

# **Awareness and Knowledge of Bangladeshi People regarding Oral and Oropharyngeal Cancer**

**A thesis paper submitted to the Department of Pharmacy in conformity  
with the requirements for the Degree of Bachelor of Pharmacy**

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## **Affirmation by the Candidate**

I, Sherajum Monira Kashfi hereby declare that this dissertation entitled “Awareness and Knowledge of Bangladeshi people regarding Oral and Oropharyngeal Cancer” submitted to the Department of Pharmacy, East West University, in the partial fulfillment of the requirement for award of the degree of bachelor of pharmacy, is a record of original research work carried out by me during fall 2015 to spring 2016 under the supervision and guidance of Ms. Meena Afroze Shanta, Lecturer, Department of Pharmacy, East West University.

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## **Certificate by the Supervisor**

This is to certify that the dissertation entitled “Awareness and Knowledge of Bangladeshi people regarding Oral and Oropharyngeal Cancer” is a research work done by Sherajum Monira Kashfi, in partial fulfillment of the requirement for the Degree of Bachelor of Pharmacy, is a record of original research work carried out by me during fall 2015 to spring 2016 under the supervision and guidance of me.

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## **Authorization by Head of the Department**

This is to endorse that the dissertation entitled “Awareness and Knowledge of Bangladeshi people regarding Oral and Oropharyngeal Cancer” is a research work done by Sherajum Monira Kashfi under the supervision of Ms. Meena Afroze Shanta, Lecturer, Department of Pharmacy, East West University.

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*Abu Saleh Monir Ahmed*

and

*Fauzia Akter*

## Abstract

Oral and pharyngeal cancers are the sixth most common cancers internationally. In the United States, there are about 30,000 new cases of oral and pharyngeal cancers diagnosed each year. Furthermore, survival rates for oral and pharyngeal cancers have not significantly improved over the last three decades. This study examines the knowledge and risk awareness of oral and pharyngeal cancer including risk factors, disparities, and preventative factors in Bangladesh. The study revealed that the research in this field has been focused on alcohol, tobacco, and their combined effects on oral and oropharyngeal cancers. The study on oral and oropharyngeal cancer inequalities among study students also appears to be in risk. However, there is less influence of dietary factors on these cancers. Finally, effective interventions for the reduction of oral and oropharyngeal cancers are analyzed. We have got some vital evidence about oropharyngeal cancers from a developing country like Bangladesh that we have got a clear idea about the factors those are responsible for oropharyngeal cancer and its magnitude of impact over the people. We also come to know about the thought of the people about oropharyngeal cancers, its treatment procedure, diet, its vaccination, preventive ways and also the awareness of the people that helps us to study more or to find new things based on this study information. The study suggests that majority of the participants thought that marijuana use (95%), smoking tobacco (93%), consuming heavy alcohol (81%), using cigars and pipes (89%), dentures and poor dentition (80%) and weakened immune system (75%) are the major reasons behind oral & oropharyngeal cancers. Being infected with human papillomavirus (HPV) (55%) is also a vital reason for OPC. The study also reveals that women (45%) are more prone to OPC than man (31%). Majority of the participants knew that low intake of Vitamin C (68%), Beta Carotenes (59%), Vitamin A&E (50%) and Iodine deficiency (53%) are responsible for oropharyngeal cancer where few people know that high fat intake is responsible for high risk of oropharyngeal cancer where high intake of Fruits & Vegetables are responsible for reducing oropharyngeal cancer.

**Keywords:** Oral and pharyngeal, risk factors, inequalities, preventative factors etc.

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## List of Abbreviations

Oropharyngeal Cancer	OPC
Human Papilloma Virus	HPV
Oral Cavity Cancer	OCC
Annual Percentage Change	APC
Positron Emission Tomography	PET
Transoral Laser Microsurgery	TLM
Intensity Modulated Radiation Therapy	IMRT
Tobacco-Specific N-nitrosamines	TSNAs
Acquired Immune Deficiency Syndrome	AIDS
Graft Versus Host Disease	GVHD
Epstein Barr Virus	EBV
Cyto Megalo Virus	CMV
Herpes Simplex Virus	HSV
Epidermal Growth Factor Receptor	EHFR
Area Under the Curve	AUC
Oral Cancer Education	OCE
Risk Ratio	RR

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# **Chapter 1: Introduction**



## 1.1 Oral cavity and oropharyngeal cancers

Cancer is an abnormal growth of cells which tend to proliferate in an uncontrolled way and in some cases, to metastasize. Cancer is the Latin word for crab. The ancients used the word to mean a malignancy, doubtless because of the crab-like tenacity a malignant tumor sometimes seems to show in grasping the tissues it invades. Cancer may also be called malignancy, a malignant tumor, or a neoplasm literally, a new growth. Cancer is not one disease, it is a group of more than 100 different and distinctive diseases. It can encompass any tissue of the body and have many different forms in each body area. Most cancers are named for the type of cell or organ in which they start. If a cancer spreads, the new tumor bears the same name as the original tumor. The incidence of a particular cancer may depend on gender. While cancers are the most common type of malignancy for both men and women, the second most common type in men is prostate cancer and in women, breast cancer. Cancer frequency does not equate to cancer mortality. Skin cancers are often curable. Lung cancer is the leading cause of death from cancer for both men and women today. Benign of tumors are not cancer, malignant tumors are cancer. Cancer is not contagious (MedicineNet, 2013).

Cancer starts when cells in the body begin to grow out of control. Cells in nearly any part of the body can become cancer, and can spread to other areas of the body. Oral cavity cancer, or just oral cancer, is cancer that starts in the mouth also called the oral cavity. Oropharyngeal cancer starts in the oropharynx, which is the part of the throat just behind the mouth. Most oropharyngeal cancers are squamous cell carcinomas. Squamous cells are the thin, flat cells that line the inside of the oropharynx (American Cancer Society, 2016).

## 1.2 Epidemiology of oral and pharyngeal cancer

Oral and pharyngeal cancers are the sixth most common cancers in the world.

- There are about 30,000 new cases of oral and pharyngeal cancers diagnosed each year in the United States. It has been found that oral cancer resulted in 135,000 deaths in 2013 up from 84,000 deaths in 1990. Oral cancer occurs more often in people from the lower end of the socioeconomic scale.

- In 2011, close to 37,000 Americans are projected to be diagnosed with oral or pharyngeal cancer. 66% of the time these will be found as late stage three and four disease.
- Five-year relative survival for oral cavity cancer patients in Germany is about 55%. Survival rates of patients diagnosed with oral cancer have not significantly improved in decades (Chaturvedi *et al.*, 2013).
- Human papillomavirus (HPV) is the cause of increasing oropharyngeal cancer (OPC) incidence in some countries. The trends for OPCs and oral cavity cancers (OCCs) in 23 countries across four continents. OPC incidence significantly increased during 1983 to 2002 predominantly in economically developed countries.
- Among men, OPC incidence significantly increased in the United States, Australia, Canada, Japan, and Slovakia, despite non-significant or significantly decreasing incidence of OCCs.
- Among women, in all countries with increasing OPC incidence (Denmark, Estonia, France, the Netherlands, Poland, Slovakia, Switzerland, and United Kingdom), there was a concomitant increase in incidence of OCCs.
- The magnitude of increase in OPC incidence among men was significantly higher at younger ages <60 years than older ages in the United States, Australia, Canada, Slovakia, Denmark, and United Kingdom.
- OPC incidence significantly increased during 1983 to 2002 predominantly in developed countries and at younger ages. These results underscore a potential role for HPV infection on increasing OPC incidence, particularly among men (Chaturvedi *et al.*, 2013).
- Epidemiologic trends, increasing oropharyngeal cancer incidence has been observed in numerous developed nations over the past few decades (e.g. the US annual percentage change [APC] = 3.0 for SEER 9 areas from 1999 through 2012; Canada, APC = 2.7 from 1992 through 2009; Denmark, APC = 3.5 from 1978 through 2007; Portugal, APC = 3.49 from 1998 through 2007; Netherlands, APC = 2.1 for males and APC = 2.7 for females from 1989 through 2011; Korea,

APC = 2.35 from 1999 through 2009; and Australia, APC = 1.2 for males and APC = 0.8 for females from 1982 through 2008).

- For oral cavity cancer, many regions have reported decreasing or stabilizing trends (e.g. Canada, Australia, Bulgaria, Croatia, Slovenia, Ukraine, Slovakia, Netherlands, France, and Germany), whereas others have exhibited markedly increasing trends (e.g. Iceland, Finland, and Ireland).
- In India, oral cancer trends vary by region, although investigators estimate that the total number of new mouth cancer cases will increase from 45,859 in 2010 to 64,525 in 2020.
- In Korea from 1999 through 2010, age-standardized incidence rates increased markedly for cancers of the oral tongue (APC = 2.2 for males, APC = 4.1 for females, and APC = 6.1 for individuals younger than age 40 years) and buccal mucosa (APC = 4.8) (Majchrzak *et al.*, 2014).
- In Bangladesh, more than 7000 people are newly diagnosed each year and among them 6.6% people are died due to their life style and other factors on frequency, mortality, survival and inclinations in cancers of the lip, oral cavity and oropharynx (Chaturvedi *et al.*, 2013).

### 1.3 The oral cavity and oropharynx

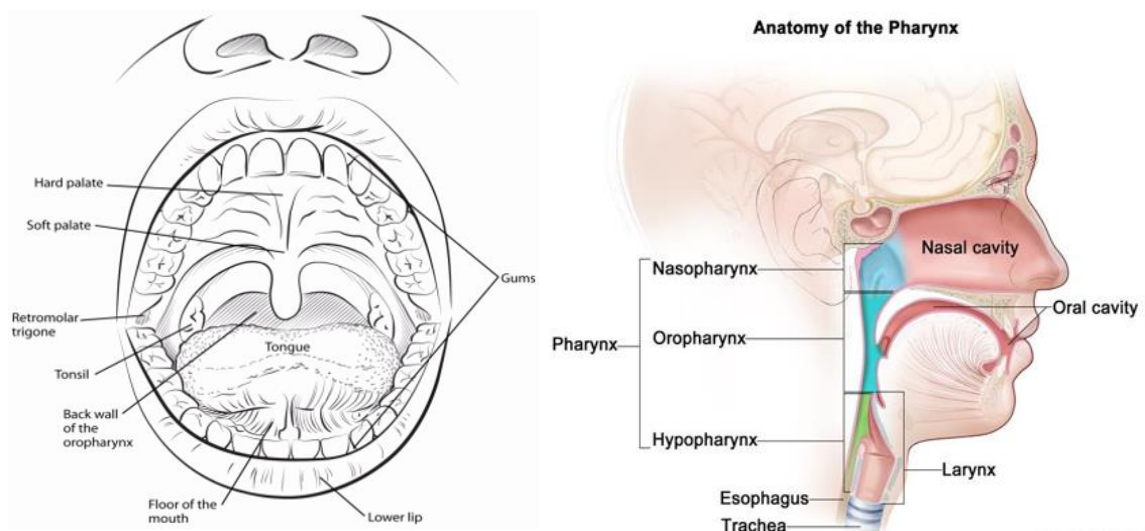
Oral cavity includes the lips, the inside lining of the lips and cheeks, the teeth, the gums, the front two thirds of the tongue, the floor of the mouth below the tongue, and the bony roof of the mouth.

Area behind the wisdom teeth can be included as a part of the oral cavity, although it is often considered part of the oropharynx. It begins where the oral cavity stops. It includes the base of the tongue, the soft palate, the tonsils, and the side and back wall of the throat (American Cancer Society, 2016).

The oropharynx is the middle part of the pharynx behind the mouth. It includes the following:

- Back one-third of the tongue
- Soft palate
- Side and back walls of the throat
- Tonsils

The pharynx is a hollow tube about 5 inches long that starts behind the nose and ends where the trachea and esophagus begin. Air and food pass through the pharynx on the way to the trachea or the esophagus. Oropharyngeal cancer is a type of head and neck cancer. Sometimes more than one cancer can occur in the oropharynx and in other parts of the oral cavity, nose, throat, larynx, trachea, or esophagus at the same time (National Cancer Institute, 2015).



**Figure 1.3:** Anatomy of Pharynx (American Cancer Society, 2016) & (National Cancer Institute, 2015)

The oral cavity and oropharynx help to breathe, talk, eat, chew, and swallow. Minor salivary glands throughout the oral cavity and oropharynx make saliva that keeps mouth moist and helps to digest food. The different parts of the oral cavity and oropharynx are made up of several types of cells. Different cancers can develop from each type of cell. The differences are important, because they can influence a person's treatment options and

prognosis. Cancers can also start in other parts of the throat (American Cancer Society, 2016).

## **1.4 Tumors and growths in the oral cavity and oropharynx**

Several types of tumors can develop in the oral cavity and oropharynx. They fit into 3 general categories:

- Benign or non-cancerous growths that do not invade other tissues and do not spread to other parts of the body.
- Harmless growths that can later develop into cancer. These are known as pre-cancerous conditions.
- Cancerous tumors that can grow into surrounding tissues and spread to other parts of the body.

### **1.4.1 Benign tumors**

Many types of benign tumors and tumor like conditions can start in the mouth or throat:

- Eosinophilic granuloma
- Fibroma
- Granular cell tumor
- Keratoacanthoma
- Leiomyoma
- Osteochondroma
- Lipoma
- Schwannoma
- Neurofibroma
- Papilloma
- Condyloma acuminatum
- Verruciform xanthoma
- Pyogenic granuloma

- Rhabdomyoma
- Odontogenic tumors (tumors that start in tooth forming tissues)

These non-cancerous tumors start from different kinds of cells and have a variety of causes. Some of them may cause problems, but they are not likely to be life threatening. The usual treatment for these types of tumors is surgery to remove them completely since they are unlikely to recur (American Cancer Society, 2016).

### **1.4.2 Leukoplakia and erythroplakia**

Leukoplakia and erythroplakia are terms used to describe certain types of abnormal tissue that can be seen in the mouth or throat:

- Leukoplakia is a white or gray patch.
- Erythroplakia is a flat or slightly raised, red area that often bleeds easily if it is scraped.
- Erythroleukoplakia is a patch with both red and white areas.

Dentist or dental hygienist is the first person to spot these white or red areas. They may be a cancer, they may be a pre-cancerous condition called dysplasia, or they could be a relatively harmless condition. Dysplasia is graded as mild, moderate, or severe, based on how abnormal the tissue looks under the microscope. Knowing the degree of dysplasia helps predict how likely it is to progress to cancer or to go away on its own or after treatment. A biopsy is the only way to know for certain if an area of leukoplakia or erythroplakia contains dysplastic cells or cancer cells. For a biopsy, a sample of tissue from the abnormal area is removed and then looked at under the microscope. Most cases of leukoplakia do not develop into cancer. But some leukoplakia are either cancerous when first found or have pre-cancerous changes that can eventually progress to cancer if not properly treated. Erythroplakia and erythroleukoplakia are less common but are usually more serious. Most of these red lesions turn out to be cancer when they are biopsied or will develop into cancer later. Most oral cancers do not develop from pre-existing lesions (American Cancer Society, 2016).

## **1.5 Types of oropharyngeal cancers**

Several types of cancers can start in the mouth or throat.

### **1.5.1 Squamous cell carcinomas**

More than 90% of cancers of the oral cavity and oropharynx are squamous cell carcinomas, also called squamous cell cancers. These cancers begin in early forms of squamous cells, which are flat, scale like cells that normally form the lining of the mouth and throat. The earliest form of squamous cell cancer is called carcinoma in situ, meaning that the cancer cells are present only in the outer layer of cells called the epithelium. This is different from invasive squamous cell carcinoma, where the cancer cells have grown into deeper layers of the oral cavity or oropharynx.

### **1.5.2 Verrucous carcinoma**

Verrucous carcinoma is a type of squamous cell carcinoma that makes up less than 5% of all oral cancers. It is a low grade means slow growing cancer that rarely spreads to other parts of the body, but it can grow deeply into surrounding tissue. If they are not treated, areas of ordinary squamous cell cancer may develop within some verrucous carcinomas. Some verrucous carcinomas may already have areas of ordinary squamous cell cancer that are not recognized in the biopsy sample. Cells from these areas of squamous cell carcinoma may then spread to other parts of the body. For all of these reasons, verrucous carcinomas should be removed promptly, along with a wide margin of surrounding normal tissue.

### **1.5.3 Minor salivary gland carcinomas**

Minor salivary gland cancers can develop in the glands in the lining of the mouth and throat. There are several types of minor salivary gland cancers, including adenoid cystic carcinoma, mucoepidermoid carcinoma, and polymorphous low grade adenocarcinoma.

#### **1.5.4 Lymphomas**

The tonsils and base of the tongue contain immune system (lymphoid) tissue, where cancers called lymphomas can start (American Cancer Society, 2016).

### **1.6 Pathophysiology of oral and pharyngeal cancer**

The oral cavity is a specialized environment of soft and hard tissues that is unique and one of the most dynamic regions in the body. It is the only area of the body that houses teeth contains bone, blood vessels, nerves, mucosa, salivary glands, taste buds, and muscle tissue. Any of these structures can manifest either benign or malignant pathology, as well as manifest the signs of many systemic diseases and general health of a patient. Oral and maxillofacial surgeons must be vigilant in their examination and knowledge of the types of pathology that can present in the oral cavity.

There are a number of developmental tumors that are related to the jaws and the specialized organs that lead to the development of teeth that are often asymptomatic. Many times these types of pathology are detected by the careful clinical and radiographic (x-ray) examination that is performed routinely by your dentist and dental hygienist. Once there is suspicion of an odontogenic cyst or tumor and after careful clinical and radiographic examination, a biopsy is often performed and sent to a pathologist that specializes in oral diseases. The majority of these cysts or tumors are benign and treatment can range from simple removal to more extensive surgeries requiring reconstruction. Often, people will have different changes that are noticed themselves or by their dentist or physician. These can range from bumps, white spots, growths, or swellings on the gum tissue, cheeks, or lips. Although these things are often benign, they should not be ignored and should be promptly evaluated by surgeons. With the evaluation, it is often recommend biopsy, or close follow up with the patient. The most serious type of oral pathology is oral cancer and because early detection is critical to successful treatment. The most common presentation of oral cancer is a red or red-white patch in the mouth, a sore or ulceration that fails to heal, a hard lump in the soft tissues of the mouth or neck, or changes in sensation in the soft tissues of the



mouth, lip, chin, or tongue. These lesions are typically not painful but this does not mean that they should be ignored. Patients should perform self-examination monthly and attend routine doctor visits for a more thorough examination (BostonHealthNet, 2014).

## 1.7 Diet

There is an inverse relationship between fruit intake and risk of oral and pharyngeal cancer. The influence of constituents in fruits, although it is possible that cooking vegetables may have a nutrient diminishing effect. Dietary intake of other nutrients, such as the B vitamins, vitamin E, folate, and iron, showed no consistent relationship to risk of oral and pharyngeal cancer. Coffee or other hot beverage consumption did not increase risk; intake of nitrite-containing meats or cooking practices, such as smoking, pickling, or charcoal grilling, also did not increase risk. All analyses were adjusted for the effects of tobacco and alcohol, strong risk factors for oral and pharyngeal cancer. Dietary findings who did not use tobacco or alcohol were similar to those for all subjects (McLaughlin *et al.*, 1988).

## 1.8 Signs and symptoms of oral and oropharyngeal cancer

These and other signs and symptoms may be caused by oropharyngeal cancer or by other conditions. Check with your doctor if you have any of the following:

- A sore throat that does not go away.
- Trouble swallowing.
- Trouble opening the mouth fully.
- Trouble moving the tongue.
- Weight loss for no known reason.
- Ear pain.
- A lump in the back of the mouth, throat, or neck.
- A change in voice.
- Coughing up blood.

Sometimes oropharyngeal cancer does not cause early signs or symptoms (Schiff *et al.*, 2016).

## **1.9 Diagnosis of oropharyngeal cancer**

A doctor can diagnose oropharyngeal cancer by examining the throat. The doctor will use a mirror and lights, and/or a fiber optic scope, to look at the throat and will feel the neck for masses. If the doctor finds abnormal tissue, he or she will obtain a piece of tissue in a procedure called a biopsy. The tissue will be checked for cancer cells (National Cancer Institute, 2015).

### **1.9.1 Tests to examine mouth and throat to detect, diagnose and stage of oral and oropharyngeal cancer**

The following tests and procedures can be used:

#### **1.9.1.1 Physical exam and history**

An exam of the body to check general signs of health, including checking for signs of disease, such as swollen lymph nodes in the neck or anything else that seems unusual. The medical doctor or dentist does a complete exam of the mouth and neck and looks down the throat with a small, long handled mirror to check for abnormal areas. A history of the patient's health habits and past illnesses and treatments will also be taken (Schiff *et al.*, 2016).

#### **1.9.1.2 PET-CT scan**

A procedure that combines the pictures from a positron emission tomography scan and a computed tomography scan. The PET and CT scans are done at the same time with the same machine. The combined scans give more detailed pictures of areas inside the body than either scan gives by itself. A PET-CT scan may be used to help diagnose disease, such as cancer, plan treatment, or find out how well treatment is working.

### 1.9.1.3 CT scan

A procedure that makes a series of detailed pictures of areas inside the body, taken from different angles. The pictures are made by a computer linked to an x-ray machine. A dye is injected into a vein or swallowed to help the organs or tissues show up more clearly. This procedure is also called computed tomography, computerized tomography, or computerized axial tomography.

### 1.9.1.4 PET scan (positron emission tomography scan)

A procedure to find malignant tumor cells in the body. A small amount of radioactive glucose is injected into a vein. The PET scanner rotates around the body and makes a picture of where glucose is being used in the body. Malignant tumor cells show up brighter in the picture because they are more active and take up more glucose than normal cells do (Schiff *et al.*, 2016).

### 1.9.1.5 MRI (Magnetic Resonance Imaging)

A procedure that uses a magnet, radio waves, and a computer to make a series of detailed pictures of areas inside the body. This procedure is also called nuclear magnetic resonance imaging (NMRI).

### 1.9.1.6 Biopsy

The removal of cells or tissues so they can be viewed under a microscope by a pathologist to check for signs of cancer. A fine needle biopsy is usually done to remove a sample of tissue using a thin needle (Schiff *et al.*, 2016).

The following procedures may be used to remove samples of cells or tissue:

- **Endoscopy:** A procedure to look at organs and tissues inside the body to check for abnormal areas. An endoscope is inserted through an incision in the skin or opening in the body, such as the mouth or nose.

