A STUDY ON KNOWLEDGE & AWARENESS OF TUBERCULOSIS AMONG UNDERGRADUATE STUDENTS OF GOVERNMENT UNIVERSITIES IN DHAKA

This dissertation is submitted to the Department of Pharmacy, East West University in the partial fulfillment of the requirements for the Degree of Bachelor of Pharmacy.

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Declaration by the Research Candidate

I, **Akhi Alamgir,** ID: 2012-3-70-033 hereby declare that the dissertation entitled "KNOWLEDGE & AWARENESS OF TUBERCULOSIS AMONG UNDERGRADUATE STUDENTS OF GOVERNMENT UNIVERSITIES IN DHAKA'' submitted by me to the Department of Pharmacy, East West University and in the partial fulfillment of the requirement for the award of the degree Bachelor of Pharmacy, under the supervision and guidance of **Tilka Fannana**, Senior Lecturer, Department of Pharmacy, East West University, Dhaka, Bangladesh.

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Certificate by the Supervisor

This is to certify that the dissertation entitled "KNOWLEDGE & AWARENESS OF TUBERCULOSIS AMONG UNDERGRADUATE STUDENTS OF GOVERNMENT UNIVERSITIES IN DHAKA'' submitted to the Department of Pharmacy, East West University for the partial fulfillment of the requirement for the award of the degree Bachelor of Pharmacy is a bonafied record of original and genuine research work carried out by **Akhi Alamgir**, ID: 2012-3-70-033 under my supervision and guidance.

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Certificate by the Chairperson

This is to certify that the dissertation entitled "KNOWLEDGE & AWARENESS OF TUBERCULOSIS AMONG UNDERGRADUATE STUDENTS OF GOVERNMENT UNIVERSITIES IN DHAKA'' submitted to the Department of Pharmacy, East West University for the partial fulfillment of the requirement for the award of the degree Bachelor of Pharmacy is a bonafied record of original and genuine research work carried out by **Akhi Alamgir**, ID: 2012-3-70-033, under the supervision and guidance of **Tilka Fannana**, Senior Lecturer, Department of Pharmacy, East West University and no part of this project has been submitted to other degree.

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This Research paper is

Dedicated

To my Beloved Parents

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List of Abbreviations

AIDS- Acquired Immune Deficiency Syndrome

BCG- Bacille Calmette-Guerin

DR-Drug resistant

DRS- Drug Resistance Survey

DOTS- Directly Observed Treatment

EPTB- Extra-Pulmonary Tuberculosis

HIV- Human Immunodeficiency Virus

HPSP- Health and Populations Sector Program

IGRAs- Interferon Gamma Release Assays

IV- Intravascular

LAM- Lipoarabinomannan

MDR-TB- Multi Drug Resistant TB

NTP- National Tuberculosis Control Program

PHC-Primary Health Care

PPD-Purified Protein Derivate

PTB- Pulmonary Tuberculosis

RHZE- Rifampicin (R), Isoniazid (H), Pyrazinamide (Z), Ethambutol (E)

TB – Tuberculosis

TU- Tuberculin Units

WHO- World Health Organization

XDR-TB- Extensively Drug-Resistant TB

Abstract

Tuberculosis (TB) is the second leading cause of human death and TB is one of the major public health problems in Bangladesh. The objective of this study was to investigate the knowledge & awareness among undergraduate students of govt. universities in Dhaka. A cross-sectional survey was performed on 300 undergraduate students of govt. universities in Dhaka. Data were collected from universities of Dhaka from January to May 2016 using a standard 4 pages structured questionnaire. Among 300 students, male and female were 67 % and 33 % respectively. Most of the students (98%) were informed about the term TB. About 34 % students believed that TB is a communicable disease, 87.23% students agreed that bacteria is an agent for TB, less than half of the subjects (45%) had the knowledge about the vaccination against TB and 61% students believed that TB is curable. However, students had poor knowledge about latent TB (20%) and DOTs program (21%). 60% of students were aware about initial investigation for TB patients, maximum students (77%) had the idea about the place from where one can take treatment of TB & 53% were aware about the duration of treatment of TB. Most of the students (63%) of students had knowledge about precaution that should be taken by TB patient. In the present study demonstrated that the level of general knowledge about TB was insufficient among undergraduate students of govt. universities in Dhaka; consequently health education program is needed to improve the knowledge among undergraduate university students regarding TB.

Keywords: *Tuberculosis, Knowledge, Awareness, Undergraduate students.*

Chapter-1

Introduction

1.1. OVERVIEW

Tuberculosis (TB) is a public health problem in many developing countries including Bangladesh. Globally there were 8.8 million incident cases of TB in 2010. With the rising number of HIV infection and AIDS cases there is a threat of resurgence of TB as this is the most common opportunistic infection in them. TB is the leading cause of death among all infectious diseases and WHO reported that in 2010 there were 1.1 million deaths among HIV negative people and an additional 0.35 million deaths from HIV associated tuberculosis. The global burden of TB mainly lies in the 22 high burden countries and about 50% of prevalence occurs in 5 countries of South East Asia, namely, India, Indonesia, Bangladesh, and Thailand, Myanmar. Bangladesh rank sixth among the high burden countries with an incidence rate of 225 per 100,000 thousand populations per year and a mortality rate (exclusive of HIV) of 43 per 100,000 thousand populations per year. Millennium development goal 6 implies to halt and begin to reverse the incidence of TB by 2015 and fixed the target to reduce prevalence of and death due to TB by 50% compared with a baseline of 1990 by 2015. The direct observed treatment short course (DOTS) was launched in 1995 as the main strategy in the control of tuberculosis. The strategy includes diagnosis through bacteriology and standardized short-course chemotherapy with full patient support. Bangladesh adopted DOTS strategy in national TB control program (NTP) during fourth population & health plan (1992–1998) and integrated into essential service package under the health and populations sector program (HPSP) in 1998. Although initially TB services were based in TB clinics and TB hospitals, under the DOTS strategy the services were expanded gradually to primary level of health facility incorporating GO-NGO partnership. Government and NGO community health workers are involved in village level for case detection and awareness building activities. In 2002, DOTS was expanded to Dhaka metropolitan city. By 2006 entire country has been covered by DOTS service. The DOTS strategy relies greatly on passive case finding for TB treatment and its success depends on the patient's health awareness, ability to recognize early sign symptoms, and accessibility to health services for immediate self reporting. It is important that basic knowledge about the disease and the availability of treatment is clear among community to prevent any undue delay in availing the service. The perceptions of TB prevailing in the community influence the health seeking behavior of people for their symptoms. While care seeking behavior of chest symptomatic has been explored in different studies, there is dearth of information on community perceptions of TB. The current study was

done to determine knowledge of TB patients about tuberculosis and their perception of the illness. (Tasnim et al., 2012)

1.2. Tuberculosis

Tuberculosis (TB) is a chronic infectious disease caused by a bacterium called Mycobacterium tuberculosis. It usually affects the lungs in 80% of cases with warning signs of cough, hemoptysis, and chest pain, shortness of breath, fever, weight loss, and drenching night sweat. TB is spread mainly through the air in form of droplets. When infectious people cough, sneeze, talk, laugh or spit, droplets containing Mycobacterium tuberculosis are sprayed into the air. People nearby may inhale the bacteria and become infected. *Mycobacterium tuberculosis* can remain viable as airborne droplet suspended in the air for a long time or as part of house dust for weeks. However, transmission usually occurs only after substantial exposure to someone with active TB. A person can be infected by *Mycobacterium tuberculosis* for many years without getting sick or spreading the organism to other people. If the immune system is weakened by immunosuppressive disease like HIV infection, diabetes mellitus, malignancy, chronic kidney disease, extremes of ages, and immunosuppressive agent, latent TB infection can develop into active disease. If a person with active disease is left untreated, he or she will infect on the average between 10 and 15 people every year. TB accounts for 2.5% of the global burden of disease and is the commonest cause of death in young women, killing more women than all causes of maternal mortality combined. (Desalu et al., 2012)

1.3. Historic Evolution of TB

Tuberculosis has claimed its victims throughout much of known human history. It reached epidemic proportions in Europe and North America during the 18th and 19th centuries, earning the sobriquet, ‘‘Captain Among these Men of Death.’’ Then it began to decline. Understanding of the pathogenesis of tuberculosis began with the work of Théophile Laennec at the beginning of the 19th century and was further advanced by the demonstration of the transmission of Mycobacterium tuberculosis infection by Jean-Antoine Villemin in 1865 and the identification of the tubercle bacillus as the etiologic agent by Robert Koch in 1882. Clemens von Pirquet developed the tuberculin skin test in 1907 and 3 years later used it to demonstrate latent

tuberculosis infection in asymptomatic children. In the late 19th and early 20th centuries sanatoria developed for the treatment of patients with tuberculosis. The rest provided there was supplemented with pulmonary collapse procedures designed to rest infected parts of lungs and to close cavities. Public Health measures to combat the spread of tuberculosis emerged following the discovery of its bacterial cause. BCG vaccination was widely employed following World War I. The modern era of tuberculosis treatment and control was heralded by the discovery of streptomycin in 1944 and isoniazid in 1952. (Daniel, 2006)

1.4. Pathophysiology of TB

After inhalation, the droplet nuclei are carried down the trachea-bronchial tree and deposited in a respiratory bronchiole or alveolus where they are ingested by alveolar macrophages that produce a nonspecific response to the bacillus. Infection depends both on the bacterial virulence and the inherent microbicidal ability of the alveolar macrophage that ingests it. If the bacillus is able to survive initial defenses, it can multiply within the alveolar macrophage.

The tubercle bacillus grows slowly, dividing approximately every 25 to 32 hours within the macrophage. The mycobacterium has no known endotoxins or exotoxins, so there is no immediate host response to the infection. The organisms grow for 2 - 12 weeks and reach 103 to 104 in number, which is sufficient to elicit a cellular immune response that can be detected by a reaction to the tuberculin skin test. The destruction of macrophages and release of tubercle bacilli products and chemokines stimulates an immune response. Before the development of cellular immunity, tubercle bacilli spread via the lymphatics to the hilar lymph nodes and from there through the bloodstream to more distant sites. Certain organs and tissues are notably resistant to multiplication of these bacilli. The bone marrow, liver and spleen are almost always seeded with mycobacteria, but uncontrolled multiplication of the bacteria in these sites is unusual. Organisms deposited in the upper lung zones, kidneys, bones and brain find environments that favour their growth. Numerous bacterial divisions may occur before specific cellular immunity develops, limiting multiplication.

Mycobacterium tuberculosis is a highly contagious, airborne, rod-shaped organism (bacillus) that thrives on oxygen, grows slowly, and possesses a "waxy" cell wall. The cell wall's structure and

function are not well understood but appear to allow the bacteria to survive within immune cells called macrophages (specialized cells that destroy bacteria and viruses). It also provides the organism with a resistant barrier to many common drugs.

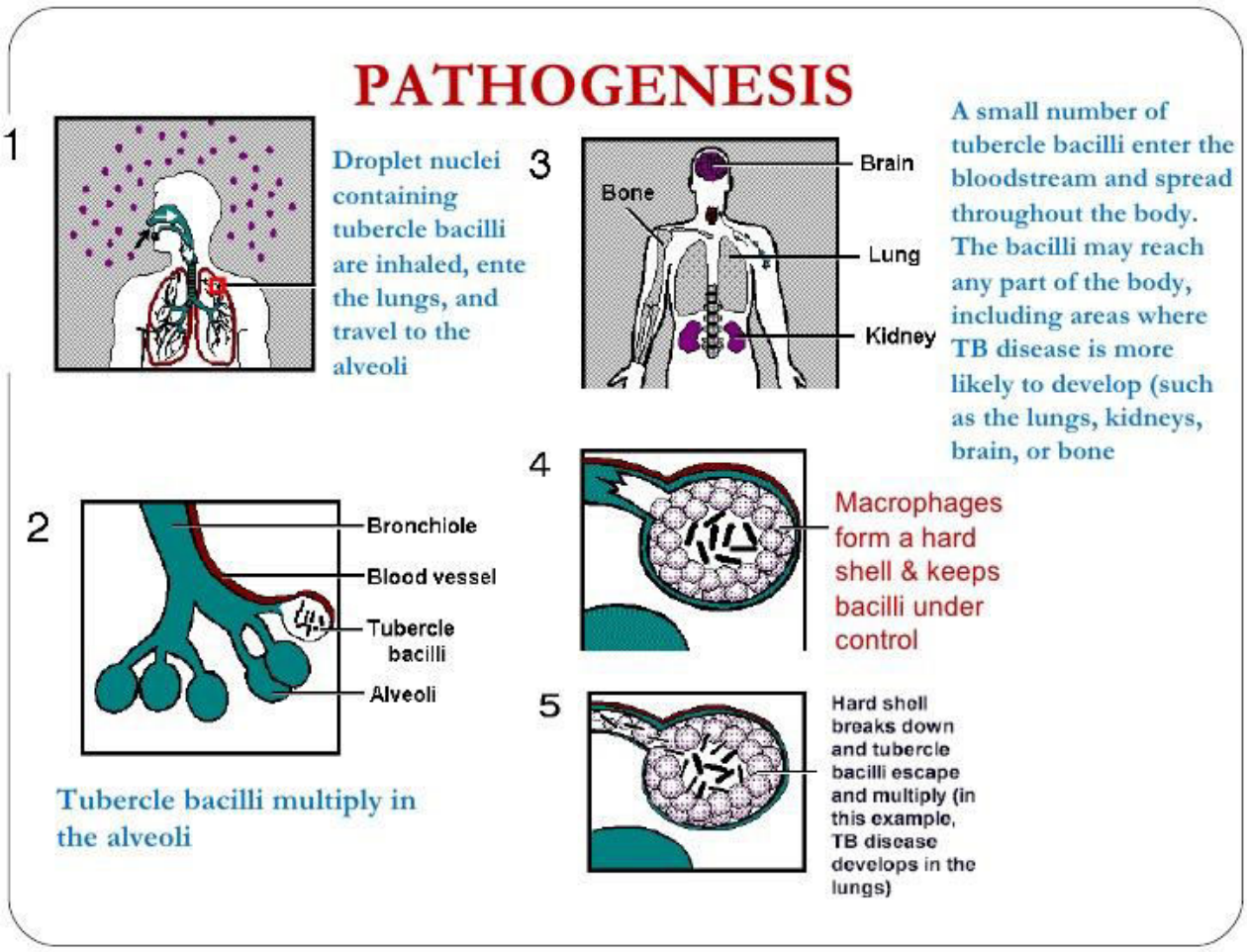

Fig 1.1: Pathophysiology of TB (Motsoaledi & Matsoso, 2014)

1.4.1. Primary infection

Primary infection occurs on first exposure to tubercle bacilli. This usually occurs in childhood so primary TB is often thought of as childhood TB. However, it can occur at any age in a previously unexposed individual. Inhaled droplet nuclei containing bacilli lodge in the terminal alveoli of the lungs, usually in the lower part of the upper lobe or upper part of the lower lobe. The bacilli

are phagocytized by the alveolar macrophages; mycobacterial products inhibit the bactericidal activities of the alveolar macrophages, allowing the bacilli to replicate within the macrophages. Other macrophages and monocytes are attracted to the area and produce an immune response. This inflammatory area is known as the Ghon focus. Bacilli and antigens drain from the Ghon focus via the lymphatic's to the hilar lymph nodes and together these form the primary (Ghon) complex. The inflammatory response produces the typical picture of caseous necrosis. Within the lymph node, the T-lymphocytes mount a specific immune response and activated macrophages inhibit the growth of the phagocytized bacilli. This primary focus contains 1,000–10,000 bacilli that gradually lose their viability and multiply more and more slowly. The inflammatory area in the primary focus is replaced by fibrous scar tissue, sometimes with calcification, in which the macrophages containing bacilli are isolated and die. Some dormant bacilli in the primary focus can survive for months or years: these are known as "latent bacilli".

Primary infection is usually asymptomatic and a positive tuberculin skin test 4-6 weeks after infection is the only evidence of infection. In a few cases, the immune response is not strong enough to prevent multiplication of bacilli and bacilli may spread from the lymphatics into the bloodstream and throughout the body causing disease within a few months. Primary progressive TB in the lungs leads to enlargement of the primary focus with spread throughout the airways or lymphatic's. Multiple areas of caseation and cavitation are found, producing a clinical picture similar to post-primary TB.

1.4.2. Secondary TB

Post-primary TB is the pattern of disease that occurs in a previously sensitized host. It occurs after a latent period of months or years after primary infection. It may occur either by reactivation of latent bacilli or by re-infection. Reactivation occurs when dormant bacilli, persisting in tissues for months or years after primary infection, start to multiply. This may be in response to a trigger such as weakening of the immune system by HIV infection. Re-infection occurs when a person who previously had a primary infection is exposed to an infectious contact. In a small number of cases it occurs as a progression of primary infection. Following primary infection, rapid progression to intra-thoracic disease is more common in children than in adults. Chest X-rays may show intra-thoracic lymphadenopathy and lung infiltrates. Post-primary TB usually affects the lungs but can involve any part of the body. The characteristic features of post-

primary PTB include upper lobe involvement with cavitation and extensive lung destruction. Sputum smears are usually positive and there is usually no intrathoracic lymphadenopathy.

Pulmonary tuberculosis is the infectious and most common form of TB disease, occurring in over 80% of cases. Laryngeal tuberculosis, although uncommon is also very infectious. Tuberculosis may, however, affect any part of the body. Extra-pulmonary tuberculosis is a result of the spread of mycobacteria to other organs, most commonly pleura, lymph nodes, spine, joints, genito-urinary tract, nervous system or abdomen. (Motsoaledi & Matsoso, 2014)

1.5. Risk factors of TB

Anyone can get tuberculosis, but certain factors can increase the risk of the disease. These factors include:

1.5.1. Weakened immune system

A healthy immune system often successfully fights TB bacteria, but body can't mount an effective defense if resistance is low. A number of diseases and medications can weaken immune system, including:

- HIV/AIDS
- Diabetes
- Severe kidney disease
- Certain cancers
- Cancer treatment, such as chemotherapy
- Drugs to prevent rejection of transplanted organs
- Some drugs used to treat rheumatoid arthritis, Crohn's disease and psoriasis
- Malnutrition
- Very young or advanced age

1.5.2. Traveling or living in certain areas

The risk of contracting tuberculosis is higher for people who live in or travel to countries that have high rates of tuberculosis and drug-resistant tuberculosis, including-

- Africa
- Eastern Europe
- Asia
- Russia
- Latin America
- Caribbean Islands

1.5.3. Poverty and substance abuse

- **Lack of medical care-** If one receives a low or fixed income, live in a remote area, have recently immigrated to the United States, or are homeless, may lack access to the medical care needed to diagnose and treat TB.
- **Substance abuse-** IV drug use or alcohol abuse weakens immune system and makes more vulnerable to tuberculosis.
- **Tobacco use-** Using tobacco greatly increases the risk of getting TB and dying of it.

1.5.4. Working or living condition

- **Health care work-** Regular contact with people who are ill increases chances of exposure to TB bacteria (wearing a mask and frequent hand-washing greatly reduce risk).
- **Living or working in a residential care facility-** People who live or work in prisons, immigration centers or nursing homes are all at a higher risk of tuberculosis. That's because the risk of the disease is higher anywhere there is overcrowding and poor ventilation.

1.5.5. Living in a refugee camp or shelter- Weakened by poor nutrition and ill health and living in crowded, unsanitary conditions, refugees are at especially high risk of-

- **Spinal pain.** Back pain and stiffness are common complications of tuberculosis.
- **Joint damage.** Tuberculous arthritis usually affects the hips and knees.
- **Swelling of the membranes that cover your brain (meningitis).** This can cause a lasting or intermittent headache that occurs for weeks. Mental changes also are possible.

- **Liver or kidney problems** Liver and kidneys help filter waste and impurities from bloodstream. These functions become impaired if the liver or kidneys are affected by tuberculosis.
- **Heart disorders.** Rarely, tuberculosis can infect the tissues that surround your heart, causing inflammation and fluid collections that may interfere with heart's ability to pump effectively. This condition, called cardiac tamponade, can be fatal. (Mayoclinic.org, 2016)
-

1.6. Mode of transmission of TB

- **Airborne transmission**

Airborne transmission occurs when infectious agents are carried by dust suspended in the air. With airborne transmission, direct contact is not needed to spread disease (as compared with respiratory droplet transmission).

- **Respiratory (droplet) transmission**

Some disease-causing bacteria and viruses are carried in the mouth, nose, throat and respiratory tree. They can spread by coming into direct contact with droplets nuclei (airborne particles 1 to 5 microns in diameter) when an infected person coughs or sneezes, or through saliva or mucus on unwashed hands.

- **Sexually transmitted diseases (STDs)**

Sexually transmitted diseases are Oregon's most frequently reported infections and account for almost two-thirds of all reportable diseases.

- **Animal or insect transmission**

Many microbes that threaten public health are carried by animals or insects and transmitted to humans.

- **Food or water transmission**

Food and water are necessary for life, but also prone to contamination with harmful microbes.

- **Health care transmission**

Doctors and hospitals are where the sick people go, but unfortunately, some infections may be transmitting in these settings. (Ghimire et al., 2016)

1.7. Types of TB

Tuberculosis (TB) is divided into two categories: Pulmonary and Extra-pulmonary.

1.7.1. Pulmonary Tuberculosis Types

- Primary Tuberculosis Pneumonia
- Tuberculosis Pleurisy
- Cavitary Tuberculosis
- Laryngeal Tuberculosis

- **Primary Tuberculosis Pneumonia**

This uncommon type of TB presents as pneumonia and is very infectious. Patients have a high fever and productive cough. It occurs most often in extremely young children and the elderly. It is also seen in patients with immunosuppression, such as people with HIV/AIDS, and in patients on long term corticosteroid therapy.

- **Tuberculosis Pleurisy**

This usually develops soon after initial infection. A granuloma located at the edge of the lung ruptures into the pleural space, the space between the lungs and the chest wall. Usually, a couple of tablespoons of fluid can be found in the pleural space. Once the bacterium invade the space, the amount of fluid increases dramatically and compresses the lung, causing shortness of breath

(dyspnea) and sharp chest pain that worsens with a deep breath (pleurisy). A chest x-ray shows significant amounts of fluid. Mild- or low-grade fever commonly is present. Tuberculosis pleurisy generally resolves without treatment; however, two-thirds of patients with tuberculosis pleurisy develop active pulmonary TB within 5 years.

- **Cavitary Tuberculosis**

Cavitary TB involves the upper lobes of the lung. The bacteria cause progressive lung destruction by forming cavities, or enlarged air spaces. This type of TB occurs in reactivation disease. The upper lobes of the lung are affected because they are highly oxygenated (an environment in which M. tuberculosis thrives). Cavitary TB can, rarely, occur soon after primary infection. Symptoms include productive cough, night sweats, fever, weight loss, and weakness. There may be hemoptysis (coughing up blood). Patients with cavitary TB are highly contagious. Occasionally, disease spreads into the pleural space and causes TB empyema (pus in the pleural fluid).

- **Laryngeal Tuberculosis**

TB can infect the larynx, or the vocal chord area. It is extremely infectious.

1.7.2. Extra-pulmonary Tuberculosis

This type of tuberculosis occurs primarily in immune compromised patients.

- Lymph Node Disease
- Tuberculosis Peritonitis
- Tuberculosis Pericarditis
- Osteal Tuberculosis
- Renal Tuberculosis
- Adrenal Tuberculosis
- Tuberculosis Meningitis
- Miliary TB

- **Lymph Node Disease**

Lymph nodes contain macrophages that capture the bacteria. Any lymph node can harbor uncontrolled replication of bacteria, causing the lymph node to become enlarged. The infection can develop a fistula (passageway) from the lymph node to the skin.

- **Tuberculosis Peritonitis**

M. tuberculosis can involve the outer linings of the intestines and the linings inside the abdominal wall, producing increased fluid, as in tuberculosis pleurisis. Increased fluid leads to abdominal distention and pain. Patients are moderately ill and have fever.

- **Tuberculosis Pericarditis**

The membrane surrounding the heart (the pericardium) is affected in this condition. This causes the space between the pericardium and the heart to fill with fluid, impeding the heart's ability to fill with blood and beat efficiently.

- **Osteal Tuberculosis**

Infection of any bone can occur, but one of the most common sites is the spine. Spinal infection can lead to compression fractures and deformity of the back.

- **Renal Tuberculosis**

This can cause asymptomatic pyuria (white blood cells in the urine) and can spread to the reproductive organs and affect reproduction. In men, epididymitis (inflammation of the epididymis) may occur.

- **Adrenal Tuberculosis**

TB of the adrenal glands can lead to adrenal insufficiency. Adrenal insufficiency is the inability to increase steroid production in times of stress, causing weakness and collapse.

- **TB Meningitis**

M. tuberculosis can infect the meninges (the main membrane surrounding the brain and spinal cord). This can be devastating, leading to permanent impairment and death. TB can be difficult to discern from a brain tumor because it may present as a focal mass in the brain with focal neurological signs. Headache, sleepiness, and coma are typical symptoms. The patient may appear to have had a stroke.

- **Miliary TB**

Miliary TB is disseminated TB. "Miliary" describes the appearance on chest x-ray of very small nodules throughout the lungs that look like millet seeds. Miliary TB can occur shortly after primary infection. The patient becomes acutely ill with high fever and is in danger of dying. The disease also may lead to chronic illness and slow decline. Symptoms may include fever, night sweats, and weight loss. It can be difficult to diagnose because the initial chest x-ray may be normal. Patients who are immunosuppressed and children who have been exposed to the bacteria are at high risk for developing miliary TB.

1.8. Symptoms of TB

The symptoms of active TB are very variable and depend on which part of the body has been infected, that is which type of TB it is. It is very difficult to diagnose TB just from the symptoms, as the symptoms are not usually ones that are just for TB. This means that the symptoms can often be the symptoms of another disease as well. So to diagnose TB it is always necessary to do at least one TB test. General symptoms of active TB include weakness or feeling very tired, losing weight without trying, lack of appetite, chills, fever (a high temperature of 38C or above) and night sweats. Symptoms of-

1.8.1. Pulmonary TB

The main symptoms of pulmonary tuberculosis are:

• Persistent cough of 2 weeks or more or any duration if HIV positive

• Fever for more than 2 weeks

• Drenching night sweats

• Unexplained weight loss (more than 1.5 kg in a month)

A productive cough, often accompanied by systemic symptoms such as fever, night sweats or loss of weight, is the commonest presentation of pulmonary tuberculosis. Every patient with a positive symptom screen must be investigated appropriately. Not all those with TB will have a cough; therefore, a high index of suspicion is required, particularly in people who are HIV positive who may only have one of the above symptoms. A history of contact with a person with PTB increases the likelihood of a TB diagnosis and symptoms such as weight loss need to be investigated. Some patients may present with chest pains (due to pleurisy, muscle strain), breathlessness (due to extensive lung disease or concomitant pleural effusion), localized wheeze due to local tuberculous bronchitis, or because of external pressure on the bronchus by an enlarged lymph node.

Physical signs may not be helpful in confirming the diagnosis, but it is important to examine the patient carefully. Some of the common signs are:-

Fever – the body temperature may be high or irregular (greater than 38.5 degrees Celsius)

Pulse – the pulse rate may be raised because of fever

Chest – there may be no abnormal signs, crackles in the lung apices more pronounced on deep breathing; localized wheeze in local obstruction or pressure; dullness where there is effusion and in chronic disease there may be extensive fibrosis with the trachea pulled to one side.

1.8.2. Extra-pulmonary TB

Extra pulmonary TB, which is also known as disseminated or miliary TB, refers to all the different types of TB other than pulmonary TB. Generally it is the types of TB that do not affect the lungs. The main exception to this is the type of extra-pulmonary TB known as Pleural TB. The general symptoms of extra-pulmonary TB are the same as for pulmonary TB, but there can then be specific symptoms relating to the particular site or sites in the body that are infected.

- **Lymph node TB**

Lymphadenitis is the inflammation and/or enlargement of a lymph node and is a common response to a variety of infections particularly in children. The only symptoms of TB

lymphadenitis may be painless slowly enlarging lymph nodes, as there are often no general TB symptoms. The swollen lymph nodes are often in the neck area, although they can be in the groin. TB infection of the lymph nodes in the neck is sometimes referred to by the name Scrofula, or as TB adenitis.

- **Skeletal (bone and joint) TB**

The most common initial symptom of bone TB is pain, but it depends on the bone or joint that is affected. There may also be curving of the affected bone or joint, as well as loss of movement in the affected bone or joint. The affected bone may also be weakened and may fracture easily. Spinal TB is also known as TB Spondylitis Disease. The symptoms of spondylitis disease depend on the stage of disease, and the affected site, but back pain is the earliest and most common symptom.

- **Meningitis TB**

TB meningitis does not start with classic meningitis symptoms. It begins with vague, general symptoms of aches and pains, a fever, and generally feeling unwell. This lasts for anywhere from about 2 to 8 weeks. Only then do the more obvious symptoms like vomiting, severe headache, a dislike of lights, neck stiffness and seizures occur.

- **Gastrointestinal or Abdominal TB**

The symptoms of abdominal TB can be abdominal pain, diarrhea, and bleeding from the anus or rectum. As with a number of the other types of TB, the symptoms will depend on the exact area that is affected. (Motsoaledi & Matsoso, 2014)

1.9. Diagnosis of TB

The diagnosis of TB depends on numerous factors namely; self-presentation of persons with TB symptoms to health care facility, high index of TB suspicion among health care professionals, TB screening practices in health facilities, sensitivity and specificity of diagnostic test used,

turnaround time for delivery of laboratory results, and the capacity to trace people with positive results and start them on treatment.

1.9.1. Techniques of Diagnosis

- **Mantoux test**

The Mantoux test is an unspecific test that reveals if the patient has been exposed to mycobacteria. It is the most used form of tuberculin skin test in the world. The tuberculin used in skin tests today is purified protein derivate (PPD). This form tuberculin was first made in the 1930s. Tuberculin consists of different proteins processed from a liquid culture of M.tuberculosis. The standard for tuberculin used in the Mantoux test is called PPD RT 23 and is kept in Statens Serum Institut in Copenhagen. PPD RT 23 exists in two different compositions of tuberculin units (TU), 2 TU/0.1 mL and 10 TU/0.1 mL which contain 0.04 micrograms and 0.2 micrograms of Tuberculin PPD RT 23 respectively. 2 TU/0.1 mL is the recommended composition, unless low tuberculin sensitivity is expected. When performing the Mantoux test, the standard dosage of 0.1 mL tuberculin containing 2 TU is injected intradermalin the middle third of the forearm. After a successful injection, a papule of 8-10 mm in diameter will appear and then disappear in about ten minutes. The result of the test is seen after 48-72 hours, when the size of the induration is evaluated. The induration is often flat, uneven and surrounded by an area of redness.

It is measured transversely on the long axis of the forearm. An induration of 0-5 mm is considered negative, 6-14 mm is considered positive and 15 mm or more is considered strongly positive. A positive test can indicate either infection with the M.tuberculosis complex, infections with non-tuberculous mycobacteria or that the person has been immunized with the BCG vaccine. Individual risk factors, national guidelines and epidemiological factors must always be accounted for when interpreting the result. In some countries the Mantoux test is used not just for diagnostics, but also to verify immunization by BCG vaccine or to ensure that only persons who have not been exposed to M. tuberculosisare vaccinated. When a person has symptoms of TB, further diagnostic procedures should be performed regardless of Mantoux test results.

- **TB drug susceptibility tests**

Drug susceptibility testing means testing to find out which drugs the TB bacteria in a patient are susceptible to, and can therefore determine whether the person has got drug resistant TB. Some drug susceptibility tests, such as the expert TB test can be used to diagnose TB, as well as testing for some types of TB drug resistance.

- **Chest X-ray as a TB test**

Acute pulmonary TB can be easily seen on an X-ray. However, what it shows is not specific and a normal chest X-ray cannot exclude extra pulmonary TB. Also, in countries where resources are more limited, there is often a lack of X-ray facilities.

- **TB Interferon gamma release assays (IGRAs)**

IGRAs are blood tests that measure a person's immune response to the bacteria that cause TB. The immune system produces some special molecules called cytokines. These TB tests work by detecting a cytokine called the interferon gamma cytokine. In practice one carry out one of these TB tests by taking a blood sample and mixing it with special substances to identify if the cytokine is present.

