarely (only 1-6 times this yr) 13. Sometimes (7-12 times this yr) 14. Often (a few times each month) 15. Mostly (most days/weeks)

N0	QUESTION	RESPONSE	RESPONSE OPTIONS
4	In the past 12 months how often did *you* personally eat <u>less</u> food in a meal due to scarcity of food?		16. Never 17. Rarely (only 1-6 times this yr) 18. Sometimes (7-12 times this yr) 19. Often (a few times each month) 20. Mostly (most days/weeks)
5	In the past 12 months how often did food stored in your home run out and there was no money to buy more that day?		21. Never 22. Rarely (only 1-6 times this yr) 23. Sometimes (7-12 times this yr) 24. Often (a few times each month) 25. Mostly (most days/weeks)
6	In the past 12 months how often did you worry about where food would come from? (*Mathar bhitre koto chinta* from food or money worries).		26. Never 27. Rarely (only 1-6 times this yr) 28. Sometimes (7-12 times this yr) 29. Often (a few times each month) 30. Mostly (most days/weeks)
7	In the past 12 months, how often did your family purchase rice?		31. Never 32. Rarely (once every few months last year) 33. Sometimes (a few times each month) 34. Often (every week) 35. Mostly (every day)
8	In the past 12 months how often did <u>your family</u> take <u>food</u> (rice, lentils etc.) on credit (or loan) from a local shop?		36. Never 37. Rarely (only 1-6 times this yr) 38. Sometimes (7-12 times this yr) 39. Often (a few times each month) 40. Mostly (this happens a lot)
9	In the past 12 months how often did <u>your family</u> have to borrow food from relatives or neighbors to make a meal?		41. Never 42. Rarely (only 1-6 times this yr) 43. Sometimes (7-12 times this yr) 44. Often (a few times each month) 45. Mostly (this happens a lot)
10	Based on answers to the above questions, in the enumerator's opinion, this household should be classified as:		46. Food secure 47. Food insecure without hunger 48. Food insecure with hunger

Pain Measurement:

THE VISUAL ANALOGUE SCALE & GRAPHIC RATING SCALE
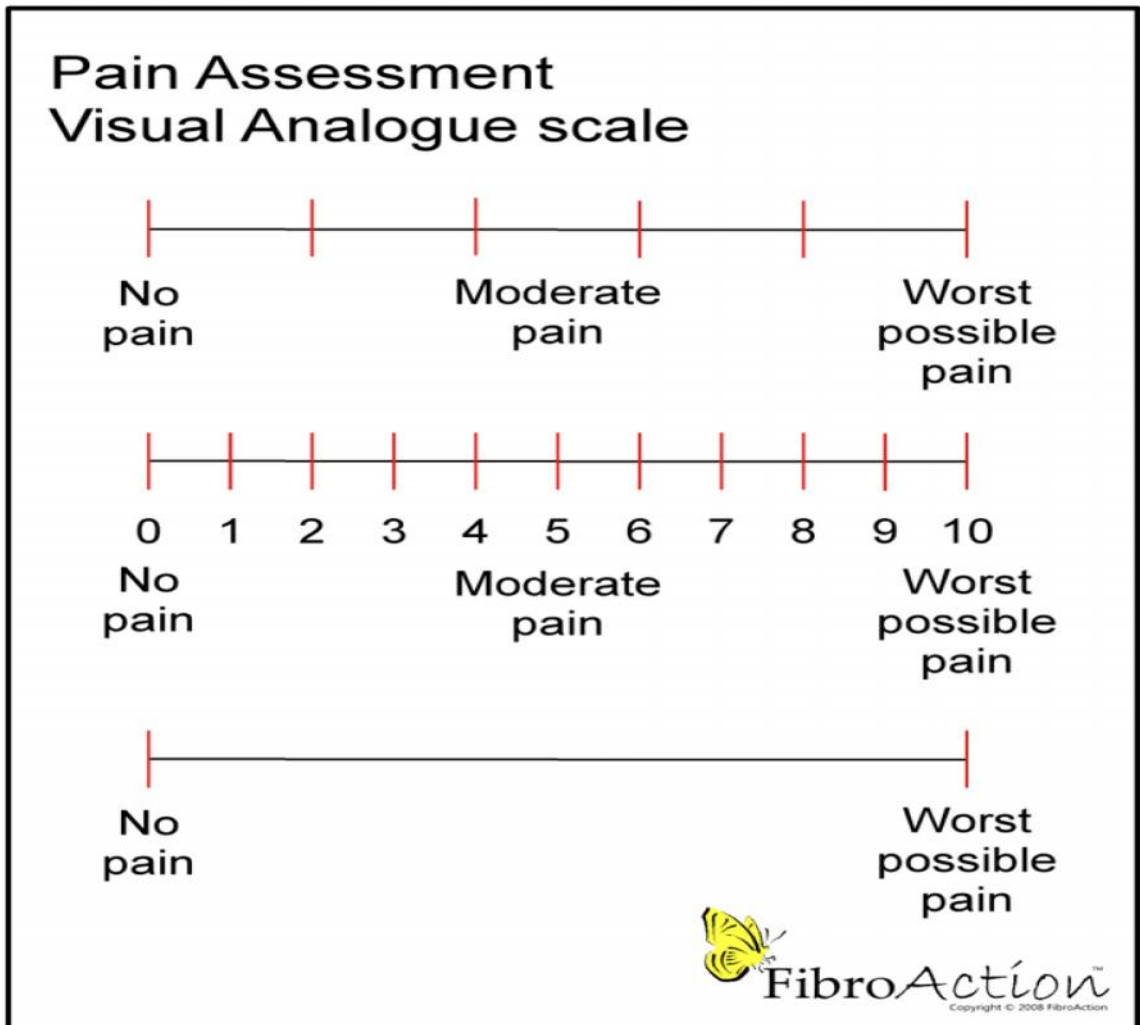
PHYSICAL ACTIVITY (IPAQ)

> **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder that normal.
> **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder that normal.

1a. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling,?
Think about *only* those physical activities that you did for at least 10 minutes at a time.

_____ days per week   **1b.** How much time in total did you usually spend on one of those days doing vigorous physical activities*?*

Or ☐ none   _____ hours _____ minutes

2a. Again, think *only* about those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ days per week   **2b.** How much time in total did you usually spend on one of those days doing moderate physical activities*?*
_____ hours _____ minutes

Or ☐ none

3a. During the last 7 days, on how many days did you walk for at least 10 minutes at a time? This includes walking at work and at home, walking to travel from place to place, and any other walking that you did solely for recreation, sport, exercise or leisure.

_____ days per week   3b. How much time in total did you usually spend walking on one of those days*?*
_____ hours _____ minutes

Or ☐ none

The last question is about the time you spent sitting on weekdays while at work, at home, while doing course work and during leisure time. This includes time spent sitting at a desk, visiting friends, reading traveling on a bus or sitting or lying down to watch television.

4. During the last 7 days, how much time in total did you usually spend sitting on a week day?

____ hours _____ minutes

………………………….
Signature of Interviewer

Annexure – 3

Work plan:

Sl .No.	Activity detail	1-2 months	3-4 months	5-6 months	7-8 months	9-10 months	11-12 months
1	Title selection and approval	██					
2	Introduction and Rationale	██	██				
3	Literature review	██	██	██	██	██	
4	Questionnaire Development, Training of the Data collector and Pilot study			██	██		
5	Data collection				██	██	
6	Data processing and data analysis					██	
7	Report writing and submission						██