An endoscope is a thin, tube-like instrument with a light and a lens for viewing. It may also have a tool to remove abnormal tissue or lymph node samples, which are checked under a microscope for signs of disease. The nose, throat, back of the tongue, esophagus, stomach, voice box, windpipe, and large airways will be checked.

The type of endoscopy is named for the part of the body that is being examined. For example, pharyngoscopy is an exam to check the pharynx.

- **Laryngoscopy:** A procedure in which the doctor checks the larynx with a mirror or with a laryngoscope. A laryngoscope is a thin, tube like instrument with a light and a lens for viewing.

#### **1.9.1.7 Oral brush exam**

A procedure in which the medical doctor or dentist uses a small brush to remove cells that may be cancer. The cells are checked under a microscope for signs of disease (Schiff *et al.*, 2016).

If cancer is found, the following test may be done to study the cancer cells:

#### **1.9.1.8 HPV test**

A laboratory test used to check the sample of tissue for certain types of HPV infection. This test is done because oropharyngeal cancer can be caused by the HPV virus (Merck and the Merck Manuals 2016).

### **1.10 Stages of oropharyngeal cancer**

The stages of oropharyngeal cancer span from Stage 0 to Stage IV. In Stage 0, cancer is found only in the cells that line the oropharynx. Additional stages are described as follows:

**Stage I:** The cancer is 2 centimeters or smaller and has not spread outside the oropharynx.

**Stage II:** The cancer is larger than 2 centimeters, but not larger than 4 centimeters and has not spread outside the oropharynx (Cleveland Clinic Foundation, 2013).

**Stage III:** In this stage, cancer is larger than 4 centimeters and has not spread outside the oropharynx. An alternate form of this stage is that cancer is any size and has spread to only one lymph node on the same side of the neck as the cancer. The lymph node that contains cancer is 3 centimeters or smaller.

**Stage IV:** This stage contains the sub stages of IVA, IVB, and IVC.

**Stage IVA:** In stage IVA, the cancer has spread to tissues outside the oropharynx, including the voice box, roof of the mouth, jaw, muscle of the tongue, or central muscles of the jaw. The cancer may have spread to one or more nearby lymph nodes, which are still not larger than 6 centimeters. The cancer is any size, is only in the oropharynx, and has spread to one lymph node that is larger than 3 centimeters but no larger than 6 centimeters, or to more than one lymph node, none larger than 6 centimeters.

**Stage IVB:** In the stage IVB the cancer appears in a lymph node that is larger than 6 centimeters and may have spread to other tissues around the oropharynx. The cancer surrounds the main artery in the neck or has spread to bones in the jaw or skull, to muscle in the side of the jaw, or to the upper part of the throat behind the nose. The cancer may have spread to nearby lymph nodes.

**Stage IVC:** In the stage IVC, the cancer has spread to other parts of the body. The tumor may be any size and may have spread to lymph nodes (Cleveland Clinic Foundation, 2013).

## **1.11 Treatment of oropharyngeal cancer by stage**

**Stage I:** Treatment may be radiation therapy or surgery.

**Stage II:** Treatment involves surgery to remove the cancer or radiation therapy.

**Stage III:** Treatment for this stage of oropharyngeal cancer may include surgery to remove the cancer, followed by radiation therapy. Other treatments may include:

- Radiation therapy alone
- A clinical trial of chemotherapy, followed by surgery or radiation therapy
- A clinical trial of chemotherapy combined with radiation therapy
- A clinical trial of new ways to provide radiation therapy (Schiff *et al.*, 2016).

**Stage IV:** For cases in which oropharyngeal cancer can be removed by surgery, treatment may be one of the following:

- **Surgery to remove the cancer, followed by radiation therapy:** Surgery, increasingly, transoral laser microsurgery: Surgery is increasingly being used as primary treatment of oropharyngeal cancer. Transoral laser microsurgery (TLM) is increasingly being used to resect tumors of the tonsil and base of tongue endoscopically, avoiding the morbidity of open surgery. In TORS, a surgical robot with multiple adaptable arms is controlled by a surgeon at a console. The articulating arms of the robot and an endoscopic camera are inserted through the patient's mouth. The robotic procedure provides better visualization of structures and causes less surgical morbidity compared to open surgery. However, the indications for using TORS are not yet well defined.
- **Radiation therapy, with or without chemotherapy:** Radiation therapy sometimes combined with chemotherapy, can be used as primary therapy or postoperatively. Traditionally, radiation has been used for early stage cancers and chemo radiation has been used for advanced cancers. Intensity modulated radiation therapy (IMRT) has increasingly been used as a way to spare surrounding tissue and decrease long term adverse effects. Because the oropharynx is rich in lymphatic, cervical lymph node metastasis is common and must be considered in all patients with oropharyngeal cancer. (Schiff *et al.*, 2016).
- Clinical trial combining radiation therapy and chemotherapy
- Clinical trial of new ways to provide radiation therapy

For cases in which the cancer cannot be removed by surgery, treatment may include one of the following:

- Radiation therapy
- Clinical trial during which chemotherapy is followed by surgery or radiation therapy
- Clinical trial of radiation therapy given with chemotherapy or radio sensitizers
- Clinical trial of new ways of giving radiation therapy
- Clinical trial of hyperthermia and radiation therapy (Cleveland Clinic Foundation, 2013).

## **1.12 Risk factors of oropharyngeal cancer**

Tobacco and alcohol use are among the strongest risk factors for oral cavity and oropharyngeal cancers.

### **1.12.1 Tobacco use**

Most people with oral cavity and oropharyngeal cancers use tobacco, and the risk of developing these cancers is related to how much and how long they smoked or chewed. Smokers are many times more likely than non-smokers to develop these cancers. Tobacco smoke from cigarettes, cigars, or pipes can cause cancers anywhere in the mouth or throat, as well as causing cancers of the larynx, lungs, esophagus, kidneys, bladder, and several other organs. Pipe smoking is a particularly significant risk for cancers in the area of the lips that touch the pipe stem. It is important for smokers who have been treated for oral cavity or oropharyngeal cancer to quit smoking, even if their cancer seems to be cured. Continuing to smoke greatly increases their risk of developing a second cancer of the mouth, throat, larynx, or lung. Oral tobacco products are linked with cancers of the cheek, gums, and inner surface of the lips. Using oral tobacco products for a long time poses an especially high risk. These products also cause gum disease, destruction of the bone sockets around teeth, and tooth loss. It is also important for people who have been treated for oral

cavity or oropharyngeal cancer to give up any oral tobacco products (American Cancer Society, 2016).

### **1.12.2 Chemistry, pharmacology and toxicology of tobacco smoke**

The majority of carcinogens in tobacco smoke are the byproduct of pyrolysis, they are also found in pipe and cigar smoke, often in much higher concentrations. The International Agency for Research on Cancer has generated a significant body of research demonstrating the biological activity of these agents in both laboratory animals and humans. Chemical analysis reveals that smoke from a single cigarette is composed of over 4,000 different constituents, including some that are pharmacologically active, toxic, mutagenic, or carcinogenic. Smokeless tobacco also contains carcinogens, some at extremely high levels. It is especially significant that the preparation of smokeless tobacco products, which entails curing, fermentation, and aging, occurs under conditions favoring the formation of tobacco-specific N-nitrosamines (TSNAs) from nicotine and other tobacco alkaloids such as nornicotine, anatabine, and anabasine. During tobacco chewing and snuff dipping, it is likely that additional amounts of carcinogenic TSNAs are also formed endogenously in the oral cavity (The Oral Cancer Foundation, 2016).

Two of the six TSNAs identified in smokeless tobacco, N'-nitrosornicotine (NNN) and 4-(methylnitrosamino)-1,3-pyridyl-1-butanone (NNK), are strong carcinogens in mice, rats, and hamsters, capable of inducing both benign and malignant tumors of the oral and nasal cavity as well as of the lung, esophagus, and pancreas. Poly nuclear aromatic hydrocarbons (PAHs) in tobacco smoke have been implicated extensively in oral carcinogenesis, and NNK and NNN, which are found in both tobacco and tobacco smoke, likely play a major etiological role in cancers of the oral cavity as well. In light of the vast number of toxic and carcinogenic compounds that exist in tobacco and tobacco smoke and the level of exposure to these agents among tobacco users, it is not surprising that tobacco use is so profoundly implicated in the causation of human cancer. A number of these compounds have been directly implicated in the production of oral carcinomas and exist in



both cigarette smoke and in smokeless tobacco in concentrations that have induced oral malignancies in laboratory animals (The Oral Cancer Foundation, 2016).

### **1.12.3 Drinking alcohol**

Drinking alcohol increases the risk of developing oral cavity and oropharyngeal cancers. About 7 out of 10 patients with oral cancer are heavy drinkers.

### **1.12.4 Drinking and smoking together**

The risk of these cancers is even higher in people who both smoke and drink alcohol, with the highest risk in heavy smokers and drinkers. According to some studies, the risk of these cancers in heavy drinkers and smokers may be as much as 100 times more than the risk of these cancers in people who don't smoke or drink.

### **1.12.5 Betel quid and gutka**

In Southeast Asia, South Asia, and certain other areas of the world, many people chew betel quid, which is made up of areca nut and lime wrapped in a betel leaf. Many people in these areas also chew gutka, a mixture of betel quid and tobacco. People who chew betel quid or gutka have an increased risk of cancer of the mouth (American Cancer Society, 2016).

### **1.12.6 Human papilloma virus (HPV) infection**

Human papilloma virus (HPV) is a group of more than 150 types of viruses. They are called papilloma viruses because some of them cause a type of growth called a papilloma. Infection with certain types of HPV can also cause some forms of cancer, including cancers of the penis, cervix, vulva, vagina, anus, and throat. Other types of HPV cause warts in different parts of the body. HPV can be passed from one person to another during skin-to-skin contact. One way HPV is spread is through sex, including vaginal and anal intercourse and even oral sex. HPV types are given numbers.

The type linked to throat cancer is HPV16. Most people with HPV infections of the mouth and throat have no symptoms, and only a very small percentage develop oropharyngeal cancer. Oral HPV infection is more common in men than in women. In some studies, the risk of oral HPV infection was linked to certain sexual behaviors, such as open mouth kissing and oral-genital contact. The risk also increases with the number of sexual partners a person has. Smoking also increases the risk of oral HPV infection. At this time the US Food and Drug Administration has not approved a test for HPV infection of the mouth and throat.

The number of oropharyngeal cancers linked to HPV has risen dramatically over the past few decades. HPV DNA is now found in about 2 out of 3 oropharyngeal cancers and in a much smaller fraction of oral cavity cancers. The reason for the rising rate of HPV-linked cancers is unclear, although some think that it could be because of changes in sexual practices in recent decades, in particular an increase in oral sex. People with oral and oropharyngeal cancer linked with HPV infection tend to be younger and are less likely to be smokers and drinkers. Oropharyngeal cancers that contain HPV DNA tend to have a better outlook than those without HPV.

### **1.12.7 Gender**

Oral and oropharyngeal cancers are about twice as common in men as in women. This might be because men have been more likely to use tobacco and alcohol in the past. This is changing, but the recent rise in HPV-linked cancers has been mainly among younger men, so it is still likely to occur more often in men in the near future (American Cancer Society, 2016).

### **1.12.8 Age**

Cancers of the oral cavity and oropharynx usually take many years to develop, so they are not common in young people. Most patients with these cancers are older than 55 when the cancers are first found. But this may be changing as HPV-linked cancers become more common. People with cancers linked to HPV infection tend to be younger.

### **1.12.9 Ultraviolet light**

Sunlight is the main source of UV light for most people. Cancers of the lip are more common in people who have outdoor jobs where they are exposed to sunlight for long periods of time.

### **1.12.10 Poor nutrition**

Several studies have found that a diet low in fruits and vegetables is linked with an increased risk of cancers of the oral cavity and oropharynx.

### **1.12.11 Weakened immune system**

Oral cavity and oropharyngeal cancers are more common in people who have a weak immune system. A weak immune system can be caused by certain diseases present at birth, the acquired immunodeficiency syndrome (AIDS), and certain medicines such as those given after organ transplants.

### **1.12.12 Graft versus host disease**

Graft versus host disease (GVHD) is a condition that sometimes occurs after a stem cell transplant. During this medical procedure, blood stem cells from a donor are used to replace bone marrow that has been destroyed by disease, chemotherapy, or radiation. GVHD occurs when the donor stem cells recognize the patient's cells as foreign and launch an attack against them. GVHD can affect many tissues of the body, including those in the mouth. This increases the risk of oral cancer, which can occur as early as 2 years after GVHD (American Cancer Society, 2016).

### **1.12.13 Genetic syndromes**

People with certain syndromes caused by inherited defects in certain genes have a very high risk of mouth and throat cancer.

- Fanconi anemia is a condition that can be caused by inherited defects in several genes that contribute to repair of DNA. People with this syndrome often have blood problems at an early age, which may lead to leukemia or aplastic anemia. They also have a very high risk of cancer of the mouth and throat.
- Dyskeratosis congenita is a genetic syndrome that can cause aplastic anemia, skin rashes, and abnormal fingernails and toenails. People with this syndrome also have a very high risk of developing cancer of the mouth and throat at an early age.

#### **1.12.14 Lichen planus**

This disease occurs mainly in middle aged people. Most often it affects the skin, but it sometimes affects the lining of the mouth and throat, appearing as small white lines or spots. A severe case may slightly increase the risk of oral cancer.

#### **1.12.15 Unproven or controversial risk factors**

- **Mouthwash:** Some studies have suggested that mouthwash with a high alcohol content might be linked to a higher risk of oral and oropharyngeal cancers. But recent research has questioned these results. Studying this possible link is complicated by the fact that smokers and frequent drinkers who already have an increased risk of these cancers are more likely to use mouthwash than people who neither smoke nor drink.
- **Irritation from dentures:** It has been suggested that long term irritation of the lining of the mouth caused by poorly fitting dentures is a risk factor for oral cancer. But many studies have found no increased risk in denture wearers overall. Poorly fitting dentures can tend to trap agents that have been proven to cause oral cancer, such as alcohol and tobacco particles, so denture wearers should have them checked by a dentist regularly to ensure a good fit. All denture wearers should remove their dentures at night and clean and rinse them thoroughly every day. (American Cancer Society, 2016)

- **Family history:** People often worry that they are at a higher risk of cancer because someone in their family has it. There does seem to be a slightly higher risk of getting mouth cancer if people have a close relative who has had mouth cancer. We don't know the reason for this.
- **Mouth Conditions:** Sometimes changes can happen in the cells of the lining of the mouth and they cause red or white patches to appear. Doctors call these red patches erythroplakia and white patches leukoplakia. In some people these changes may develop into cancer over some years. Dentists can see these patches during dental checks so it is important to have regular dental appointments to find these changes early.
- **Blood pressure lowering drug (Hydrochlorothiazide):** Hydrochlorothiazide is a drug used to treat high blood pressure. One of its possible side effects is photosensitivity. A small study showed hydrochlorothiazide may increase the risk of developing lip cancer (Cancer Research UK, 2014).

### 1.13 Prognosis for people with oropharyngeal cancers

The prognosis for people with oropharyngeal cancer depends on the health of the person, the HPV status of the tumor, and the stage of the disease. Tumors that are HPV-positive have a dramatically improved cure rate, compared to tumors that are HPV-negative. It is important for people with oral cancer or oropharyngeal cancer to have follow-up exams for the rest of their lives as cancer can occur in nearby areas. It is important to eliminate risk factors like smoking and drinking, which increase the risk for second cancers, or recurrent cancer (Cleveland Clinic Foundation, 2013).

### 1.14 Factors affecting prognosis and treatment options

The prognosis depends on the following:

- The stage of the cancer
- The number and size of lymph nodes with cancer

- Whether the patient has HPV infection of the oropharynx
- Whether the patient has a history of smoking for more than ten pack years

Oropharyngeal tumors related to HPV infection have a better prognosis and are less likely to recur than tumors not linked to HPV infection. Treatment options depend on the following:

- The stage of the cancer
- Keeping the patient's ability to speak and swallow as normal as possible
- The patient's general health

Patients with oropharyngeal cancer have an increased risk of another cancer in the head or neck. This risk is increased in patients who continue to smoke or drink alcohol after treatment (Schiff *et al.*, 2016).

## 1.15 Viruses and their interactions with oncogenes

Alterations of cellular oncogenes, which lead to altered expression of their products, have been implicated in human cancers. Cellular oncogenes, also known as proto-oncogenes, acquire their transforming properties or become activated by gene amplification, point mutations, and gene rearrangements. Oncogenes can encode growth factors and growth factor receptors, act on internal Signaling molecules, and regulate DNA transcription factors. Other genes encode proteins that inhibit the cell cycle or promote programmed cell death (apoptosis). Tumor suppressor genes may become inactivated or mutated with consequential loss of control over cell division. The retinoblastoma and gene products are examples.

Consideration of risk factors should recognize that many molecular events governing control of cell cycles are influenced by viruses. Those most commonly implicated in oral cancer transformation have been the human papillomavirus (HPV), herpes group viruses, and the adenoviruses. Of these, HPV and herpes have been the most thoroughly studied and are now considered to be the most likely "synergistic viruses" involved in human oral

cancer. The herpes viruses most often linked to oral cancer are the Epstein-Barr virus (EBV) and cytomegalovirus (CMV); both EBV DNA and CMV.

DNA have been demonstrated in oral carcinomas. The hamster cheek pouch model has been used to evaluate the role of herpes simplex virus (HSV), and reports indicate that HSV can act synergistically with chemical carcinogens to initiate oncogenic transformation in this animal model. However, there is still debate as to whether the presence of HSV in such tissues shows a cause and effect association between virus and cancer. More than 100 different HPV types have been isolated from benign and malignant neoplasms. HPV antigens and gene products have been detected in biopsies of oral cancer and pre-cancer. HPV has also been identified in nodal metastases from oral, head, and neck cancers. The genotypes most often found in oral carcinoma are HPV 16 and 18, but HPV can also be found in normal oral mucosa. Whether or not HPV plays an active role in the initiation of oral malignancy, whether it is simply a passenger virus, and whether the virus acts in synergy with exogenous agents such as tobacco or alcohol to promote neoplasia are all questions that still await answers. Some viruses, particularly HPV and herpes, interact with oncogenes and tumor suppressors. Recent evidence suggests that the HPV 16/E5 gene can induce malignant transformation in epithelial cells, possibly acting by enhancing growth factor mediated intercellular signal transduction. The E6 and E7 HPV 16 and 18 gene products act as oncoproteins by interacting with host cell apoptotic protein, promoting its elimination. Loss of, in turn, removes inhibition of cell-cycling influences. Still, there are substantial gaps in our knowledge about how oncogenes, tumor suppressor genes, and viruses promote oral cancer (The Oral Cancer Foundation, 2016).

## **1.16 Immunocompetence**

Studies suggest that HPV 16 transfectants play a significant role in oral cancer development by altering intercellular immune surveillance mechanisms. The most common interpretation of surveillance mechanism data is that specific cellular defense mechanisms acting against cancer development, such as anti-oncogenes, can be mutated by viruses. This theory is supported by the fact that HPV 16 E6 and E7 gene products may be able to bind

various human gene products, particularly the gene, thereby deregulating control of cell proliferation and differentiation. There are also studies demonstrating that HPV-related lesions can mediate protection against certain tumor cells.

Oral cancer does not appear to be a common consequence of systemic immunosuppression even though, among HIV-positive immune compromised individuals, HIV-associated oral malignancies have been reported. The most common are Kaposi's sarcoma and non-Hodgkin's lymphomas. KS is a malignant reactive lesion that stems from factors e.g. cytokines that induce the formation of tumors in a number of tissues and organs. The most prominent feature of Kaposi's is produced by an angiogenesis factor, which leads to the characteristic appearance of a vascular lesion. Skin is the most common site for KS, but about half of all patients will have oral manifestations. In many of these individuals, the disease will manifest itself first in the oral cavity; sometimes, other sites will not be affected. KS can afflict any oral mucosal site, the palate being the most frequent and the gingiva second. The occurrence of non-Hodgkin's lymphoma (NHL) continues to increase as the number of HIV infected individuals grows and their longevity extends. Inappropriate B-lymphocyte stimulation and the presence of Epstein-Barr virus play a role in this disease, but the co-factors are poorly understood. Frequently, these lymphomas are extra nodal and can involve the mouth. In some cases, oral NHL has been either the first or only evidence of NHL tumor (The Oral Cancer Foundation 2016).

## **1.17 Vaccination**

The sharply increasing prevalence of HPV plus OPSCC further establishes the importance of vaccination against HPV in all eligible patients, both male and female. Two vaccines against HPV are currently available: one that targets HPV-16 and -18 (Cervarix; GlaxoSmithKline) and one that targets HPV-6, -11, -16, and -18 (Gardasil; Merck Sharp & Dohme Corp.). HPV+ OPSCC is most often caused by HPV-16 and infrequently by HPV-18; thus both vaccines are effective in preventing oral transmission of the cancer-causing virus. HPV-6 and -11 are most often implicated in benign warts in the anogenital area. While the specific effect of HPV vaccination on HPV+ OPSCC itself has not been



evaluated yet, the currently available HPV-16/-18 vaccine has recently been found to be even more efficacious against oral HPV infection (vaccine efficacy, 93.3%; 95% CI, 62.5–99.7%) than against cervical HPV infection (vaccine efficacy, 72.0%; 95% CI, 63.0–79.1%) in a randomized trial of young women in Costa Rica.<sup>18</sup> This efficacy is likely to also be observed in men. In a 2008 analysis of the cost effectiveness of routine HPV vaccination of 12-year old girls, the cost per quality-adjusted life year was \$3,906 when cervical, anal, vaginal, vulvar, and oropharyngeal cancers, as well as herd immunity effects, were considered. As a comparison, in a 2006 study the cost per quality adjusted life year for vaccinating adults aged 50 to 64 years against influenza was \$28,044.<sup>20</sup> Vaccination against high risk HPV types is crucial in preventing these devastating cancers in the future. The HPV vaccine is recommended for children and adolescents aged 9 to 26 years, and parents should be counseled with regard to its cancer-preventing potential. The current cost is approximately \$360, which is covered through most public and private insurances (Moore *et al.*, 2015).