- **Serological tests for TB**

Serological tests for TB are tests carried out on samples of blood, and they claim to be able to diagnose TB by detecting antibodies in the blood. However, testing for TB by looking for antibodies in the blood is very difficult.

- **Sputum smear microscopy as a test for TB**

Smear microscopy of sputum is often the first TB test to be used in countries with a high rate of TB infection. Sputum is a thick fluid that is produced in the lungs and the airways leading to the lungs. A sample of sputum is usually collected by the person coughing.

To test for TB several samples of sputum will normally be collected. To do the TB test a very thin layer of the sample is placed on a glass slide, and this is called a smear. A series of special stains are then applied to the sample, and the stained slide is examined under a microscope for signs of the TB bacteria.

- **Fluorescent microscopy**

The use of fluorescent microscopy is a way of making sputum TB tests more accurate. With a fluorescent microscope the smear is illuminated with a quartz halogen or high pressure mercury vapor lamp, allowing a much larger area of the smear to be seen and resulting in more rapid examination of the specimen.

- **Culturing bacteria to test for TB**

Culturing is a method of studying bacteria by growing them on media containing nutrients. Media can be either solid media on culture plates or bottles of liquid media (culture broths). Different media are used to make it as easy as possible for the suspected microorganisms to grow. To isolate a single bacterial species from a mixture of different bacteria, solid media are normally used. Individual cells dividing on the surface do not move away from each other as they would do in liquid, and after many replications they form visible colonies composed of tens of millions of cells all derived from a single cell.

- **TB LAM (lateral flow version)**

This assay detects lipoarabinomannan (LAM) antigens in urine. LAM is a component of the mycobacterial outer cell wall that is shed from metabolically active or degrading cells and is cleared by the kidney and detectable in urine. It has been reported to have good sensitivity in HIV-infected patients with low CD4 (<50cells/mm3) cell counts. In a clinical setting this test may have a role in diagnosis if used in combination with other tests to support a diagnosis of TB in patients with advanced immunosuppression. Further studies are required to determine the role of this test in programmatic settings.

1.9.2. Some problems of current TB tests

Some of the current TB tests take a long time to obtain a result, and some TB tests are not very accurate. The TB tests either have low sensitivity (the ability to correctly detect people with TB) and/or low specificity (the ability to correctly detect people who haven't got TB). If a TB test has low sensitivity, it means that there will be a significant number of "false negatives", meaning that the test result is suggesting that a person has not got TB when they actually have. Similarly, a low specificity means that there will be a significant number of "false positives" suggesting that a person has TB when they actually haven't. (Ruud & Vollen, 2011)

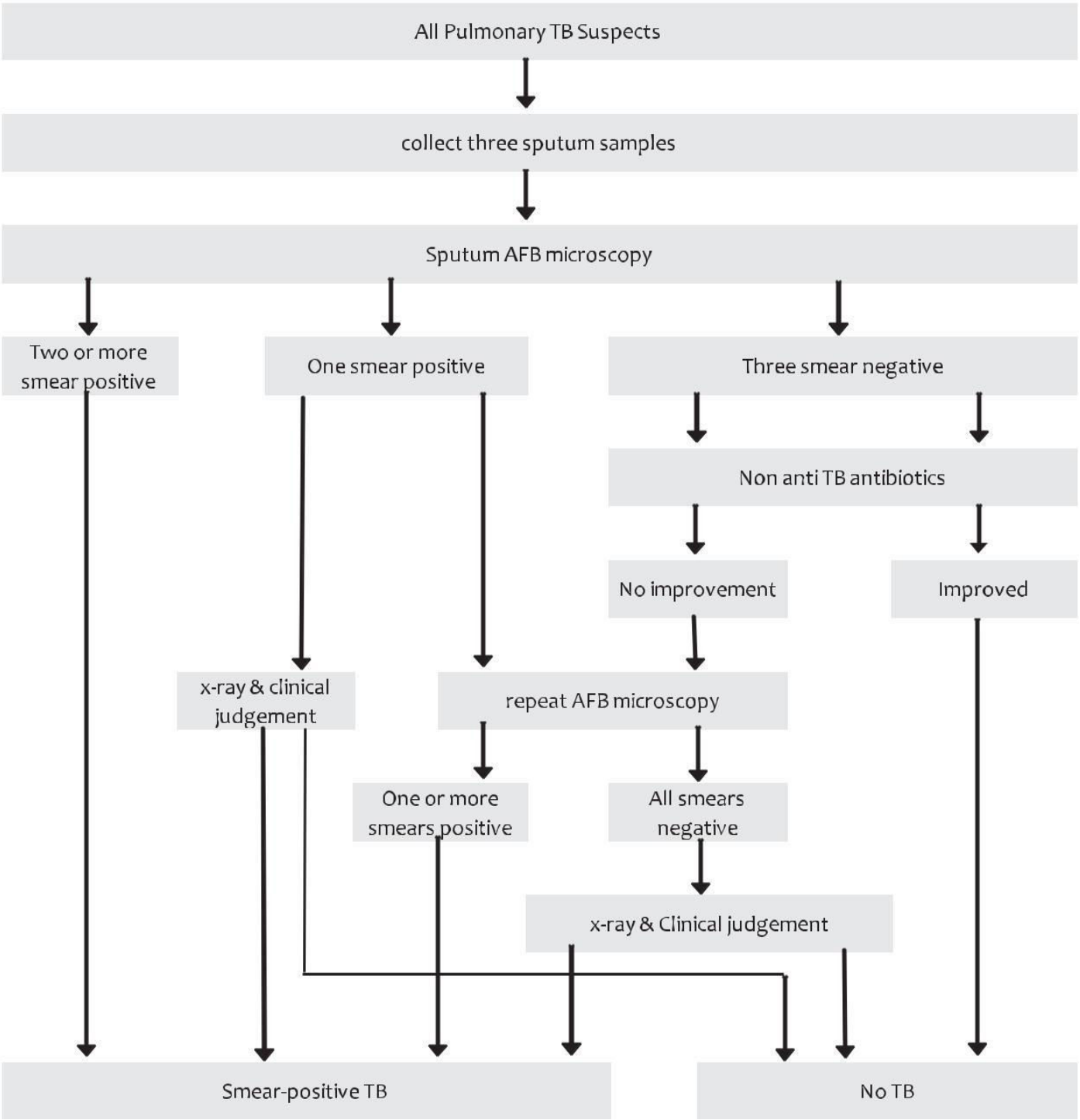

Fig 1.2: Diagnosis of suspected Pulmonary Tuberculosis (Ruud & Vollen, 2011)

1.10. Treatment of TB

1.10.1. Stages of TB treatment

The standard TB regimen is a six month course of antibiotics but the duration and drugs used may vary according to a patient's age, type of TB infection, and whether they have been treated before. Treating TB takes longer than treating other types of bacterial infections because the bacteria that cause TB grow slowly, and die slowly. The standard six month course of treatment consists of two phases. The first phase lasts two months and is called the **intensive phase**. The second phase lasts four months and is called the **continuous phase**.

- **The intensive phase (2 months)**

During the intensive phase, patients are normally administered a combination of four antibacterial medications: isoniazid, rifampicin, pyrazinamide, and ethambutol. These drugs are taken on a daily basis. The medications work by disrupting the functioning of the bacteria that cause tuberculosis. Isoniazid and ethambutol inhibit the formation of the bacterial cell wall. Pyrazinamide prevents bacterial growth, while rifampicin makes the bacterium unable to produce vital proteins. Rifabutin is another medication that is sometimes used in place of rifampicin during the intensive phase, but rifampicin is more widely used because of its cheaper cost. These medications are used in combination rather than alone in order to prevent the development of resistant strains of bacteria. Side effects, particularly nausea and abdominal pain, are relatively common during the first few weeks of therapy. Urine and tears can also turn orange, which is harmless but disconcerting if patients are not warned. More severe side effects, such as joint pain, visual impairment, liver damage, and peripheral neuropathy are less common but can be serious when they do occur. Within a few weeks of beginning treatment most patients will start to feel better. During the intensive phase it is normal for the patient to become non-contagious. The patient's sputum converts from positive to negative, so that TB bacilli can no longer be detected under a microscope.

- **The continuous phase (4-5 months)**

Once the intensive phase is completed, the "continuous phase" of treatment begins. During this four-month phase, isoniazid and rifampicin are normally taken alone on a daily basis. If the medications are taken regularly and sputum tests remain negative, this six month course of treatment is standard and the patient is considered cured upon completion. (Leavens, 2011)

1.10.2. Principles of TB Treatment

The key to stopping the spread of TB in a community is to start treating patients who are coughing up live TB bacilli as soon as possible. Apart from the public health imperative, effective treatment reduces individual morbidity and mortality. For treatment to be effective, it is crucial that the correct drugs are given for the correct period of time. PTB (Pulmonary TB) and EPTB (Extra Pulmonary TB) are both treated in the same way.

The aims of TB treatment are to:

• Cure the patient of TB
• Decrease transmission of TB to others
• Prevent the development of acquired drug resistance
• Prevent relapse
• Prevent death from TB or its complications

1.10.2.1. The Essential TB drugs

TB drugs have varying properties:

1) They may be bactericidal, bacteriostatic (sterilizing) or have the ability to prevent resistance.

2) They differ in the ability to act against the various populations of bacilli found in a tuberculosis lesion:

- Metabolically active bacilli, intermediately active bacilli, semi-dormant bacilli (persists)
- Some TB drugs act best in an acid environment; others better at a more alkaline pH

3) Bacilli occur both in extracellular spaces where the pH is usually neutral or alkaline and in intracellular spaces where it is acid.

Table 1.1: Properties of the individual TB Drugs

Drug	Drug Property	Target Bacilli	pH	Site of Action
Isoniazid (H)	Bactericidal after 24 hours. High potency: kills >90% bacilli in first few days of treatment.	Rapid and intermediate growing bacilli	Alkaline and acid media.	Intracellular and extracellular.
Rifampicin (R)	Bactericidal within 1 hour. High potency. Most effective sterilising agent.	All populations including dormant bacilli.	Alkaline and acid media.	Intracellular and extracellular.
Pyrazinamide (Z)	Bactericidal with a low potency. Achieves its sterilising action within 2-3 months.	Slow growing bacilli.	Acid medium.	Intracellular bacilli only (macrophages).
Ethambutol (E)	Bacteriostatic. Low potency. Minimises the emergence of drug resistance.	All bacterial populations.	Alkaline and acid media.	Intracellular and extracellular.
Streptomycin (S)	Bactericidal with a low potency.	Rapidly growing bacilli.	Alkaline medium.	Extracellular bacilli

Table 1.2: Recommended daily dosages of the individual drugs for adults and children >8yrs/ >30kg

Essential TB drug (abbreviation)	Dose mg/kg	Dose range mg/kg
Rifampicin (R)	10	8– 12
Isoniazid (H)	5	4– 6
Pyrazinamide (Z)	25	20 – 30
Ethambutol (E)	15	15 – 20
Streptomycin (S)	15	12 – 18

Table 1.3: Fixed dose combination tablets available for adults and children >8yrs/ >30kg

Intensive Phase	Continuation Phase
RHZE (150,75,400,275mg)	RH (150,75mg) RH (300,150mg)

1.10.2.2. Standard Treatment Regimen for New and Previously Treated Patients

The standard treatment regimen for all patients is made up of an intensive phase lasting 2 months and a continuation phase lasting 4 months. During the intensive phase 4 drugs (isoniazid, rifampicin, pyrazinamide, and ethambutol) are used to rapidly kill the tubercle bacilli. Infectious patients become less infectious within approximately 10-14 days of starting treatment and symptoms abate. However, the majority of patients with sputum smear-positive TB will become smear-negative within 2 months. In the continuation phase, 2 drugs (isoniazid, rifampicin) are used, over a period of 4 months. The sterilizing effect of these drugs eliminates the remaining bacilli and prevents subsequent relapse.

1.10.2.3. Treatment for Extra Pulmonary TB

Six months treatment is as effective in extra-pulmonary as in pulmonary disease. In some instances of severe or complicated disease (meningitis, TB bones/joints, miliary TB) treatment may need to be extended to nine months. The intensive phase remains two months and the continuation phase is prolonged to seven months – 2(RHZE)/ 7(HR).

1.10.2.4. Adjunctive Treatment

- **Pyridoxine (Vitamin B6)**

The use of Pyridoxine is recommended for all adults patients started on TB treatment to prevent peripheral neuropathy most commonly caused by Isoniazid.
Dose of Pyridoxine: 25mg daily: If patient develops peripheral neuropathy at any stage during TB treatment, the dose can be increased to 50 – 75mg (up to maximum of 200mg) until the symptoms subside, then reduce to 25mg daily.

- **Steroids**

The use of corticosteroids is recommended in extra-pulmonary tuberculosis, particularly for TB meningitis and pericarditis. High dose steroid treatment for 2-4 weeks and the taper off gradually over several weeks depending on clinical progress is recommended. The response to treatment is assessed clinically.

1.10.2.5. Management of the Common Side Effects of TB Medicines

- **Monitoring for side effects**

The clinical monitoring of all TB patients for side effects during treatment is important. Key to this is educating the patients and their families on how to recognize the symptoms of the common side effects and to report them immediately when they develop. At every follow up visit, the patients must be asked about the following symptoms;

- Burning, numbness and tingling sensation in the feet

- Joint pains
- Anorexia
- Nausea
- Abdominal pains
- Skin rash with/ without itching
- Changes in the color of urine
- Impaired vision
- Yellowing of eyes
- Confusion

When the patient has minor side effects they can be reassured and treated symptomatically at the clinic. When they present with major side effects they must be referred to next appropriate level of care – hospital immediately.

Table 1.4: Common side effects of TB drugs

Side effects	Drug(s) responsible
Minor	
Anorexia, nausea, abdominal pains	Rifampicin
Joint pains	Pyrazinamide
Burning sensation in feet	Isoniazid
Orange/ red coloured urine	Rifampicin
Major	
Skin itching/ rash	Streptomycin, Rifampicin, Isonazid
Deafness (no wax on otoscopy)	Streptomycin
Dizziness (vertigo, nystagmus)	Streptomycin
Jaundice (other causes excluded)	Isoniazid, Rifampicin, Pyrazinamide
Vomiting, confusion	Isoniazid, Rifampicin, Pyrazinamide

(Motsoaledi & Matsoso, 2014)

1.10.3. Antituberculosis Chemotherapy

The anti-tuberculosis therapy is a unique, two-phased chemotherapy consisting of initial intensive phase with multiple drugs (three or more) and continuation phase with two or three drugs. The multidrug initial intensive phase is given to take care of the drug-resistant organisms and to achieve 'a quick kill' to reduce the bacillary load, which in turn reduces the number of "persisters' in the lesions. "Persisters" are drug-sensitive organisms, which become dormant and are later responsible for relapses. The continuation phase of chemotherapy, consisting of two drugs is therefore given to kill the "persisters," which show intermittent activity.

The role of individual drugs in first-line chemotherapy of TB is unique. Isoniazid is responsible for the initial kill of about 95% organisms during the first two days of treatment. Its bactericidal role is then replaced by rifampicin and pyrazinamide during the intensive phase. In the continuation phase, rifampin is the most effective drug against dormant bacilli (persisters), as shown by the similarity of response by patients with initially isoniazid-resistant or sensitive strain. When either rifampin or isoniazid is not used, the duration of chemotherapy is 12 to 18 months. When both isoniazid and rifampin are used in treatment, the optimum duration of chemotherapy is 9 months. Addition of pyrazinamide, but not neither streptomycin nor ethambutol reduces the duration to six months. Prolongation of chemotherapy beyond these periods increases the risk of toxicity while providing no additional benefit. Second-line therapy duration ranges from 18 to 24 months.

1.10.4. Tuberculosis (TB) – Surgery

Surgery is rarely used to treat tuberculosis (TB). But it may be used to treat extensively drug-resistant TB (XDR-TB) or to treat complications of an infection in the lungs or another part of the body

- **Surgery for TB inside the lungs**

Surgery is used to:

- Repair lung damage, such as serious bleeding that cannot be stopped any other way, or repeated lung infections other than TB.

- Remove a pocket of bacteria that cannot be killed with long-term medicine treatment.

Surgery has a high success rate, but it also has a risk of complications, which may include infections other than TB and shortness of breath after surgery.

➢ **Surgery for TB outside the lungs**

Surgery sometimes may be needed to remove or repair organs damaged by TB in parts of the body other than the lungs (extra pulmonary TB) or to prevent other rare complications, such as:

- TB infection of the brain (TB meningitis): Doctor may surgically place a tube (shunt) that drains excess fluid from the brain to prevent a buildup of pressure that can further damage the brain.
- TB infections of the heart (TB pericarditis): Surgeon may partially remove or repair the infected sac around the heart.
- TB infection of the kidneys (renal TB): Surgeon may need to either remove infected kidney or repair the kidney or other parts of the urinary system.
- TB infection of the joints: May need surgery to repair damaged areas of spine or joints (orthopedic surgery).

1.10.5. Directly Observed Therapy (DOT)

A component of case management that helps to ensure that patients adhere to treatment is directly observed therapy (DOT). DOT is the most effective strategy for making sure patients take their medicines. DOT means that a health care worker or other designated individual watches the patient swallow every dose of the prescribed drugs. DOT should be considered for all patients because it is difficult to reliably predict which patients will be adherent. Even patients who intend to take their medicine might have trouble remembering to take their pills every time. All DOT visits should be documented. In many health departments, DOT is the standard of care.

(WebMD Medical Reference from Healthwise, 2014)

1.11. Drug resistant (DR) TB

Drug Resistant Tuberculosis (DR TB) is confirmed through laboratory tests that demonstrate growth of infecting isolates of Mycobacterium tuberculosis in-vitro in the presence of one or more anti-tuberculosis drugs. By definition, there are four different categories of drug resistance, namely:

- **Multi Drug Resistant TB (MDR-TB):** Resistance to at least both rifampicin and isoniazid
- **Extensive Drug Resistant TB**: Resistance to any fluoroquinolone and to at least one of the three second line injectable drugs (capreomycin, kanamycin and amikacin), in addition to multi drug resistance.
- **Mono resistance:** Resistance to one of the first line TB medicines (rifampicin, isoniazid, pyrazinamide or ethambutol).
- **Poly Drug Resistant TB:** Resistance to more than one first line TB medicines. This excludes resistance to both rifampicin and isoniazid. (Motsoaledi & Matsoso, 2014)

1.11.1. The Situation of Drug Resistant TB in Bangladesh

At present, MDR TB cases in Bangladesh are relatively low and a few XDR TB cases exist. The National Tuberculosis Control Program (NTP), through a well functioning TB program, is in the position to keep MDR TB low with few sporadic XDR TB cases. The NTP has carried out its first nation-wide drug resistance survey (DRS) in tuberculosis patients in collaboration with WHO and SNRL (Supra National Reference Laboratory), Antwerp, Belgium in 2010-2011. The result shows the overall number of MDR TB cases is low, 1.4% among new cases and 28.5% among re-treatment cases.

In new case, Rifampicin mono resistance is low (0.2%) though relatively higher, primary mono resistance to isoniazid (1.5%) and streptomycin (6.6%). Table 1.6 shows the prevalence of anti-tuberculosis drug resistance in Bangladesh.

Table 1.5: Prevalence of Anti-TB Drug Resistance in Bangladesh

Drug resistance pattern	DRS 2010-11		
	New % (n = 1049)	Previously treated % (n = 291)	Total % (n = 1343)
Susceptible to all drugs (%)	87.7	56.8	81.3
Mono resistance (%) (Isoniazid)	1.4	2.5	1.6
Mono resistance (%) (Rifampicin)	0.2	0.4	0.3
Mono resistance (%) (Ethambutol)	0.2	0.0	0.2
Mono resistance (%) (Streptomycin)	6.6	7.1	6.7
Resistance HE	0.1	0.0	0.0
Resistance HES	0.0	0.7	0.2
Multi Drug Resistant (MDR TB)	1.4	28.5	7.0
Resistance to all 4 drugs (HRES)	0.5	14.1	3.3

(Source: DRS Data (2010-2011), NTP, Bangladesh)

1.11.2. Causes of Drug Resistance (DR) TB

Anti-TB drug resistance is said to be present if growth of M. tuberculosis isolates are observed in spite of presence of anti-TB drugs. Although its' causes could be microbial, clinical and/or programmatic, Drug Resistant TB is essentially a manmade phenomenon. From a microbiological perspective, resistance is caused by a genetic mutation that makes a drug

ineffective against the mutant bacilli. From a clinical and programmatic perspective, it is an inadequate or poorly administered treatment regimen that allows a Drug Resistant strain to become the dominant strain in a patient infected with TB. Table 1.7 summarizes the common causes of inadequate treatment.

Table 1.6: Causes of Inadequate Anti-TB Treatment

Health-care providers: inadequate regimens	Drugs: inadequate supply or quality	Patients: inadequate drug intake
• Inappropriate guidelines or non-compliance with guidelines; • Absence of guidelines; • Poor training; • No monitoring of treatment and poor DOT; • Poorly organized or funded TB control programmes.	• Poor quality; • Unavailability of certain drugs (stock- outs or delivery disruptions); • Poor storage conditions; • Wrong dose or combination of drugs.	• Poor adherence; • Lack of information; • Adverse effects of treatment; • Social barriers (stigma, restrictions); • Mal-absorption due to other causes; • Substance dependency disorders; • Mental disorders; • Non-cooperative; • Education level; • Lack of transportation; • Lack of money.

(Adapted from WHO programmatic management of Drug Resistant tuberculosis guidelines: Emergency Update 2008)

1.11.3. Diagnosis of MDR-TB

The accurate diagnosis of MDR-TB requires a positive culture of *Mycobacterium tuberculosis* and drug susceptibility testing. However, genetic probes which detect drug resistance to rifampicin with >95% accuracy are very suggestive of MDR-TB; <10% of rifampicin resistance is monoresistant, and so rifampicin resistance is a marker for MDR-TB in >90% of cases.

1.11.4. Diagnosis of XDR-TB

The original method used to test for MDR-TB and XDR-TB was the Drug Susceptibility Testing (DST). DST is capable of determining how well four primary antitubercular drugs inhibit the growth of Mycobacterium Tuberculosis. The four primary antitubercular drugs are Isoniazid, Rifampin, Ethambutol and Pyrazinamide. Drug Susceptibility testing is done by making a medium plate and spreading the bacteria on the plate. Disks containing one of the four primary drugs are added to the plate. After weeks of allowing the bacteria to grow the plate is checked for clear areas around the disk. If there is a clear area, the drug has killed the bacteria and most likely the bacteria is not resistant to that drug.

1.11.5. Treatment DR-TB

1.11.5.1. Groups of Anti-Tuberculosis Drugs

The classes of anti-tuberculosis drugs have traditionally been divided into first and second-line drugs, with isoniazid, rifampicin, pyrazinamide, streptomycin, and ethambutol being the primary first-line drugs. These guidelines will often refer to this classification system; yet, will also use a group system based on efficacy, experience of use and drugs classes. These groups are referred to in the following sections and are very useful for the design of DR TB treatment regimens. The different groups are shown in Table 6.1. Not all drugs in the same group have the same efficacy or safety profiles.

Table 1.7: Classification (Groups) of Anti-TB drugs

Grouping	Drugs	Remarks
Group 1 First-line oral agents	Isoniazid (H); Rifampicin (R); Ethambutol (E); Pyrazinamide (Z);	These are the most potent and best tolerated drugs. Pyrazinamide is used in the Standard MDR TB regimens because it is thought to retain some susceptibility in many cases of MDR TB. However, caution is warranted, because whenever a drug was used in a previous regimen that failed, it should not be heavily relied upon as a key drug.
Group 2 Injectable agents	Kanamycin (Km); Amikacin (Am); Capreomycin (Cm); Streptomycin (S)	All regimens to treat MDR TB or XDR TB includes; an injectable agent. Given the greater ototoxicity with streptomycin and high rates of streptomycin resistance in DR TB cases, it will not be used to treat DR TB in Bangladesh. Amikacin and kanamycin are considered to be very similar and have a high frequency of cross-resistance. There is low cross-resistance with kanamycin (or amikacin) and capreomycin.
Group 3 Fluoroquinolones	Moxifloxacin (Mfx); Levofloxacin (Lfx); Ofloxacin (Ofx)	All patients should receive one of the fluoroquinolones. The most potent available fluoroquinolones in descending order based on in vitro activity and animal studies are: moxifloxacin = gatifloxacin > levofloxacin> ofloxacin. Levofloxacin is the fluoroquinolone on the Standard MDR TB Regimen while moxifloxacin will be used in the Standard XDR TB Regimen.
Group 4 Oral bacteriostatic second-line agents	Ethionamide (Eto); Prothionamide (Pto); Cycloserine (Cs); *p*-aminosalicylic acid (PAS)	The Standard MDR TB Regimen in Bangladesh employs at least two agents from Group 4. In general, avoid the combination of PAS with ethionamide (or prothionamide) because of increased gastrointestinal side effects and hypothyroidism, however, sometimes this combination is needed. The drugs in Group 4 may be started at a low dose and escalated over seven days (this is called drug ramping).
Group 5 Agents with unclear role in DR TB treatment (not recommended by WHO for routine use in DR TB patients)	Clofazimine (Cfz); Linezolid (Lzd); Amoxicillin/Clavulanate (Amx/Clv); Clarithromycin (Clr); Thioacetazone (Thz); Imipenem/Cilastatin (Ipm/Cln); High-dose Isoniazid (High-dose H);a	These drugs are not recommended by the WHO for routine use in DR TB treatment because their contribution to the efficacy of multidrug regimens is unclear. However, they can be used in cases of XDR TB. Only clofazimine and amoxicillin/ clavulanate are used routinely in Bangladesh for the Standard XDR TB regimen. Other drugs may be added in consultation with an expert in the treatment of XDR TB. If strains resistant to low concentrations of INH, but are susceptible to higher concentrations, then high-dose INH can be considered

Table 1.8: Adult Dosages of Second line Anti-tuberculosis Drugs

Drug*	<33 Kg mg/kg/day	33-50 kg mg/kg/day	51–70 kg mg/kg/day	>70 kg (max dose) mg/kg/day
Pyrazinamide (Z) (500mg)	**30–40 mg**	**1000-1750 mg**	**1750-2000 mg**	**2000-2500 mg**
Amikacin (Am) (1 g vial)	15–20 mg	500-750 mg	1000 mg	1000 mg
Kanamycin (Km) (1 g vial)	**15–20 mg**	**500-750 mg**	**1000 mg**	**1000 mg**
Capreomycin (Cm) (1 g vial)	15–20 mg	500-750 mg	1000 mg	1000 mg
Levofloxacin (Lfx) (250 mg, 500 mg)	7.5-10 mg	750mg	750 mg	750-1000 mg
Moxifloxacin (Mfx) (400 mg)	7.5-10 mg	**400mg**	**400 mg**	**400mg**
Ofloxacin (Ofx) (200 mg	15-20 mg	800 mg	800mg	800-1000 mg
Ethionamide (Eto) (250 mg)	**15–20 mg**	**500mg**	**750 mg**	**750–1000 mg**
Protionamide (Pto) (250 mg)	15–20 mg	500mg	750 mg	750–1000 mg
Cycloserine (Cs) (250 mg)	**15–20 mg**	**500mg**	**750 mg**	**750–1000 mg**
P-aminosalicylic acid (PAS) (4 g sachets)	150 mg	8 g	8 g	8 -12 g
Group 5 drugs				
Clofazimine (Cfz)	50mg	100mg	100mg	200mg
Amoxicillin/Clavulanate (Amx/Clv)	Normal dose 875/125mg twice daily (Preferably) or 500/125 three times daily			
Clarithromycin (Clr)	Usual adult dose is 500 mg twice daily.			
High-dose INH (H)	16-20mg/kg daily			
Linezolid (Lzd)	Usual adult dose is 600 mg twice daily. Most reduce the dose to 600 mg once a day after 4 to 6 weeks to decrease adverse effects.			
Thioacetazone (Thz)	Usual adult dose is 150 mg per day			
Imipenem/cilastatin (Ipm/Cln)	Usual adult dose is 500-1000 mg IV every 6 hours.			

(*Drugs in the Standard MDR TB Regimen are Bolded.)

Table 1.9: Pediatric Dosages of Second-line Anti-tuberculosis Drugs

Drug	Daily dose (mg/kg)	Frequency	Maximum daily dose
Isoniazid (H) (50 mg, 100 mg, 300 mg, 50mg/5ml solution)	10 (10 - 15)	Once daily	300 mg
Rifampicin ® (150 mg, 300 mg)	15 (10 - 20)	Once daily	600 mg
Pyrazinamide (Z) (400 mg, 500 mg)	35 (30 - 40)	Once daily	
Ethambutol (E) (100 mg, 400 mg)	15 (15 - 25)	Once daily	
Streptomycin (S) (1 g vial)	20 - 40	Once daily	1 g
Kanamycin (Km) (1 g vial)	15 - 30	Once daily	1 g
Amikacin (Am) (1 g vial)	15 - 22.5	Once daily	1 g
Capreomycin (Cm) (1 g vial)	15 - 30	Once daily	1 g
Ofloxacin (Ofx) (200 mg)	15 - 20	Once daily	1000 mg
Levofloxacin (Lfx) (250 mg, 500 mg)	15 - 20 < 5years 10 > 5 years	Once daily	1000 mg
Moxifloxacin (Mfx) (400 mg)	7.5 - 10	Once daily	400 mg
Clarithromycin (Clr)	20 mg	Twice daily	
Ethionamide (Eto) (250 mg)	15 - 20	Once daily	1 g
Prothionamide	15 - 20	Once daily	1 g
Cycloserine (Cs) (250 mg)	10 - 20	Once or twice daily	1 g
PAS (4 g sachets)	300	Twice or thrice daily	12 g
Clofazimine (Cfz) (50 and 100mg)	2-3	Twice daily	200 mg
Amoxycillin/Clavulanate (Amx/Clv) (500/125) – dosing is base on Amoxacillin component.	30 mg (< 3 months) 45 mg (> 3 months and less than 40 kg)	Twice daily.	2000mg

(Husain et al., 2013)

1.11.5.2. Length of the Intensive Phase of the MDR TB and XDR TB Regimen

The recommended administration duration of the injectable agent is guided by culture conversion (reference Table 1.10 and 1.11).

- **Patients on the Standard MDR TB Regimen**

The injectable agent should be given for four months past culture conversion and for a minimum of at least 8 months. It is given seven days a week. Injectable agent should be continued for at least 8 months. For patients who have completed 4 months of treatment having documented culture conversion and are clinically doing well, consideration to decrease the injectable to three times a week can be made by the expert clinician. Do not decrease the injectable to three times a week for patients who have not culture converted (unless suffering from severe adverse reaction). In case of re-conversion, the duration should be determined by Clinical Management Committee.

The Standard MDR TB Regimen should be given for a minimum of 20 months and at least 18 months past sustained culture conversion (reference Table 6.4). The Standard XDR TB Regimen should be given for at least 22 months past culture conversion.

Table 1.10: Length of Treatment for the Standard MDR TB Regimen

Date of first sustained conversion*	Length of injectable agent	Length of Total treatment for Standard MDR TB regimen
Between month 0 and 4	8 months	20 - 22 months
Between months 5 and 8	Add 4 months from conversion date	Add 18 months from conversion date

*Date of first negative smear and culture by two consecutive months

- **Patients on the Standard XDR TB Regimen**

Proposed duration of treatment is minimum 24 months (Intensive phase minimum 12 months Continuation phase minimum 12 months). However, the final decision will be taken by Clinical Management Committee.

Table 1.11: Length of Treatment for the Standard XDR TB Regimen

Date of first sustained conversion*	Length of injectable agent	Length of Total treatment for Standard XDR TB regimen
Between month 0 and 2	12 months	24 months
Between months 3 and 6	Add 10 months from conversion date	Add 22 months from conversion date

(Husain, et al., 2013)

1.11.5.3. Treatment of Mono and Poly-Resistance TB

Patients with mono and poly-resistance must be referred to the MDR-TB hospital for assessment and initiation of treatment but should not be admitted in the hospital. The PHC (Primary Health Care) facility must then monitor the patient throughout the treatment period and the treatment outcomes must be reported to the MDR-TB Treatment initiation site. Where DR-TB registers are kept at PHC level, these patients must be registered in these registers and the data collated at district level. (Motsoaledi & Matsoso, 2014)

1.12. Prevention of TB

From the public health point of view, the best way to prevent TB is to provide effective treatment to the infectious TB cases. This interrupts the chain of transmission. Good treatment programes are the best prevention programs. HIV-infected individuals are particularly susceptible to infection with *M. tuberculosis* and the development of TB.