## **1.18 Gene therapy**

New discoveries about how changes in the DNA of cells in the mouth and throat cause these cells to become cancerous are being applied to experimental treatments intended to reverse these changes. Gene therapies that interfere with the growth-stimulating effect of certain HPVs are also being developed. Another type of gene therapy adds new genes to the cancer cells to make them more susceptible to being killed by certain drugs. These forms of treatment are still in the earliest stages of study, so it will probably be several years before we know if any of them are effective (American Cancer Society, 2016).

## **1.19 Drug Used in oral and oropharyngeal Cancer**

### **1.19.1 Chemotherapy for oral cavity and oropharyngeal Cancer**

- Chemotherapy is the use of anticancer drugs to treat cancer. For oral cavity and oropharyngeal cancers, the drugs are given into a vein or taken by mouth, which

allows them to enter the bloodstream and reach cancer that has spread to organs beyond the head and neck. It may be used in several different situations.

- Chemo typically combined with radiation therapy may be used instead of surgery as the main treatment for some cancers.
- Chemo combined with radiation therapy may be given after surgery to try to kill any small deposits of cancer cells that may have been left behind. This is known as adjuvant chemotherapy.
- Chemo sometimes with radiation may be used to try to shrink some larger cancers before surgery. This is called neo adjuvant or induction chemotherapy. In some cases this makes it possible to use less radical surgery and remove less tissue. This can lead to fewer serious side effects from surgery.
- Chemo with or without radiation can be used to treat cancers that are too large or have spread too far to be removed by surgery. The goal is to slow the growth of the cancer for as long as possible and to help relieve any symptoms the cancer is causing.

The chemo drugs used most often for cancers of the oral cavity and oropharynx are:

- Cisplatin
- Carboplatin
- 5-fluorouracil (5-FU)
- Paclitaxel (Taxol<sup>®</sup>)
- Docetaxel (Taxotere<sup>®</sup>)

Other drugs that are used less often include:

- Methotrexate
- Ifosfamide (Ifex<sup>®</sup>)
- Bleomycin

A chemo drug may be used alone or combined with other drugs. Combining drugs can often shrink tumors more effectively but will likely cause more side effects. A commonly used combination is cisplatin and 5-FU. This combination is more effective than either

drug alone in shrinking cancers of the oral cavity and oropharynx. Another combination often used is cisplatin, 5-FU, plus docetaxel.

For cancers of the head and neck chemo is often given at the same time as radiation known as chemo radiation. Cisplatin alone is usually the preferred chemo drug when given along with radiation. Some doctors prefer to give the radiation and chemo before surgery. However, the side effects can be severe and may be too much for some patients. In patients whose cancers are too advanced for surgery but not widespread, chemo and radiation given together might produce a better outcome than radiation alone. But this combined approach can be hard to tolerate, especially for people in poor health.

### **1.19.2 Possible side effects of chemotherapy**

Chemo drugs attack cells that are dividing quickly, which is why they work against cancer cells. But other cells in the body, such as those in the bone marrow, the lining of the mouth and intestines, and the hair follicles are also affected. This can lead to some side effects. The side effects of chemo depend on the type and dose of drugs given and how long they are taken. These side effects can include:

- Hair loss
- Mouth sores
- Loss of appetite
- Nausea and vomiting
- Diarrhea
- Low blood counts

Chemo can affect the blood producing cells of the bone marrow, leading to low blood cell counts. This can lead to:

- Increased chance of infections due to low white blood cell counts
- Easy bruising or bleeding due to low blood platelet counts
- Fatigue due to low red blood cell counts

Along with the risks above, some side effects are seen more often with certain chemo drugs. For example, 5-FU often causes diarrhea. This is often treated with drugs like loperamide. Cisplatin, docetaxel, and paclitaxel can cause nerve damage. This can lead to numbness and tingling in the hands and feet. Cisplatin can also kidney damage. To help prevent this, the patient is given fluid intravenously (IV) before and after each dose (American Cancer Society, 2016).

## 1.20 Targeted therapy

Clinical trials are studying several targeted therapies that block the action of substances such as growth factors and growth factor receptors that cause head and neck cancers to grow and spread. Several drugs that target the epidermal growth factor receptor (EGFR) may help treat oral and oropharyngeal cancers. Cetuximab (Erbix) is already approved for use against these cancers. Other drugs now being studied include erlotinib (Tarceva<sup>®</sup>), panitumumab (Vectibix<sup>®</sup>), and lapatinib (Tykerb<sup>®</sup>). Drugs that block the growth of blood vessels tumors need to survive, such as bevacizumab (Avastin<sup>®</sup>) and sunitinib (Sutent<sup>®</sup>), are now being studied for use against these cancers as well (American Cancer Society, 2016).

## 1.21 Acceptable chemotherapy regimens for primary systemic therapy with concurrent radiation

- Cisplatin 100 mg/m<sup>2</sup> IV on days 1, 22, and 43 or 40-50 mg/m<sup>2</sup> IV weekly for 6-7 week
- Cetuximab 400 mg/m<sup>2</sup> IV loading dose 1 week before the start of radiation therapy, then 250 mg/m<sup>2</sup> weekly (premedicate with dexamethasone, diphenhydramine, and ranitidine)
- Cisplatin 20 mg/m<sup>2</sup> IV on day 2 weekly for up to 7 week plus paclitaxel 30 mg/m<sup>2</sup> IV on day 1 weekly for up to 7 week
- Cisplatin 20 mg/m<sup>2</sup>/day IV on days 1-4 and 22-25 plus fluorouracil (5-FU) 1000 mg/m<sup>2</sup>/day by continuous IV infusion on days 1-4 and 22-25

- 5-FU 800 mg/m<sup>2</sup> by continuous IV infusion on days 1-5 given on the days of radiation plus hydroxyurea 1 g PO q12 h (11 doses per cycle); chemotherapy and radiation given every other week for a total of 13 week
- Carboplatin 70 mg/m<sup>2</sup>/day IV on days 1-4, 22-25, and 43-46 plus 5-FU 600 mg/m<sup>2</sup>/day by continuous IV infusion on days 1-4, 22-25, and 43-46
- Carboplatin area under the curve (AUC) 1.5 IV on day 1 weekly plus paclitaxel 45 mg/m<sup>2</sup> IV on day 1 weekly (Stevenson *et al.*, 2016).

## 1.22 Aims and objectives of the study

- The Objective of this study is to view the current prevalence and risk factors for oral carcinoma across Bangladesh because we have a rising 160 million people are living here.
- To evaluate the awareness and knowledge among the students regarding oral and pharyngeal cancer.
- To identify how many students know the impact of smoking and drinking alcohol regarding this issue are our principal aims and objectives of the study.

## 1.23 Significance of the study

The death rate for oral cancer is higher than cervical cancer, Hodgkin's lymphoma, laryngeal cancer, cancer of the testes, and endocrine system cancers such as thyroid, or skin cancer. If the definition of oral cancer is expanded to include cancer of the larynx, for which the risk factors are the same.

Low public awareness of the disease is a significant factor, but these cancers could be found at early highly survivable stages through a simple, painless, five minute examination by a trained medical or dental professional.

Oral health is very important part of human health and cannot lead good life without it. Poor oral health often factors of oral cancer. Oral cancer is very dreadful disease that affects many people each year all over the world and it is eleventh most dominate cancer in the world.

In Bangladesh, we are doing this study on a university students. Previous study was done on the patients. Bangladesh government has already taken few initiatives to make people conscious but there was no study on the general people that do they know or aware of oral and pharyngeal cancer, the risk factors like diets, drinking alcohol or smoking those are responsible for this cancer. That's why this study is bearing a significant role to view the actual scenario of the prevalence of oral and pharyngeal cancer in Bangladesh.

## **Chapter 2: Literature review**

Recent literatures on morbidity and mortality patterns, known risk factors, and related socio behavioral characteristics of oral cancer have been examined. Despite variation in populations and methodologies, alcohol and tobacco were seen as the major independent etiologic agents; these effects were associated with age, sex, and religion ethnicity. Other factors were suggested, but their correlation was less consistent: geographic location, race, socioeconomic status, nutrition, dental conditions, and concurrent diseases. Social and behavioral components may alter risk, stage of disease at diagnosis, treatment, or survival from oral cancer. The impact of socio behavioral elements on the reduction of the incidence of and the mortality from the disease is an important area needing further investigation. The review focuses primarily on several high risk countries in an attempt to gain insight into the geographic variations in the incidence of this cancer in the globe and to relate the high incidence in some populations to their life style.

## **2.1 Knowledge and risk awareness of oral and pharyngeal cancer among non-medical students**

In the United States, a cross-sectional survey was conducted in May 2012, the result shows that the response rate was 87% (100 out of 115 students approached). Eighty-one percent (81%) had low oral cavity and oropharyngeal cancer knowledge; and only 2% perceived that their oral cavity and oropharyngeal cancer risk was high Risk perception was negatively correlated with age at sexual debut. There was no significant association between knowledge and perception of risk. Although 86% had heard about oral cavity and oropharyngeal cancer, only 18% had heard of oral mouth examination, and 7% of these reported ever having an oral cavity and oropharyngeal cancer exam. It is to be concluded that sexual risks are more salient than the traditional oral cavity and oropharyngeal cancer risk factors of tobacco and alcohol use. As much as health behavior is associated with risk perception, and oral cavity and oropharyngeal cancer incidence is increasingly shifting towards younger adults, interventions must be tailored in order to improve prevention and control. Prevention of oral cavity and oropharyngeal cancers may pose a difficult challenge without first improving the knowledge of oral cavity and oropharyngeal cancers among



high risk groups, particularly university-aged youth. Since oral cavity and oropharyngeal cancer risk factors are largely prevalent among young adults, it may be of value to increase awareness of cancer risk factors and primary prevention strategies among elementary, middle and high school students, as many of the risk behaviors are likely to be initiated even before college age (Osazuwa *et al.*, 2016).

## **2.2 Public Awareness of Oral and Pharyngeal Cancer**

A study was conducted at rural northern Florida in 2008, with the support of the Florida Dental Association (FDA). They found two myths about OPC and the public that were common among the public health community and other health professionals: The public is aware and knowledgeable about OPC and its cause, and overall, the public isn't concerned about the disease, leading many individuals to make unwise decisions about how to protect themselves from OPC.

Their aim was to understand what the public knew about OPC. They found that only 12% endorsed knowing "a lot" about OPC even though 91% had heard of OPC.

Higher education levels and health literacy were related to more OPC knowledge. Among women, Caucasians had more knowledge than African-Americans. Among African-American participants, men had more knowledge than females. Overall, they found that rural adults are increasingly aware of OPC, but actual knowledge about the disease, including signs, symptoms and risk factors, is low.

The awareness of OPC may be increasing but knowledge of specific risk factors including sun exposure and human papillomavirus (HPV) is low. Few people correctly identified symptoms of red or white sores that do not heal, sore throats, swelling or lumps as related to OPC. They also studied about the awareness of OPC visual and tactile examinations 46% and lifetime receipt 46% were higher than reported in earlier statewide.

Anticipated racial/ethnic differences in knowledge of the existence of OPC examinations were diminished when adjusted for levels of health literacy and socioeconomic status.

Those with low levels of health literacy and of low education and low income were least likely to know about OPC, regardless of race or ethnicity. Only 19% of the respondents were aware of their examination, whereas an additional 27% reported having the examination when a description was provided, suggesting a lack of communication between many caregivers and rural patients.

The main predictors of those having had an OPC examination in their life was: being older, Caucasian, better educated and having a dentist of record (Logan, 2015).

### **2.3 Oral and Pharyngeal Cancer Control and Early Detection**

Another study shows that, OPCs are twice as frequent in men as compared with women and currently are estimated to occur in over 35,000 Americans each year, which is an increase over the three previous years. While OPCs occur more commonly in individuals over the age of 45, particularly in those that smoke and drink alcohol, OPC can occur in persons with no evident risk habits and who are under 40. The recent increase in OPC may be in part associated with human papilloma viruses. Racial disparities are known, with both OPC rates and mortality higher in African Americans than any other racial group. Sixty four standardized continuing education courses were given for dentists throughout the ten public health districts of the USA to determine if certain behaviors regarding oral and pharyngeal cancer control could be modified.

The study data is indicated that continuing education courses had a positive influence on participants' oral cancer attitudes, knowledge, and behavior that potentially could make a difference on prevention, early detection, and ultimately OPC control. It is evident that their most effective control of OPC at present depends upon early detection by identifying oral mucosal changes through adequate oral cancer examinations, with confirmation by biopsy the presence or absence of premalignant lesions and cancer. Professional education must be emphasized as well as public education. This will raise awareness and minimize delays in diagnosis. Prevention, treatment and rehabilitation of OPC are all a part of dental/oral health care (Silverman *et al.*, 2010).

## **2.4 The global burden of oral diseases and risks to oral health**

This paper outlines that the burden of oral diseases worldwide and describes the influence of major socio behavioral risk factors in oral health. The burden of oral disease is particularly high for the disadvantaged and poor population groups in both developing and developed countries. Oral diseases such as dental caries, periodontal disease, tooth loss, oral mucosal lesions and oropharyngeal cancers, human immunodeficiency virus/acquired immunodeficiency syndrome related oral disease and orodental trauma are major public health problems worldwide and poor oral health has a profound effect on general health and quality of life. Poor living conditions, the major risk factors relate to unhealthy lifestyles, and limited availability and accessibility of oral health services. Several oral diseases are linked to non-communicable chronic diseases primarily because of common risk factors. The challenges of improving oral health are particularly great in developing countries. Globally, the greatest burden of oral diseases is on the disadvantaged and poor population groups. The burden of oral disease among older people is high and this has a negative effect on their quality of life. In several developing countries, the general population does not benefit from preventive oral health programs. With the growing consumption of tobacco in developing countries, the risk of periodontal disease, tooth loss and oral cancer is likely to increase.

Periodontal disease and tooth loss are also linked to chronic diseases such as diabetes mellitus. Global strengthening of public health programs through implementation of effective oral disease prevention measures and health promotion is urgently needed, and common risk factors tactics should be used to integrate oral health with national health programs (Petersen *et al.*, 2005).

## **2.5 Knowledge, Opinion & Practices of Dentists Regarding OPC**

This study was done in Texas, United States on oral cancer (OC) prevention and early detection. The effective response rate of the study was 40%. 82.6% of the respondents performed OC screenings routinely for their regular patients compared to 29.2% for their

new patients. 66% believed that their current Knowledge on biopsy procedures was inadequate. 88% stated they received most of their oral cancer education (OCE) during training at dental or hygiene school. There has been a fourfold increase in the number of new patients who are screened for OC in the last decade by dental professionals.

These issues suggest that, despite known risk factors, anatomical accessibility, and periodic or occasional visits of patients and at risk persons to physicians and dentists, an effective primary or secondary prevention is not yet in place. The more substantial decrease in the development of new cases has not occurred, that many pre-neoplastic lesions are missed before they become frankly invasive, and that the majority of cases are detected only when they have reached a regional or metastatic stage. The ability to control OC will depend on prevention and early diagnosis. Continuing educational campaigns are needed at the local, state, and national level in order to educate the public about the risk factors and early signs/symptoms associated with this disease (Shetty *et al.*, 2005).

## **2.6 Tobacco habits and risk of lung & oropharyngeal cancers**

Another study was conducted in India that tobacco habits are unique and vary in different regions. Few studies, and none from central India, have reported on type of tobacco used and risk of the most common cancer types in India. In Bhopal a significant risk of bidi and cigarette smoking with a dose-response relationship was observed for lung and oropharyngeal cancer. Tobacco quid chewing showed no risk for lung, marginally increased risk for oropharyngeal and about a six fold increased risk for oral cavity cancer. Population attributable risk per cent (PARP) was observed to be 82.7% and 71.6% for smokers for the development of lung and oropharyngeal cancer, while the same was found to be 66.1% for tobacco chewers for the development of oral cavity cancer. This study provides strong evidence that smoking bidi is even more hazardous than cigarette smoking in the development of lung and oropharyngeal cancer. An intervention study to prevent the use of tobacco will be useful in this population as it also underwent gas exposure due to a chemical accident in 1984 (Dikshit *et al.*, 2000).

## 2.7 Second Cancers Following Oral and Pharyngeal Cancers

Tobacco smoking and alcohol drinking each contributed to risk of second cancers, with the effects of smoking more pronounced than those of alcohol. The odds ratios (ORs) for smoking rose with duration and intensity of smoking and were strongest for tumors of the aerodigestive tract, with ORs reaching 4.7 among smokers of 40 or more cigarettes per day for 20 or more years. Current smokers as of the baseline survey experienced a fourfold increased risk of a second aerodigestive tract cancer relative to nonsmokers and former smokers. No reduction in risk was associated with cessation of smoking or drinking at or after the index diagnosis, although the short median interval between tumors diagnoses limited observation of the effects due to recent cessation. Risk was significantly reduced, however, 5 years after smoking cessation. Among drinkers, second cancer risk was greatest for beer intake, with an OR for a second aerodigestive tract cancer of 3.8 for 15 or more beers per week. Oral and pharyngeal cancer patients with the highest intakes of tobacco and alcohol are the ones most prone to develop second primary cancers. Avoidance of tobacco smoking and alcohol drinking is the most desirable way not only to prevent primary oral cancers, but also to reduce risk of second cancers of the aerodigestive system (Day *et al.*, 1993).

## 2.8 Dietary Factors in Oral and Pharyngeal Cancer

A population-based case-control study of oral and pharyngeal cancer conducted in four areas of the United States provided information on a number of risk factors, including diet. Attention was given to foods that are sources of vitamins A and C and carotene. The major finding was an inverse relationship between fruit intake and risk of oral and pharyngeal cancer; individuals in the highest quartile of intake had about half the risk of those in the lowest quartile. Vitamin C, carotene, or fiber in fruit did not appear to account completely for this relationship, since these nutrients in vegetables did not provide similar protection. This finding suggests the influence of other constituents in fruits, although it is possible that cooking vegetables may have a nutrient-diminishing effect dietary intake of other

nutrients, such as the B vitamins, vitamin E, folate, and iron, showed no consistent relationship to risk of oral and pharyngeal cancer. All analyses were adjusted for the effects of tobacco and alcohol, strong risk factors for oral and pharyngeal cancer. Dietary findings among the few subjects who did not use tobacco or alcohol were similar to those for all subjects (McLaughlin *et al.*, 1988).

## **2.9 Oral cancer in southern India**

In southern India, they found that low educational attainment, occupation as a farmer or manual worker and various indicators of poor oral hygiene were associated with significantly increased risk. An OR of 2.5 was found in men for smoking  $\geq 20$  bidi or equivalents versus 0/day. The OR for alcohol drinking was 2.2. The OR for paan chewing was more elevated among women than among men. A similar OR was found among chewers of paan with and without tobacco. Among men, 35% of oral cancer is attributable to the combination of smoking and alcohol drinking and 49% to pan-tobacco chewing. Among women, chewing and poor oral hygiene explained 95% of oral cancer. At high risk for cancer of the oral cavity other than India (e.g., central and Eastern Europe, South America), the ratios between male and female incidence rates range between 3 and 10, in India the male-to-female ratio is approximately 1 (e.g., Madras) or lower than 0.5 (Bangalore). Such very high incidence rates in Indian women reflect the persistent importance in India of paan chewing, a habit that is equally common in the two genders (Balaram *et al.*, 2002).

## **2.10 Oral Cancer and Precancerous Lesions**

From another study in United States it has been found that over 90 percent of these tumors are squamous cell carcinomas, which arise from the oral mucosal lining. In spite of the ready accessibility of the oral cavity to direct examination, these malignancies still are often not detected until a late stage, and the survival rate for oral cancer has remained essentially unchanged over the past three decades.

The ability to control oral and oropharyngeal cancer will depend on two cornerstones: prevention and early diagnosis. Continuing educational campaigns are needed on the local, state, and national level in order to educate the public about the risk factors and early signs/symptoms associated with this disease. Individuals also need to be encouraged to seek regular professional oral examinations by a dentist and/or physician. Finally, health care workers must be encouraged to perform oral cancer examinations as part of their patient care regime, and to be knowledgeable about early signs of oral carcinoma (Neville *et al.*, 2009).

## **2.11 Synopsis of oral cancer in Indian subcontinent and approvals to decrease the incidents**

This study was done to understand the current prevalence and risk factors for oral carcinoma across the Indian subcontinent. These include better hygiene, health education, and proper screening methods to detect those at risk, earlier treatment and smoking cessation clinics, proper legislation at government level and global approach as well.

Tobacco chewing was identified as important avoidable factor of oral cancer. Head and neck cancers account for one of the fourth of all cancers in Indian males. In India the incidence of oral cancer is about 3-7 times more common as compared to resource rich countries.

The age standardized incidence rate of oral cancer is reported at 12.6 per 100,000 people. The increased prevalence of the oral cancer in the Indian subcontinent seems to be due to the high exposure to sunlight due to farming, smoking and other smokeless tobacco habits, alcohol, spicy food, and neglect of overall oral health. The highest age-adjusted incidence for oral cancer is highest in India, i.e. 15.7 per100, 000 and lowest in Japan which is 0.2 per 100,000 and the difference is predominantly due to use of tobacco between the two nations.

In the West, the cancer of tongue and floor of mouth is common whereas in Indian subcontinent the cancers of gingival and buccal mucosa are common due to placement of tobacco quid in the oral cavity. This cancer of gingivobuccal complex is termed as Indian oral cancer. Human Papilloma Virus (HPV) especially types 16 and 18 are known risk factors (there are over 100 variables) and independent causative factor for oral cancer (Khan *et al.*, 2012).



## **Chapter 3: Methodology**

### **3.1 Types of study**

The study was a questionnaire based study. The Objective of this study is to view the current prevalence and risk factors for oral carcinoma across Bangladesh and to evaluate the awareness and knowledge of Bangladeshi people regarding oral and pharyngeal cancer and to identify how many people know the impact of smoking and drinking alcohol regarding this issue are our principal aims and objectives of the study.

### **3.2 Study population**

In this study, a total number of 500 students from different department of East West University participated by answering a questionnaire to evaluate the awareness and knowledge of Bangladeshi people regarding oral and pharyngeal Cancer.

### **3.3 Inclusion criteria**

The following criteria are included.

- Any male or female subject
- All the subjects are students
- Students having age more than 18 years

### **3.4 Exclusion criteria**

The following criteria are excluded.

- Students having age less than 18 years
- Students those were not interested to give information.
- Students from other institutes.

### **3.5 Data collection method**

For this study, the questionnaire was consisted of blanks, multiple choice questions, short questions and WH questions. English language survey was developed on the basis of the survey requirements. Questionnaire are covered to understand the present situation about the awareness and knowledge of Bangladeshi people regarding oral and pharyngeal cancer

and the impact of smoking, alcohol using and the other factors and also about the treatment procedure of oral and pharyngeal cancer.

### **3.6 Questionnaire Development**

Questionnaire was developed based on the study of different journal papers to study the influence awareness and knowledge of Bangladeshi people regarding oral and pharyngeal cancer. Survey questionnaire has the following two parts.

- Demographic Data
- Awareness and Knowledge on Oropharyngeal and Oral cancer

These parts contain the information about personal information, smoking status, alcohol and mouthwash usage status, diet, treatment procedure etc.

### **3.7 Sampling technique**

In this study random sampling was followed.

### **3.8 Study period**

The duration of the study was about eleventh months that started from July, 2015 to May, 2016 in East West University, Aftabnagar, Dhaka.

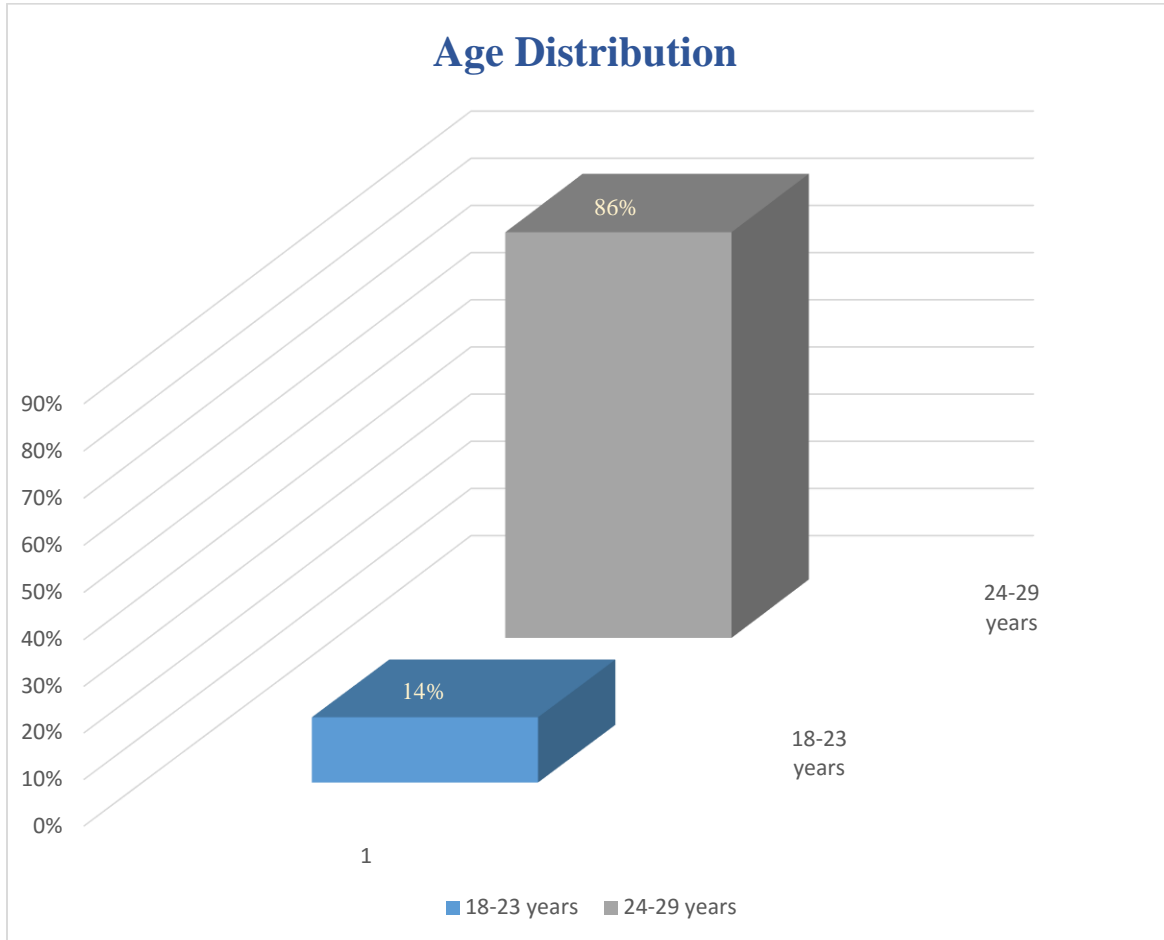
### **3.9 Data analysis**

After collecting all data were checked and analyzed by Microsoft Excel 2013. The result was shown in bar diagram, pie chart and column chart and were calculated the percentage of the study.

## **Chapter 4: Result**

## 4.1 Demographic data

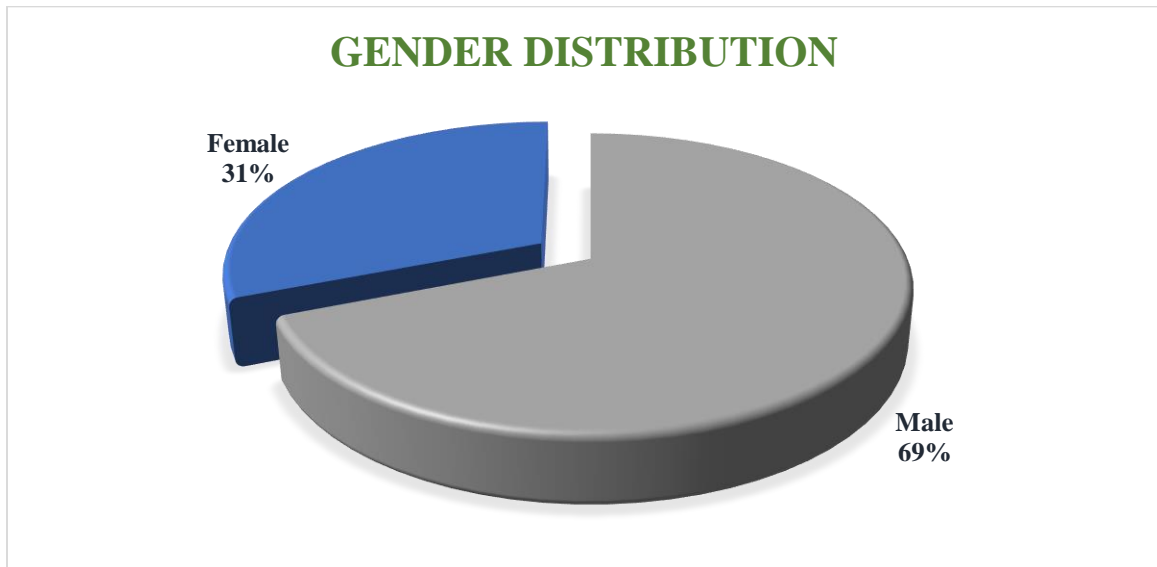
### 4.1.1. Age distribution:



**Figure 4.1.1:** Graphical representation of Age Distribution

- Most of the students were between ages of 24-29 years in East West University.
- From the participated students, 18-23 years age range were 14% and 24-29 were 86%.
- At present these pupil are living in Dhaka city but they are here from the different parts of our country.

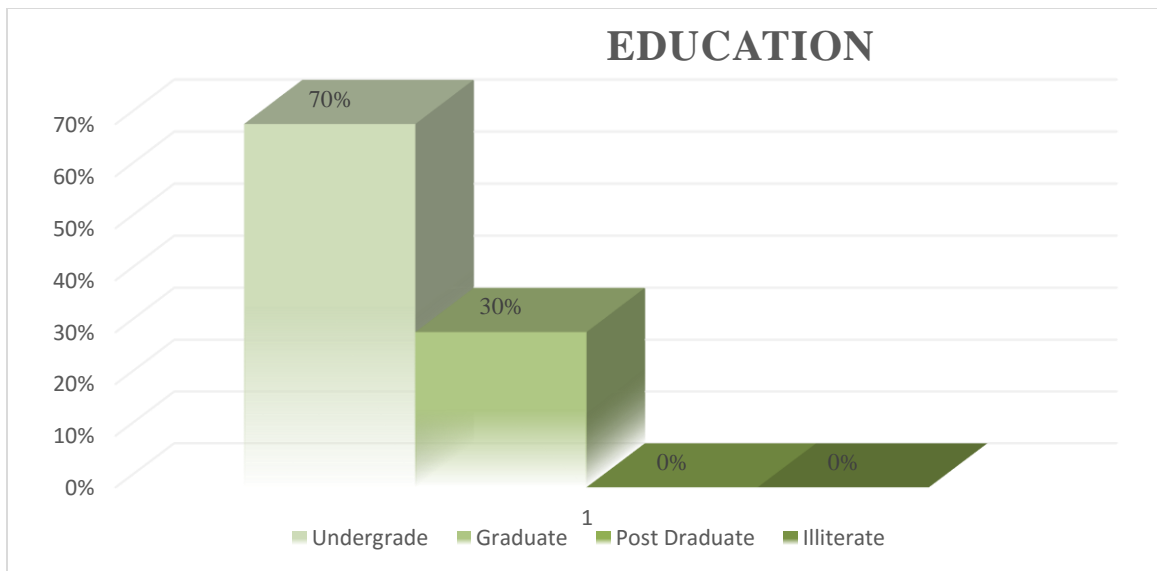
#### 4.1.2 Gender Distribution:



**Figure 4.1.2:** Graphical representation of Gender Distribution

- Among participated students, 69% were male and 31% were female.

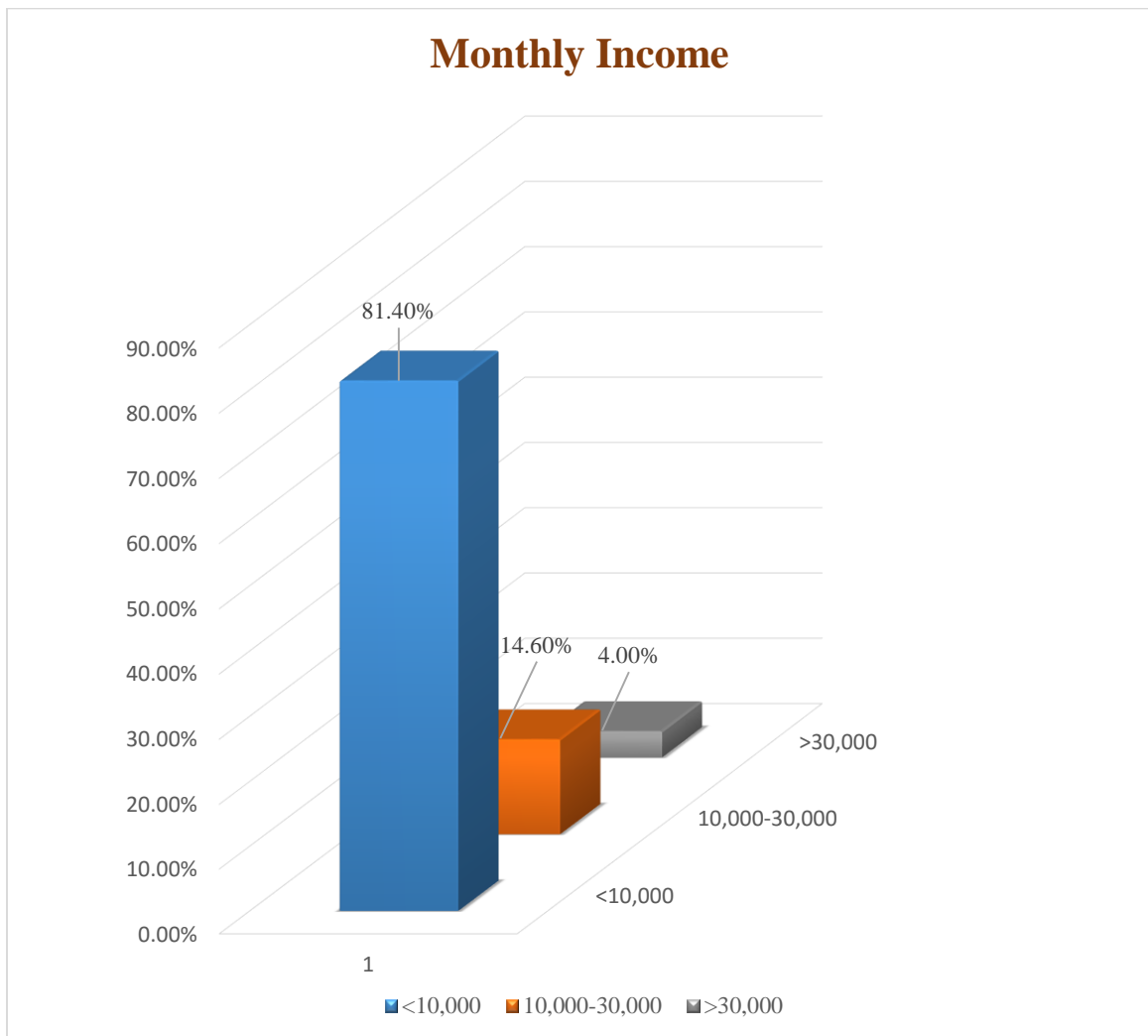
#### 4.1.3 Education:



**Figure 4.1.3:** Graphical representation of Education

- Most of the students were undergraduate. And their percentage were 70%.
- Rest of the participants were graduate students (30%).

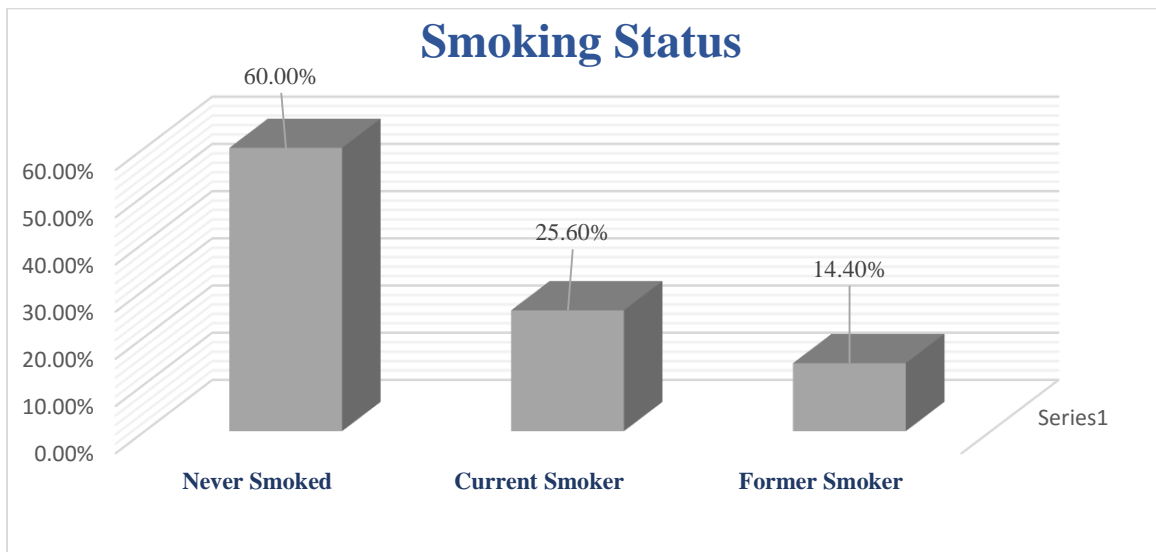
#### 4.1.4 Monthly income:



**Figure 4.1.4:** Graphical representation of Monthly Income

- Among participated students, 81.4% have income BDT less than 10,000 per month. 14.6% students have income between BDT 10,000-30,000.
- Only 4% students have income BDT more than 30,000.

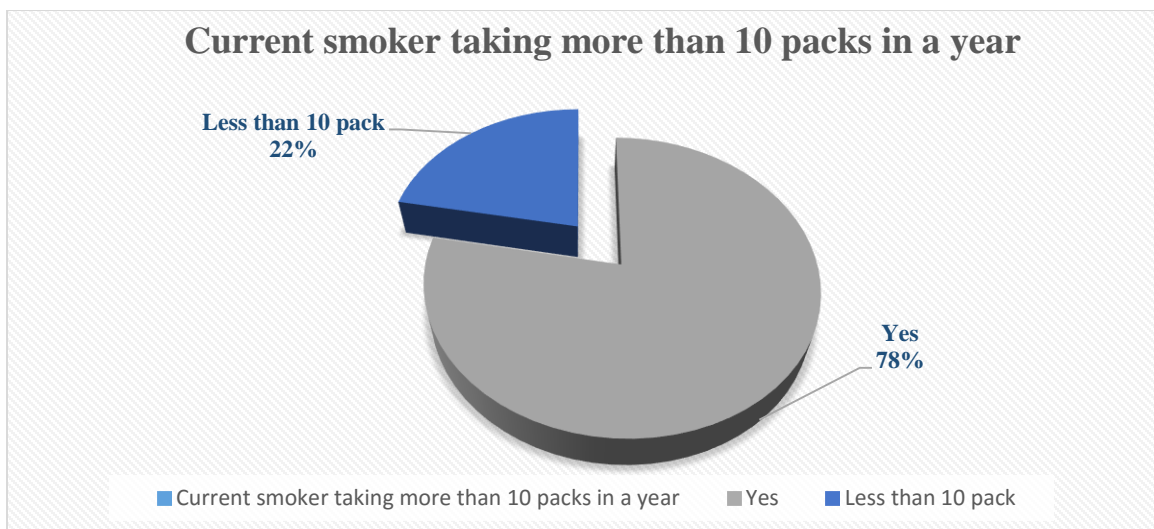
#### 4.1.5 Smoking Status:



**Figure 4.1.5:** Graphical representation of Smoking Status

- 60% of the population are never smoked, 25.6% are currently smoker and 14.4% are former smoker.

#### 4.1.6 Current smoker taking more than 10 packs in a year:

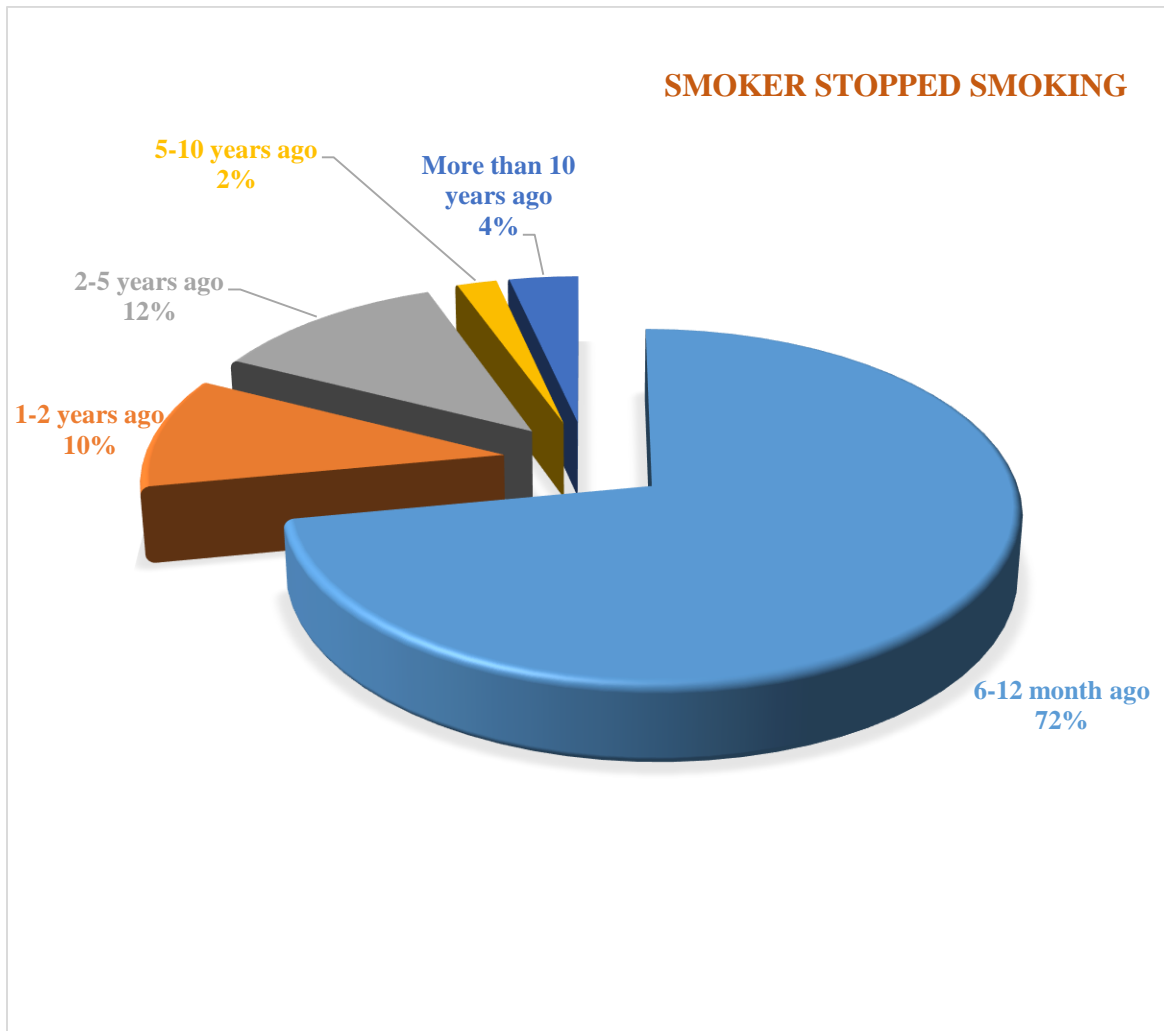


**Figure 4.1.6:** Graphical representation of Current Smoker taking >10 packs/year

- Among the current smokers, 78% take more than 10 packs of cigarette in a year.
- 22% take less than 10 packs.