- **Protection Against Exposure to TB**

Patients and staff in health units face daily exposure to TB. The risk of exposure is greatest in adult medical wards and TB wards where there are many PTB cases. Often the wards are crowded and badly ventilated. We do not yet know the size of this risk. Prompt diagnosis and treatment of patients with sputum smear- positive PTB helps to reduce exposure to TB. Out-patient diagnosis and treatment of PTB patients avoids hospital admission. This is an advantage in decreasing exposure to TB in hospital wards. In some NTPs there is a move away from an in-patient intensive phase towards outpatient management. Known HIV-positive health workers should not work with PTB patients. They should therefore not work in TB wards or adult medical wards.

- **Environmental Control**

Good ventilation helps reduce TB transmission indoors. Sunlight is a source of ultraviolet light which can kill TB bacilli. So ideally, wards should have large windows.

- **Face-masks**

A face-mask decreases the risk that the person wearing the mask can infect other people. So a TB suspect or a TB patient, if possible, should wear a mask if moving from one part of a hospital to another. Often a health worker wears a mask for protection against TB, e.g. when working on the TB ward. In fact, a mask is generally not very good at protecting the person wearing the mask from inhaling other people's infectious droplets. The exception is when the health worker is supervising a cough-inducing procedure, e.g. bronchoscopy, or sputum induction using nebulized hypertonic saline.

- **Patient education**

Health workers should teach TB suspects and TB patients' simple measures how to decrease the risk of transmitting TB. These include covering the mouth with the hand when coughing, and

using sputum pots with lids. When examining TB patients or suspects, they are asked to turn their head to one side. This is to avoid the patient coughing directly at the health worker.

- **PTB suspects**

In the majority of cases, PTB (Pulmonary TB) suspects attend as out-patients for the diagnosis of TB. In some cases it is necessary to admit PTB suspects to hospital. If possible they should be admitted to a separate ward from other patients. There are often no facilities to separate PTB suspects from other patients. PTB suspects should be tried to be kept in a part of the ward away from other patients.

- **BCG (Bacille Calmette-Guerin)**

BCG (Bacille Calmette-Guerin) is a live attenuated vaccine derived originally from *M. bovis*. The route of injection is intra-dermal. The usual dose is 0.05 ml in neonates and infants under the age of 3 months, and 0.1 ml in older children. In high TB prevalence countries, WHO recommends a policy of routine BCG immunization for all neonates shortly after birth. The benefit of BCG is in protecting young children against disseminated and severe TB, e.g. TB meningitis and miliary TB. BCG has little or no effect in reducing the number of adult cases of PTB.

- **Patients with sputum smear-positive PTB**

In many NTPs, sputum smear-positive PTB patients spend at least part, and often all, of the intensive phase of anti-TB treatment in hospital. Isolation of these patients in TB wards helps reduce the risk of TB exposure to other patients. Do not admit a patient to the TB ward until you have made the diagnosis of TB. In particular, a TB suspect with HIV infection and high susceptibility to TB should avoid exposure to TB. A TB suspect may not turn out to have TB.

(Ghimire et al., 2016)

1.13. Global Epidemiology of TB

Tuberculosis (TB) is a major global health problem. It causes ill-health among millions of people each year and ranks alongside the human immunodeficiency virus (HIV) as a leading cause of death worldwide. In 2014, there were an estimated 9.6 million new TB cases: 5.4 million among men, 3.2 million among women and 1.0 million among children. There were also 1.5 million TB deaths (1.1 million among HIV-negative people and 0.4 million among HIV-positive people), of which approximately 890 000 were men, 480 000 were women and 140 000 were children.

Table 1.12: Estimated epidemiological burden of TB, 2014. Best estimates are followed by the lower and upper bounds of the 95% uncertainty interval. Numbers in thousands.

	TOTAL NOTIFIED	NEW AND RELAPSE [a]	RETREAT-MENT EXCLUDING RELAPSE	NEW OR PREVIOUS TREATMENT HISTORY UNKNOWN			RELAPSE			PERCENTAGE OF PULMO-NARY CASES BACTERIO-LOGICALLY CONFIRMED
				PULMONARY BACTERIO-LOGICALLY CONFIRMED	PULMONARY CLINICALLY DIAGNOSED	EXTRA-PULMONARY	PULMONARY BACTERIO-LOGICALLY CONFIRMED	PULMONARY CLINICALLY DIAGNOSED	EXTRA-PULMONARY	
Afghanistan	32712	31746	966	14737	8573	7227	1209			65
Bangladesh	196797	191166	5631	106767	42832	37406	2989	863	309	72
Brazil	81512	73970	7542	41120	17801	9479	3602	1488	480	70
Cambodia	43738	43059	679	12168	11286	18310	445	709	141	51
China	826155	819283	6872	235704	526106	32348	25125			33
DR Congo	116894	115795	1099	75631	13494	19566	4298	1892	914	84
Ethiopia	119592	119592		40087	41575	37930				49
India	1683915	1609547	74368	754268	343032	275502	124679	112066		66
Indonesia	324539	322 806	1733	193321	101991	19653	6449	1391	1	66
Kenya	89294	88025	1269	34997	30872	14640	3569	2947	1000	53
Mozambique	58270	57773	497	24430	23455	6276	1542	2070		50
Myanmar	141957	138352	3605	42608	70305	16108	5276	3650	405	39
Nigeria	91354	86464	4890	49825	29460	4764	2415		0	64
Pakistan	316577	308417	8160	122537	120350	57463	7420	426	221	52

	TOTAL NOTIFIED	NEW AND RELAPSE[a]	RETREAT - MENT EXCLUDING RELAPSE	NEW OR PREVIOUS TREATMENT HISTORY UNKNOWN			RELAPSE			PERCENTAGE OF PULMO-NARY CASES BACTERIO-LOGICALLY CONFIRMED
				PULMONARY BACTERIO - LOGICALLY CONFIRMED	PULMONARY CLINICALLY DIAGNOSED	EXTRA-PULMONARY	PULMONARY BACTERIO-LOGICALLY CONFIRMED	PULMONARY CLINICALLY DIAGNOSED	EXTRA-PULMONARY	
Philippines	267436	243379	24057	92991	139950	4161	6277			41
Russian Federation	136168	102340	33828	37296	40894	8763	7982	6753	652	49
South Africa	318193	306166	12027	155473	106482	33522	7430	2693	566	60
Thailand	71618	67722	3896	34394	21115	10244	1969	0	0	63
Uganda	46171	44187	1984	26079	1854	4180	1499	468	107	69
UR Tanzania	63151	61571	1580	23583	2380	13600	1008			51
Viet Nam	102087	100349	1738	49938	25179	18118	7114			69
Zimbabwe	32016	29653	2363	11224	13151	3909	1369			49
High-burden countries	**5160146**	**496132**	**198784**	**2179178**	**1763137**	**653169**	**22366**	**137416**	**4796**	**56**
AFR	1342400	1300852	41548	635560	399155	212057	39782	11217	3081	62
AMR	228476	215243	13233	127864	40746	32501	10193	2918	1021	76
EMR	465677	453393	12284	183630	151696	103959	12368	866	874	56
EUR	321421	266058	55363	112416	76759	39175	23935	11483	2290	61
SEAR	2580605	2482074	98531	1188654	632418	389819	152498	117970	715	64
WPR	1375572	1335816	39756	449845	734179	103085	44354	3037	1316	40
Global	**6314151**	**605346**	**260715**	**269799**	**203493**	**88056**	**283130**	**147491**	**9297**	**58**

Blank cells indicate data not reported.

[a] New and relapse includes cases for which the treatment history is unknown.

(GLOBAL TUBERCULOSIS REPORT 2015, 2015)

Chapter-2

Literature Review

Assessment of knowledge regarding tuberculosis among non-medical university students in Bangladesh: a cross-sectional study

The aim of this study was to assess the Knowledge about TB among non-medical university students in Bangladesh. A cross-sectional survey was performed on 839 non-medical university students. Data were collected from University of Rajshahi from March to August 2013 using a standard semi-structured questionnaire. Chi-square test was utilized to find the factors which are associated with students' knowledge about TB. Among 839 students, male and female were 68.2% and 31.8 % respectively. Most of the students (94.4 %) were informed about the term TB, among them 50 % got information from electronic media. More than 50 % students believed that TB is a communicable disease, 42.8 % students agreed that bacteria is an agent for TB, most of the subjects (93 %) had the knowledge about the vaccination against TB and 97.6 % students believed that TB is curable. However, students had poor knowledge about latent TB (13.7 %) and DOTs program (28.5 %).In this study demonstrated that the level of general knowledge about TB was insufficient among non-medical university students. Consequently, health education program is needed to improve the knowledge among university students regarding TB.

(Rana et al., 2015)

Factors Associated with Poor Knowledge among Adults on Tuberculosis in Bangladesh: Results from a Nationwide Survey

The objective of this study was to describe knowledge of TB among newly diagnosed TB cases and community controls to assess factors associated with poor knowledge in order to identify programmatic implications for control measures. Embedded in TB prevalence survey 2007–2009, we included 240 TB cases from the TB registers and 240 persons≥15 years of age randomly selected from the households where the survey was implemented. All participants were interviewed using a structured, pre-tested questionnaire to evaluate their TB knowledge.

Regression analyses were done to assess associations with poor knowledge of TB. This survey documented that overall there was fair knowledge in all domains investigated. However, based on the number of correct answers to the questionnaires, community controls showed significantly poorer knowledge than the TB cases in the domains of TB transmission (80% vs. 88%), mode of transmission (67% vs. 82%), knowing≥1suggestive symptoms including cough (78% vs. 89%),

curability of TB (90% vs. 98%) and availability of free treatment (75%vs. 95%). Community controls were more likely to have poor knowledge of TB issues compared to the TB cases even after controlling for other factors such as education and occupation in a multivariate model (OR 3.46, 95% CI: 2.00-6.09). Knowledge on various aspects of TB and TB services varies significantly between TB cases and community controls in Bangladesh. The overall higher levels of knowledge in TB cases could identify them as peer educators in ongoing communication approaches to improve care seeking behavior of the TB suspects in the community and hence case detection. (Hossain et al., 2015)

Patient's Knowledge and Attitude towards Tuberculosis in an Urban Setting

This cross-sectional study was conducted to assess knowledge of TB patients about symptoms, ways of transmission and treatment of tuberculosis, and their perception of the illness. Between March and August 2008, 762 adult TB patients were interviewed at selected DOTS Centre of Dhaka city. Male and female distribution was 55.6% and 44.4%, respectively. One quarter of them was illiterate, and more than half had extended family and live in a congested situation. Night fever was the most common symptom known (89.9%), and 56% were aware that it could spread through sneezing/coughing. Television was mentioned as a source of information about TB. The majority expressed a helping attitude towards other TB patients. Although most of them were positive about getting family support, 46.6% mentioned discrimination of separate utensils for food or drink. About 50.5% expressed increased sadness, 39.8% had fear of loss of job/wedges, and 21.4% felt socially neglected. Along with drug treatment the psychosocial reactions of TB patients should be addressed at DOTS centers for better control of the disease.

(Tasnim et al., 2012)

Knowledge and Attitude towards Tuberculosis among Sandstone Quarry Workers in Desert Parts of Rajasthan

This study was conducted to test the knowledge and attitude of sand-stone quarry workers of Jodhpur on tuberculosis. Nineteen sand-stone quarry sites were selected randomly in Jodhpur district from which 376 quarry workers were interviewed who consented to participate in the

study. Their literacy rate was 28.5%. More than half (50.5%) had heard about tuberculosis from neighbors followed by friends (42.6%) and family members (37.2%). Only 1.6% knew that tuberculosis was caused by germs and 45.2% respondents had misconception that TB was a hereditary disease. Literates were more aware than illiterates about symptoms of tuberculosis. Only 6.9% knew about the need of treatment for 6-8 months and 0.8% knew about the use of BCG vaccine for prevention of tuberculosis. Tendency to discriminate TB patients was evident as 72.6% respondents opined to isolate TB patients from the family and 80.6% opined to avoid sharing food with these patients. Extensive health education directed towards bringing a change in attitude among sandstone quarry workers was needed to create awareness and remove myths about tuberculosis in such groups of people in the community. (Yadav & Mathur, 2006)

Public Awareness of Tuberculosis in China: a National Survey of 69 253 Subjects

This study was conducted to investigate the level of awareness about tuberculosis (TB) in the public and associated factors in China. Participants were recruited from 60 counties in 19 provinces and interviewed using a structured questionnaire. Questions asked covered the areas are-overall TB awareness, signs/symptoms of TB, mode of TB transmission, TB dispensaries, free TB detection/treatment policy, TB curability and stigma attached to TB. Factors associated with TB awareness were examined using logistic regression. A total of 69 253 respondents aged 12–65 years were interviewed, revealing an overall TB awareness rate of 89.0% (95% CI 88.8–89.3). The awareness rates for TB symptoms, TB dispensaries and the free TB detection/treatment policy were respectively 15.1% (95% CI 14.8–15.4), 41.9% (95% CI 41.6–42.3) and 44.7% (95% CI 44.3–45.0). Approximately 71.9% (95% CI 71.6–72.3) had some extent of stigma towards patients with TB. People in the farming industry and those with low educational levels had poorer knowledge of all aspects of TB knowledge and were more likely to stigmatism TB. Future TB control programs in China should emphasized TB symptoms, TB dispensaries and its free TB detection/treatment policy to increase public TB awareness, and should target farm workers and people with low educational levels. (Lu et al., 2009)

Knowledge and Awareness of Tuberculosis among Pre-university Students in Trinidad

The purpose of the study was to determine the level of knowledge and attitudes among pre-university students in Trinidad and Tobago on the pre-disposing factors and prevention of tuberculosis and the management of persons with the disease. More than 90% (542 of 600) of participating students from nine secondary schools duly completed the self-administered questionnaires. Two-thirds of the students were girls (336) and the rest were boys (206). The ages of the participants ranged from 16–19 years and more than 82% of them belonged to the 17–18 year old age group. The least represented was the 19 year olds. The study showed that although 92.8% had heard of tuberculosis, overall knowledge about the disease was generally poor. The majority of students (77.5%) believed the disease could be prevented, but 10.3% knew of the BCG vaccine and only 11.1% knew about the Mantoux skin test. The study also demonstrated the need for renewed efforts in health education for the public, clarifying areas of misunderstandings about important and common diseases like tuberculosis, in developing countries. (Orrett & Shurland, 2001)

Tuberculosis: do we know enough? A study of Patients and their Families in an out-Patient Hospital Setting in Karachi, Pakistan

In Pakistan approximately 5.7 million people suffer from tuberculosis, with 260 000 new cases occurring every year. This study was conducted in an out patient hospital setting in Karachi. This study was conducted to explore the level of awareness about tuberculosis amongst patients and their families, and recommend strategies for increasing understanding of the disease. Descriptive cross-sectional survey was based on a structured questionnaire using convenience sampling. Of the 203 patients interviewed, 131 were males. Nearly 82% knew that tuberculosis is contagious and 78% were aware that lungs are commonly affected. Almost half knew that it spreads by droplets and causes cough and that treatment is long and costly. With regard to commonly affected age and sex, however, respectively only 43% and 23% had the correct knowledge. Less than one third could identify appropriate risk factors and ways to cure and limit spread. Almost half tuberculosis considered to be a social stigma. Media emerged as the main source of information. Respondents with more than 12 years of formal education were more likely to have

better knowledge. Further population based studies are recommended. Misconceptions about tuberculosis need to be removed through focused health education messages. The importance of complete and appropriate treatment needs to be emphasized. (Ali et al., 2003)

Knowledge of Disease and Treatment among Tuberculosis Patients in Mwanza, Tanzania

It was a health care facility based study in a rural and urban setting in Mwanza region, Tanzania to determine patients' general knowledge of tuberculosis (TB) and the management of the disease. From 7 May to 7 July 1998, 296 pulmonary tuberculosis patients were consecutively interviewed. The majority of the respondents (89%) were out patients. Questions were based on Tanzanian National Tuberculosis Programed (NTP) treatment guidelines for teaching tuberculosis patients. When correct answers to five out of seven questions asked was regarded as satisfactory knowledge; only 30% of the study population had satisfactory knowledge of disease and treatment. Persons with information on TB prior to diagnosis and those with higher education were more likely to have satisfactory knowledge (OR 9.23 and 19.93; 95% CI 2.77–31.08 and 5.74–69.19, respectively). There was a negative correlation between the level of knowledge and patients' age (r 0.181, P 0.01). Knowledge was not significantly affected by sex or area of residence. The two most important sources of information about TB were health workers and former TB patients. Using NTP guidelines as reference, a substantial number of patients interviewed in health facilities in the study period had an unsatisfactory knowledge of TB disease and its management. The study did identify factors associated with satisfactory knowledge that could assist in designing health education intervention strategies.

(Wandwalo & Mørkve, 2002)

Knowledge about Tuberculosis and its Treatment among New Pulmonary TB Patients in the North and Central Regions of Vietnam

This study was conducted based on 42 districts in north and central Vietnam were included in the study to describe patients' knowledge of TB and to evaluate the impact of the National Tuberculosis Program's health education. New pulmonary TB patients who had received TB treatments for a minimum of 1 month were interviewed using a structured questionnaire. A total

of 364 patients were interviewed; 93% of respondents reported receiving TB information from the health staff. Apart from health education, many patients reported TB information from the TV. This was more common among men than women (71.4%vs. 51.3%). The average knowledge score was 7.07 (maximum 10). This was significantly associated with level of education and receiving health education. More than half of the patients expressed fear of being known as TB patients in the community. Knowledge about TB and its treatment was generally high. Marginalised groups with limited access to media and low education levels may benefit from specially targeted educational interventions. To reduce stigma and the impact of social consequences of TB, an ongoing health education programme designed to increase the knowledge level in the whole population appeared to be warranted. (Hoa et al., 2004)

Knowledge, Attitude and Misconceptions regarding Tuberculosis in Pakistani Patients

Objective of this study was to assess knowledge of patients with tuberculosis; about their disease and misconceptions regarding TB. A cross sectional study was conducted at Out-patient clinics of two teaching hospitals (private and public) in Karachi, Pakistan. A questionnaire was filled for the purpose. A total of 170 patients were interviewed, 112 from private and 58 from a public sector hospital. Cough, fever, bloody sputum and chest pain were recognized as the common symptoms of TB. Eleven (7%) patients thought TB was not an infectious disease and 18 (10.6%) did not consider it a preventable disease. Contaminated food was considered the source of infection by 81 (47.6%) and 96 (57%) considered emotional trauma/stress the causative agent of TB. No counseling about preventing spread was received by 81 (50%) patients and 97 (57%) considered separating dishes as an important means of preventing spread. Thirty one (18%) patients would have discontinued their medications following relief of symptoms. Thirty nine (23%) of the respondents thought that TB could lead to infertility and 66 (38.8%) believed that there were reduced chances of getting married following infection. Misconceptions concerning TB were common in Pakistani patients. Lack of knowledge on Tuberculosis was alarming. (Khan & Irfan, 2016)

Knowledge and Awareness of Tuberculosis among High School Students of Mysore City

Objective of this study was to assess the knowledge about tuberculosis among high school students of Mysore city. A cross sectional study was carried out to assess the knowledge about tuberculosis among 129 students studying in 9th- 10^{th} standard of two high Schools in Mysore city selected by cluster sampling. 81% knew TB was caused by bacteria, 85% mentioned it spreads from person to person, 78%, 72% and 54% knew cough as the main symptom, sputum test is the diagnostic test and treatment was for 6-9 months respectively. 54% students mentioned television as main source of information. Knowledge about disease causation, manifestation and cough hygiene was good, but limited knowledge with respect to management domain and TB risk in HIV patients and patient care and discrimination towards TB patients. Only 65% of students knew the increased lifetime risk of acquiring TB in HIV positive patients called for a need to emphasis this risk factor in educational interventional program. (Renuka & Dhar, 2012)

Knowledge and Awareness of Tuberculosis among Roma Population in Belgrade: a Qualitative Study

Tuberculosis (TB) remains an important health problem in the Roma population in Serbia. Recent studies have highlighted the importance of increasing awareness of TB and reducing the associated stigmas to reduce the incidence of TB and enable earlier diagnosis and effective treatment. This study investigated the knowledge and beliefs about transmission, symptoms and treatment of TB as well as attitudes towards patients with TB among the Roma population in Belgrade. The focus-group method was considered to be appropriate for investigating knowledge and beliefs about TB. A total of 24 Roma people aged 19-55 years participated in three focus-group discussions. All participants knew that TB was a pulmonary disease and could be contagious. Saliva was the most commonly mentioned mode of transmission. Some individuals thought, albeit hesitantly, that TB could be transmitted by shaking hands with an infected individual. Of factors contributing to TB, participants mentioned bad living conditions, low quality and lack of food, and stress. Participants quoted chest pain, cough, and hemoptysis, loss of appetite, and loss of weight, weakness and sweating as basic symptoms of TB. Participants believed that effective treatment should include resting, taking prescribed medicines, inhaling

fresh air and eating “strong” food such as bacon and pork; these approaches were considered as important as taking antibiotics). In addition, participants mentioned that they used some folk medicines. Relatives and friends, and to a lesser extent television, were the main sources of information about TB. Participants most appreciate personal contact with doctors as a source of information. Participants were aware of the seriousness TB as well as some of the modes of transmission; however, they had some misconceptions. An important finding was the confidence in doctors expressed by the Roma people. (Vukovic & Obradovic, 2011)

Aims & Objectives of the study

Due to the ease of TB infection, anyone can contact the disease. Unfortunately, not many people are aware about TB. This lack of knowledge and awareness is a problem anywhere around the globe. Therefore, the study attempts to examine the level of public awareness regarding this disease to come to more effective approach to address the issue of insufficient communication of information. Specifically, this study has 5 (five) main objectives-

1. To investigate knowledge among undergraduate students of govt. universities in Dhaka about signs & symptoms, risk factors, ways of transmission, prevention and treatment of tuberculosis.
2. To evaluate their perception/attitude towards TB patients.
3. To assess misconceptions regarding TB.
4. To analyze the correlation among demographic characteristics with knowledge and attitude of people towards TB.
5. This study has highlighted the importance of increasing awareness of TB and reducing the associated misconceptions to reduce the incidence of TB and enable earlier diagnosis and effective treatment.

Significance of the Study

In 1993, World Health Organization (WHO) declared that tuberculosis (TB) is a global emergency as because more than two billion people in the world is infected with *Mycobacterium tuberculosis*, and they have the chance of developing TB at any stages of life. Furthermore, the infection rate is higher in developing countries like Bangladesh.

TB is the second leading cause of death after human immune deficiency virus (HIV), as the greatest killer worldwide due to a single infectious agent. Every year, more than 1.3 million people die around the world due to TB. 82 % deaths occur in 22 high burden countries (HBCs) and Bangladesh rank 6th among HBCs. Low awareness, education, income and high population density, smoking, diabetes, certain drugs and other associated diseases are the contributory factors for TB in Bangladesh.

It requires more attention on knowledge and awareness of the community people regarding many areas; especially about diagnostic and treatment service opportunities, availability of services, mode of transmission, effect as well as impact of disease, DOTs, type of disease etc. Lack of TB awareness, along with delay in early diagnosis and insufficient health service resources, has been associated with low TB detection rates and the interruption of TB treatment, as well as delays in early TB diagnosis. Irregularity of treatment can be a serious threat for the country as a whole due to chance of increasing spread and development of drug resistant (DR) TB.

A significant portion of middle and higher educated people have poor knowledge on TB including non-medical university students in Bangladesh. On the other hand, there are little number of surveys on level of knowledge and awareness about TB among non-medical university students in Bangladesh.

This study has paid special attention to university students considering their potential influence on the family and their contribution to the nation's work force in near future in a particular nation. Due to their unique role in near future in the society, it is important to investigate the knowledge about communicable disease like TB. Considering the level of knowledge on common symptoms, disease agent, type of disease, latent infection, source of gaining knowledge, vaccination against TB, treatment system is fundamental information about TB which is necessary to analyze. Association between the knowledge about TB among non-medical university students and socio-economic factors such as gender, religion, residence, parents'

education, occupation and income, type of family, in order to ensure corrective measures can be undertaken.

This study will be helpful to increase the TB awareness rate, to estimate the TB awareness levels among the government university students and to examine the association between socio demographic characteristics and TB awareness.

Chapter- 3

Methodology

3.1 Type of the Study

It was a survey based study.

3.2 Study Population

The study was carried out on 300 students of Dhaka University, Govt. Titumir College, Jagannath University.

3.3. Study Area

The Universities were:

- Dhaka University
- Govt. Titumir College
- Jagannath University

3.4 Inclusion Criteria

- Govt. university Students
- Both males and females

3.5. Exclusion Criteria

Anyone from private university

3.6. Study Tools

A 4 pages structured questionnaire was prepared and it was in English language. The questionnaire consisted of different parts those were personal information, causes of TB, signs & symptoms of TB, mode of spread of TB, diagnosis of TB, treatment of TB, perception towards TB patients, preventive measurement.

3.7. Development of the Questionnaire

The questionnaire was developed based on different factors that can lead to incidence of TB. TB knowledge along of signs & symptoms, treatment, mode of spread, risk factors, diagnosis, perception towards TB patients, preventive measurement etc. were asked in the survey.

The questionnaire was prepared to obtain the level of knowledge and awareness about TB along with demographic information that would help us to correlate among demographic characteristics with knowledge and attitude of people towards TB.

3.8. Data Collection Method

The data was collected through questionnaire that is formed in English language. It is a questionnaire consists of multiple choice type questions. The data was collected by both face to face interview and by questionnaire supply.

3.9. Sampling Technique

In this study random sampling was followed.

3.10 Data collecting period

The duration of the study was about five months that started from January, 2016 up to May, 2016.

3.11. Data Analysis

After collecting, all the data were checked and analyzed with the help of Microsoft Excel 2010.

3.12. Ethics

Oral consent was taken from all participants before the survey took place. The informed consent form included all necessary information for the participants that was read out at the beginning of every interview. It was maintained strictly that there was no enforcement during data collection.

Chapter-4

Result

4.1. Age Distribution

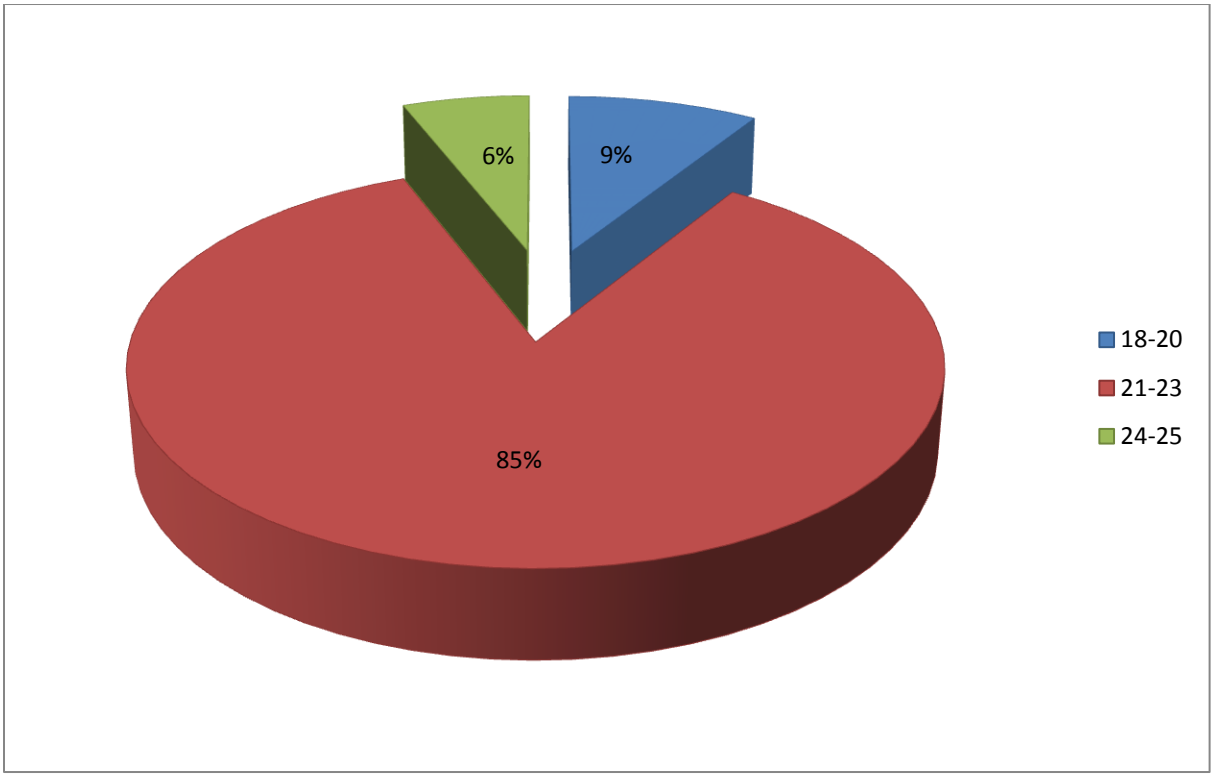

Fig 4.1: Age Distribution

In this survey about maximum (85%) students were in age range 21-23 years, minimum (6%) students were in age range 24-25 years and remaining (9%) were age range 18-20 years.

4.2. Gender Distribution

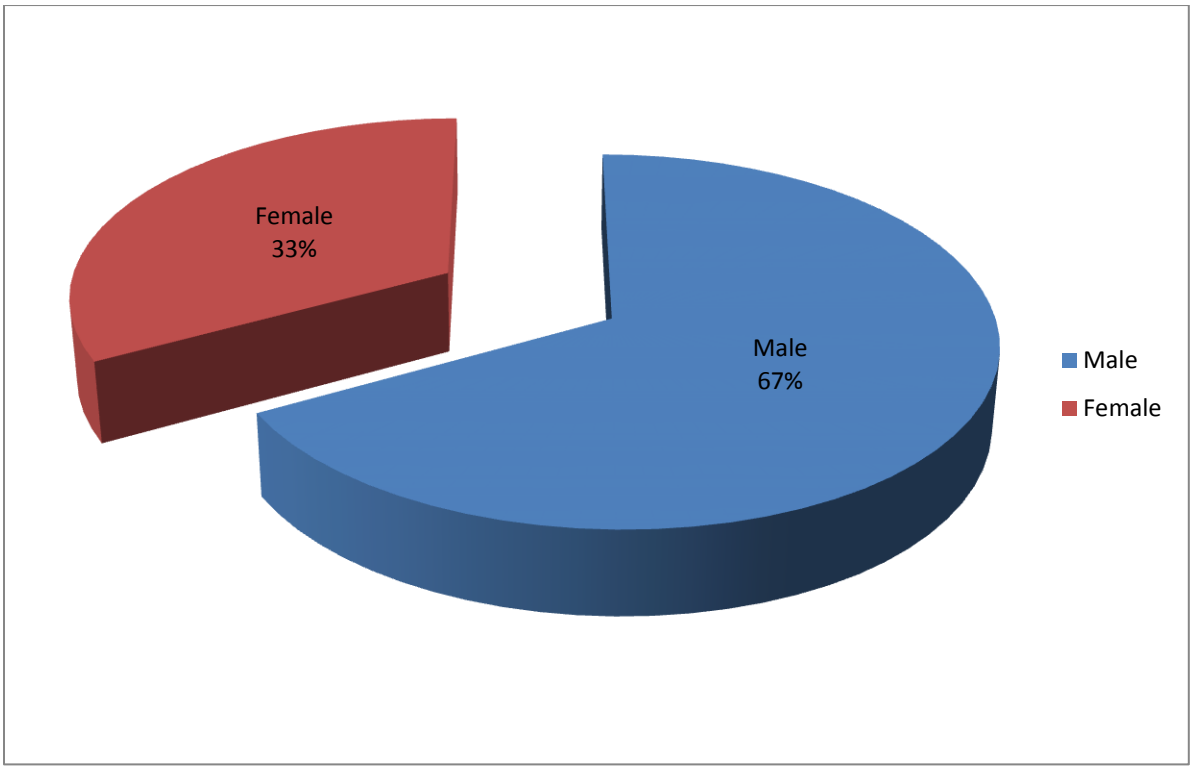

Fig 4.2: Gender Distribution

Of the respondents, 67% were males and 33% were females.