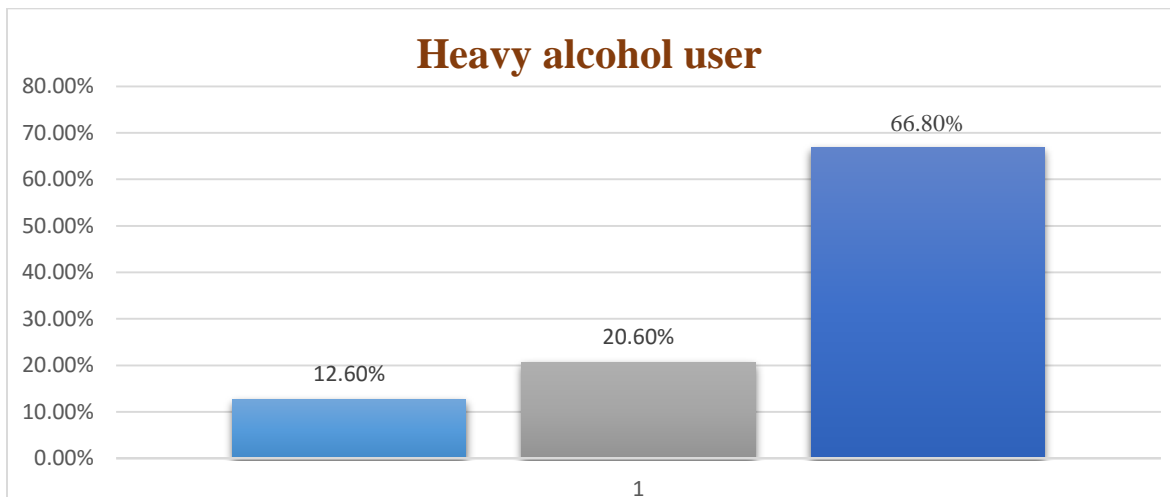
#### 4.1.7 Percentage of smoker who stopped smoking:



**Figure 4.1.7:** Graphical representation of Smoker stopped smoking after certain time

- Among the study population who smoke, majority of the students said they stopped smoking from 6-12 months before.
- 12% students said they stopped smoking 2-5 years before, 10% gave up 1-2 years before and 2% of them stopped smoking from 5-10 years before.
- Only 4% smoker stopped smoking since 5-10 years before.

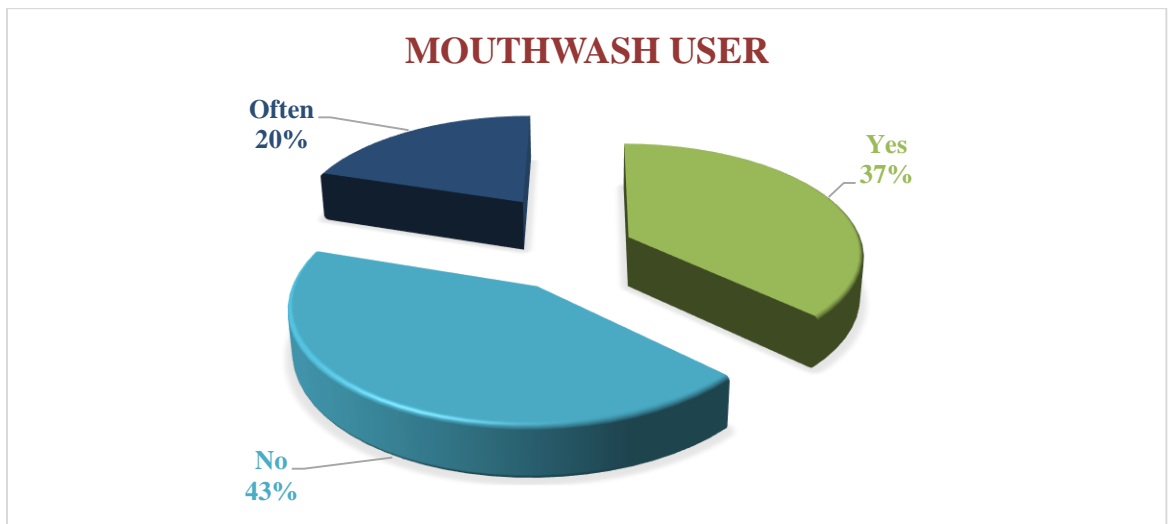
#### 4.1.8 Heavy alcohol user:



**Figure 4.1.8:** Graphical representation of Heavy Alcohol User

- From participated study population, 12.6% are heavy alcohol user and 20% take alcohol lightly where 66.8% never take alcohol before.

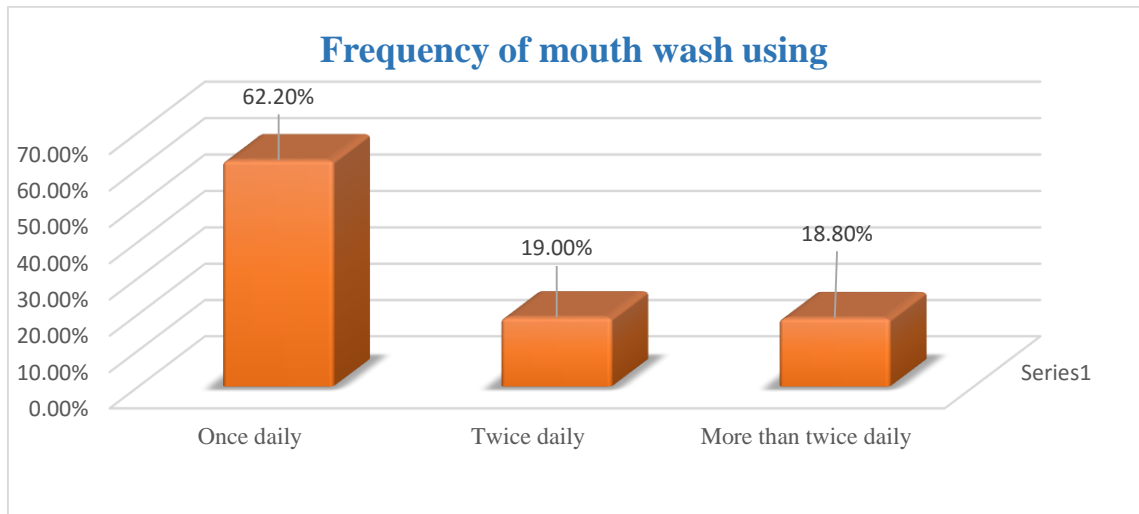
#### 4.1.9 Mouthwash user:



**Figure 4.1.9:** Graphical representation of percentage of Mouthwash User

- Among study pupil 37% of them use mouthwash. 43% don't and 20% often use mouthwash.

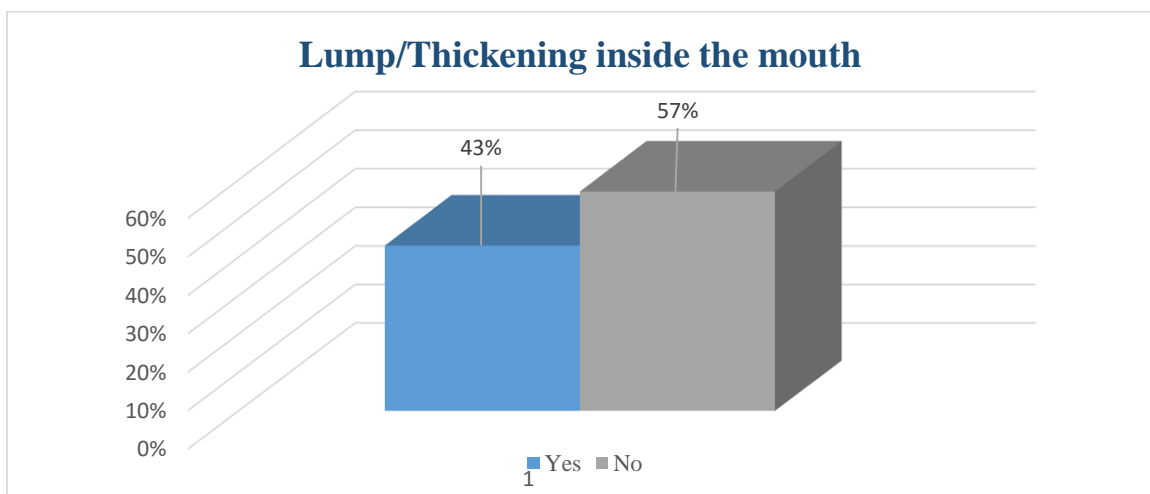
#### 4.1.10 Frequency of Mouthwash using:



**Figure 4.1.10:** Graphical representation of Frequency of Mouthwash using

- 62.2% people use mouthwash once in a day, where 19% do it twice in a day and 18.8% use mouthwash more than twice in a day.

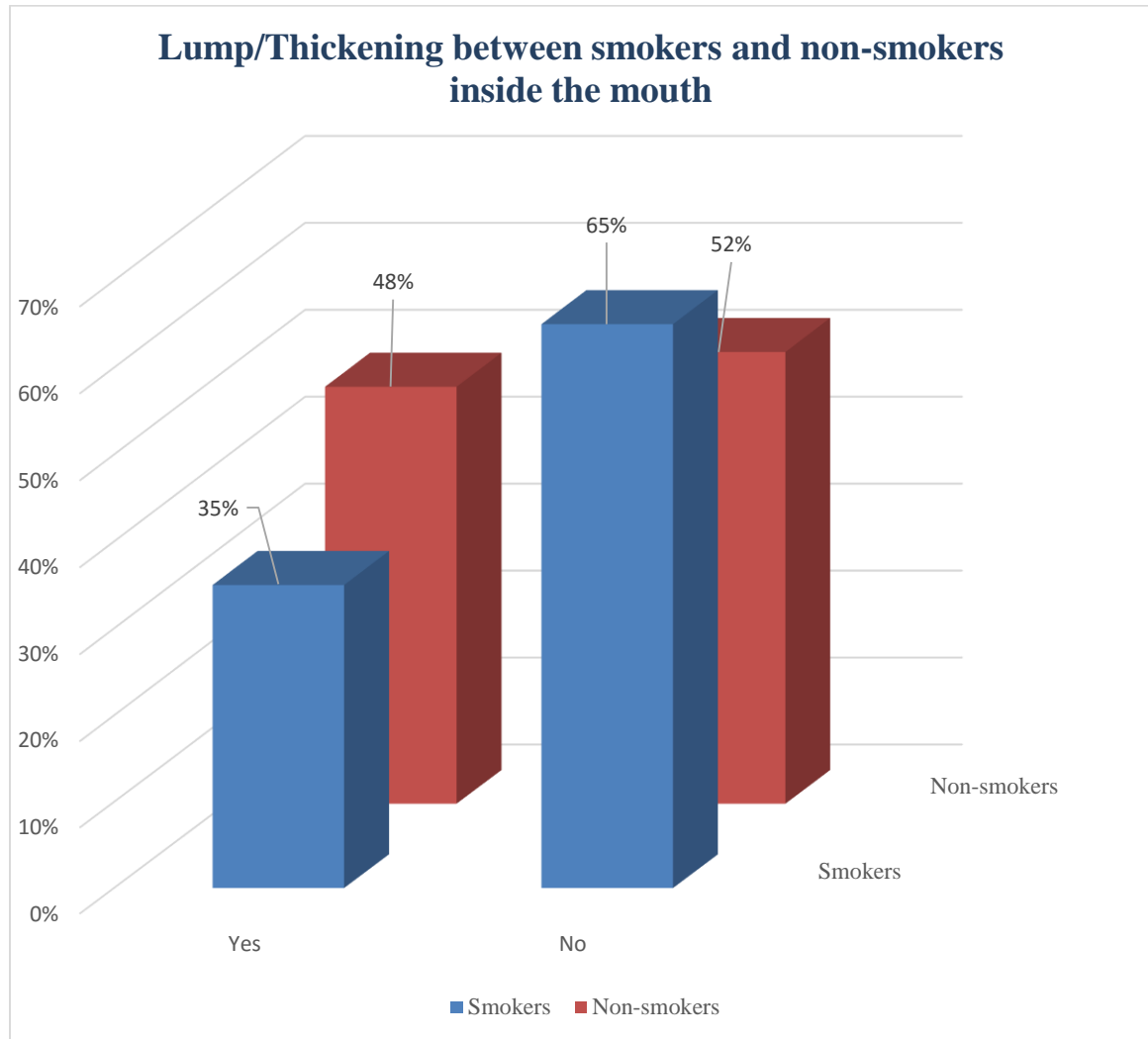
#### 4.1.11 Lump/Thickening inside the mouth:



**Figure 4.1.11:** Graphical representation of Lump/Thickening inside the mouth

- Among students 43% people said, they have lump/thickening inside the mouth, 57% don't.

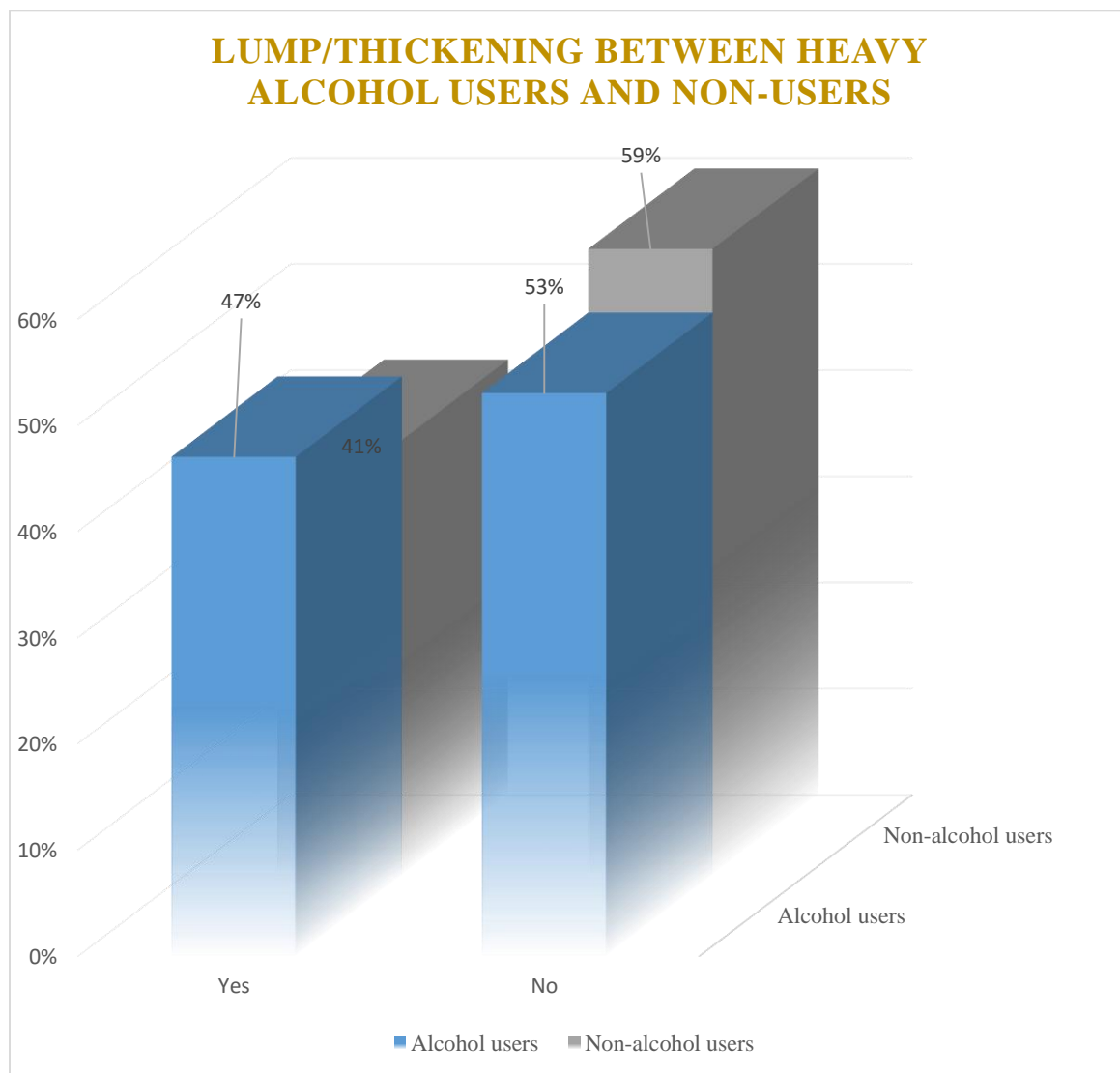
#### 4.1.11.1 The percentage of Lump/Thickening among Smokers and Non-smokers inside the mouth:



**Figure 4.1.11.1:** Graphical representation of the percentage of Lump/Thickening among Smokers and Non-smokers inside the mouth

- From this study we have come to know that in case of smokers, lump/thickening inside the mouth is occurred in 35% cases and 65% smokers didn't have such type of problem.
- In case of non-smokers, 48% percent pupil said that they have lump/thickening problem where 52% stated free from this kind of problems.

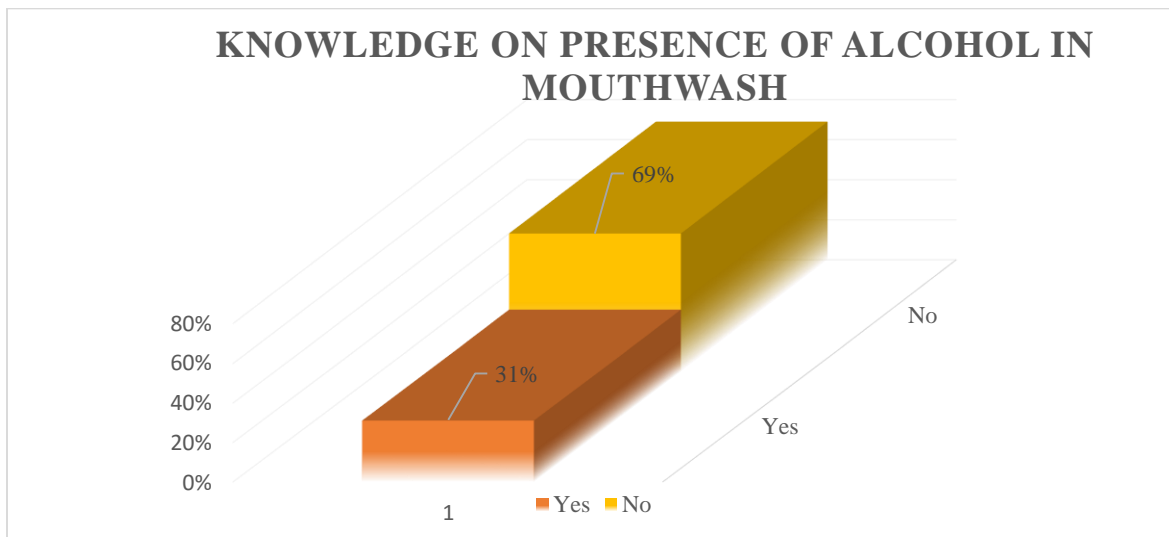
#### 4.1.11.2 Lump/Thickening between Alcohol users and Non-users:



**Figure 4.1.11.2:** Graphical representation of Lump/Thickening between Heavy Alcohol users and Non-users

- From this study we have come to know that in case of alcohol users, lump/thickening inside the mouth is occurred in 47% cases and 53% users didn't have such type of problem.
- In case of non-alcohol user, 41% percent pupil said that they have lump/thickening problem where 59% stated free from this kind of problems.

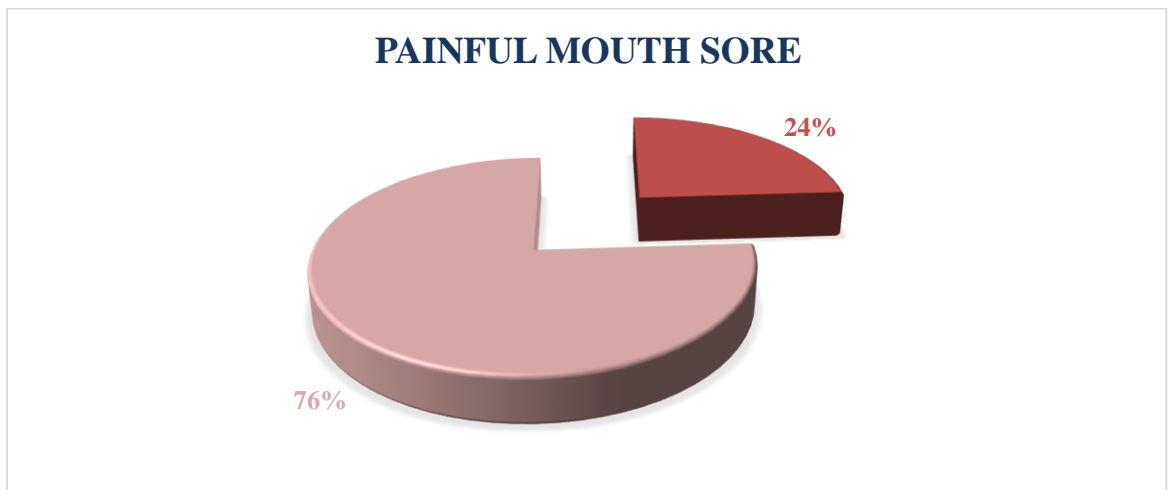
#### 4.1.12 Knowledge on Presence of Alcohol in Mouthwash:



**Figure 4.1.12:** Graphical representation of Knowledge on Presence of Alcohol in Mouthwash

- 31% of study people know the presence of alcohol in mouthwash but 69% don't know that mouthwash contains alcohol that may give harmful effect inside the mouth.

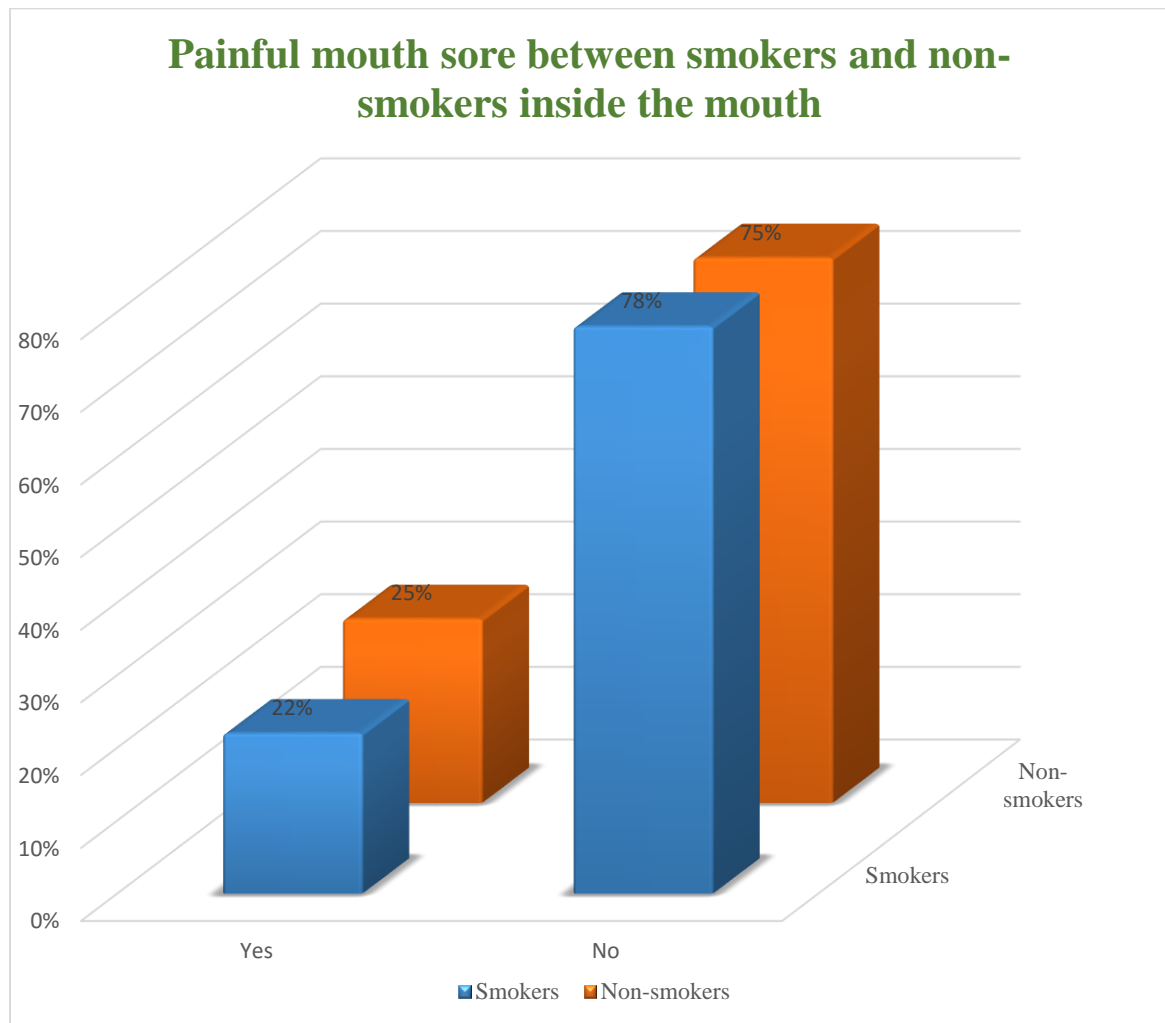
#### 4.1.13 Painful mouth sore:



**Figure 4.1.13:** Graphical representation of Presence of Painful Mouth Sore

- 76% participants don't feel painful mouth sore where only 24% feel it.

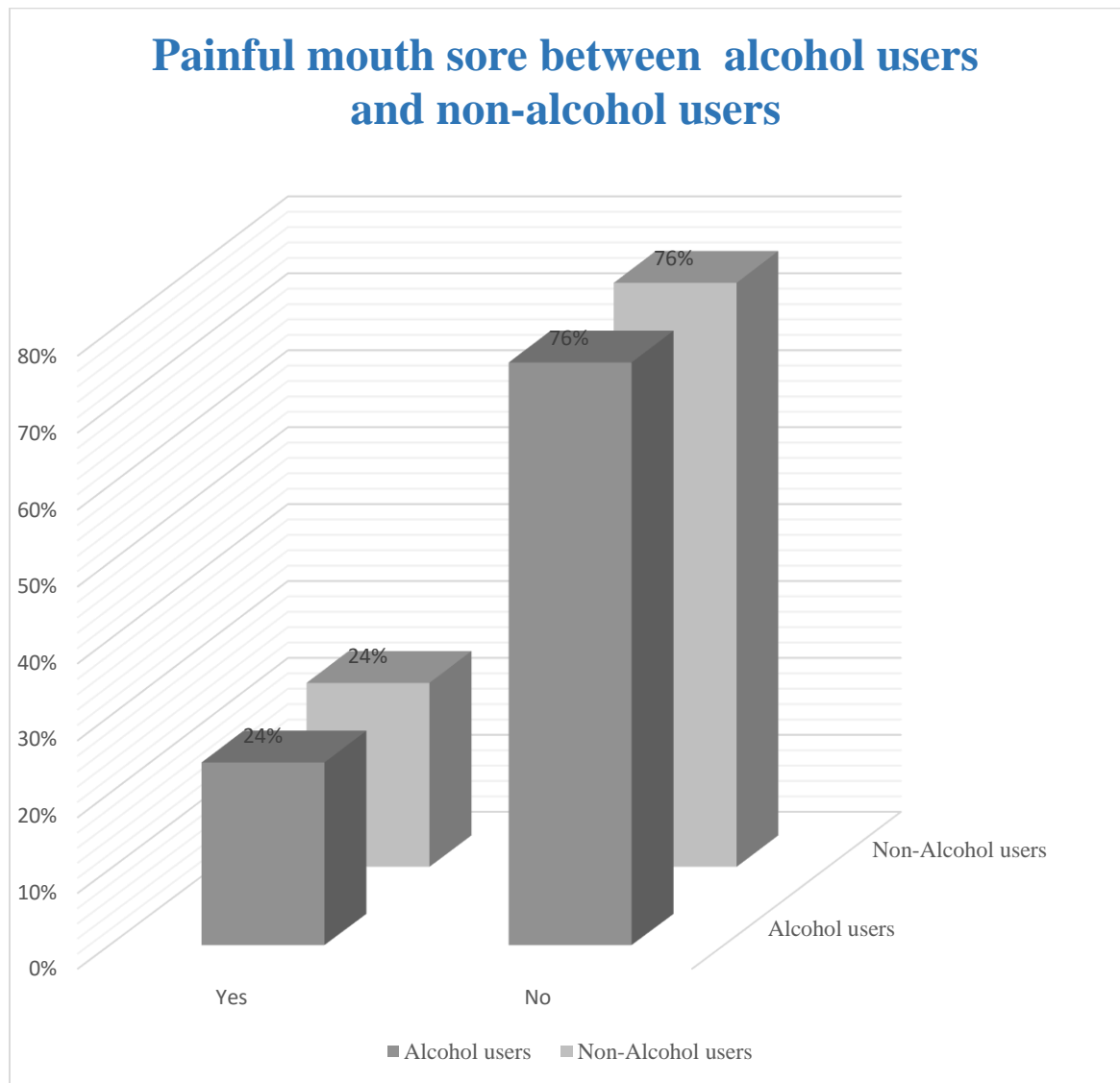
#### 4.1.13.1 Painful mouth sore between smokers and non-smokers inside the mouth:



**Figure 4.1.13.1:** Graphical representation of Painful Mouth Sore between Smokers and Non-smokers

- From this study we have come to know that in case of smokers, painful mouth sore inside the mouth is occurred in only 22% cases and 78% smokers didn't have such type of problem.
- In case of non-smokers, 25% percent pupil said that they have painful mouth sore problem where 75% stated free from this kind of problems.

#### 4.1.13.3 Painful mouth sore between Alcohol users and Non-users inside the mouth

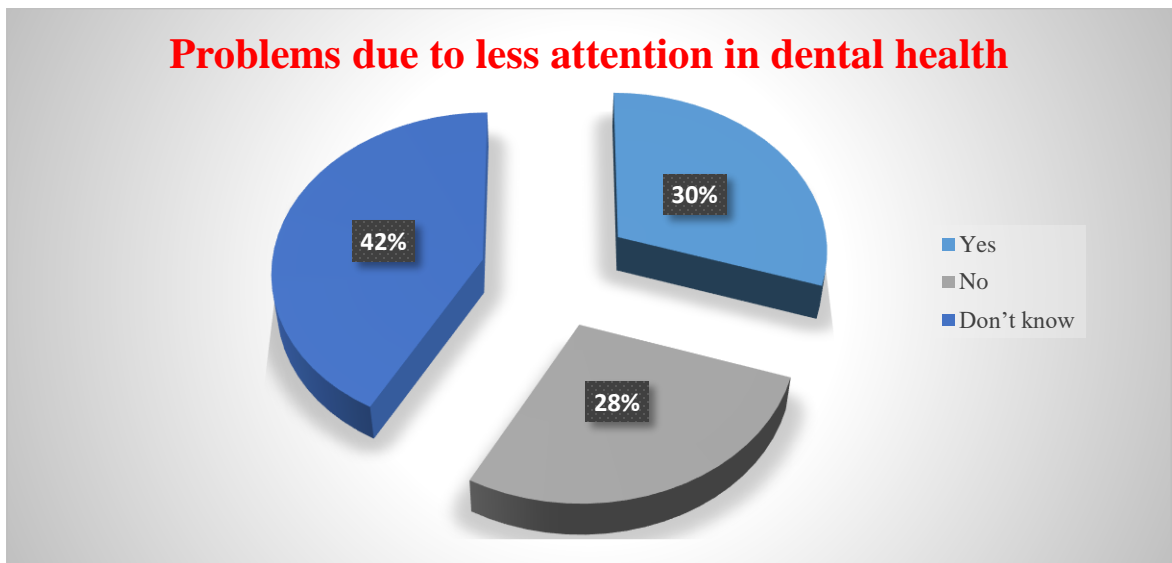


**Figure 4.1.13.3:** Graphical representation of Painful mouth sore between Alcohol users and non-users

- From this study we have come to know that in case of Alcohol users, painful mouth sore inside the mouth is occurred in only 24% cases and 76% users didn't have such type of problem.
- In case of non- Alcohol users, 24% percent pupil said that they have painful mouth sore problem where 76% stated free from this kind of problems.



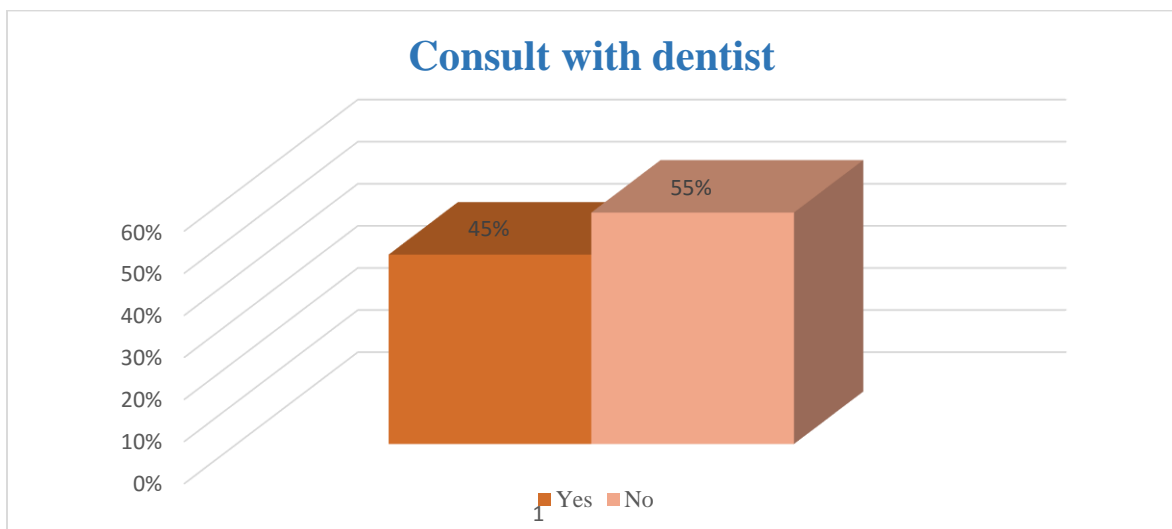
#### 4.1.14 Problems due to less attention in Dental Health:



**Figure 4.1.14:** Graphical representation of Problems due to less attention in Dental Health

- 30% students know the problems occur due to less attention in dental health where 28% gave answer 'No' and 42% 'Don't Know'.

#### 4.1.15 Consultation with Dentist:



**Figure 4.1.15:** Graphical representation of Consult with Dentist

- Among study pupil 55% never consult with dentist where 45% did it before.

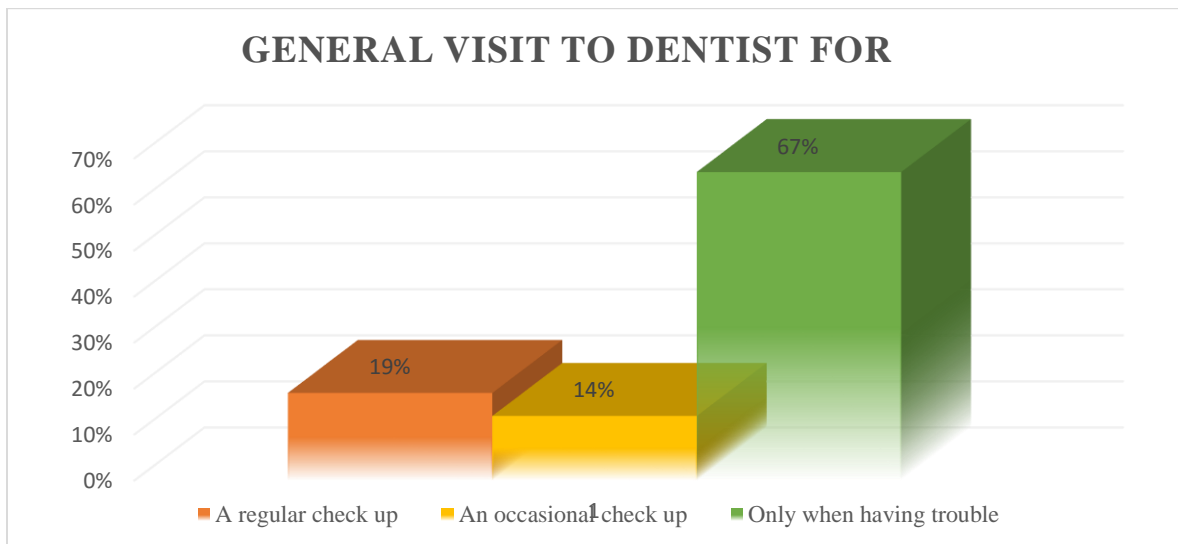
#### 4.1.16 Last time visit to Dentist:



**Figure 4.1.16:** Graphical representation of Last time visit to Dentist

- 34% of the participants visited to a dentist within past year, where 27% visited 1-2 years before and 37% visited to their dentist more than 2 years before.

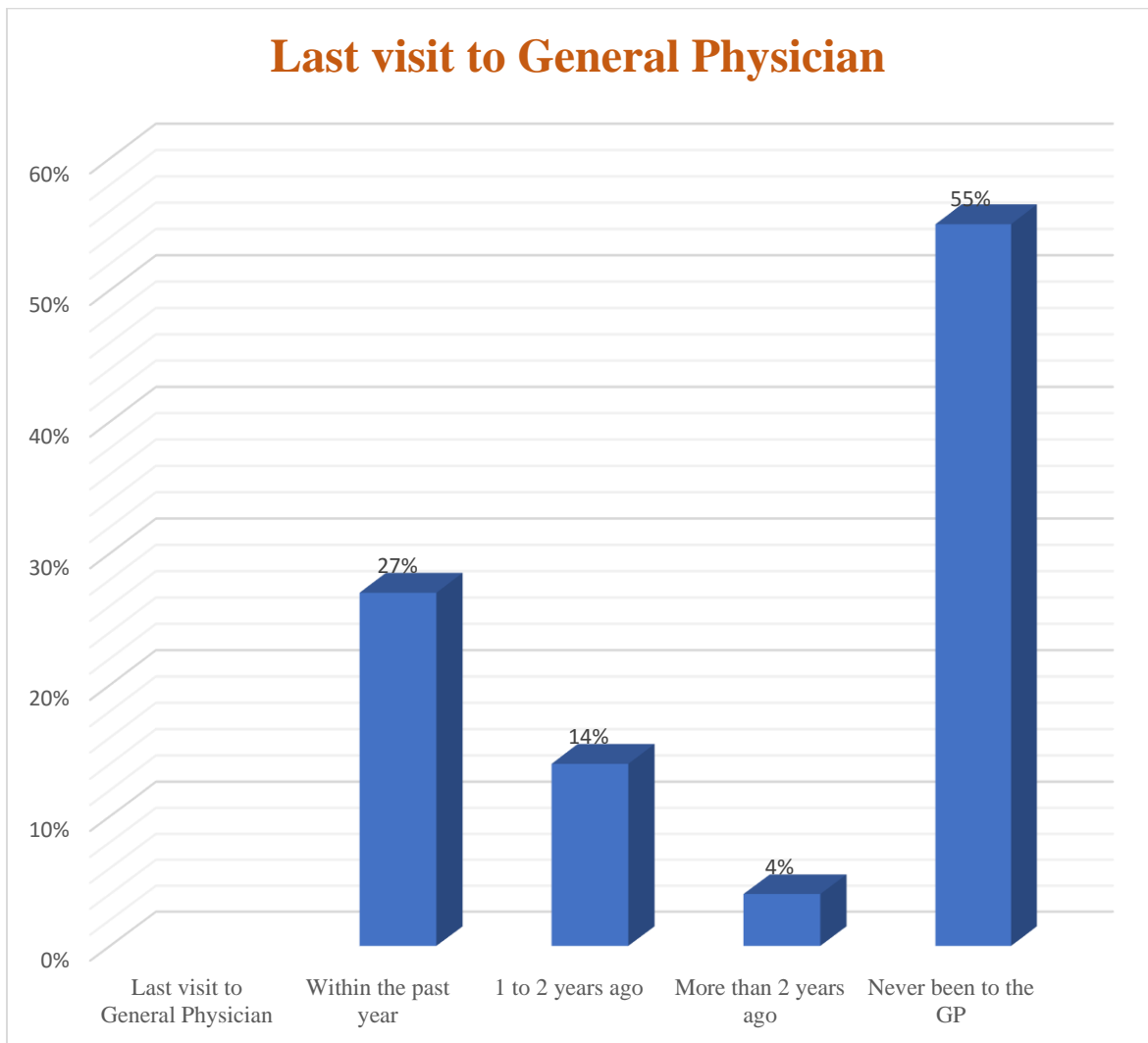
#### 4.1.17 In general visit to dentist:



**Figure 4.1.17:** Graphical representation of General visit to Dentist

- For the regular checkup, 19% participants visited to the dentist where 14% did it occasionally. Majority of them (67%) visited to a dentist only when having trouble.

#### 4.1.18 Last visit to General Physician:

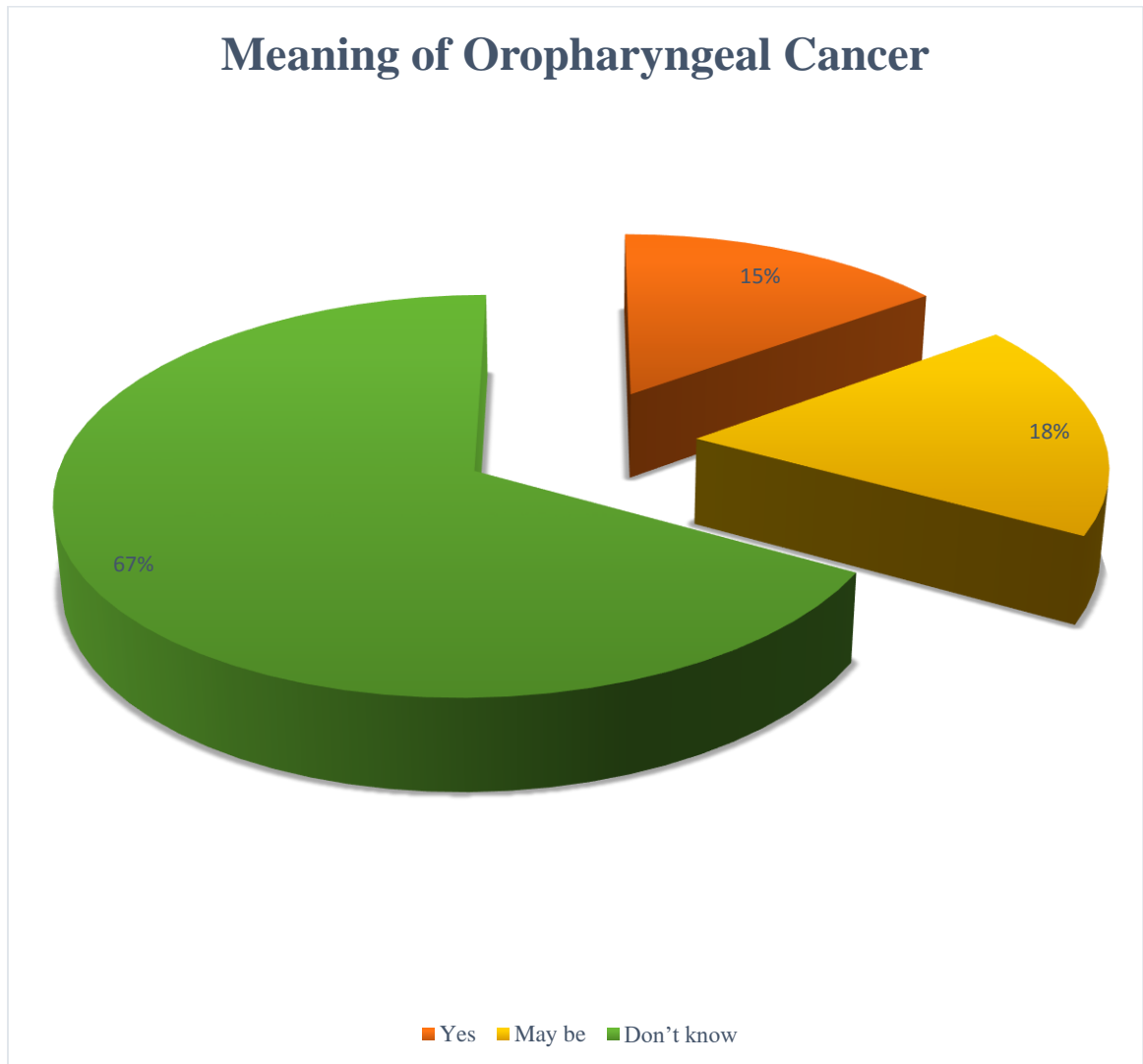


**Figure 4.1.18:** Graphical representation of Last visit to General Physician

- 55% of the study people never been to the GP where 27% went to the GP within past year, 14% of them went to the dentist within 1 to 2 years before. Only 4% went to the GP more than 2 years before.
- Regarding their dental health condition at the same age of the students, 90% participants feel better than the others where only 10 % feel bad.