4.3. Religion Distribution

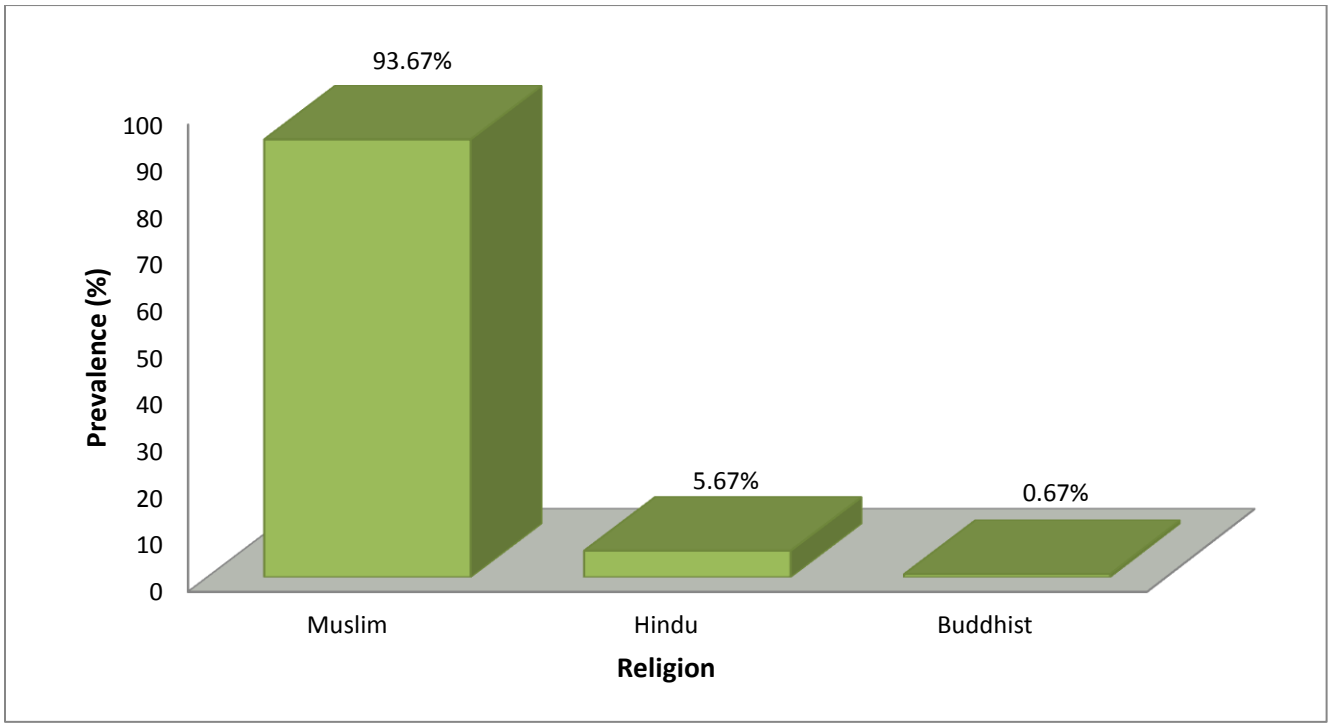

Fig 4.3: Religion Distribution

In this survey in which about 93.67% students were Muslims, 5.67% students were Hindus and remaining (0.67%) students were Buddhists.

4.4. Type of Respondents Family

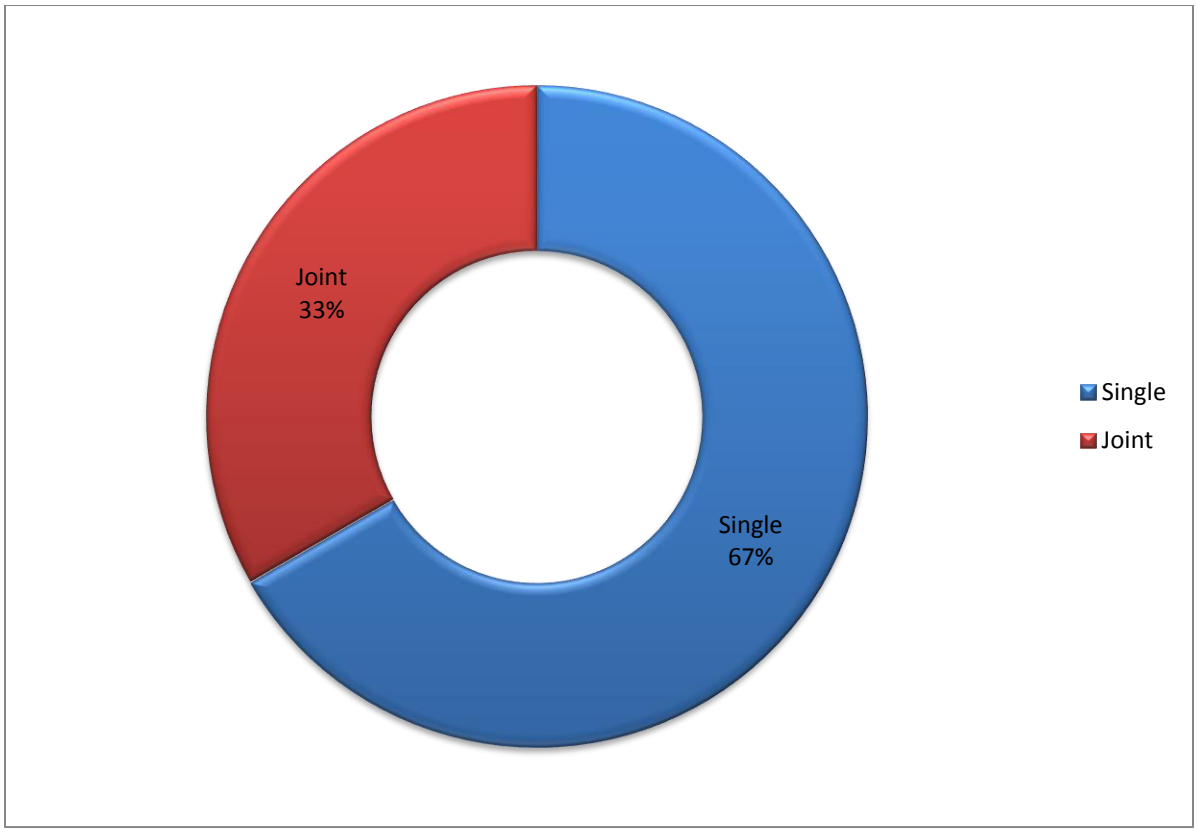

Fig 4.4: Type Respondents of Family

Of the respondents, 67% students came from single family and 33% students came from joint family.

4.5. Marital Status of respondents

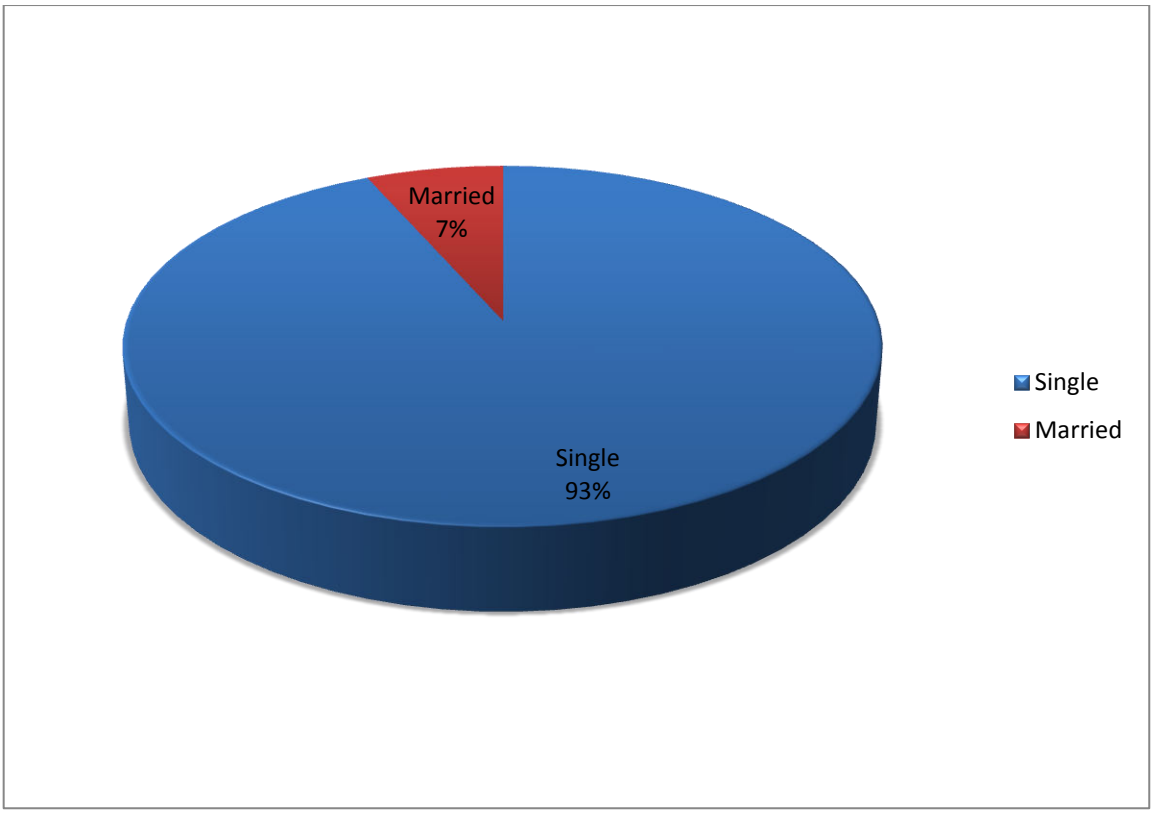

Fig 4.5: Marital status of respondents

Among the total students maximum population (about 93%) were single, only few (7%) students were married.

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4.6. University Distribution

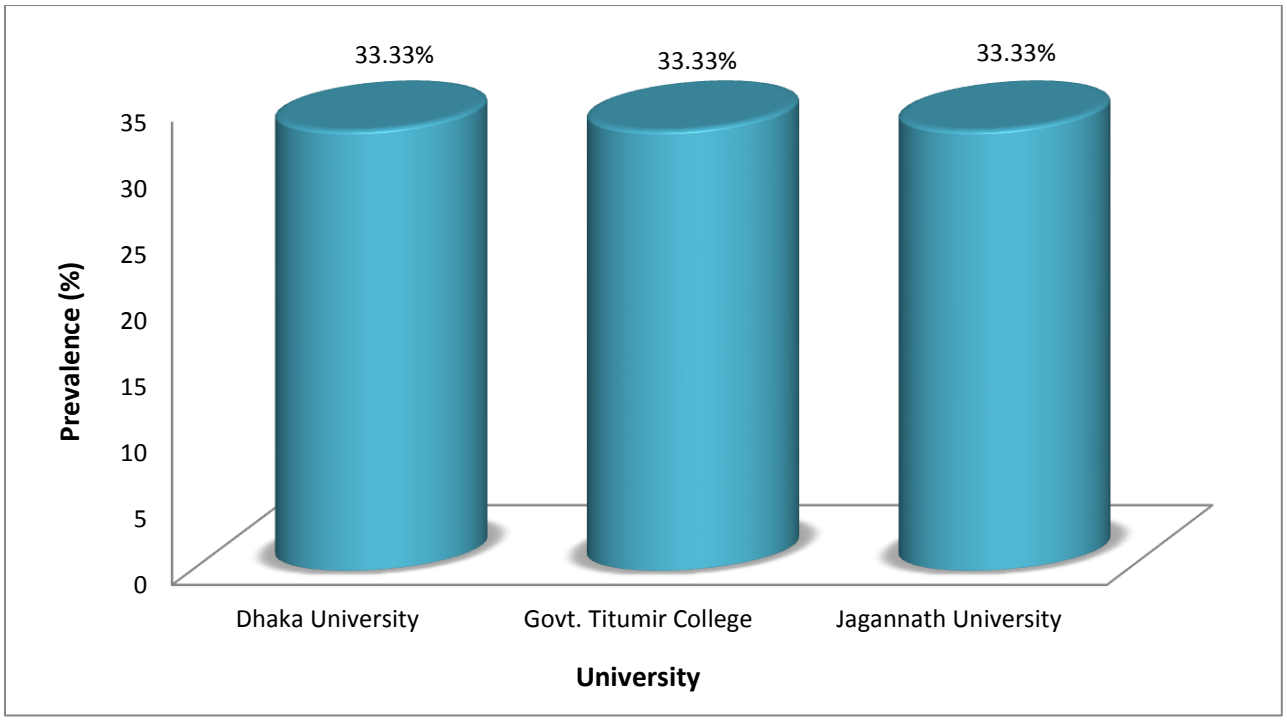

Fig 4.6: University Distribution

In this study, the number of students was same among the University of Dhaka, Govt. Titumir College and Jagannath University.

4.7. Department Distribution

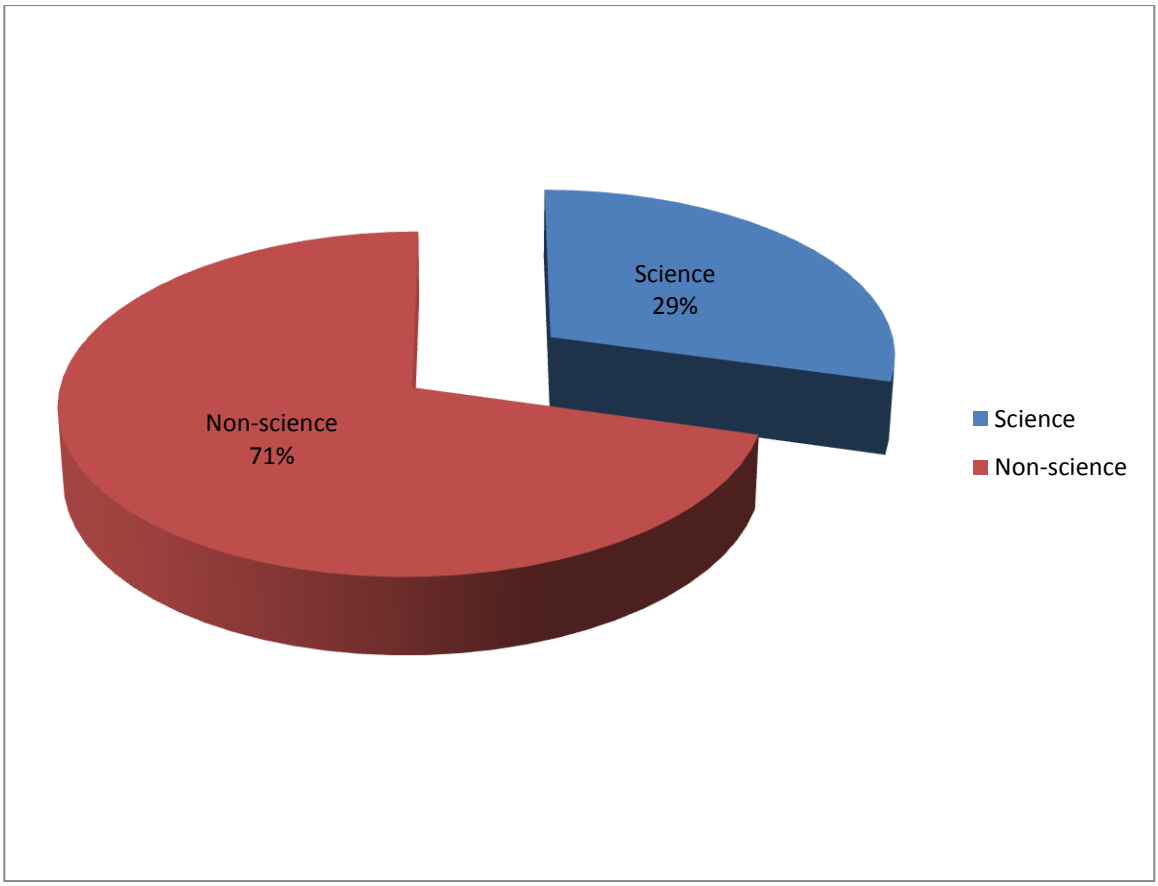

Fig 4.7: Department Distribution

Of the respondents, 71% students were from subject related non-science and 29% students were from subject related to science.

4.8. Year Distribution

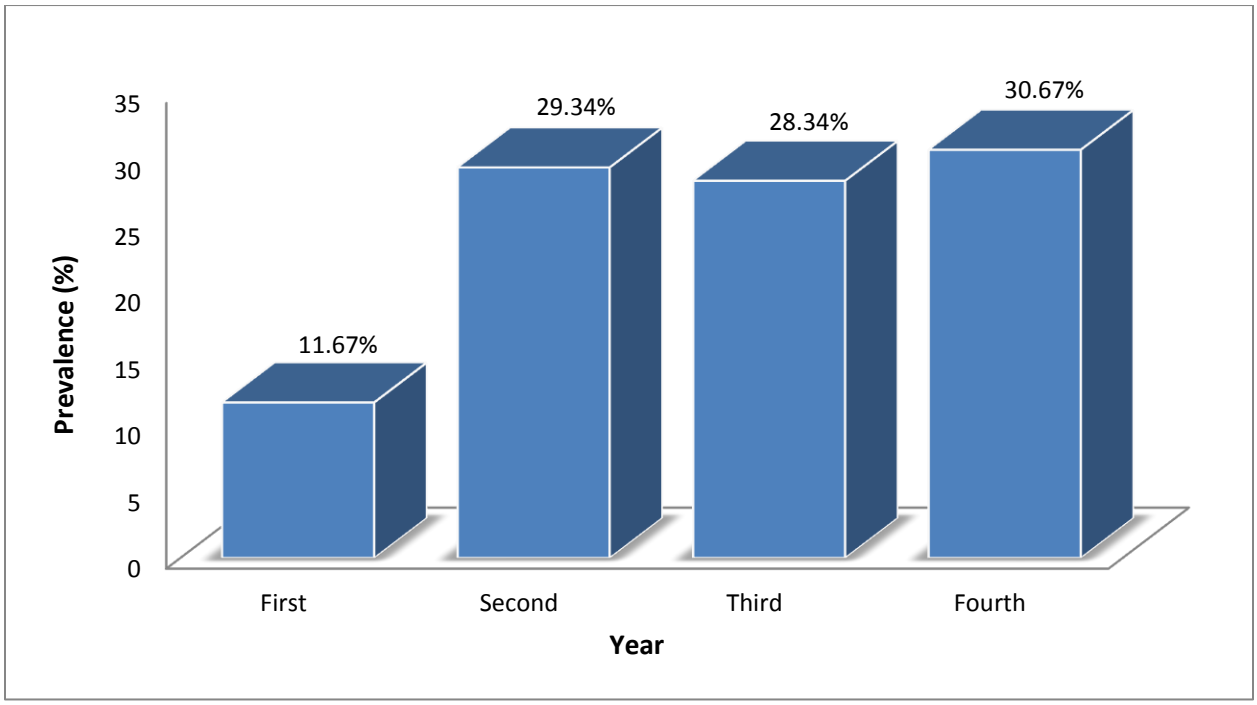

Fig 4.8: Year Distribution

In this study about 11.67% students were from first year, 29.34% from 2nd year, 28.34% from 3rd year and 30.67% from 4th year.

4.9. Job Status of Respondents

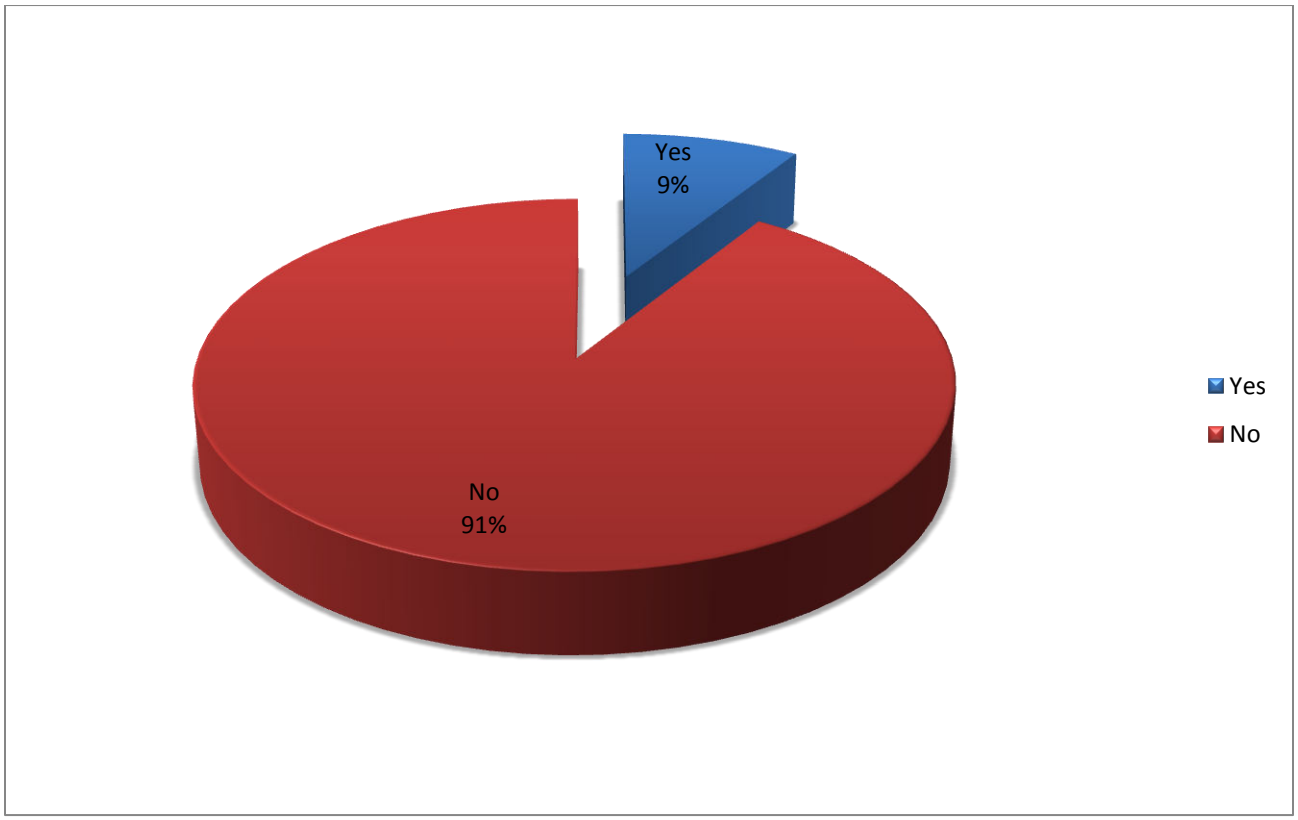

Fig 4.9: Job Status of Respondents

Among the students, who responded to this study, only 7% doing job.

4.10. Occupation Distribution

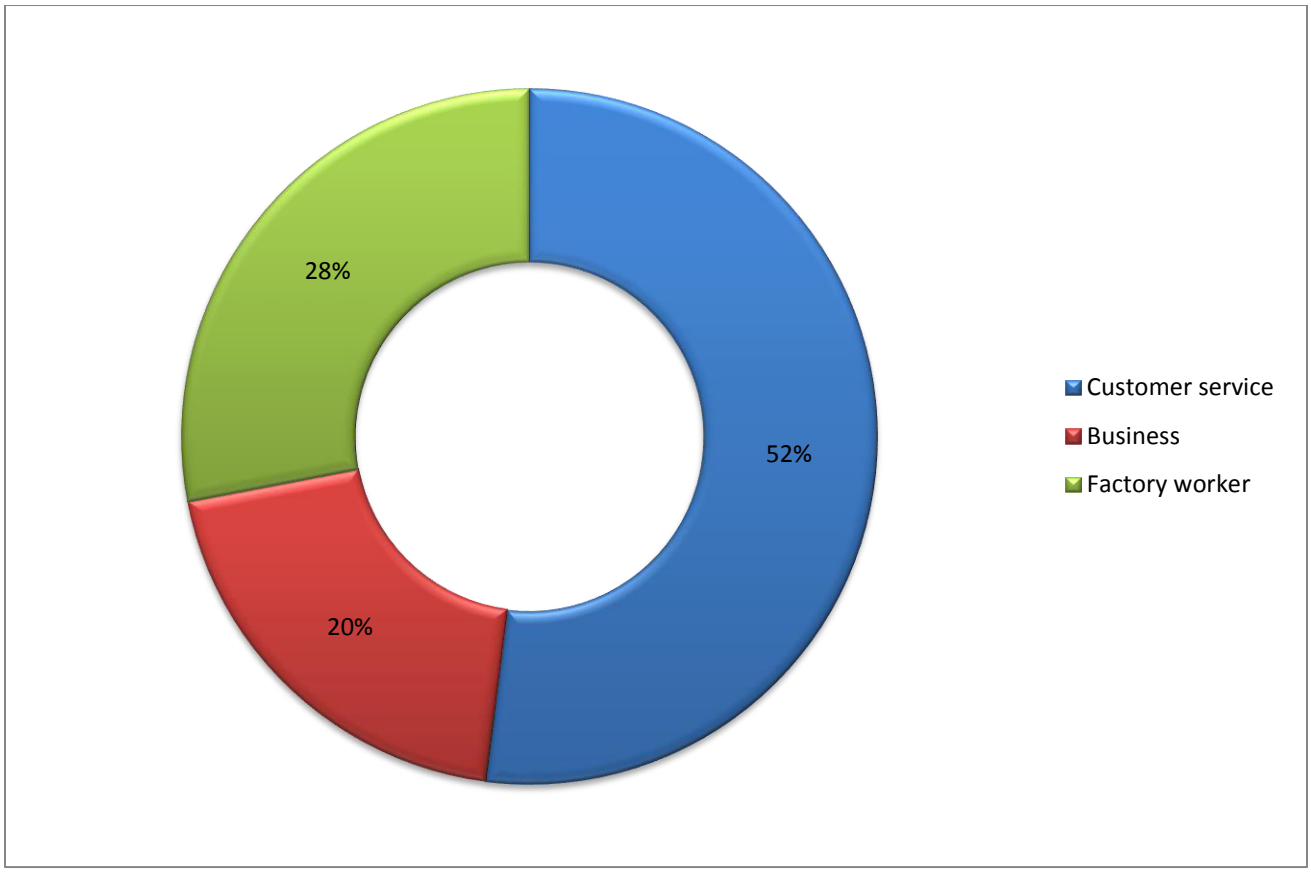

Fig 4.10: Occupation Distribution

Among 7% of students, who are doing job, 52% students provided customer service, 28% students were factory worker and remaining students (20%) were doing business.

4.11. Income Distribution

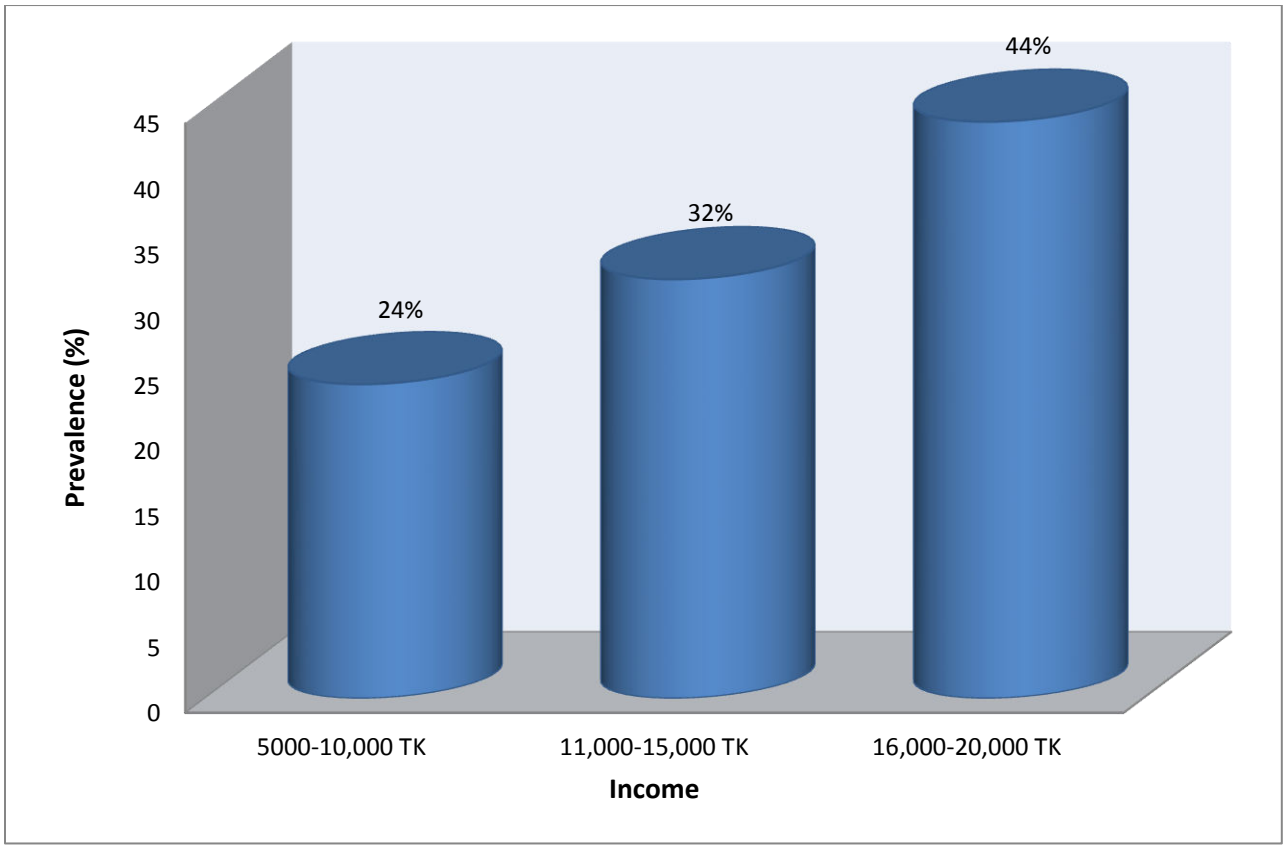

Fig 4.11: Income Distribution

Among 7% of students, who were doing job, the monthly income of 44% students was TK 16,000-20,000, 32% students earned TK 11,000-15,000 and 24% students earned TK 5000-10,000.

4.12. Parents Education Distribution

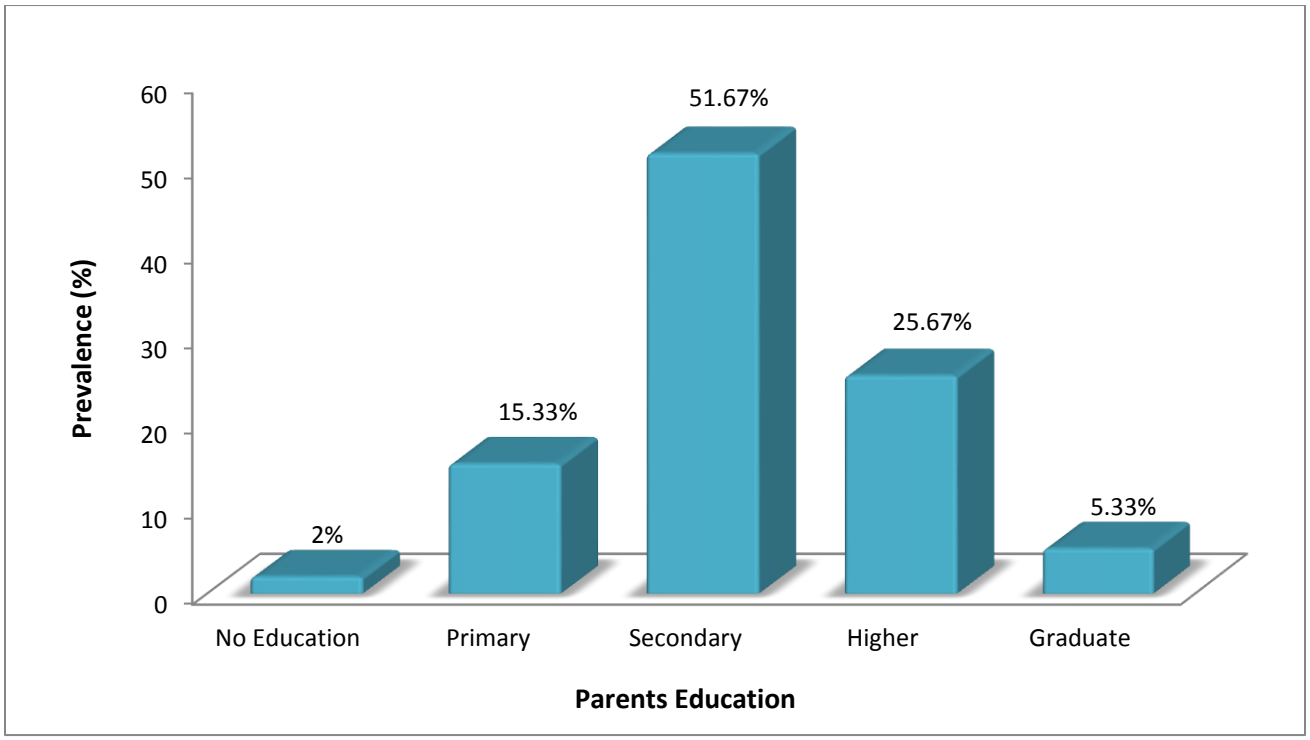

Fig 4.12: Parents Education Distribution

In this study, 2% students' parents were not educated, parents of maximum students (51.67%) were educated at secondary level, 25.67% students' parents educated at higher level, 15.33% students' parents educated at primary level and parents of remaining students (5.33%) were graduated.

4.13. Habit of Respondents

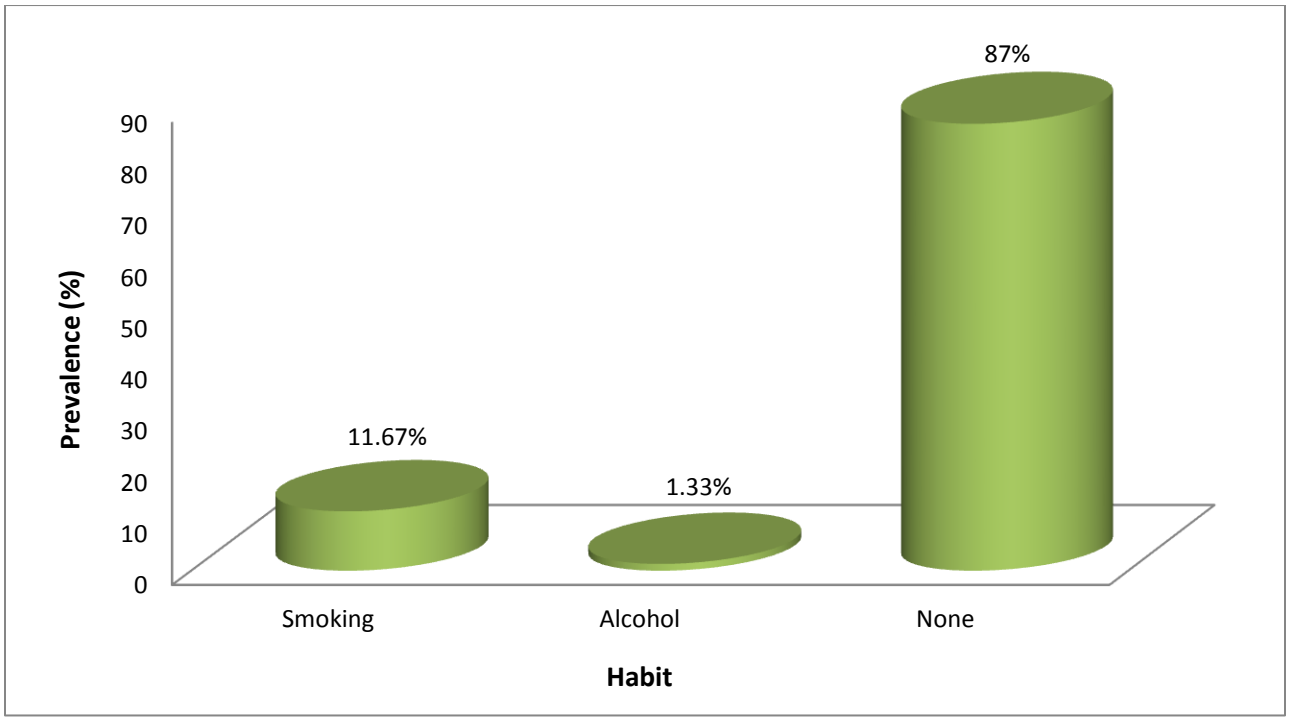

Fig 4.13: Habit of Respondents

Of this study, 87% students had no bad habit, 11.67% of respondents were smoker and 1.33% consumed alcohol.

4.14. Heard About TB

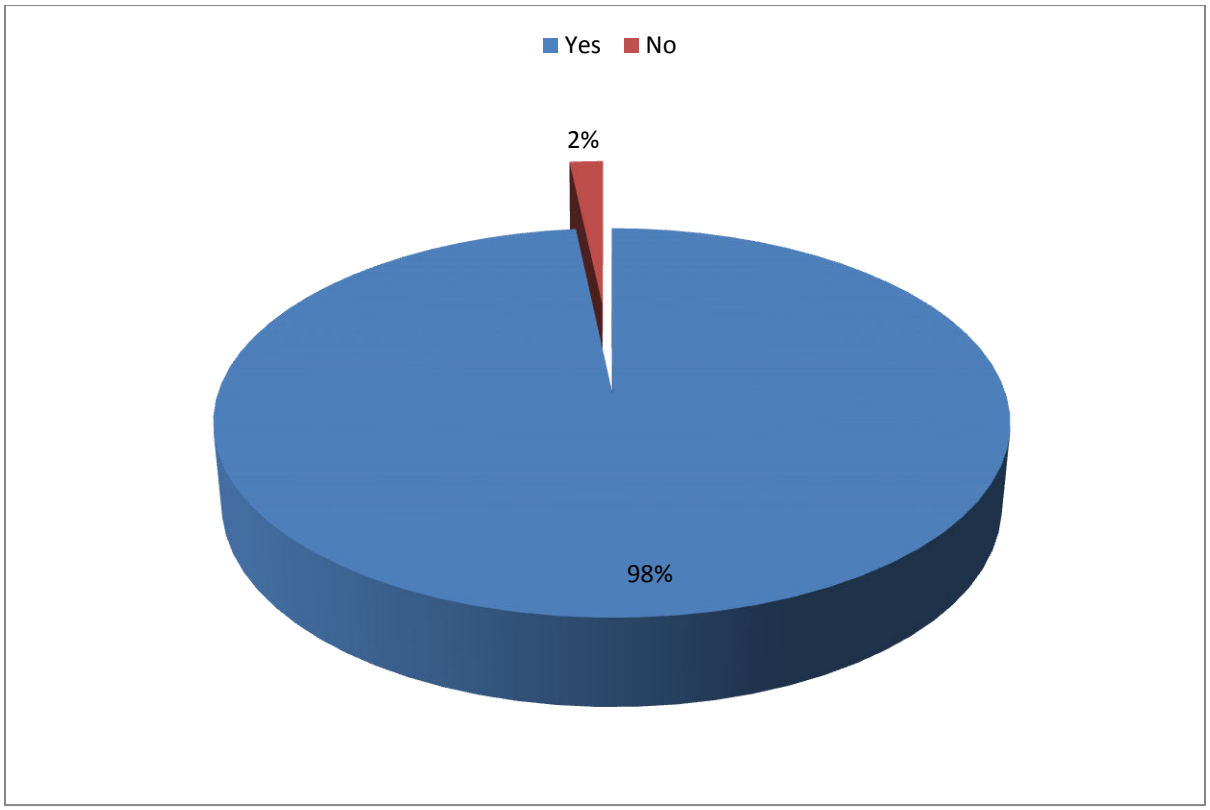

Fig 4.14: Heard About TB

In this study 98% responders confirmed that they had heard about the term TB but 2% responders had not heard.

4.15. Knowledge of TB as Communicable Disease

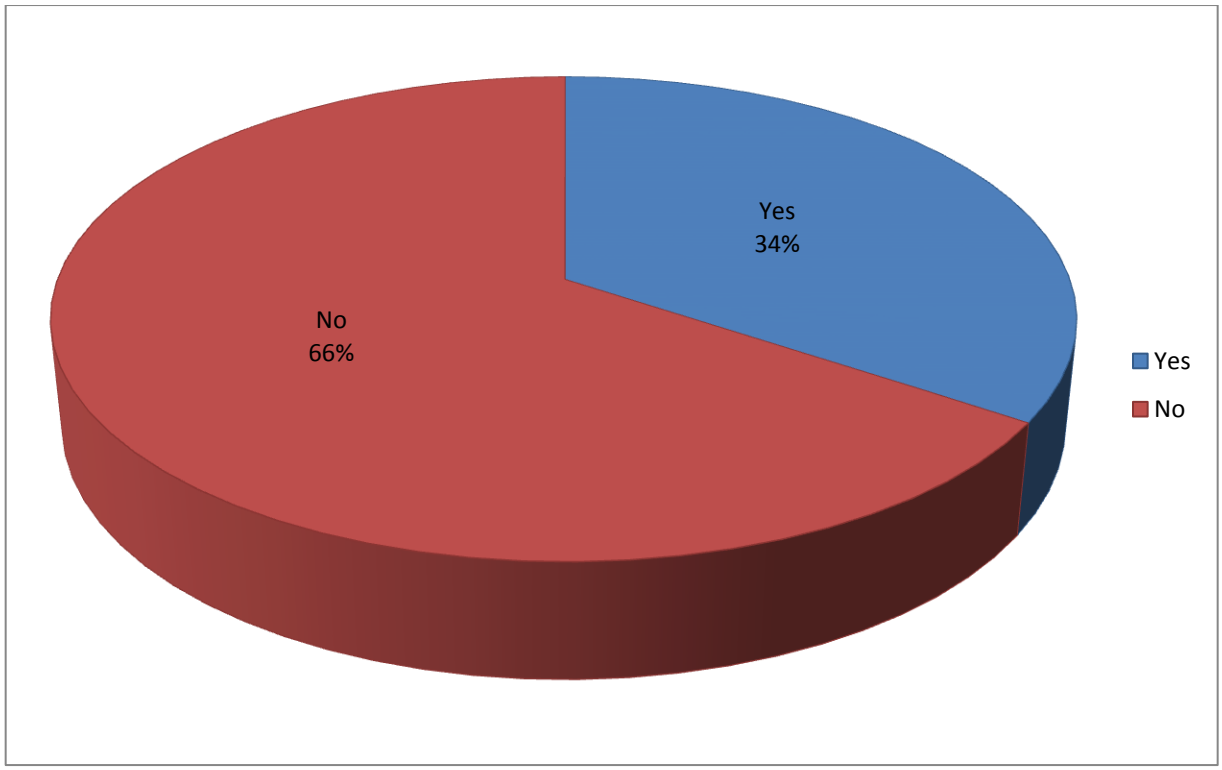

Fig 4.15: Knowledge of TB as Communicable Disease

Of the respondents, 34% students perceived that TB is as communicable disease and 66% students answered that they had no idea about the term communicable and non-communicable diseases regarding TB.

4.16. Knowledge about Latent TB

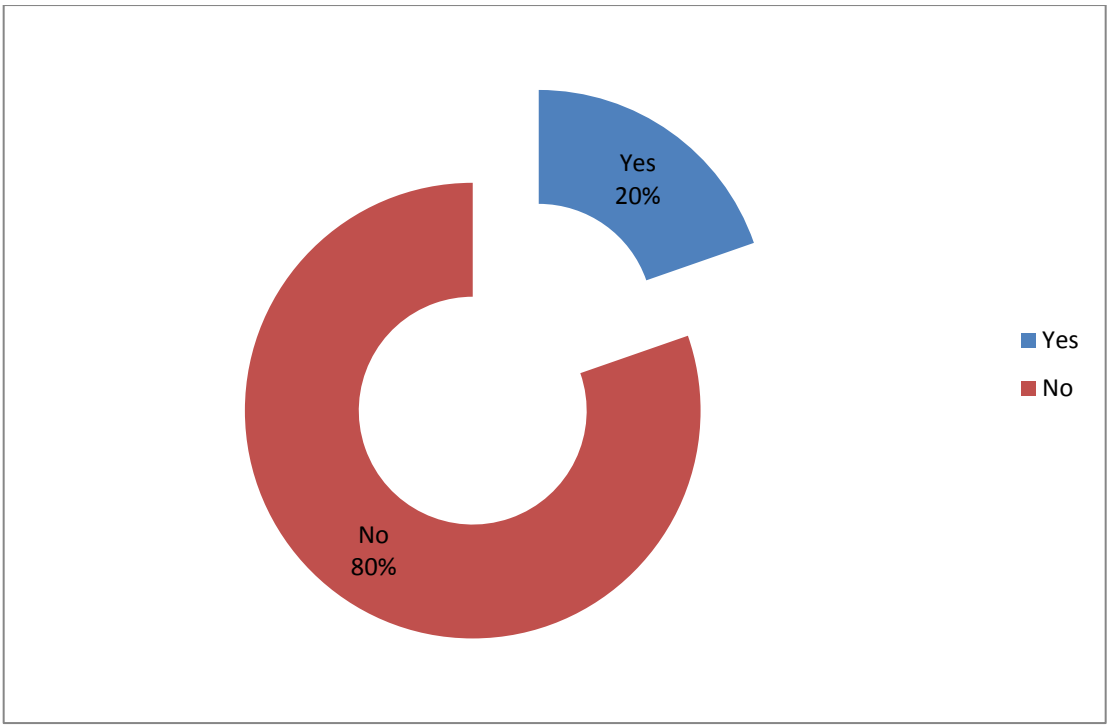

Fig 4.16: Knowledge about Latent TB

Of the respondents, only 20% answered positively while 80% respondents did not have idea about latent TB.

4.17. Major Health Problem in Bangladesh

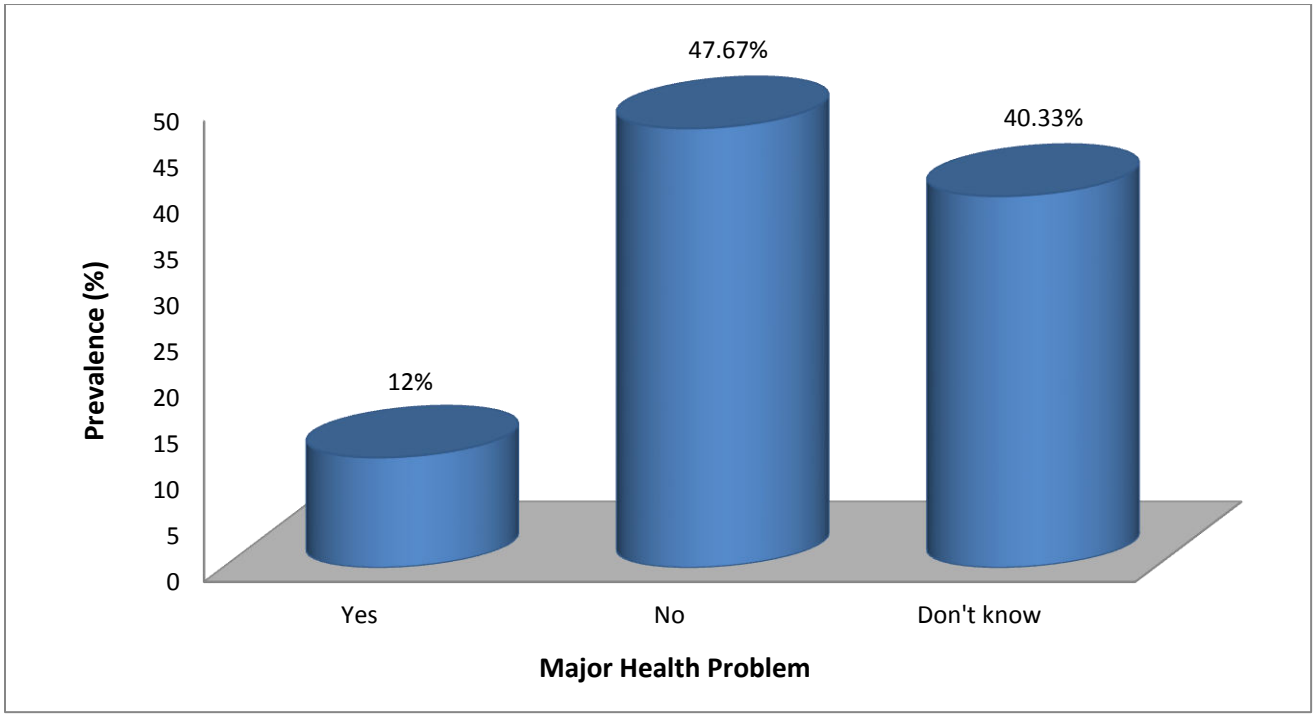

Fig 4.17: Major Health Problem in Bangladesh

In this study, 12% of students considered that TB is the major health problem in Bangladesh, 40.33% of students had not idea about his.

4.18. Knowledge about Causes of TB

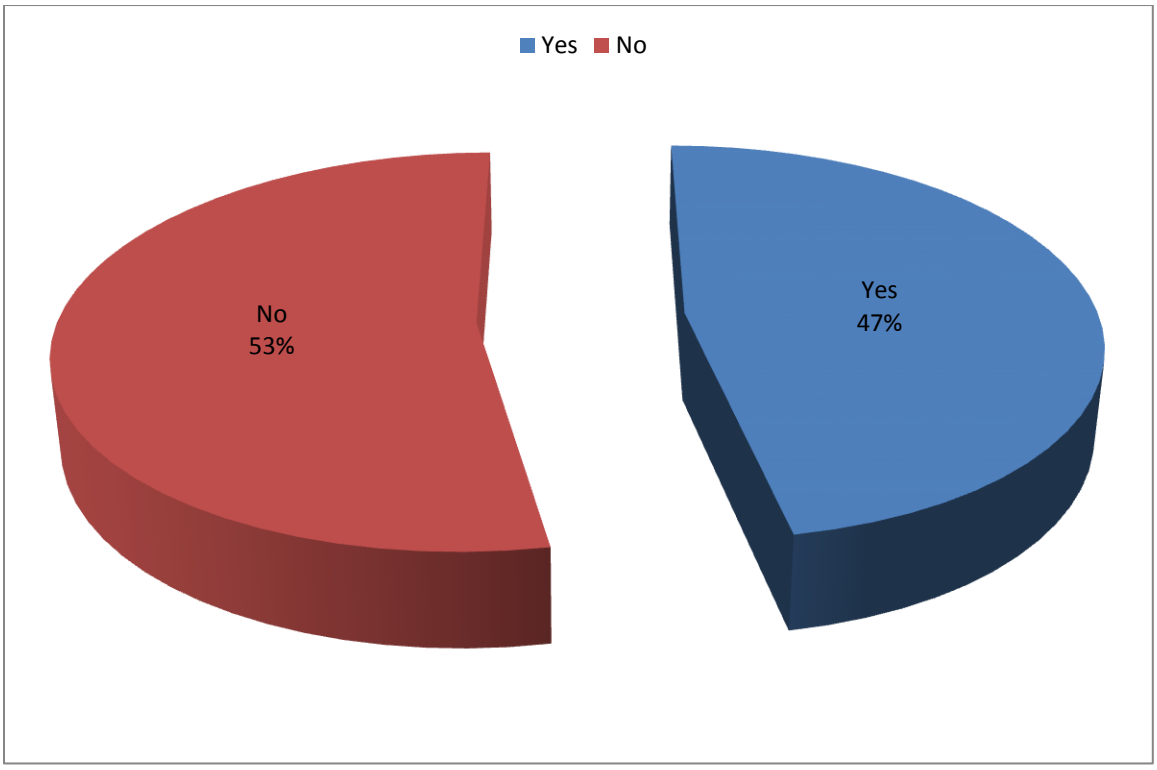

Fig 4.18: Knowledge about Causes of TB

In this study, 47% of students had knowledge about causes of TB and 53% of students had no idea about causes of TB.

4.19. Awareness of Causes of TB

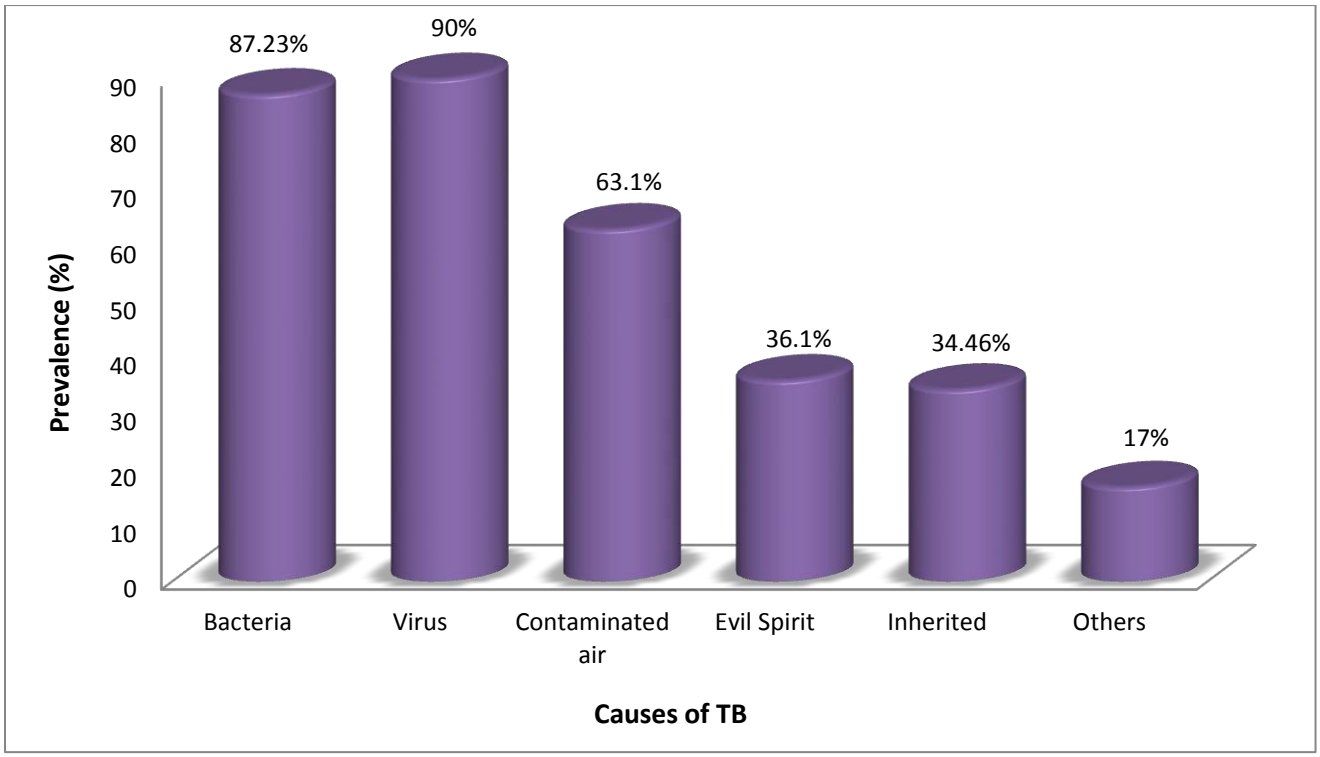

Fig 4.19: Awareness of Causes of TB

In response to this question, among 141 (47%) of the students who had knowledge about causes of TB, maximum (90%) students mentioned virus as cause of TB, the other causes mentioned were bacteria (87.23%), contaminated air (63.1%), inherited (34.46%), evil spirit (36.1%), 17% of students thought that others factor may causes TB.

4.20. Knowledge about Sign & Symptoms of TB

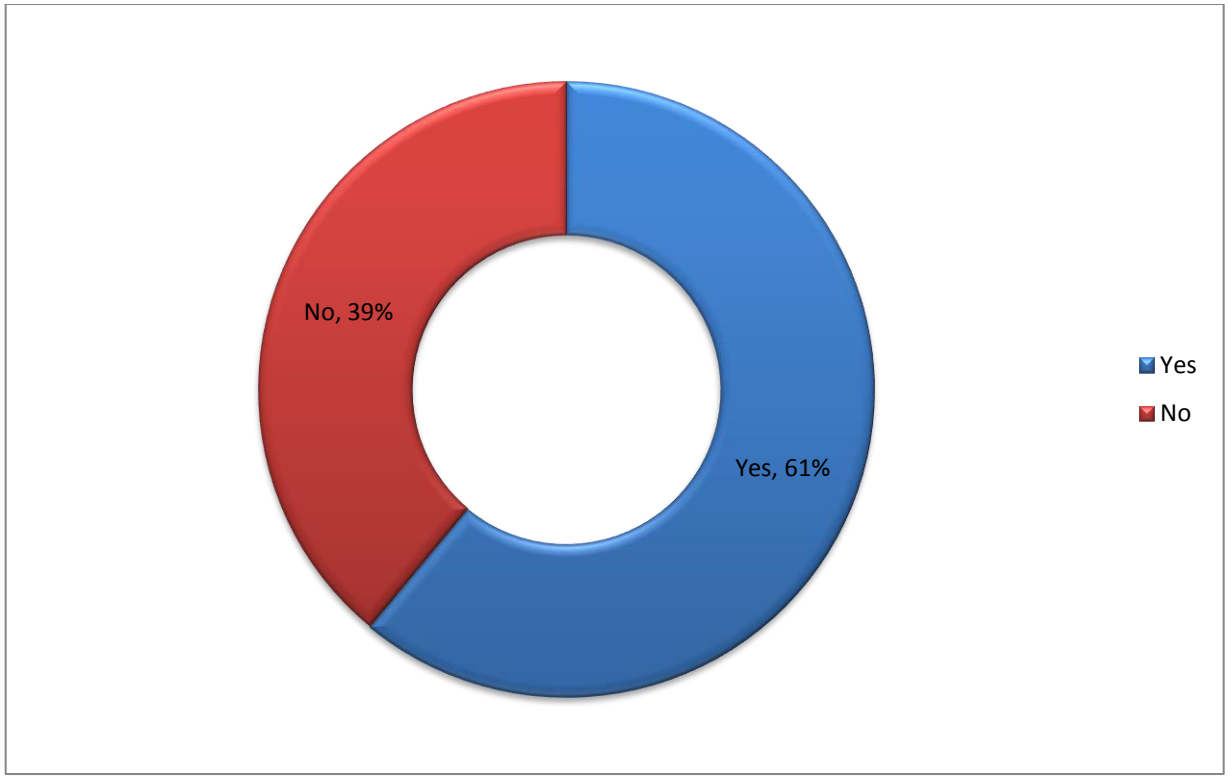

Fig 4.20: Knowledge about Sign & Symptoms of TB

In this study, 183 (61%) of students were aware of sign & symptoms of TB but 117 (39%) of students had no idea about sign & symptoms of TB.

4.21. Awareness of Sign & Symptoms of TB

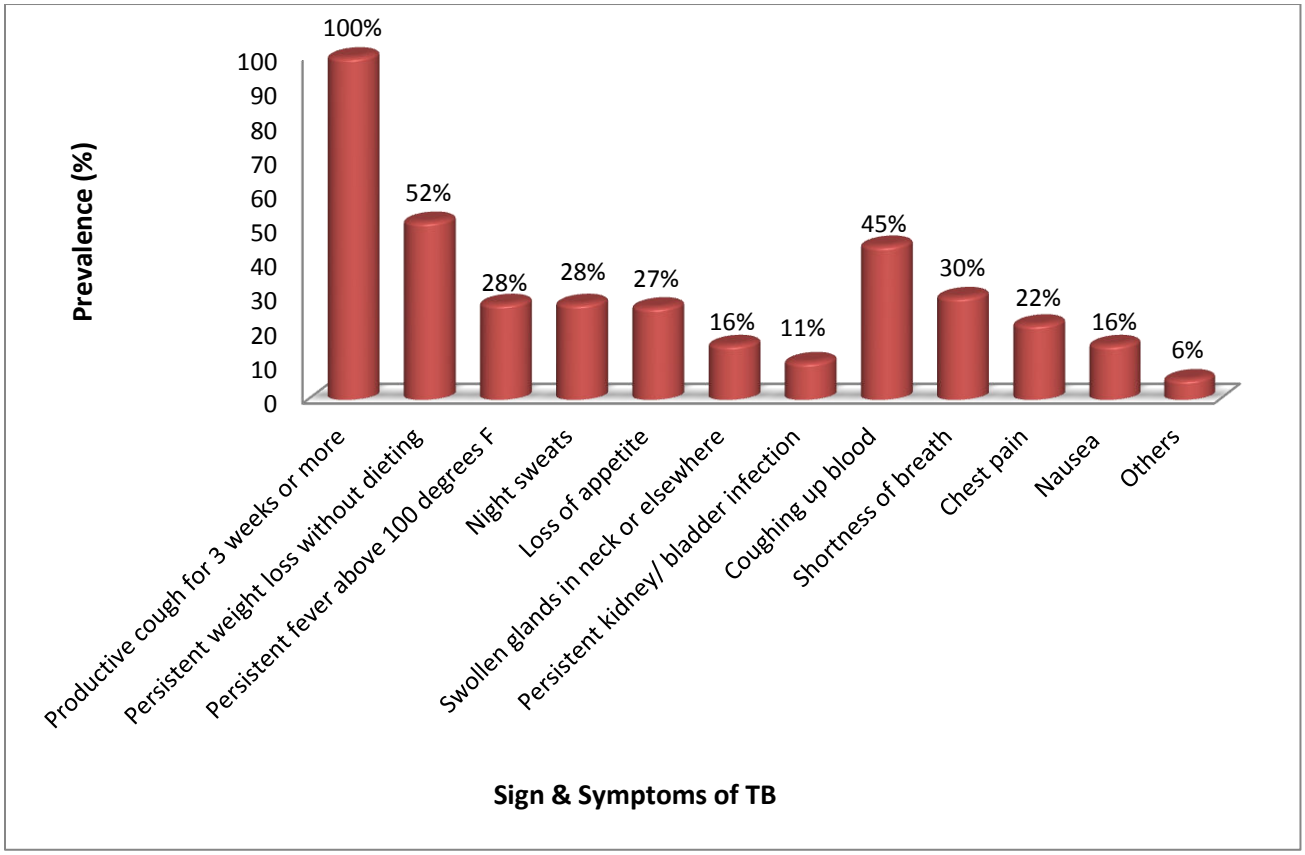

Fig 4.21: Awareness of Sign & Symptoms of TB

Among the183 (61%) of students who were aware of sign & symptoms of TB, 100% of students were aware of productive cough for 3 weeks or more as TB warning sign, 52% of students were aware of persistent weight loss without dieting as TB warning sign, 45% of students were aware of coughing up blood. Also 28% mentioned persistent fever above 100 degrees F, 28% mentioned night sweats, 27% mentioned loss of appetite, 16% mentioned swollen glands in neck or elsewhere, 11% mentioned persistent kidney/ bladder infection, 30% mentioned shortness of breath, 22% mentioned chest pain, 16% mentioned nausea and 6% mentioned other factors as sign & symptoms of TB.