## 4.2 Awareness and Knowledge on Oral & Oropharyngeal Cancer

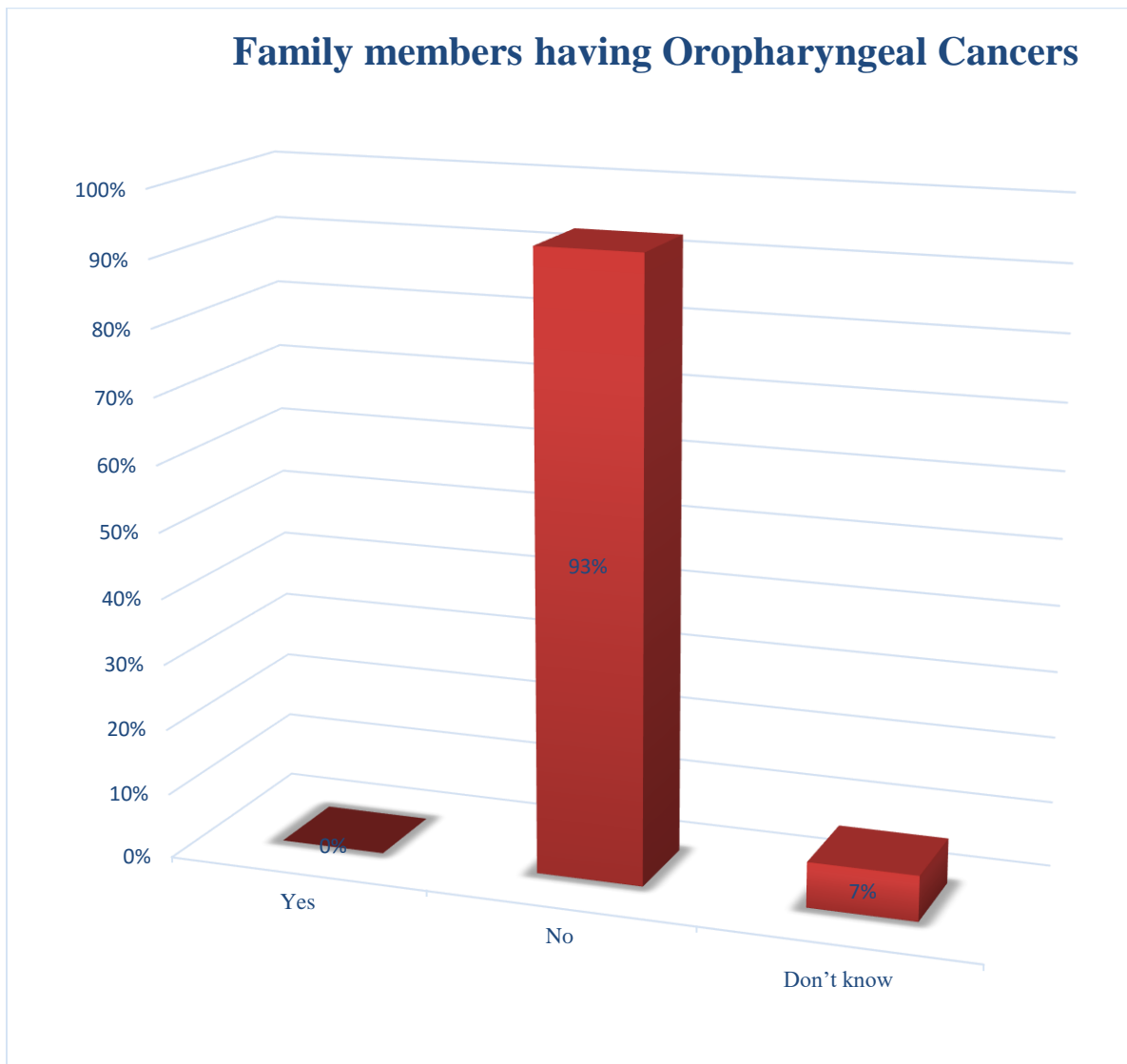
### 4.2.1 Percentage of pupil know the meaning of Oropharyngeal Cancer:



**Figure 4.2.1:** Graphical representation of Percentage of pupil know the meaning of the OPC

- Majority, about 67% participants don't know about oropharyngeal cancers.
- Only 15% know about it and 18% have confusing idea.

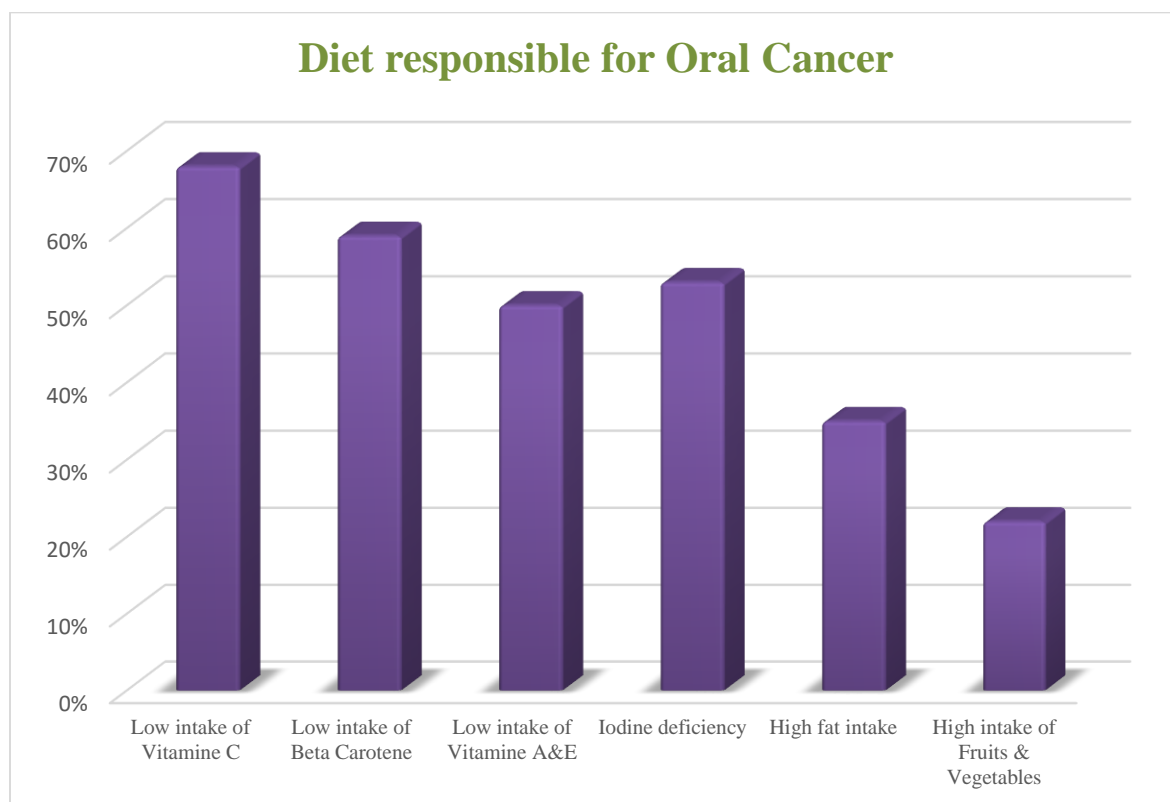
#### 4.2.2 Family members having Oropharyngeal Cancers:



**Figure 4.2.2:** Graphical representation of Family members having OPC

- Majority, about 93% participants answered that their family members having No oropharyngeal cancers.
- 7% replied that they don't have any idea about it.

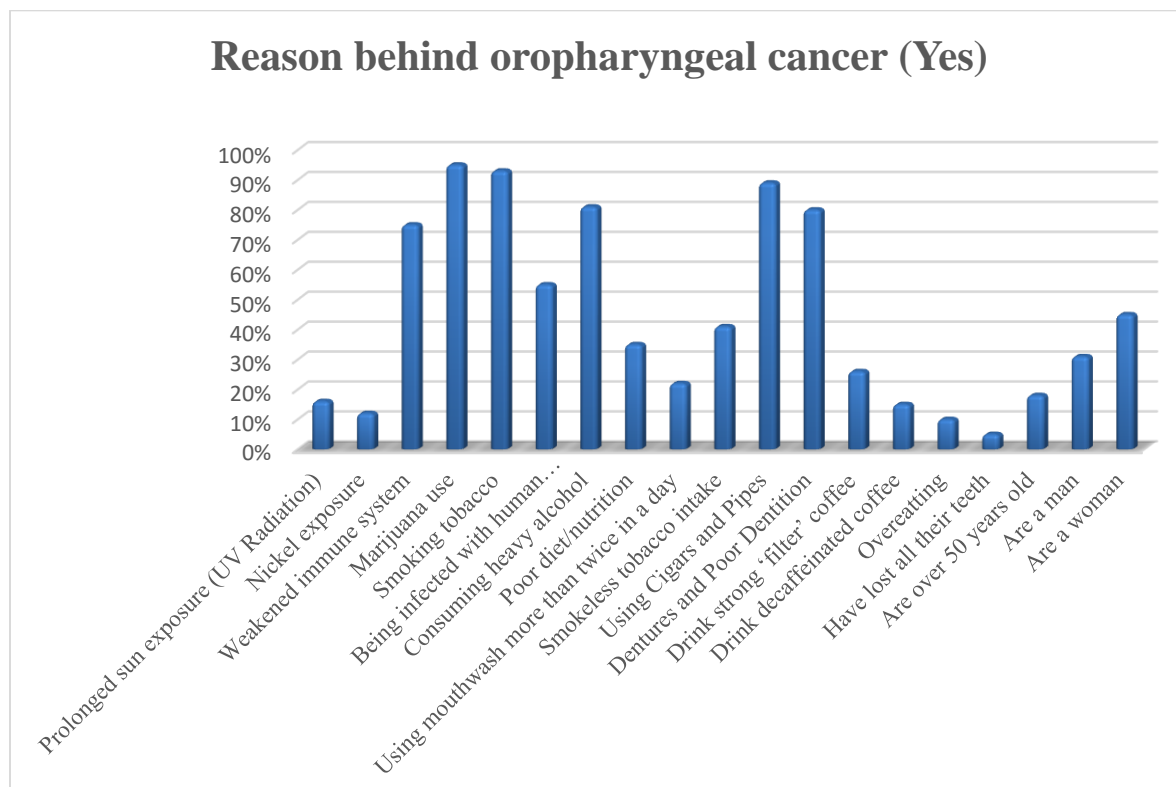
### 4.2.3 Knowledge on Diet responsible for Oral Cancer:



**Figure 4.2.3:** Graphical representation of Diet responsible for Oral Cancer

- 68% of the participants knew that low intake of Vitamin C is responsible for oropharyngeal cancer where 32% didn't know about this.
- 59% of the participants knew that low intake of Beta Carotenes is responsible for oropharyngeal cancer where 41% didn't know about this.
- 50% of the participants knew that low intake of Vitamin A&E is responsible for oropharyngeal cancer where rest 50% didn't know about this.
- 53% of the participants knew that Iodine deficiency is responsible for oropharyngeal cancer where 47% didn't know about this.
- 35% of the participants knew that high fat intake is responsible for oropharyngeal cancer where 65% didn't know about this.
- Only 22% of the participants knew that high intake of Fruits & Vegetables is responsible for reducing oropharyngeal cancer where 78% didn't know about this.

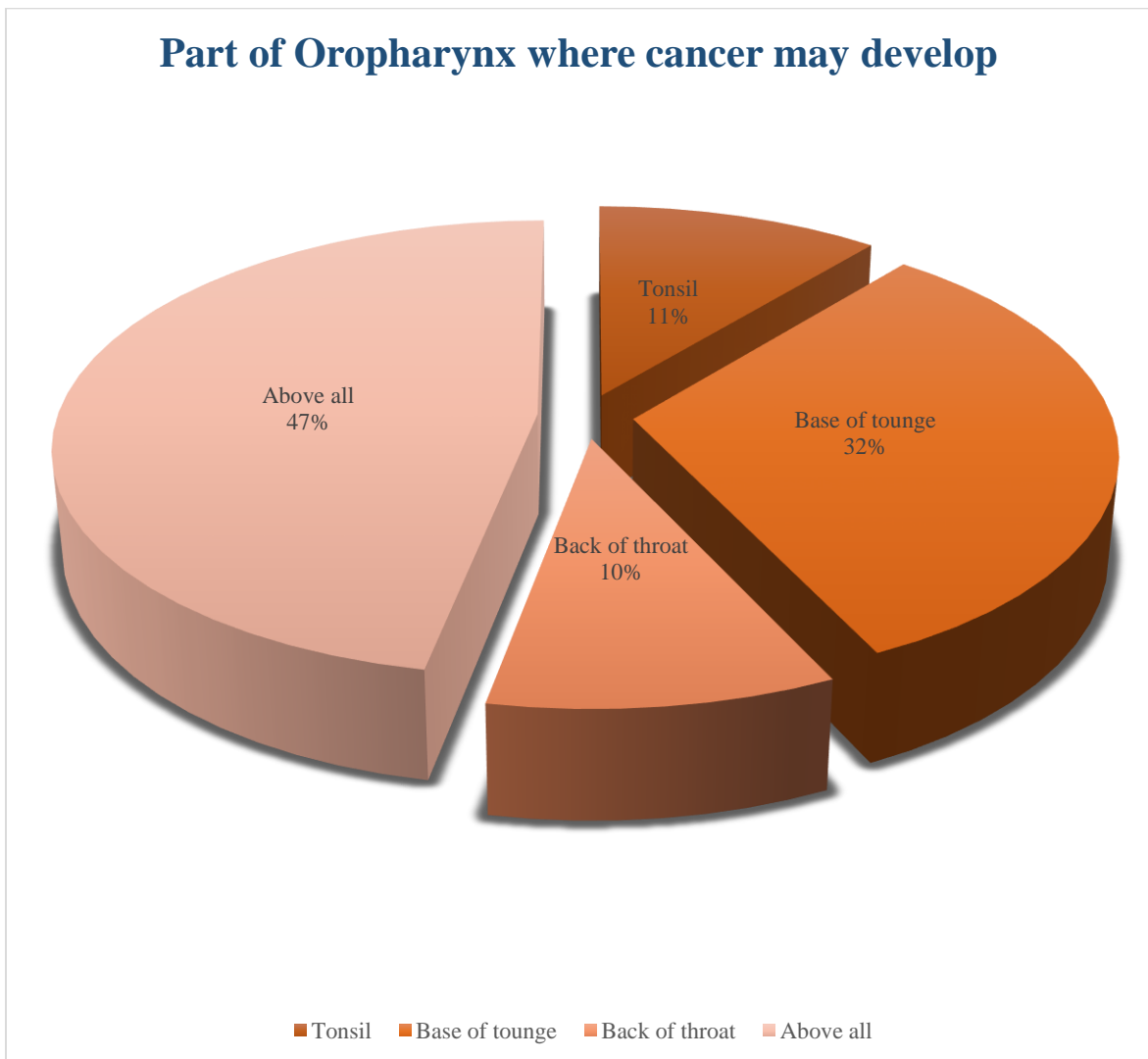
#### 4.2.4 Reasons behind Oropharyngeal Cancer:



**Figure 4.2.4:** Graphical representation of Reasons behind Oropharyngeal Cancer

- From the graphical representation of reasons behind oropharyngeal cancer we can see that majority of the participants thought that marijuana use (95%), smoking tobacco (93%), consuming heavy alcohol (81%), using cigars and pipes (89%), dentures and poor dentition (80%) and weakened immune system (75%) are the major reasons behind oral & oropharyngeal cancers.
- Being infected with human papillomavirus (HPV) (55%) is also a vital reason for OPC.
- Few people thought that prolonged sun exposure (UV Radiation), nickel exposure, poor diet/nutrition, using mouthwash more than twice in a day, smokeless tobacco intake, drink strong 'filter' coffee, drink decaffeinated coffee, overeating, losing of all their teeth, over 50 years old age these are also responsible for OPC.
- From the study it suggests that women (45%) are more prone to OPC than man (31%).

#### 4.2.5 Part of Oropharynx where cancer may develop:

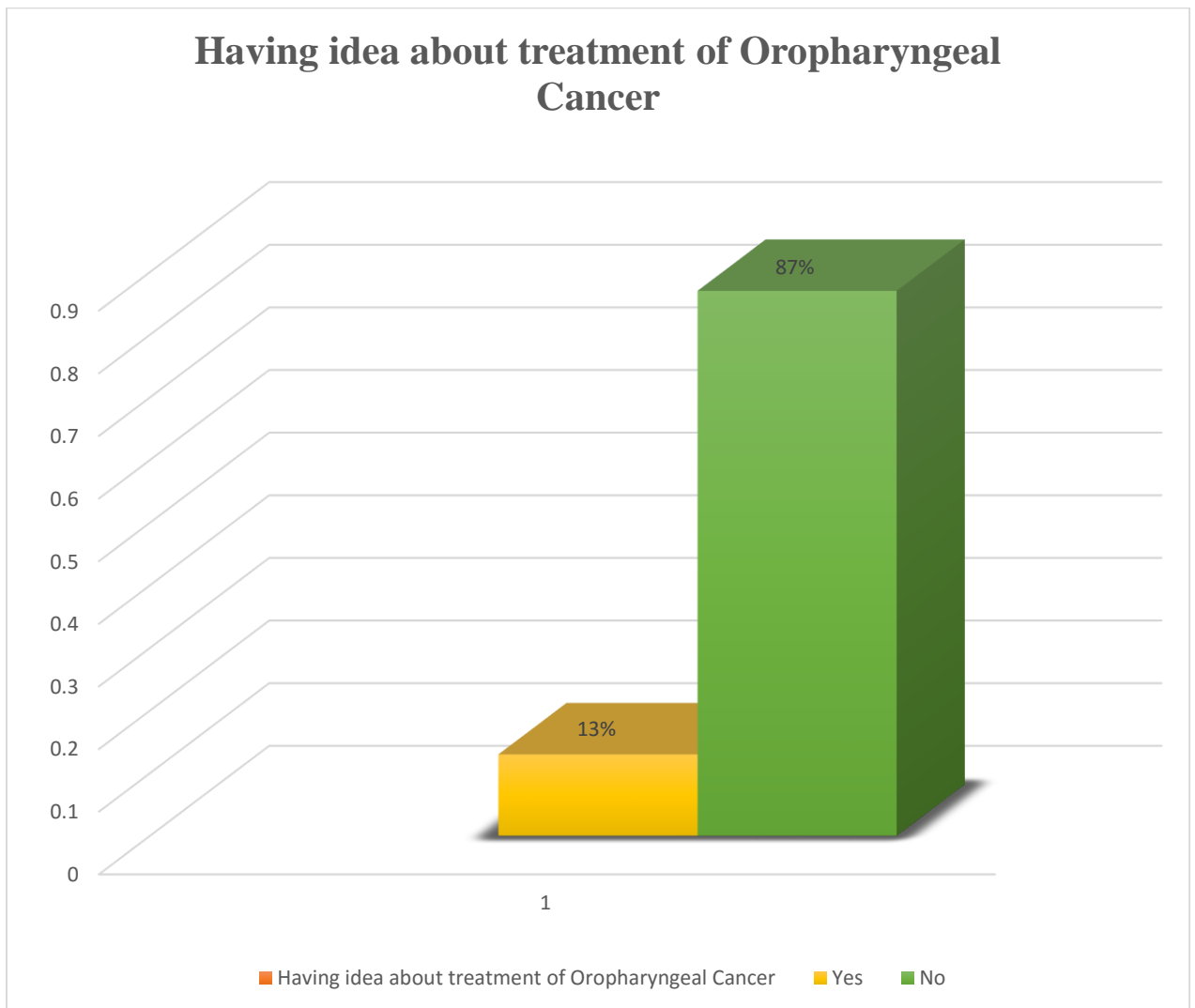


**Figure 4.2.5:** Graphical representation of Part of Oropharynx where cancer may develop

- 11% of the participants thought that oropharyngeal cancer may develop at tonsil where 32% thought that it may develop at the base of the tongue.
- 10% thought cancer may develop back of throat.
- 47% pupil thought cancer may develop in all these three region.



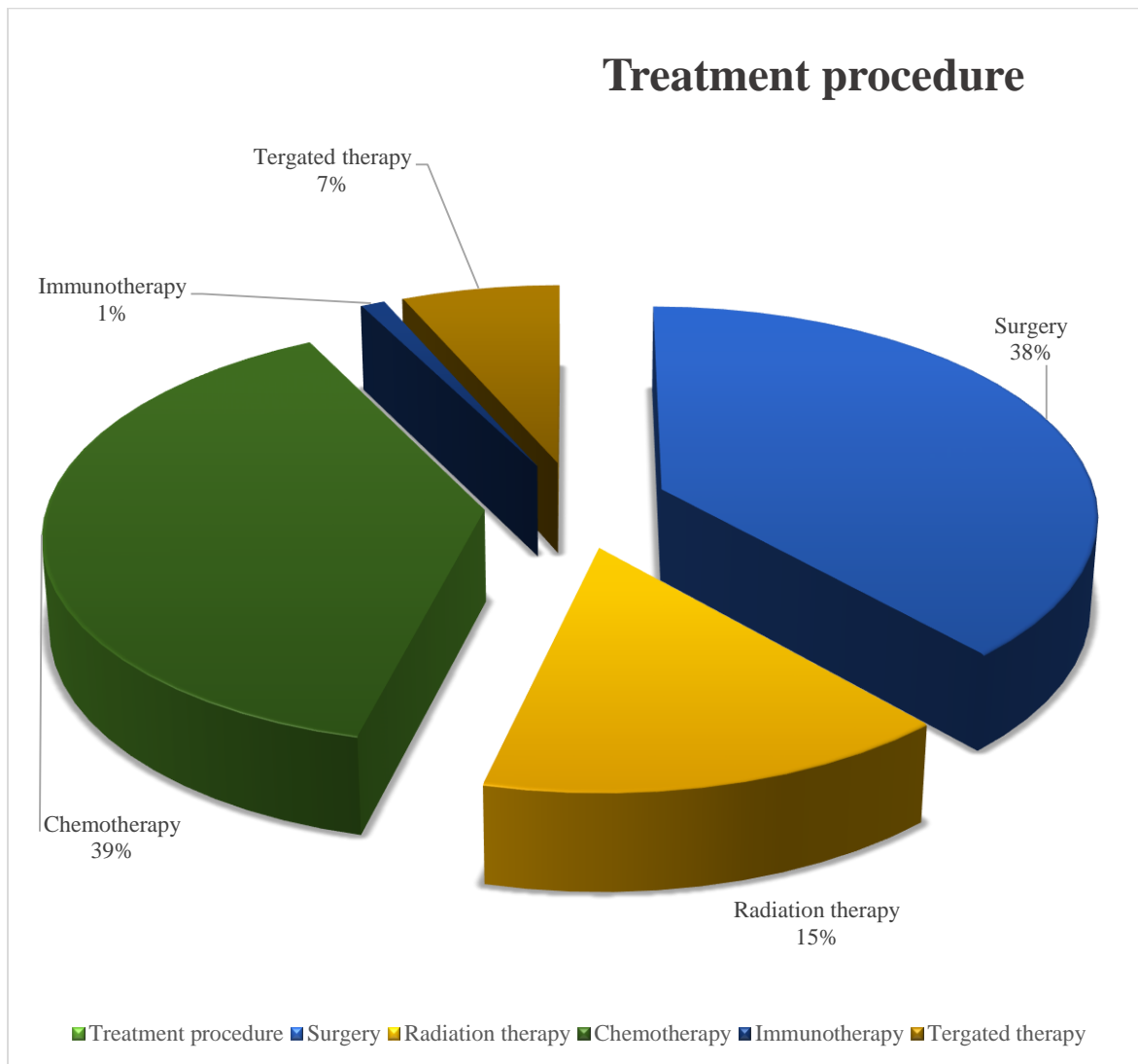
#### 4.2.6 Knowledge on Treatment of Oropharyngeal Cancer:



**Figure 4.2.6:** Graphical representation of Knowledge on Treatment of OPC

- Among the study participants, majority (87%) participants did not know about the treatment of oropharyngeal cancers.
- Only 13% have idea about this.