4.22. Knowledge about Spread of TB

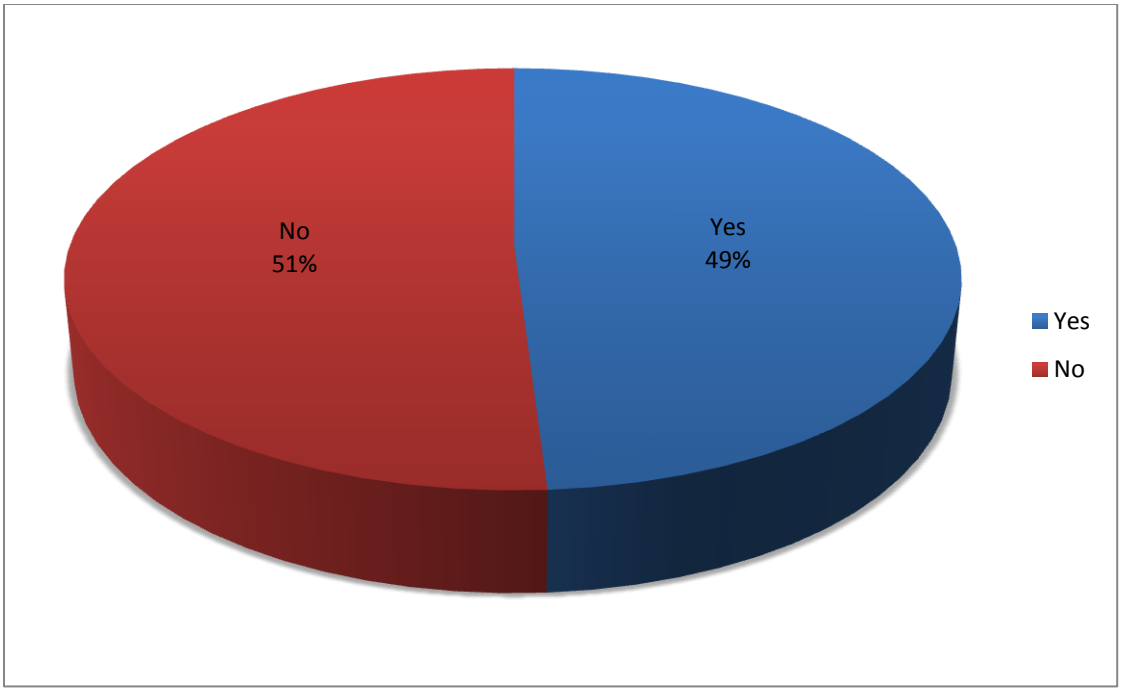

Fig 4.22: Knowledge about Spread of TB

In this study, 147 (49%) of students were concerned about spreading TB and 153 (51%) of students were not concerned about spreading of TB.

4.23. Awareness of Mode of Spread of TB

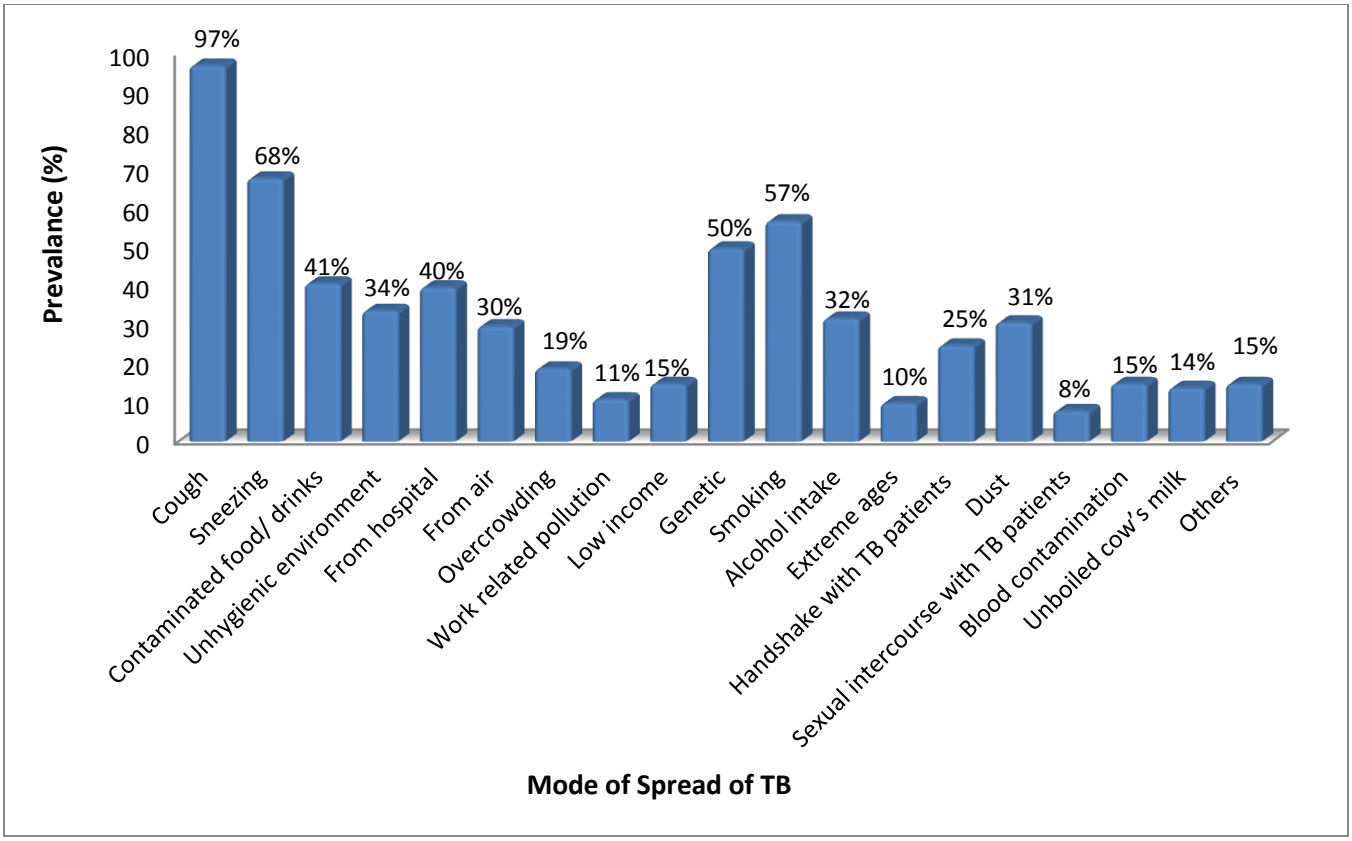

Fig 4.23: Awareness of Mode of Spread of TB

Among the 147 (49%) of students who were concerned about spreading TB, 97% of the respondents agreed that TB disease can spread through cough, 68% knew that TB is spread through sneezing, 57% believed it can be spread via smoking, 50% agreed that TB can be spread genetically. Also contaminated food/ drinks (41%), (40%) from hospital, (34%) unhygienic environment, (32%) alcohol intake, (31%) dust, (30%) from air, (25%) handshake with TB patients, (19%) overcrowding, (11%) work related pollution, (15%) low income, (15%) blood contamination, (14%) unboiled cow's milk, (10%) extreme ages, (8%) sexual intercourse with TB patients, , (15%) of other factors were believed as mode of spread of TB.

4.24. Knowledge about First Source of Information of TB

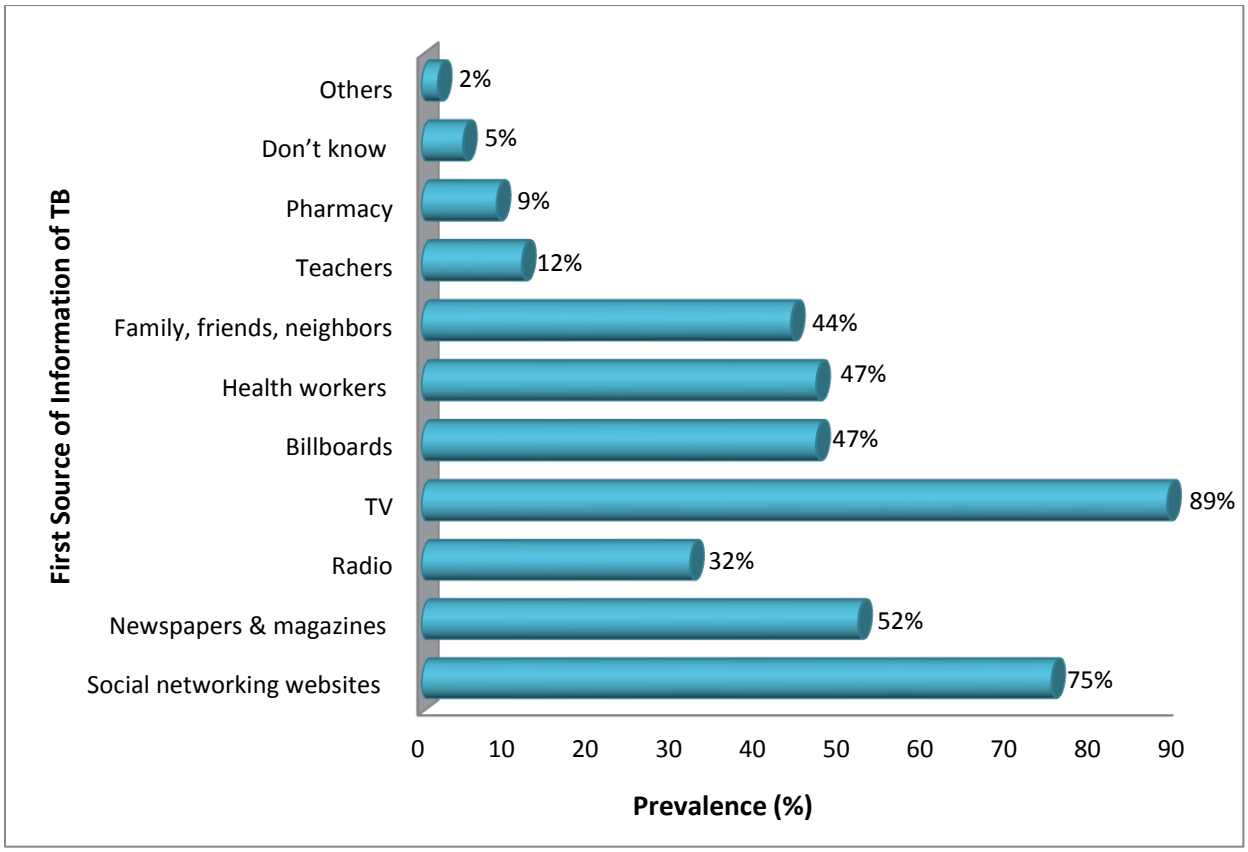

Fig 4.24: Knowledge about First Source of Information of TB

Among the study population, 89% said that they were informed about TB through TV, 75% from social networking websites, 52% from newspapers & magazines, 47% from billboards & health workers, 44% from family, friends, and neighbors and 32%, 12%, 9%, 2% were informed from radio, teachers, pharmacy and others respectively. 5% of respondents did not know about the first source of information of TB.

4.25. Organ that can be affected by TB

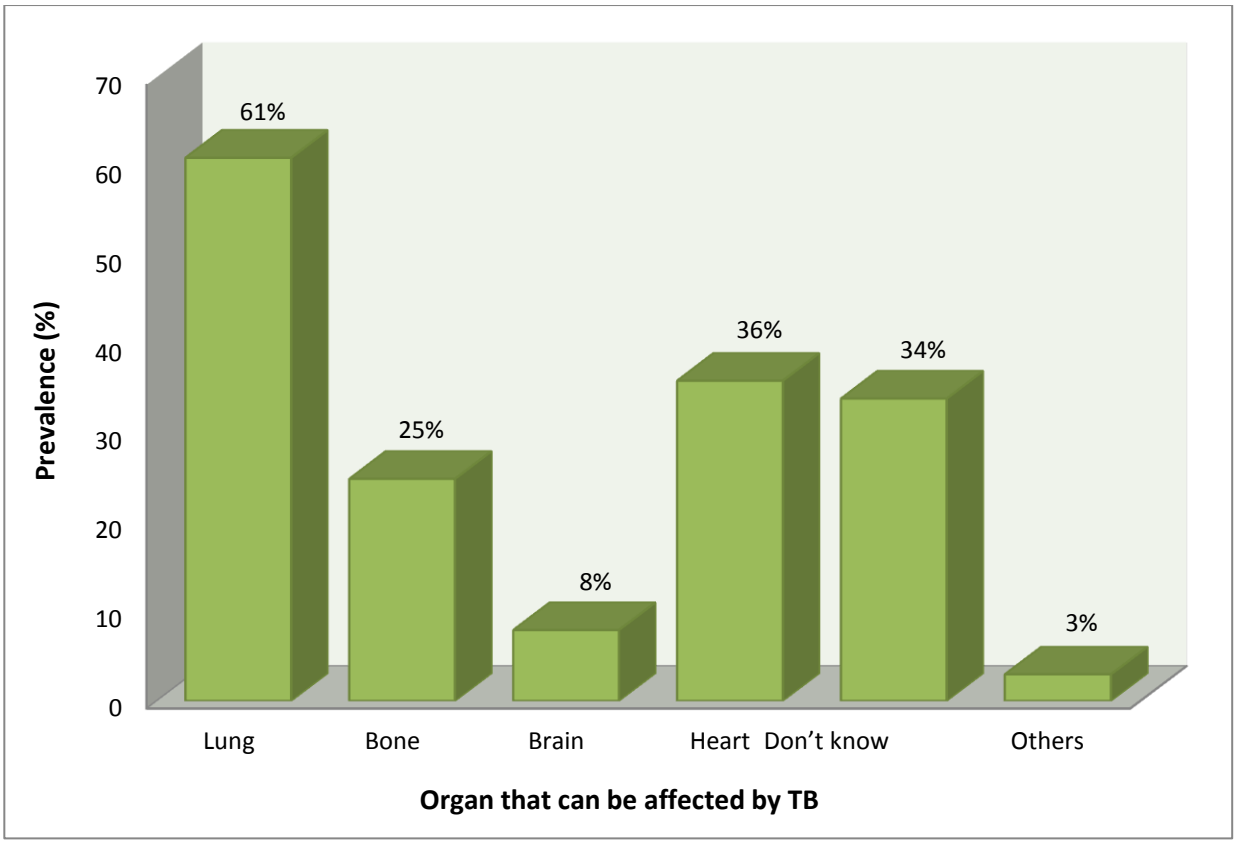

Fig 4.25: Organ that can be affected by TB

In this study, 198 (66%) students had idea about which organ that could be affected by TB and 102 (34%) students had no idea about which organ that could be affected by TB. Among 66% of students, 61% of students mentioned that lung could be affected by TB, 36% mentioned heart could be affected by TB, (25%) bone, (8%) brain and (3%) other organ were mentioned to be affected by TB.

4.26. People can be affected by TB

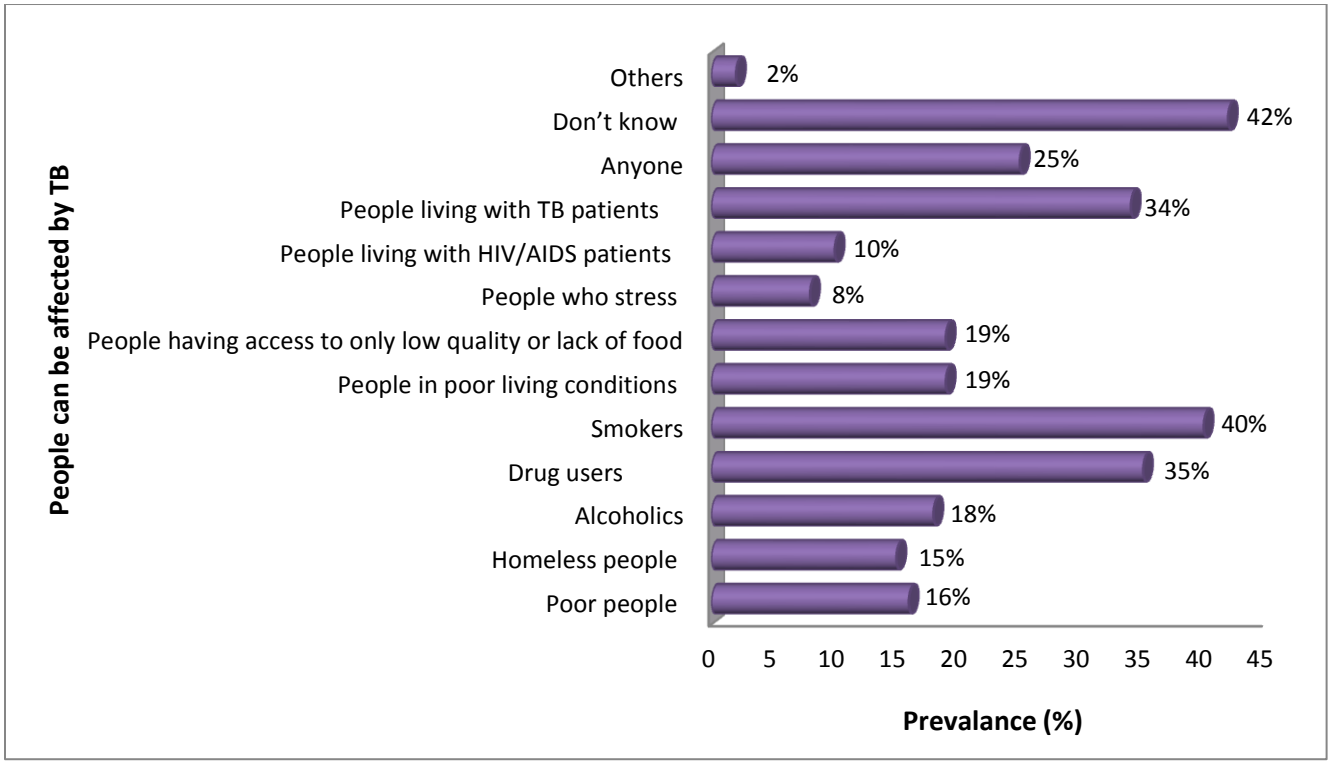

Fig 4.26: People can be affected by TB

Of the respondents, 174 (58%) students about who can be affected by TB and 126 (42%) students had no idea about who can be affected by TB. Among 58% of students, 40% students believed that smokers can be by TB, 35% students mentioned that drug users can be affected by TB, 34% students believed that people living with TB patients can be affected by TB. (16%) poor people, (15%) homeless people, (19%) people in poor living conditions & people having access to only low quality or lack of food, (18%) alcoholics, (10%) people living with HIV/AIDS patients, (8%) people who stress were considered to the risk of TB and 25% students mentioned that anyone can be affected by TB.

4.27. Knowledge about Curability of TB Disease

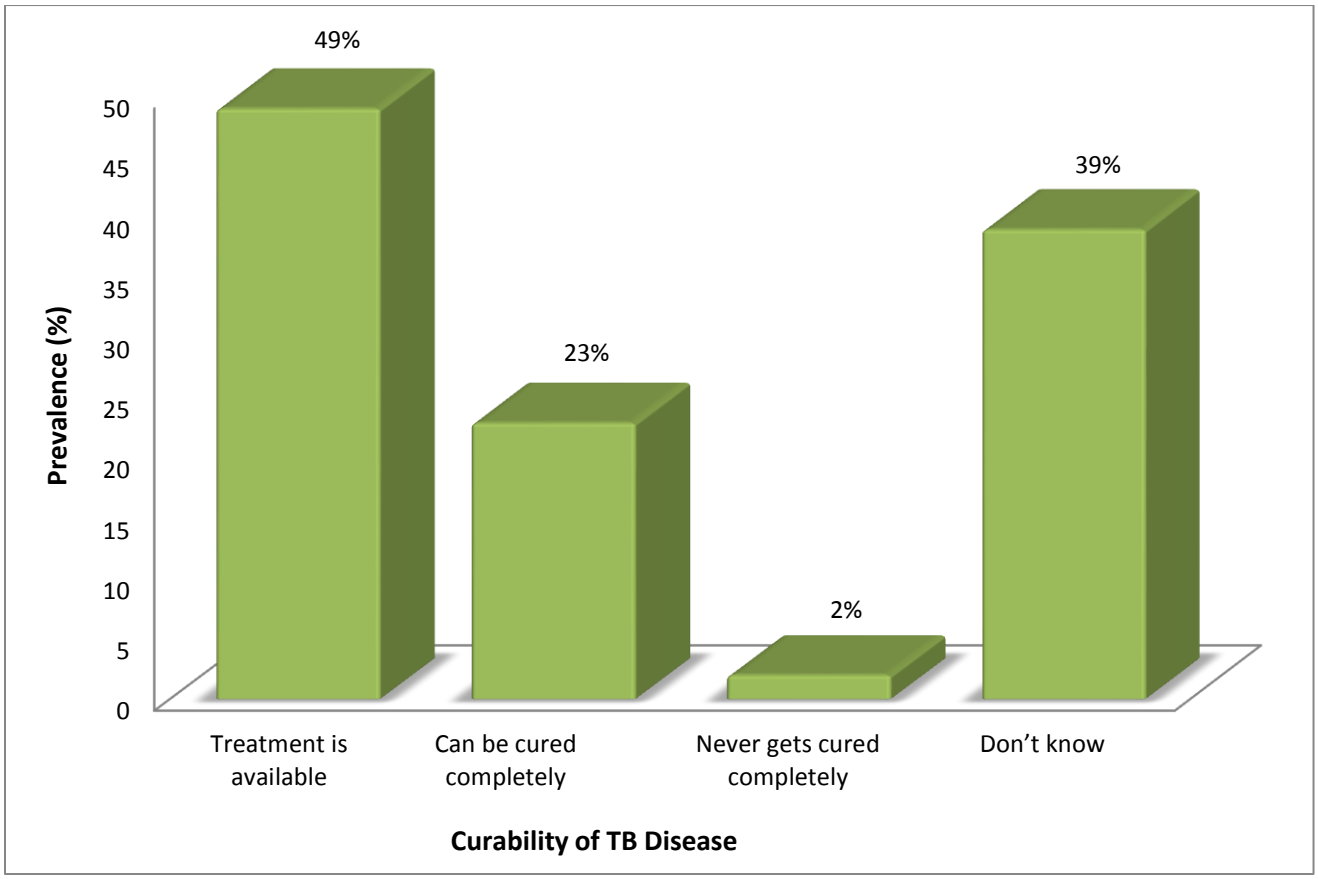

Fig 4.27: Knowledge about Curability of TB Disease

Of the respondents, 183 (61%) students had idea about the curability of TB while 117 (39%) had no idea about curability of TB. Among 61% of students, 49% students believed that treatment of TB is available, 23% students believed that TB can be cured completely and only 2% believed that TB can never be cured completely.

4.28. Knowledge about whether TB Causes Death or not

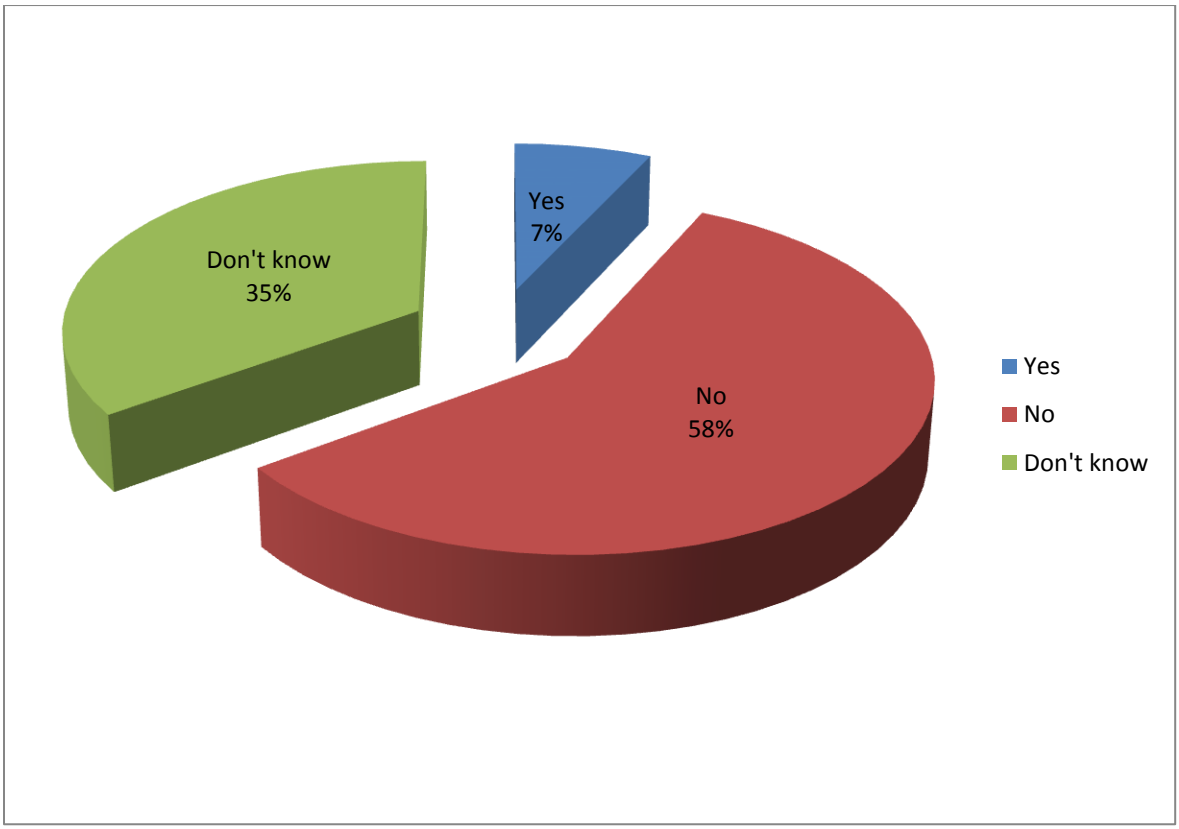

Fig 4.28: Knowledge about whether TB Causes Death or not

In this study, 58% of students thought that TB doesn't cause of death while 7% of students thought that TB does cause death and 35% of students had no idea weather TB causes death or not.

4.29. Awareness of BCG vaccine

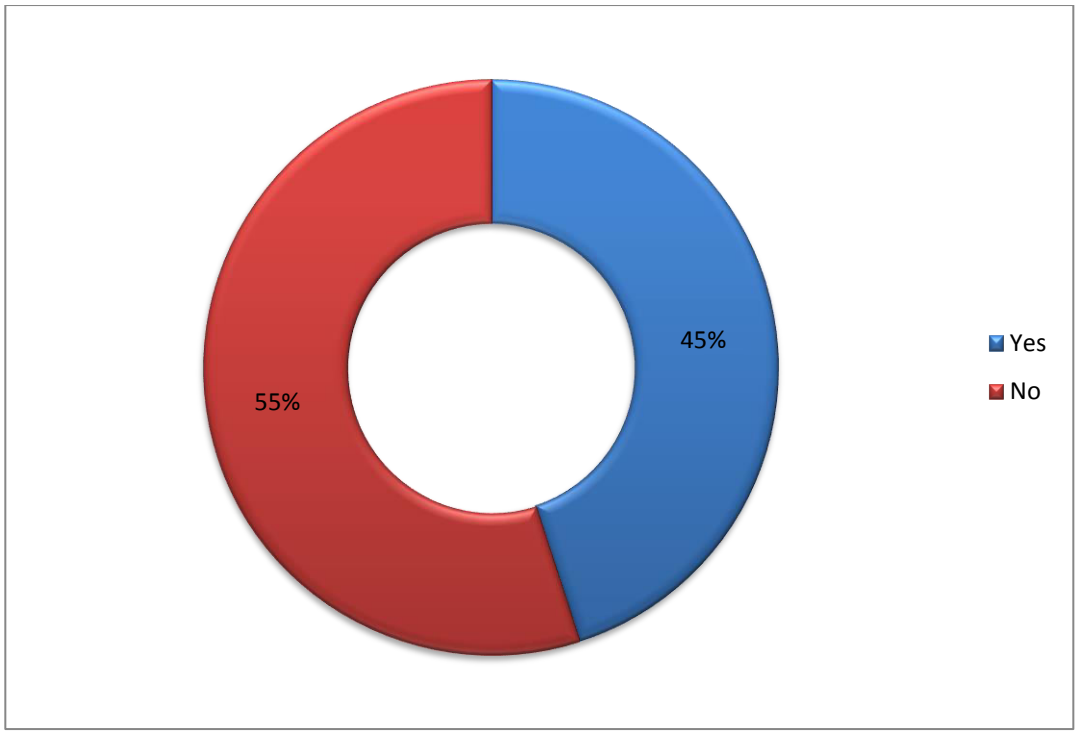

Fig 4.29: Awareness of BCG vaccine

In this study, 45% of students were aware of availability of BCG vaccine against TB and 55% of students were not aware of availability of BCG vaccine against TB.

4.30. Knowledge about Cost of TB diagnosis & Treatment in this Country

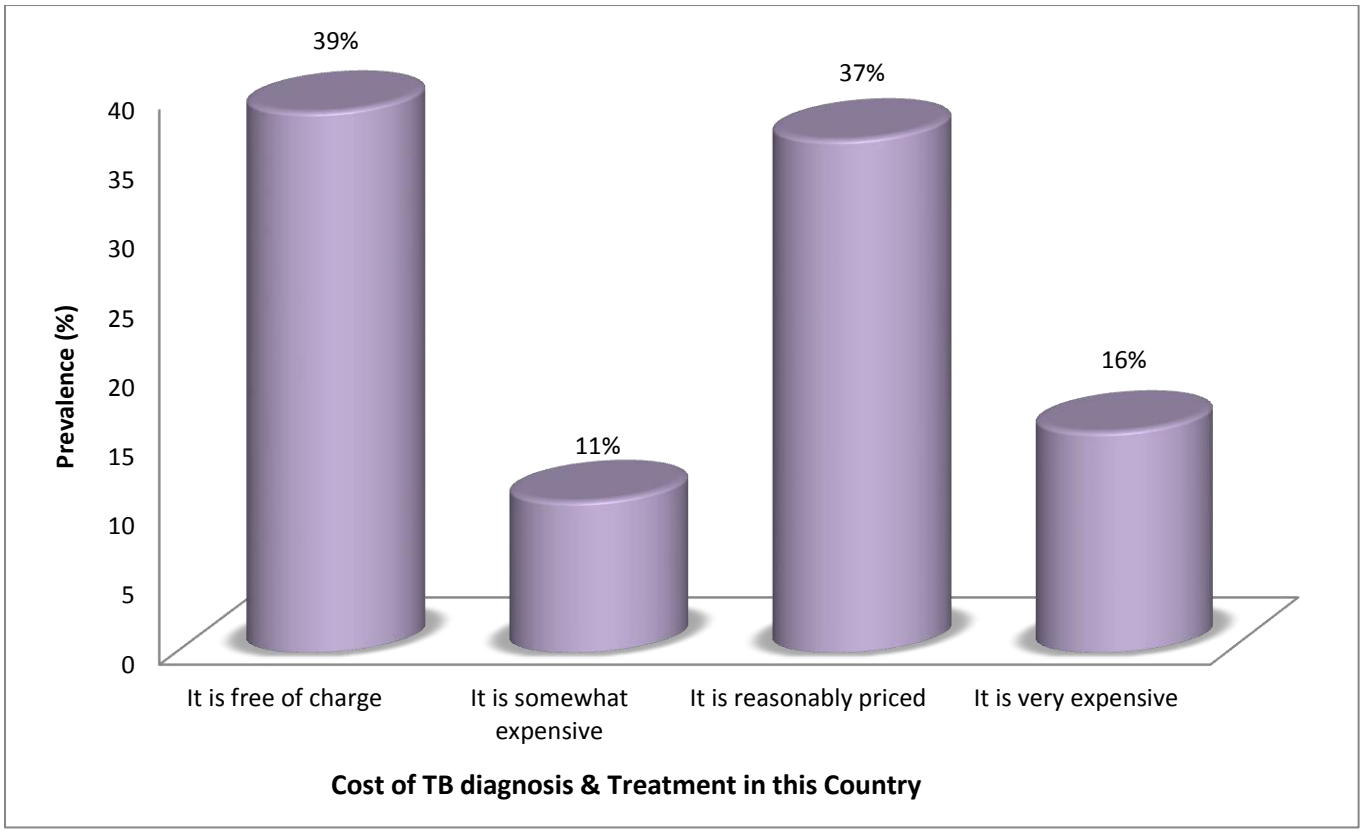

Fig 4.30: Knowledge about Cost of TB diagnosis & treatment in this country

Of the respondents, 39% of students believed that treatment of TB is free of charge, 11% of students thought that it is somewhat expensive, 37% mentioned that treatment of TB is reasonably priced and 16% of students thought that it is very expensive.

4.31. Knowledge about of TB Treatment

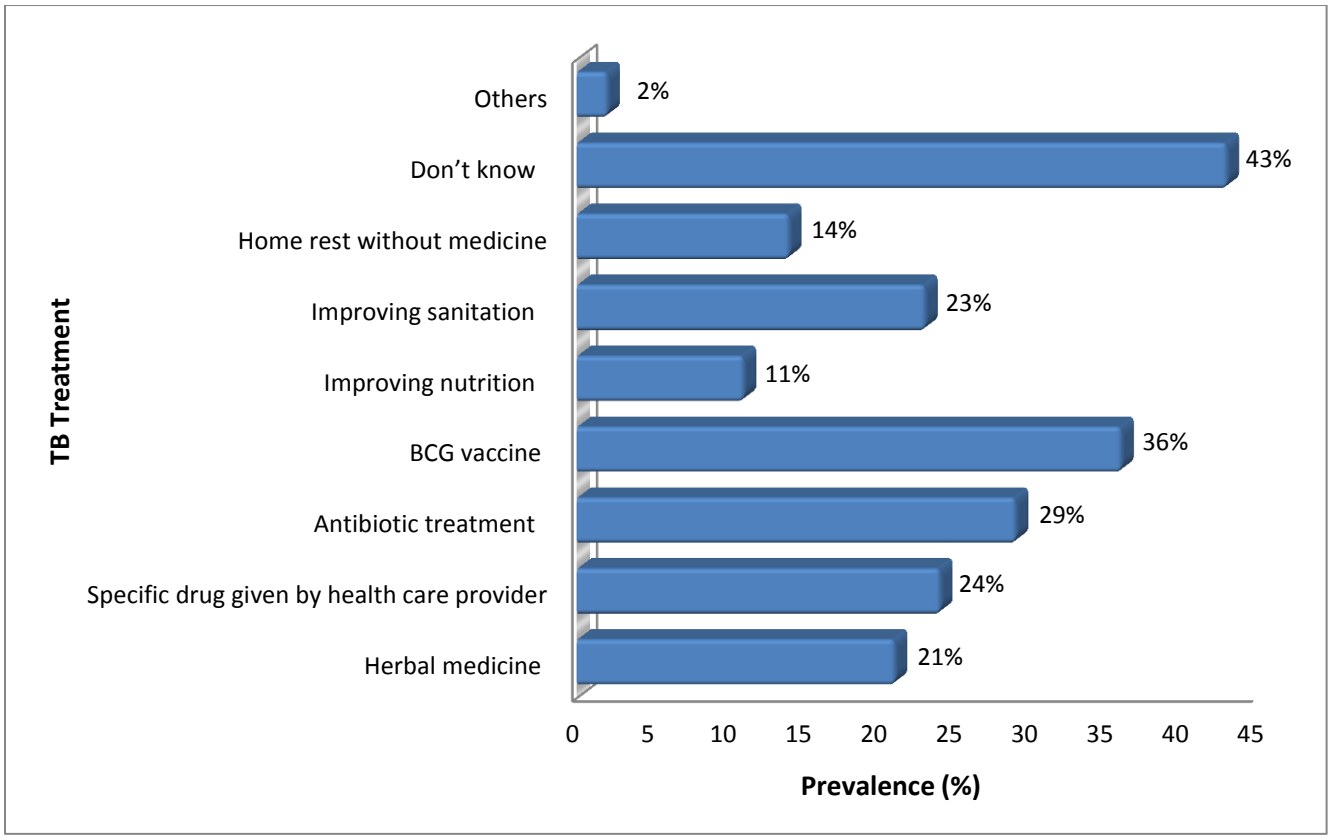

Fig 4.31: Knowledge about of TB Treatment

Of the respondents, 129 (43%) of students had no idea about of TB treatment. Among the 171 (57%) of students who had idea about of TB treatment, 36% believed that it can be prevented by BCG vaccine, 29% mentioned that it can be treated by specific drug given by healthcare provider & antibiotic treatment is also helpful for TB patients, 21% thought that TB can be treated by herbal medicine, 23%, 14%, 11%, students believed that TB can be treated by improving sanitation, home rest without medicine, improving nutrition respectively and 2% thought that other treatment can be applied to treat TB patients.

4.32. Awareness of DOTs (Directly Observed Treatment)

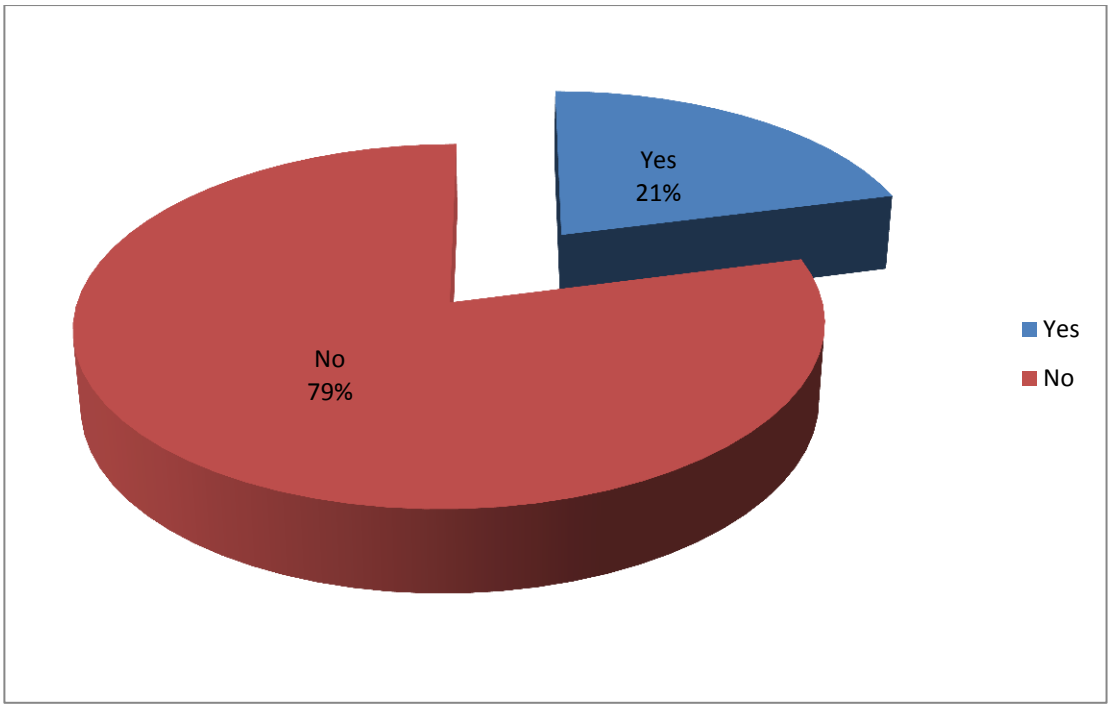

Fig 4.32: Awareness of DOTs (Directly Observed Treatment)

In this study, maximum students (79%) were not aware of DOTs and remaining students (21%) were aware of DOTs.

4.33. Knowledge about Initial Investigation for a TB Patient

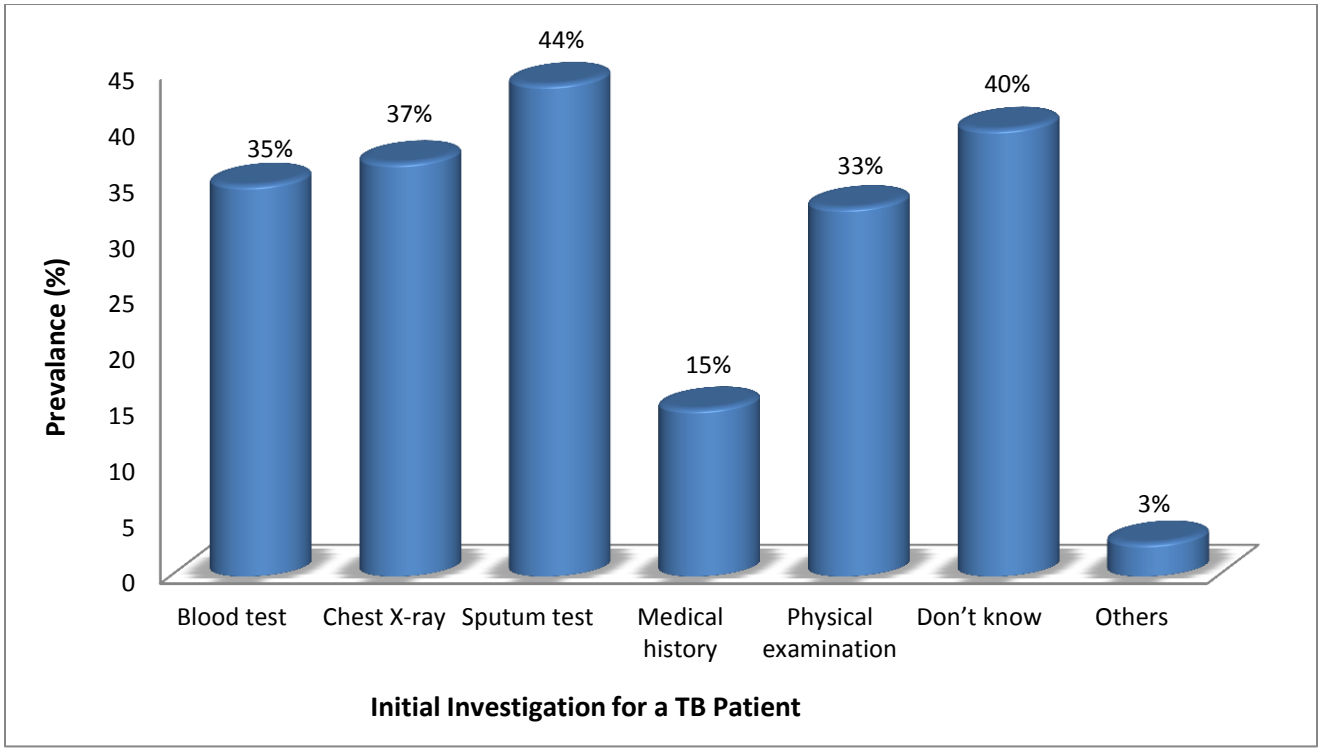

Fig 4.33: Knowledge about Initial Investigation for a TB Patient

Of the respondents, 120 (40%) of students were not aware of the investigations carried out as initial investigation for TB patients and 180 (60%) of students were aware about it. Among the 180 (60%) of students, 44% mentioned sputum test, 35% stated blood test, 37% stated chest X-ray, 33% stated physical examination, 15% said that it can be investigated from medical history and 3% thought TB can be investigated by others method.

4.34. Knowledge about Place of TB Treatment

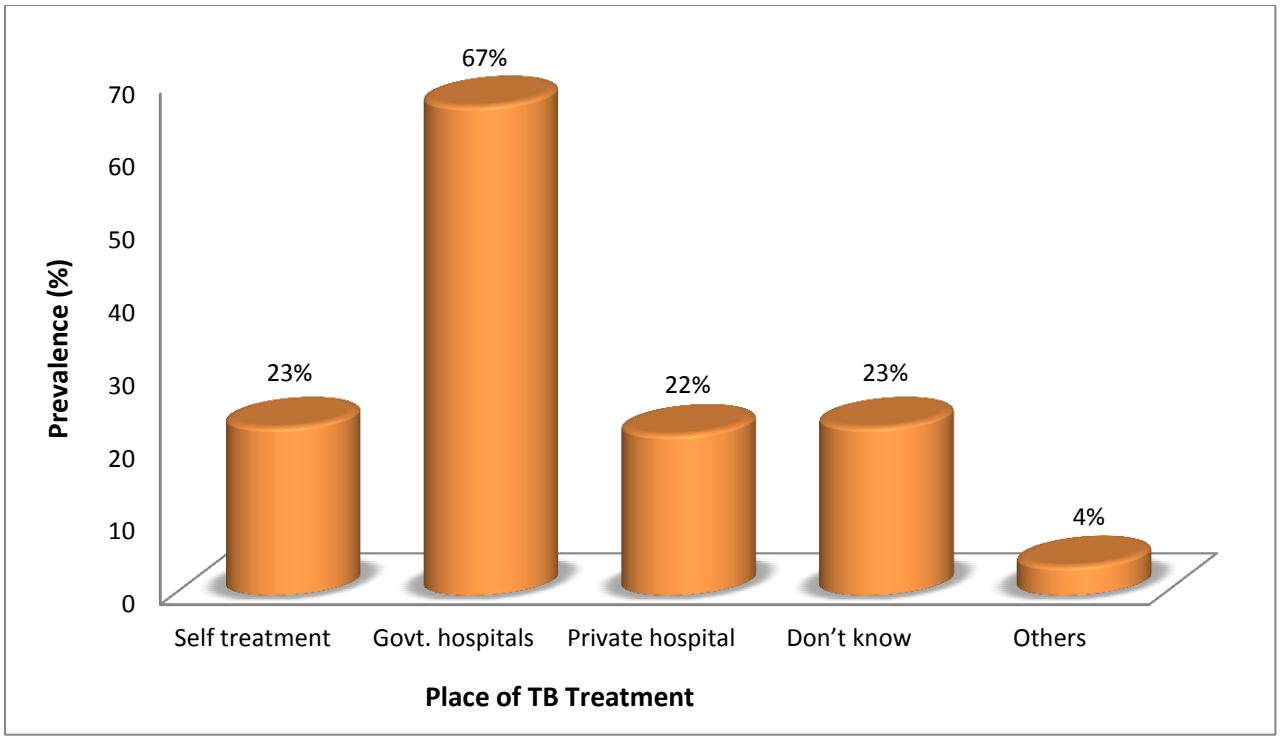

Fig 4.34.Knowledge about Place of TB Treatment

In this study, 69 (23%) of students had no idea about the place from where one can take treatment of TB and remaining students 231(77%) had the idea. Among the 77% of students, 67% believed one can take treatment from govt. hospitals, 22% stated private hospitals, 23% stated self treatment should be applied for TB treatment and 4% said treatment can be taken from other place.

4.35. Knowledge aboutDuration of Treatment of TB

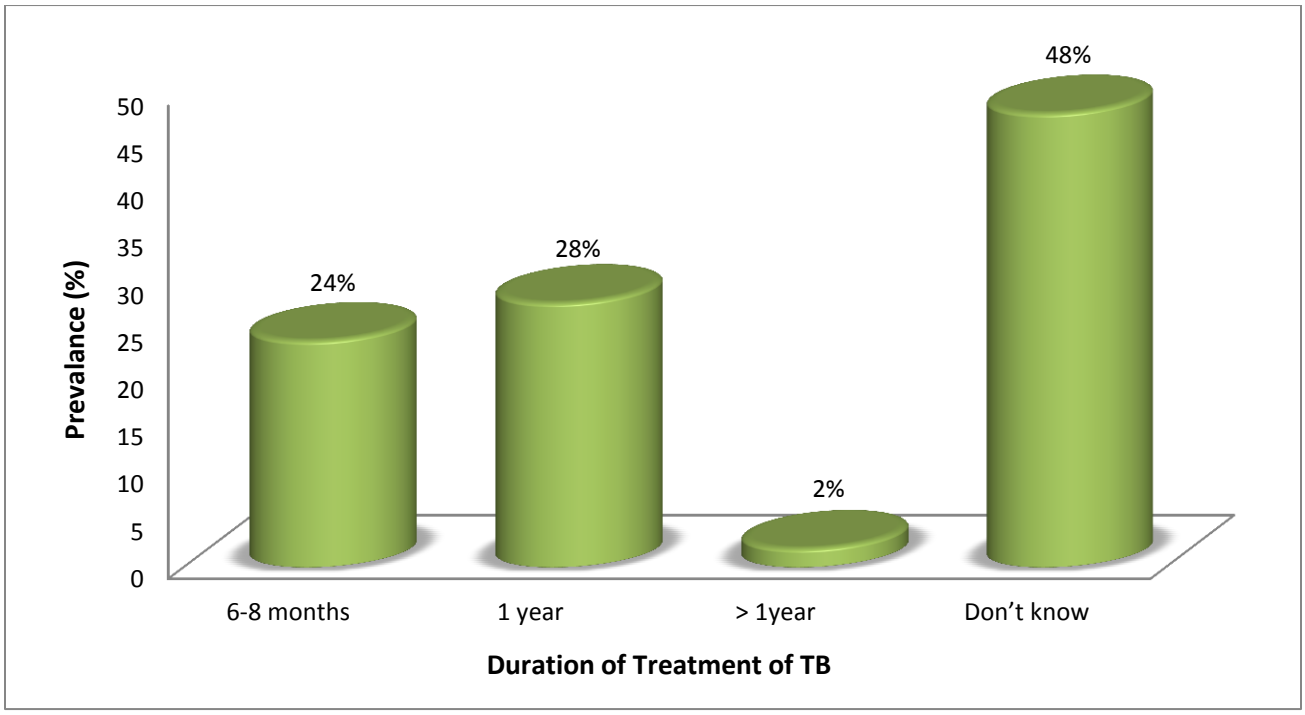

Fig 4.35: Knowledge about Duration of Treatment of TB

In this study, 47% of respondents were not aware of the fact that the duration of treatment of TB and 53% were aware about it. Among the 53% of students, 28% stated TB treatment duration is 1 year, 24% of students were aware of the fact that the duration of treatment of TB is 6-8 months, and 2% mentioned treatment duration is more than 1 year.

4.36. Affected by TB

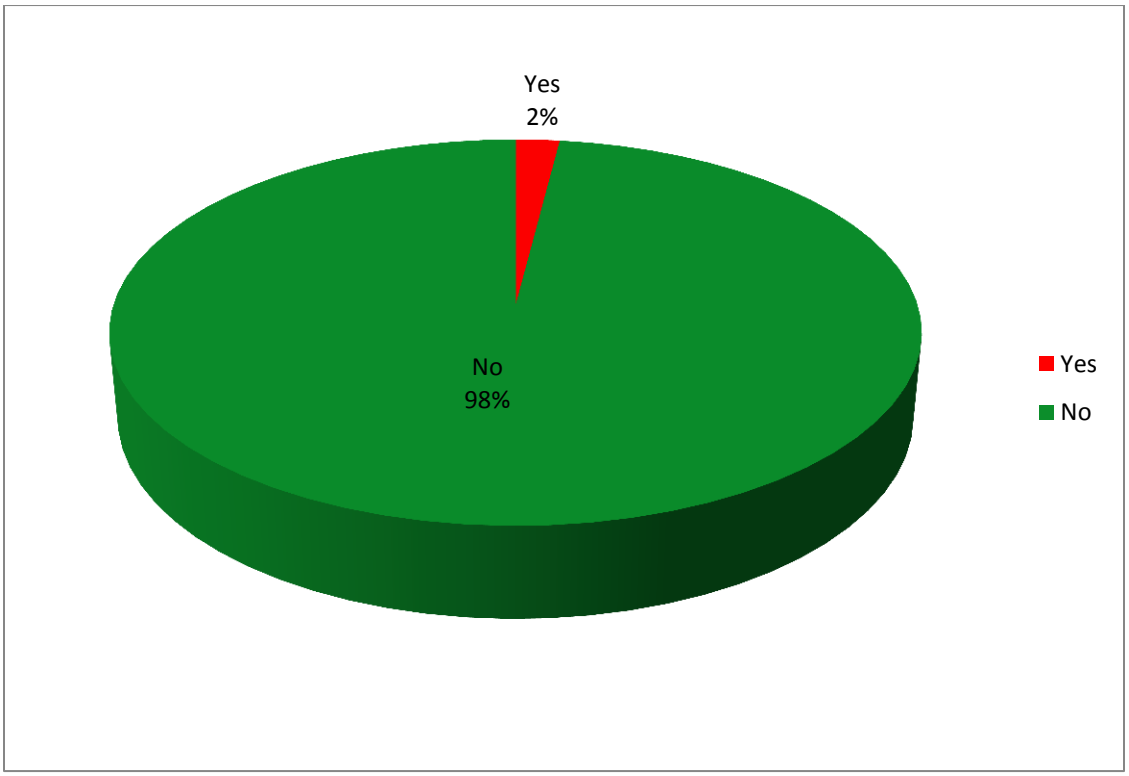

Fig 4.36: Affected by TB

Of the respondents, 98% of students had not ever been affected by TB and only 2% of students had been affected by TB.

4.37. Perception on being a TB patient

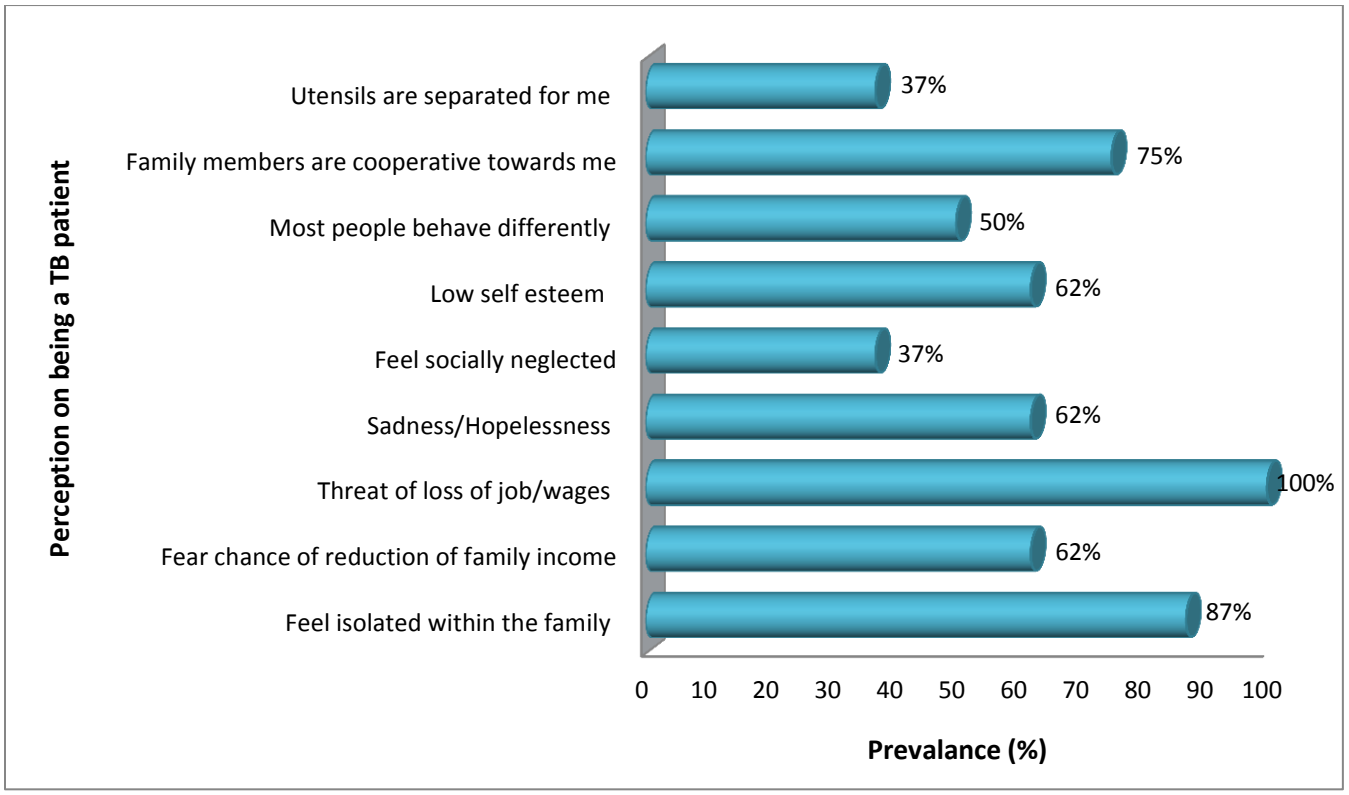

Fig 4.37: Perception on being a TB patient

Among the 2% of respondents who had been affected by TB, 100% said they feel threat of loss of job, 87% said they felt isolated within the family, 75% said family members were cooperative toward them, 62% said they felt fear to chance of reduction of family income, 62%, 62%, 50%, 37% of respondents stated that they feel sad/hopeless, low self esteem, socially neglected respectively. 50% said most people behaved with them differently, 37% stated that utensils were separated for them.

4.38. Interest to know whether Infected by TB or not

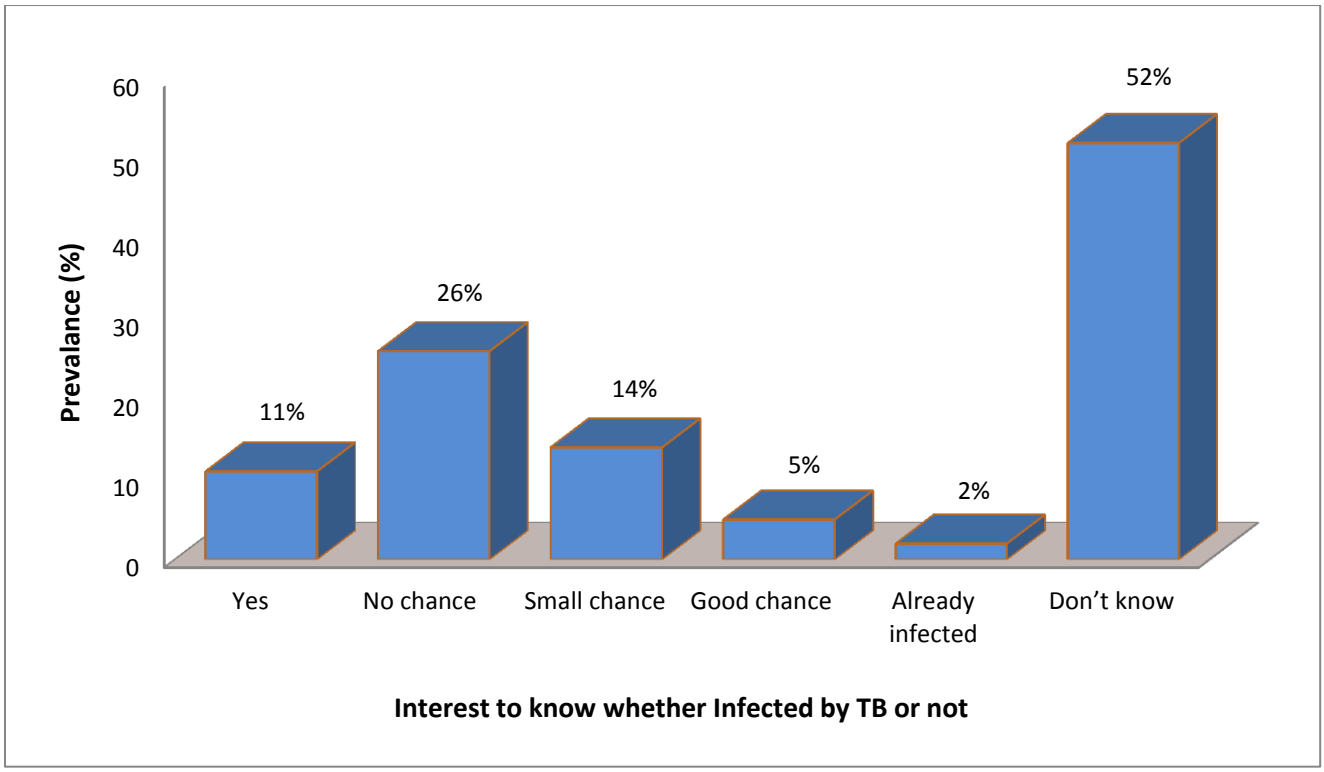

Fig 4.38: Interest to know whether Infected by TB or not

Of the respondents, 11% of students wanted to know whether they infected by TB or not, 26% said that they had no chance to be infected, 14% stated that they had small chance, 5% believed that they had good chance to be infected and 2% had already been infected. 52% of respondents were not interested to know whether they infected by TB or not.

4.39. Reaction found on being a TB Patient

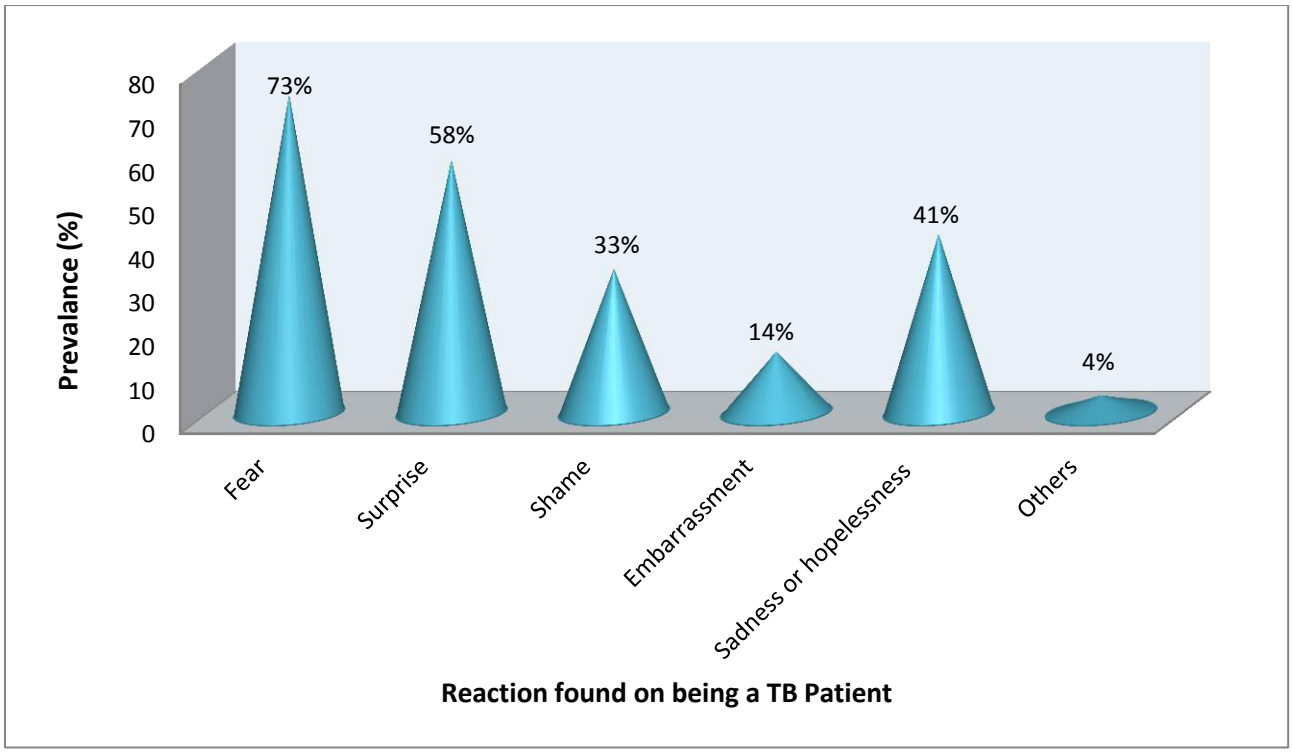

Fig 4.39: Reaction found on being a TB Patient

In this study, 73% of students said their feelings would be fear, 58% would be surprised, 33% would feel shame, 14% would be embarrassed, 41% would feel sad or hopeless and 4% said their feelings would be others if they found on being a TB Patient.

4.40. Person with talk to about TB

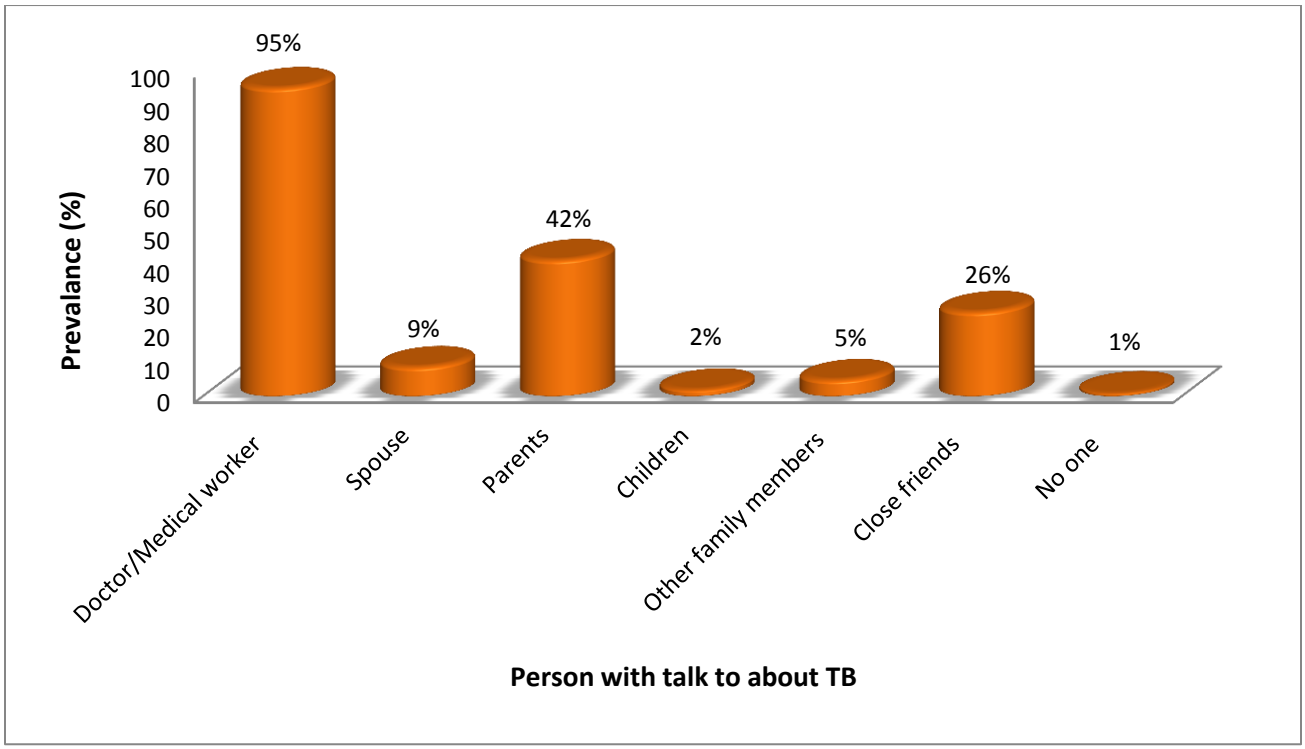

Fig 4.40: Person with talk to about TB

Among the respondents, 95% said that they will talk with doctor/medical worker, 9% stated that they will talk with spouse, 42% said they will talk with their parents, 2%, 5%, 26% respondents stated that they will talk with their children, other family members and close friend respectively about their TB illness. 1% mentioned that they won't talk anyone about their illness.

4.41. When should one get tested for TB

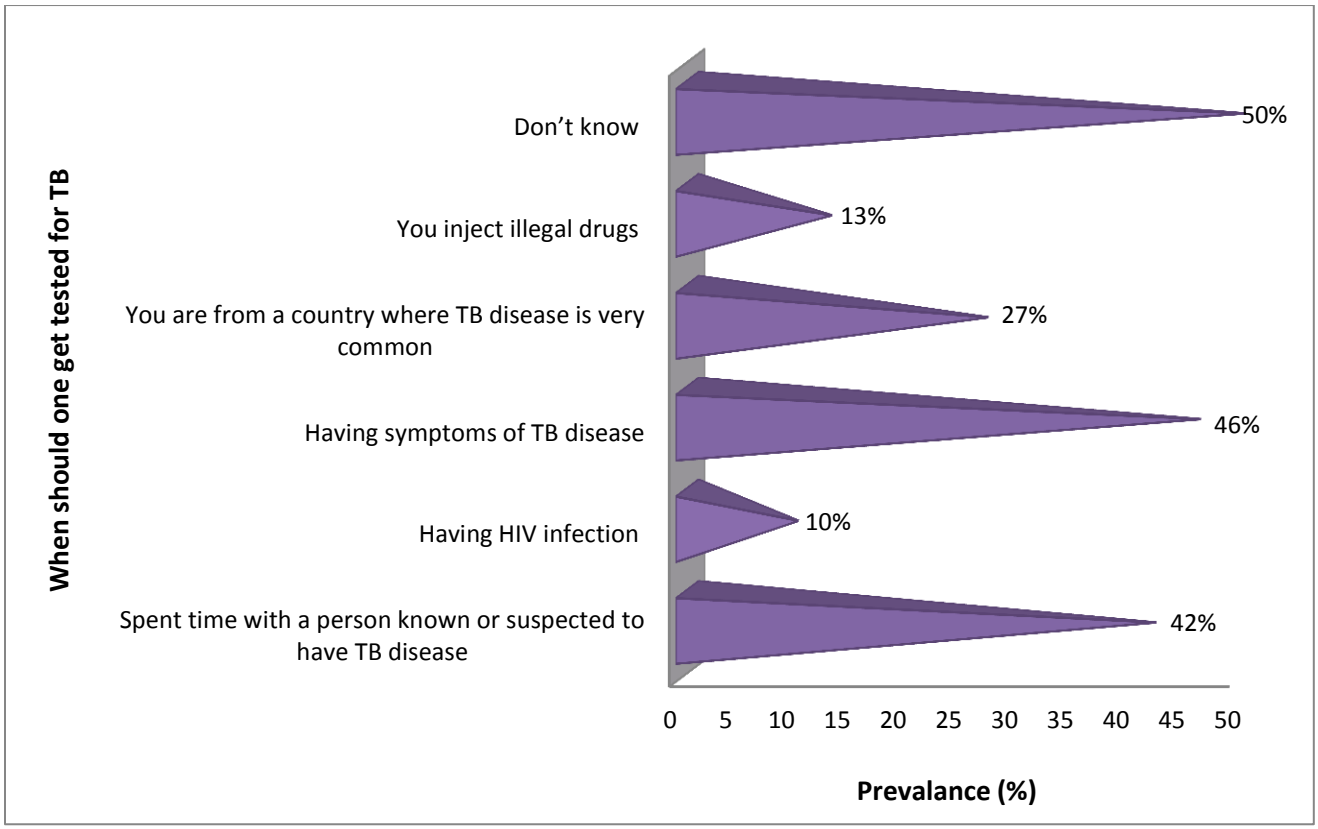

Fig 4.41: When should one get tested for TB

Of the respondents, 50% didn't know about the situation of when one should get tested for TB and 50% knew about it. Among the 50%, 42% said they should get tested TB after spending time with TB patients, 46% said they should get tested TB if they found any symptoms of TB disease, 27% said they should get tested TB if they came from a country where TB disease is very common, 13% stated they should get tested TB if they took any illegal drugs, 10% stated they should get tested TB if they had HIV infection.

4.42. Attitude towards TB patients

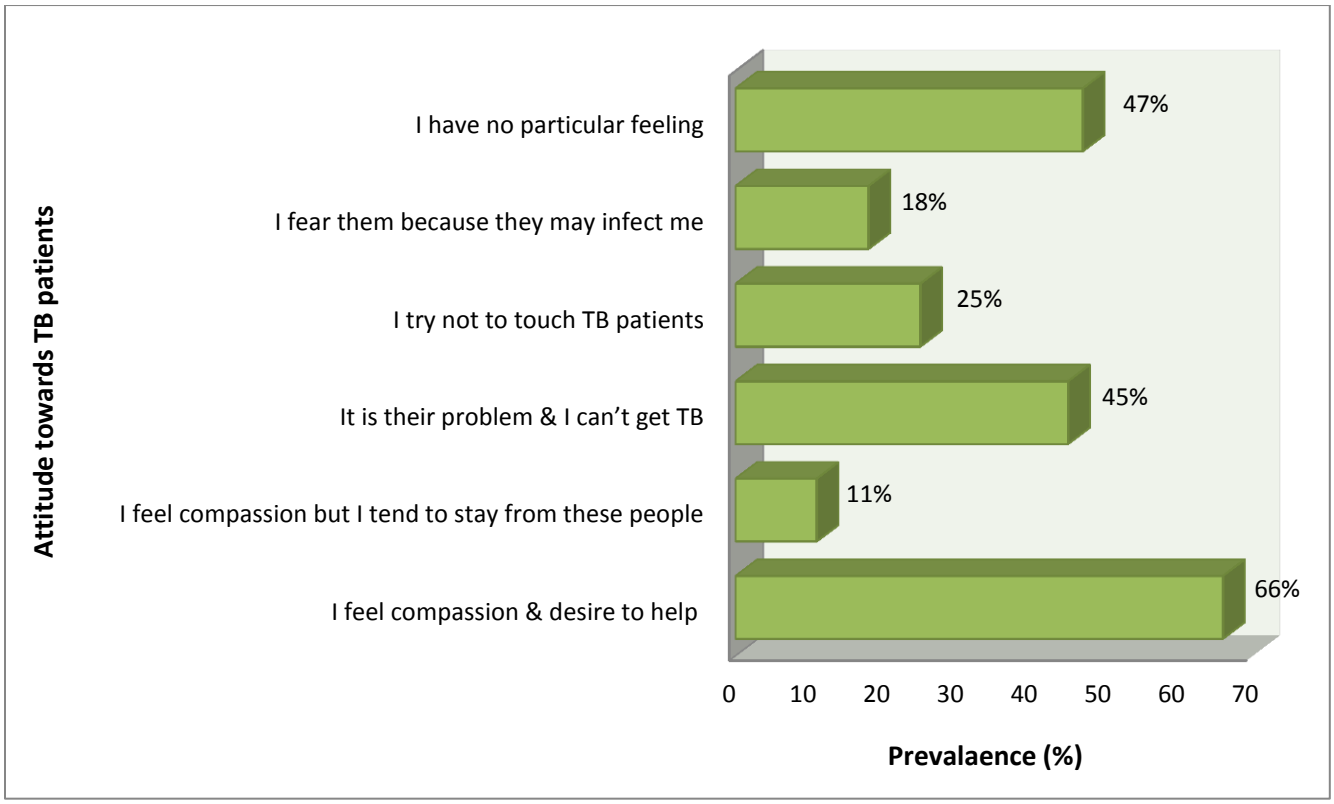

Fig 4.42: Attitude towards TB patients

Of the respondents, 47% said that they had no particular feeling towards TB patients and 53% said they have feeling. Among 53%, 66% stated that they feel compassion & desire to help, 45% thought that it was their problem & they could not get TB, 25% said they would try not to touch TB patients, 18% stated they feared TB patients due to chance of infection and 11% mentioned they felt compassion but tended to stay from these people.

4.43. Possibility of TB sufferer going back to work

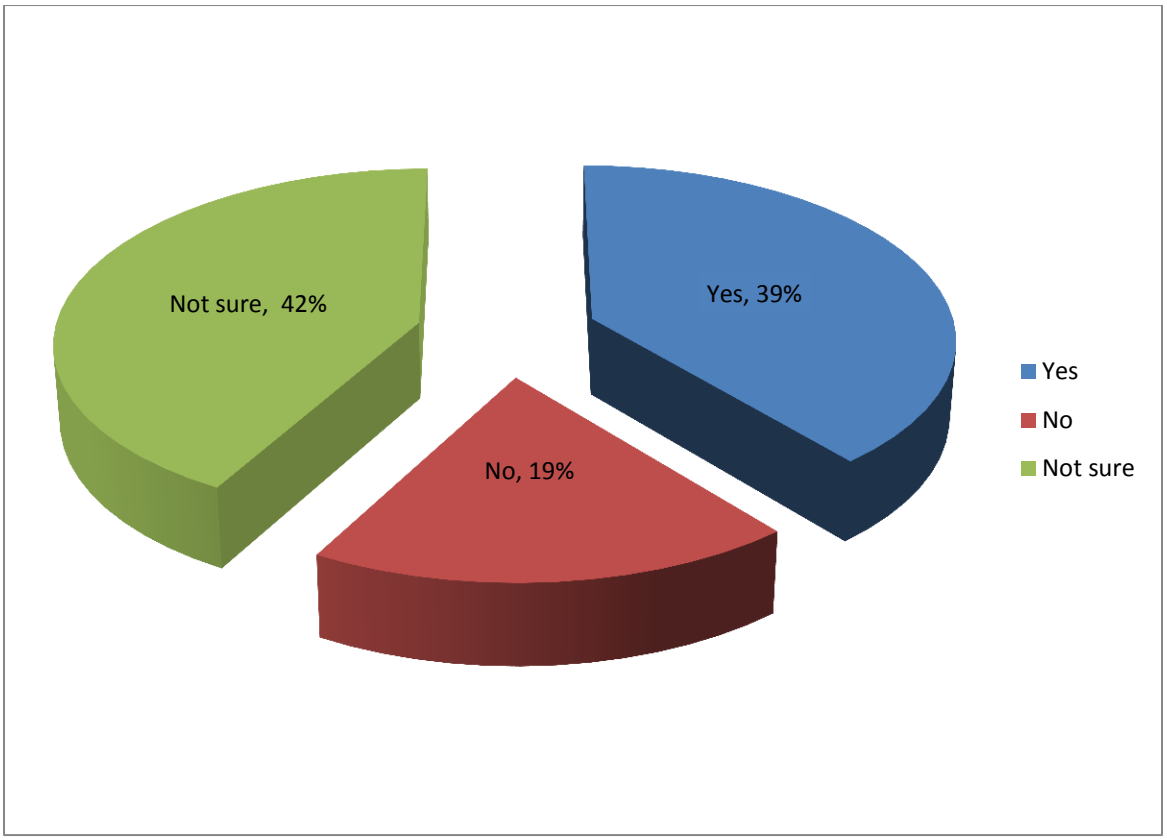

Fig 4.43: Possibility of TB sufferer going back to work

In this study, 39.39% of students said that a TB sufferer who taking TB drugs can go back to work, 19.19% of students gave negative feedback and 42.42% of students were not sure whether a TB sufferer can go back to work or not.

4.44. Precautions to be taken by a TB Patient

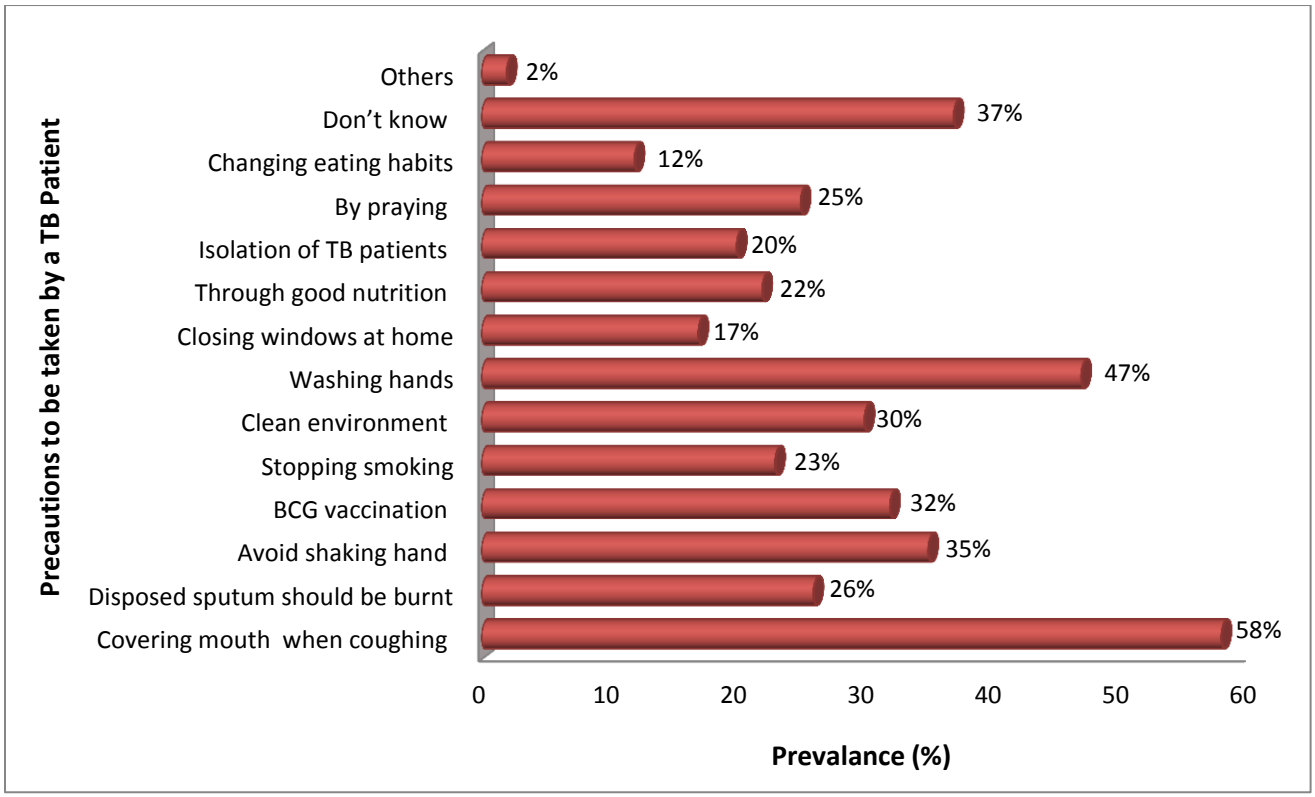

Fig 4.44: Precautions to be taken by a TB Patient

Of the respondents, 111 (37%) of students had no idea about precaution that should be taken by TB patient. Among 189 (63%) of students, 58% said TB patient should cover mouth or nose during coughing or sneezing, 47% stated TB patient should wash their hands after touching items in public places. The other precautions were burning disposed sputum (26%), avoiding shaking hand (35%), BCG vaccination (32%), through good nutrition (25%), praying (25%), stopping smoking (23%), isolating of TB patients (20%), closing windows at home (17%), changing eating habits (12%) and others (2%) had been considered as a precaution that should be taken by TB patients.

4.45. Perception towards TB patients

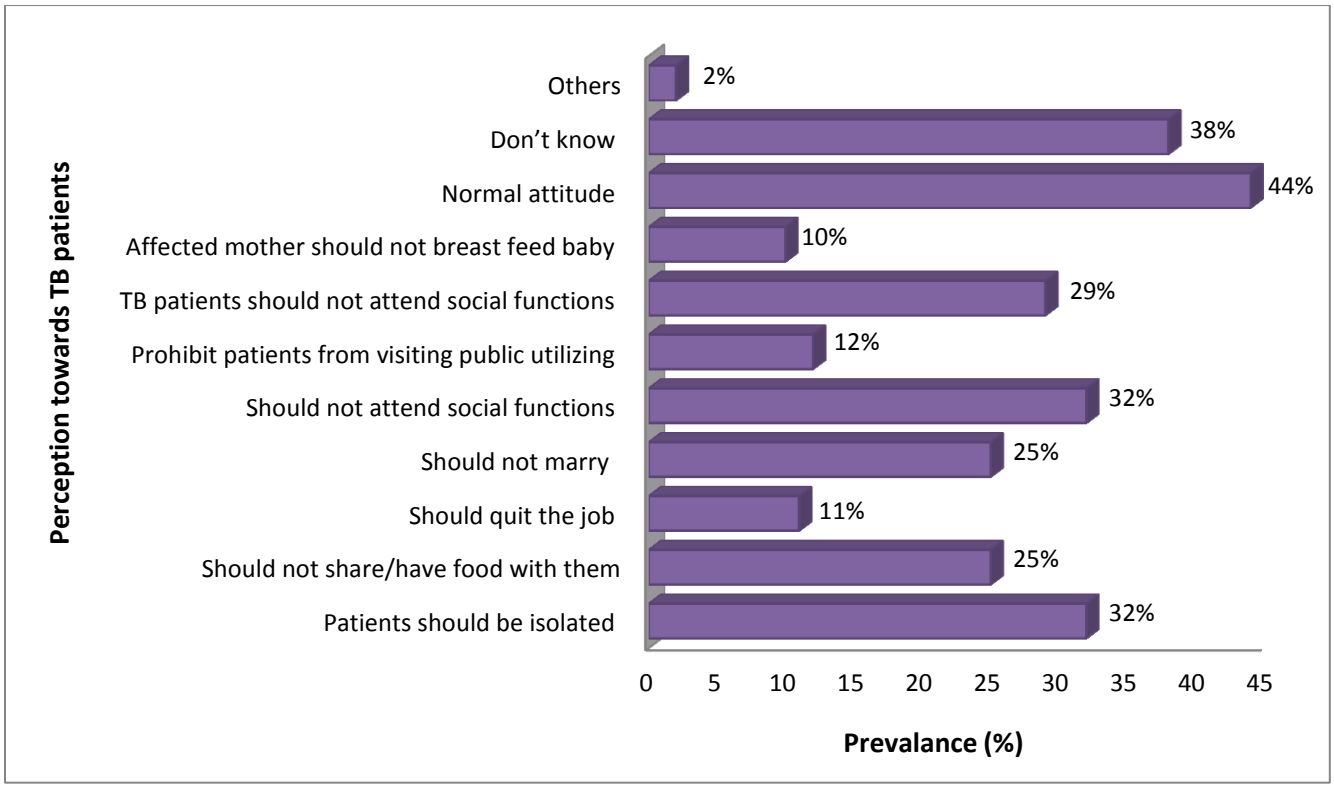

Fig 4.45: Perception towards TB patients

In this study, when respondents were asked about their perception towards TB patients, maximum (44%) had normal attitude, 32% thought that patients should be isolated and not attend social function, 25% stated should not share/have food with them and should not marry, 12% thought that patients should be prohibited from visiting public utilizing (cinema hall, club) and 11%, 10%, 2% stated that patients should quit the job, should not breast feed baby and other perceptions respectively. Out of 300 respondents 144 (38%) had no idea about it.

Chapter-5

Discussion & Conclusion

5.1. Discussion

In the present study, we surveyed the knowledge among 300 students of govt. universities in Dhaka (Dhaka University, Govt. Titumir College, Jagannath University) about TB, particularly on common symptoms, disease agent, communicable or non-communicable, latent, mode of spread TB, treatment system, vaccination against TB diagnosis, preventive measurement etc. This study also examined the perception of respondents about TB as a public health problem, source of gaining knowledge, parents' education and income etc.

In this study, it was found that almost majority of the respondents (85%) were in age range 21-23 years. About 67% were males and 33% were females and the type of family among 300 students majority of them were nuclear family (67%), and joint family (33%). About 93% students were Muslims, 6% students were Hindus and remaining (1%) students were Buddhists. Majority (71%) of the students were from subject related to non-science and about 11.67% students were from first year, 29.34% from 2^{nd} year, 28.34% from 3^{rd} year and 30.67% from 4^{th} year where only 9% students were involved in job and among that them 52% students provided customer service. In the present study, we found that parents of maximum students (51.67%) were educated at secondary level. Among the respondents, 12% of respondents were smokers and 1% consumed alcohol.

This study shows that, 98% of students confirmed that they had heard about the term TB where (Rana et al., 2015) conducted survey on "Assessment of knowledge regarding tuberculosis among non-medical university students in Bangladesh" which was performed on 839 non-medical university students that showed 94 % students declared that they had heard about the term TB, which was close to our value.

Although 98% students heard the term TB, maximum (66%) students had no idea about the term communicable and non-communicable diseases regarding TB, (Rana et al., 2015) found 33.9% respondents had no idea about the term communicable and non-communicable diseases regarding TB, which was far different from our value. (Rana et al., 2015)

We found in our study, maximum (80%) of students did not have idea about latent TB. (ANJUM et al., 2008) conducted survey on "TUBERCULOSIS; AWARENESS ABOUT SPREAD AND CONTROL'' which was performed on among people presenting at Ghurki Trust Hospital,

Lahore between November and December 2006 that stated 50% of respondents did not have idea about latent TB, which was far different from our value. (ANJUM et al., 2008)

About only 12% students considered that TB is a major health problem in Bangladesh where 40.33% of students had not idea about his.

We notify in our study that 141 (47%) of students had knowledge about causes of TB but 53% students had no idea about. Among the respondents (47%), 87.23% believed that TB is a bacterial disease while others respondents had wrong perception about the disease agent (virus, evil spirit, contaminated air. (Desalu et al., 2012) conducted survey on "Awareness of the Warning Signs, Risk Factors, and Treatment for Tuberculosis among Urban Nigerians'' which was a cross-sectional survey among 574 adults in Ilorin, found 60% of respondents gave correct answer, so we had a higher population of correct knowledge of causes. (Desalu et al., 2012)

In the present study the sign & symptoms of TB reported by the respondents indicated a fairly good level of knowledge. Majority of students (61%) were aware of sign & symptoms of TB but 39% of students weren't. Among the population who told they are aware, maximum population gave right answer about sign & symptoms of TB- productive cough for 3 weeks or more (100%), coughing up blood (45%), persistent fever above 100 degrees F(28%), loss of appetite(27%), shortness of breath (30%), chest pain (22%), nausea (16%). (Tasnim et al., 2012) performed a study on "Patient's Knowledge and Attitude towards Tuberculosis in an Urban Setting" in which between March and August 2008, 762 adult TB patients were interviewed at selected DOTS centre of Dhaka city and they found, regarding symptoms of TB (89.9%) mentioned night fever, tiredness (86.5%), productive cough (80.6%), and (61.6%) mentioned cough more than 3 weeks and chest pain (24.7%), which was close to our value. (Tasnim et al., 2012)

We found that 51% of students were not aware about spreading of TB and 49% were. Among 49% respondents, through sneezing (68%), via smoking (57%), contaminated food/ drinks (41%) were some of the main mode of transmission of TB. On the other hand (Orrett & Shurland, 2001) performed a study on "KNOWLEDGE AND AWARENESS OF TUBERCULOSIS AMONG PRE-UNIVERSITY STUDENTS IN TRINIDAD" to determine the level of knowledge and attitudes among pre-university students in Trinidad and Tobago, found that sneezing/cough (56%), smoking (54%), contaminated food/ drinks (42%), were considered as a mode of transmission of TB, which was close to our value. (Orrett & Shurland, 2001)

Among the study population, 89% said they were informed about TB through TV, (75%) social networking websites, newspapers & magazines (52%), billboards & health workers (47%), and family, friends, and neighbors (44%) had been considered as first source of information about TB. This was similar to by (Tasnim et al., 2012) who performed a study on "Patient's Knowledge and Attitude towards Tuberculosis in an Urban Setting" in which between March and August 2008, 762 adult TB patients were interviewed at selected DOTS centre of Dhaka city and they reported that, television was cited as the main sources of information (46.8%) and a small proportion mentioned about radio and bill boards in their study. (Tasnim et al., 2012)

Of the respondents, 40% students believed that smokers could be by TB and along with drug users (35%), people living with TB patients (34%), poor people (16%), homeless people (15%), and alcoholics (18%) were considered as at risk of TB. (Orrett & Shurland, 2001) performed a study on "KNOWLEDGE AND AWARENESS OF TUBERCULOSIS AMONG PRE-UNIVERSITY STUDENTS IN TRINIDAD" to determine the level of knowledge and attitudes among pre-university students in Trinidad and Tobago, found that smokers (48%), drug users (28%), living with TB patients (14%), poor people (18%), homeless people (20%), and alcoholics (10%) were considered at risk of TB, which was close to our value.

(Orrett & Shurland, 2001)

From this study we found, 49% students believed that treatment of TB is available, 23% students believed that TB could be cured completely. (ANJUM et al., 2008) conducted survey on "TUBERCULOSIS; AWARENESS ABOUT SPREAD AND CONTROL'' which was performed on among people presenting at Ghurki Trust Hospital, Lahore between November and December 2006 that found 100% of the respondents knew that TB can be cured completely, which was far different from our value. (ANJUM et al., 2008)

From the study we notify 45% of students were aware of availability of BCG vaccine against TB and maximum students (79%) were not aware of DOTs (Directly Observed Treatment).

In our survey we found, the percentage of people aware of sputum test (44%) and those aware of physical examination (33%) as initial investigation for TB patients. Matched with (Rana et al., 2015) conducted survey on "Assessment of knowledge regarding tuberculosis among non-medical university students in Bangladesh" which was performed on 839 non-medical university

students that found (44%) sputum test and (33%) physical examination were stated as initial investigation for TB patients. (Rana et al., 2015)

Of the respondents, 2% population had been affected by TB and among that 2%, 87% said they felt isolated within the family, 62% said they felt fear to chance of reduction of family income, 100% said they felt threat of loss of job.

We found that most of the populations (63%) were aware of precaution that should be taken by TB patient. Among the respondents, (58%) said TB patient should cover mouth or nose during coughing or sneezing, (47%) TB patient should wash their hands after touching items in public places. Avoid shaking hand (35%), BCG vaccination (32%), burning disposed sputum (26%), stopping smoking (23%) had been answered. (Orrett & Shurland, 2001) performed a study on "KNOWLEDGE AND AWARENESS OF TUBERCULOSIS AMONG PRE-UNIVERSITY STUDENTS IN TRINIDAD" to determine the level of knowledge and attitudes among pre-university students in Trinidad and Tobago, stated 78% of respondents were aware of precaution. So we had less population of correct knowledge about precaution that should be taken by TB patient. (Orrett & Shurland, 2001)

When respondents were asked about perception towards TB patients, patients should be isolated (32%) and not attend social function, should not share/have food with them and should not marry (25%), patients should be prohibited from visiting public utilizing (12%) and11%, 10%, 2% stated that patients should quit the job, should not breast feed baby and other perceptions had had been replied which was similar to (Tasnim et al., 2012) who performed a study on "Patient's Knowledge and Attitude towards Tuberculosis in an Urban Setting" in which between March and August 2008, 762 adult TB patients were interviewed at selected DOTS center of Dhaka city and they reported that patients should be isolated (24%), should not share/have food with them (19%), should quit the job (17%), should not marry (31%), and should not attend social functions (25%) as perception towards TB patients. (Tasnim et al., 201

5.1. Conclusion

This study concludes that the level of knowledge about causes, sign & symptoms of TB is insufficient; we consider it is necessary to improve knowledge about TB and upgrading the current health care curricula. From this study we see that, the level of knowledge about mode of spread of TB is satisfactory. Populations' knowledge of TB is insufficient in most aspects e.g. diagnosis, treatment and there are misconceptions about TB as well. TB awareness programs should incorporate these aspects with additional focus on education of TB. Thus, an effective information transfer mechanism is needed to overcome this problem. The suggestion to upgrade the system to promote awareness about TB should be conducted via the most effective medium. This is because the medium vary according to the different levels of society. Therefore, it is a must to do a need analysis before taking any measures. For example the selected media are television, social network and newspapers. This suggestion might differ for respondents from rural areas. Besides upgrading the information transfer system, other suitable methods include routine checkups. The ministry can also introduce health education at the earliest level regarding TB. This is to ensure an early prevention by providing a good understanding on the disease.

Sample of Questionnaire

KNOWLEDGE & AWARENESS OF TUBERCULOSIS AMONG UNDERGRADUATE STUDENTS OF GOVERNMENT UNIVERSITIES IN DHAKA

(Department of Pharmacy, East West University)

(All the questions asked are used for research purpose only and all the information is kept confidential)

Place a tick (√) on your choice of answer

DEMOGRAPHIC INFORMATION

1. Name :_____(if you are interested)
2. Age: ☐ 15-17 ☐ 18-20 ☐ 21-23 ☐ 24-26 ☐ Others_____
3. Gender: ☐ Female ☐ Male
4. Religion: ☐ Muslim ☐ Hindu ☐ Buddhist ☐ Christian ☐ Others_____
5. Type of family: ☐ Single ☐ Joint
6. Marital status: ☐ Single ☐ Married ☐ Divorced
7. Name of your University:_____
8. Department you are studying: _____
9. Year / Semester : _____
10. Are you doing any job? ☐ Yes ☐ No **(if your answer is yes, then fill up the question no. 11 & 12)**
11. Occupation : ☐ Customer service ☐ Business ☐ Healthcare ☐ Farming ☐ Administration& management ☐ Factory worker ☐ Others_____
12. Your monthly income is : ☐ Tk<5000 ☐ Tk 5000-10,000 ☐ Tk 11,000-15,000 ☐ Tk 16,000-20,000 ☐ >Tk 20,000
13. Parents' education : ☐ No Education ☐ Primary ☐ Secondary ☐ Higher ☐ Graduate
14. Do you have any of following habits? ☐ Smoking ☐ Alcohol ☐ Drug abuse ☐ None ☐ Others_____

KNOWLEDGE & AWARNESS OF TUBERCULOSIS

15. **Have you ever heard about TB**? ☐ Yes ☐ No
16. **Do you know that TB is a communicable disease?** ☐ Yes ☐ No
17. **Do you know what latent TB is?** ☐ Yes ☐ No
18. **Is TB a major health problem in Bangladesh?** ☐ Yes ☐ No ☐ Don't know

Chapter-6

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