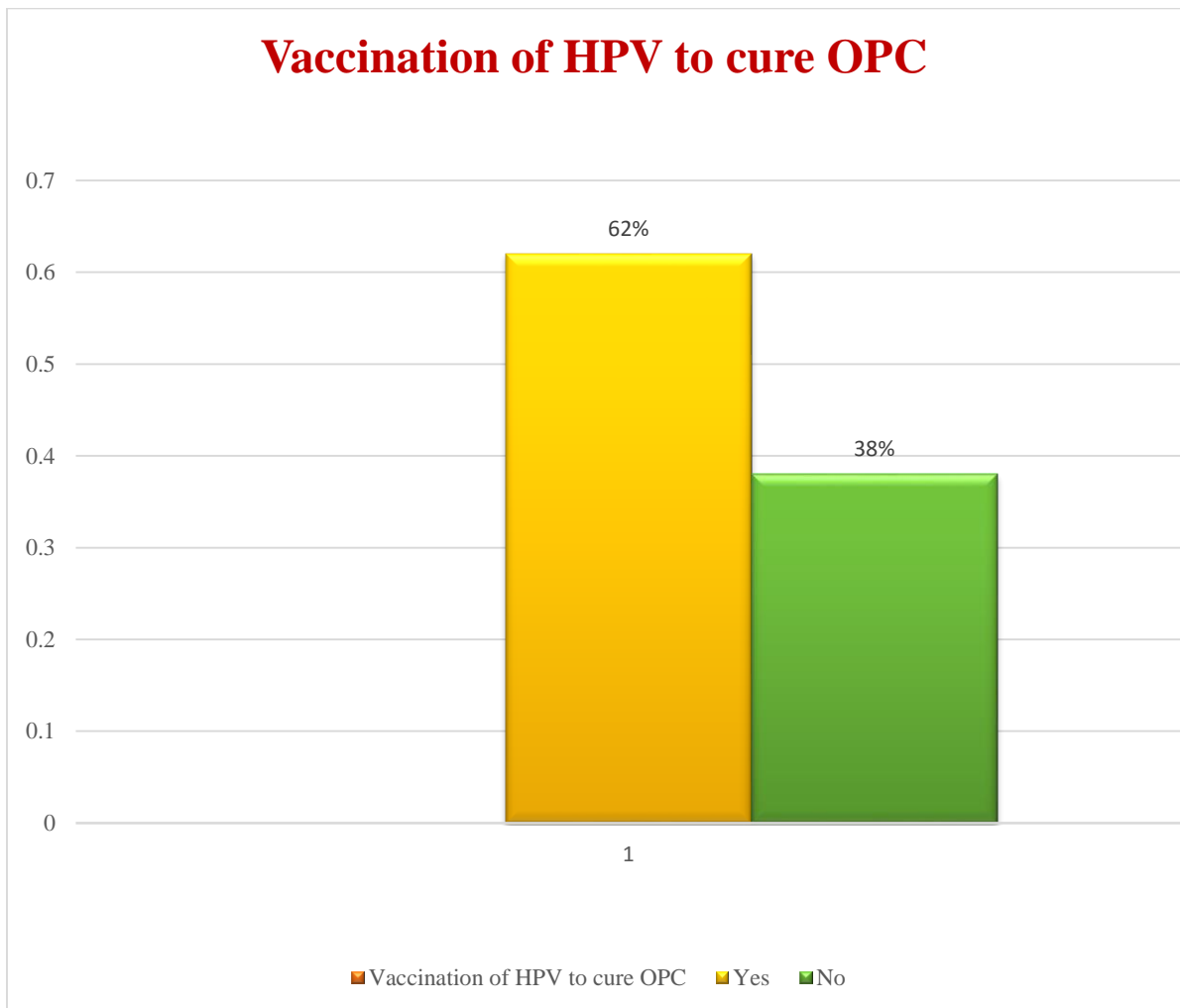
#### 4.2.7 Treatment Procedure:



**Figure 4.2.7:** Graphical representation of Treatment Procedure of Oropharyngeal Cancer

- 39% participant's preferred chemotherapy for Oropharyngeal Cancer treatment where 38% prefer surgery.
- 15.4% pupil suggested for radiation therapy and 6.60 for targeted therapy but only 1% participants preferred immunotherapy.

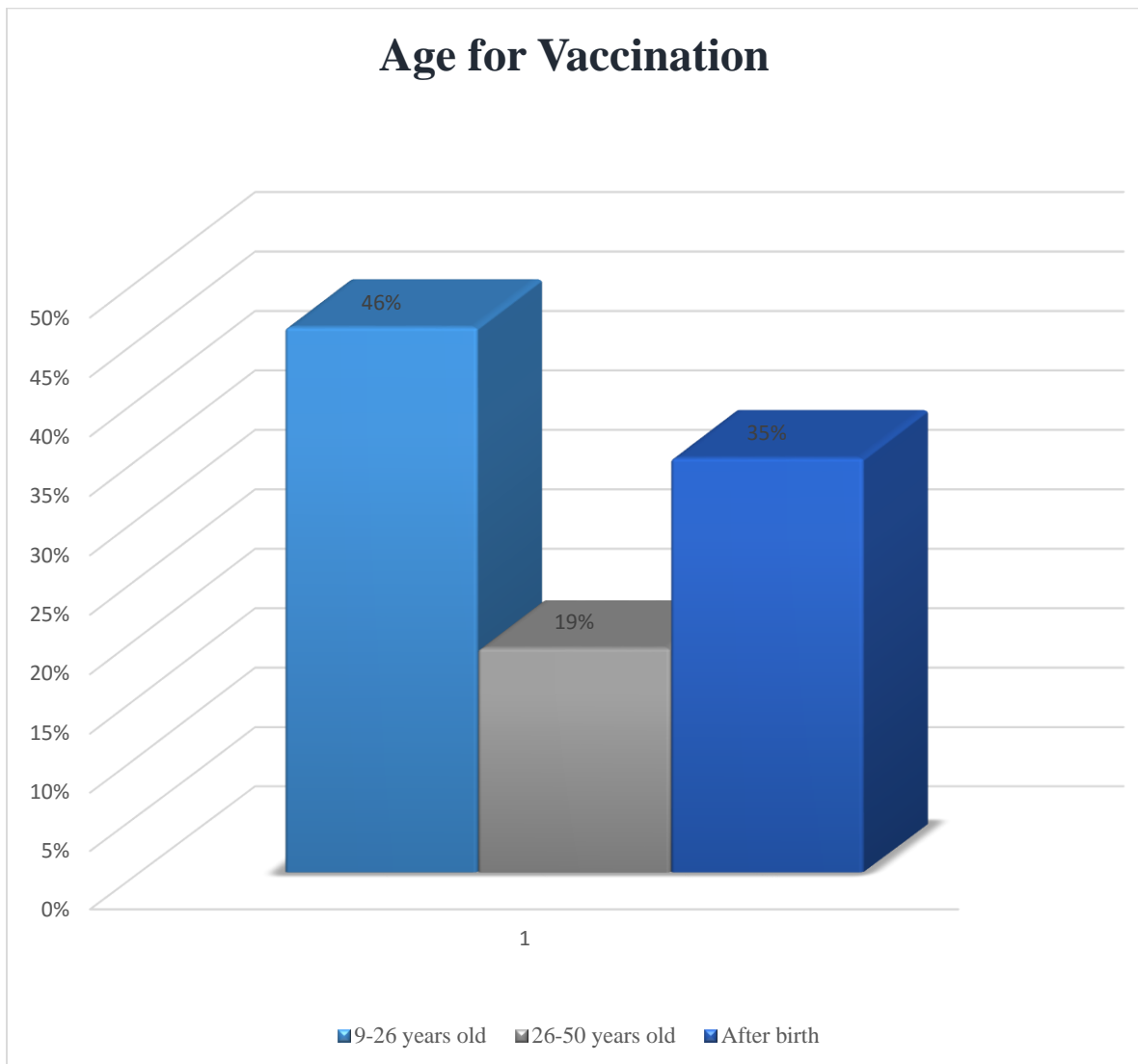
#### 4.2.8 Vaccination of HPV to Cure OPC:



**Figure 4.2.8:** Graphical representation of vaccination of HPV to cure OPC

- From the graphical presentation we can see that 62% participants thought that if people take vaccine of HPV then OPC can be cured.
- But 38% people were not agreed with this.

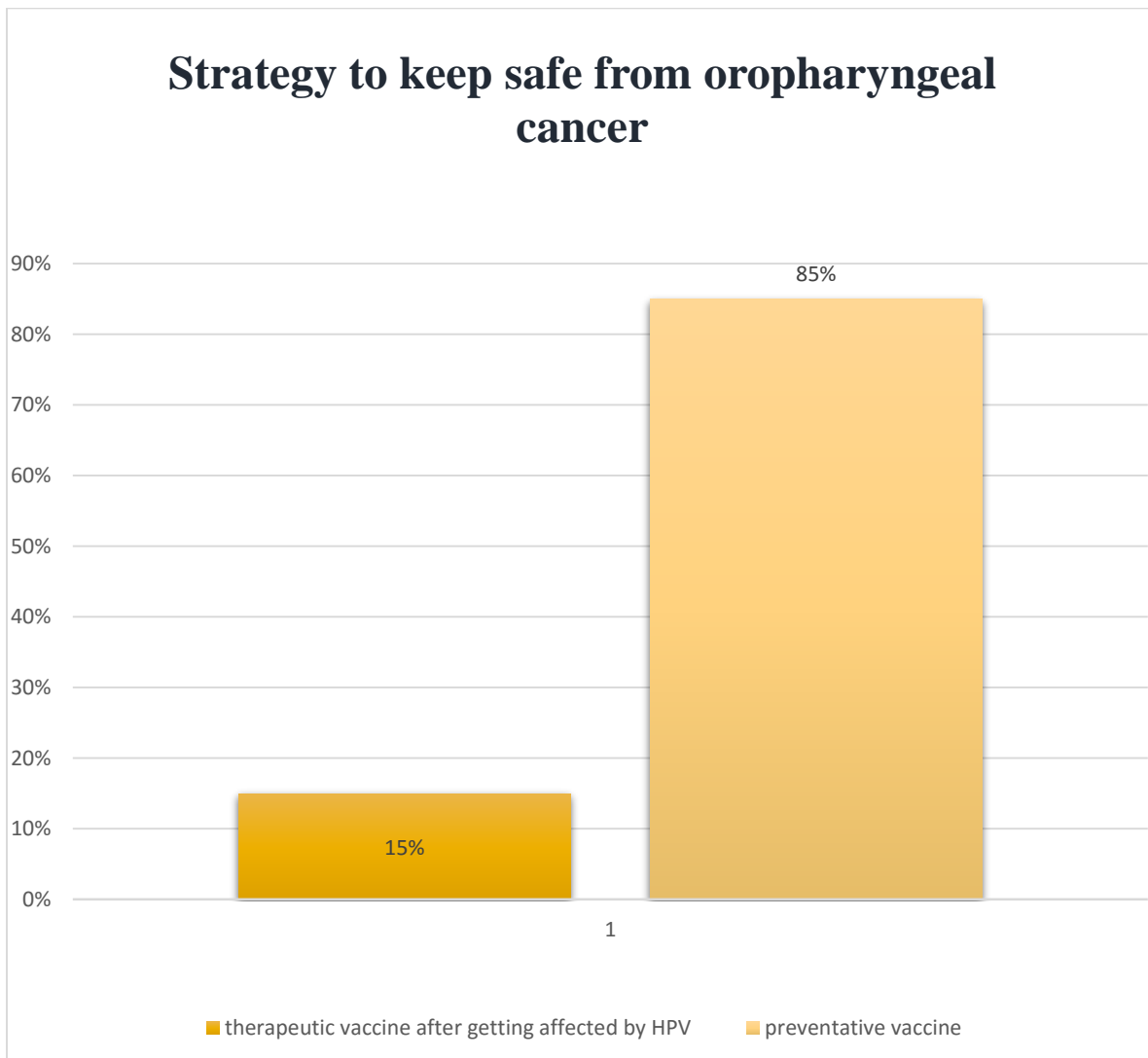
#### 4.2.9 Age for Vaccination:



**Figure 4.2.9:** Graphical representation of Age for Vaccination

- From the participated population 46% participants thought that 9-26 years should be the age range for vaccination.
- 35% thought it should be after birth but only 19% thought that the age range should be between 26-50 years.

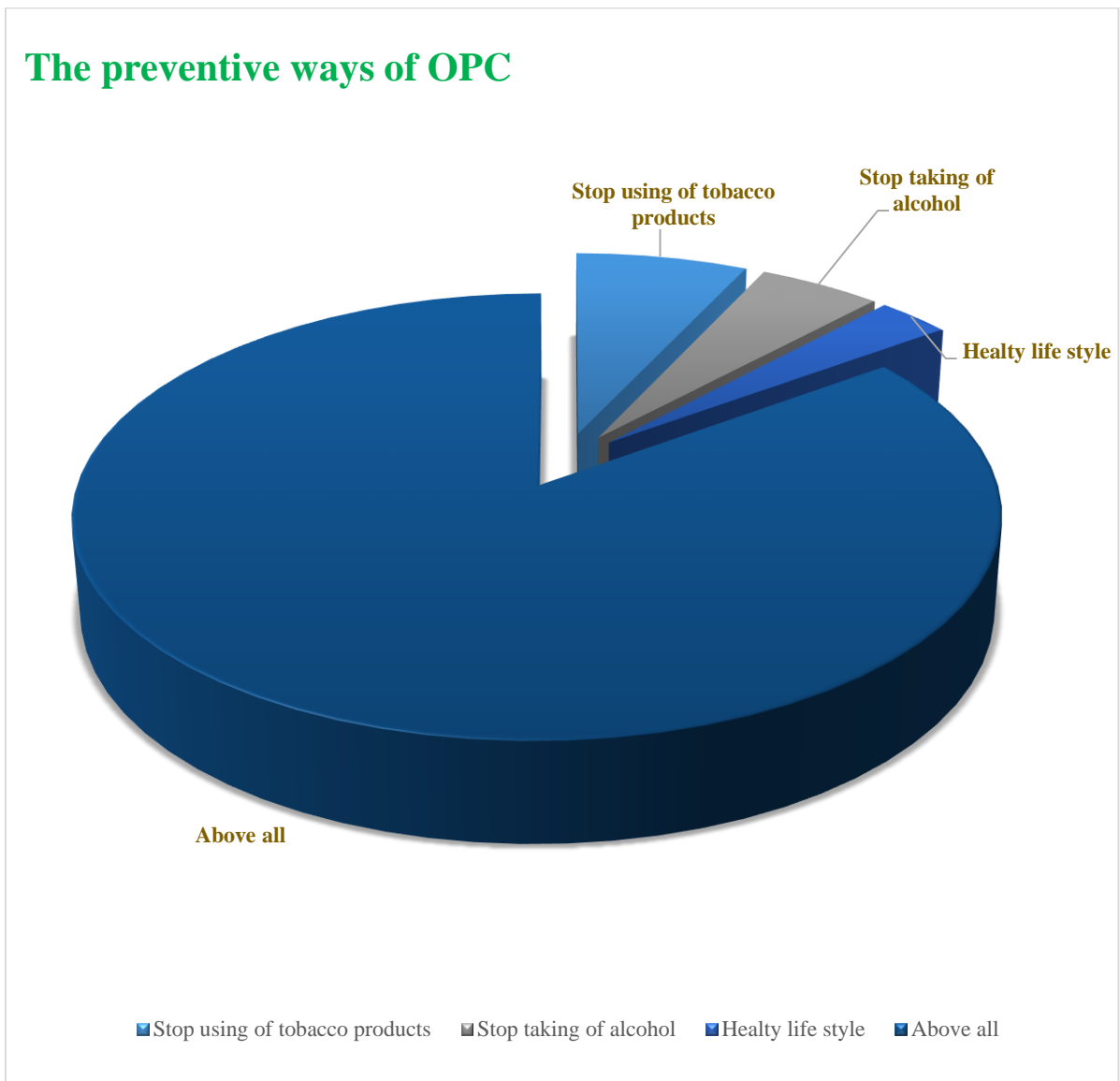
#### 4.2.10 Strategy to Keep Safe from Oropharyngeal Cancer:



**Figure 4.2.10:** Graphical representation of Strategy to Keep Safe from OPC

- From the graphical presentation we can see that majority (85%) of the participant's preferred preventive vaccine to keep safe from oropharyngeal cancer.
- Where only 15% preferred therapeutic vaccine after getting affected by HPV.

#### 4.2.11 Preventive ways of OPC:



**Figure 4.2.11:** Graphical representation of Preventive ways of OPC

- 7% of the participants thought that OPC can be prevented by stopping use of tobacco products where 5% and 3% thought, it can be prevented by stopping use of alcohol and leading healthy life style.
- Rest 85% thought OPC can be prevented by stopping all these things.

## **Chapter 5: Discussion**

In the developing countries oropharyngeal cancer is a great concern for the people living there. Oral health is very important part of human health. Poor oral health often factors of oral cancer. Oral cancer is very alarming disease that affects many people each year all over the world. It is the eleventh most dominate cancer in the world. We did a study on the students of East West University in Bangladesh to know the current prevalence and risk factors for oral carcinoma and to evaluate the awareness and knowledge of Bangladeshi people regarding oral and pharyngeal cancer and to identify how many people are concern about the impact of smoking and drinking alcohol regarding oropharyngeal cancer.

From the study we have come to know that students related to health professionals like Pharmacy or Genetic Engineering have better knowledge regarding oropharyngeal cancer and related issues than the students of not health professionals.

From the participated students, the age range was 18-29 years (69% male and 31% female). They represents themselves from the different parts of our country. Among them 60% of the population are never smoked, 25.6% are currently smoker and 14.4% are former smoker. From the current smokers, 78% take more than 10 packs of cigarette in a year where 19% take less than 10 packs and 3% of the current smokers quit smoking.

In case of smokers, lump/thickening inside the mouth is occurred in 35% cases and 65% smokers didn't have such type of problem. In case of non-smokers, 48% percent pupil said that they have lump/thickening problem where 52% stated free from this kind of problems. In case of painful mouth sore inside the mouth, 76% participants don't feel painful mouth sore where only 24% feel it. For smoker it is occurred in only 22% cases and 78% smokers didn't have such type of problem. In case of non-smokers, 25% percent pupil said that they have painful mouth sore problem where 75% stated free from this kind of problems. The study suggests that, smokers are affected by lump/thickening problem more than the painful mouth sore.

From participated study population, 12.6% are heavy alcohol user and 20% take alcohol lightly where 66.8% never take alcohol before. From this study we have found that in case of alcohol users, lump/thickening inside the mouth is occurred in 47% cases and 53% users didn't have such type of problem. In case of non-alcohol user, 41% percent pupil said that



they have lump/thickening problem where 59% stated free from this kind of problems. In case of alcohol users, painful mouth sore inside the mouth is occurred in only 24% cases and 76% users didn't have such type of problem. In case of non-alcohol users, 24% percent pupil said that they have painful mouth sore problem where 76% stated free from this kind of problems. The study suggests that, alcohol users are affected by lump/thickening problem more than the painful mouth sore.

From a study on the people of North America and in European countries Tobacco and alcohol are regarded as the major risk factors for oral and pharyngeal cancer. Nearly all the oropharyngeal cancer patients (93% males, 85% females) had been tobacco smokers, whereas the corresponding percentages for controls were significantly less (78% males, 53% females). Among the patients who were smokers, nearly all (95% males, 91% females) had also been consumers of alcoholic beverages (Rigotti *et al.*, 2000).

From another study in Japan suggest that current smokers were found to have a higher risk of death caused by oral and pharyngeal cancer compared with non-smokers in both sexes: the RR was 2.6 in men and 8.2 in women. Men who drank more than 46 g ethanol per day had an approximately threefold increased risk of oral and pharyngeal cancer. Simultaneous exposure to both factors was significantly associated with an elevated risk of oral and pharyngeal cancer (Osazuwa *et al.*, 2013).

In our study the result supports the carcinogenic effect of cigarette smoking and alcohol drinking on the oral cavity and pharynx.

The study suggests that most of the students don't know that oropharyngeal cancer may occur due to less attention in dental health. Among the study pupil majority (55%) never consult with dentist before. The study also suggests that majority, (about 67%) participants don't know about the meaning of oropharyngeal cancer where only 15% know about it and 18% haven't any clear idea.

The study also suggests that there are few reasons those have the higher magnitude of impact on oral and oropharyngeal cancers. Majority of the participants thought that marijuana use (95%), smoking tobacco (93%), consuming heavy alcohol (81%), using cigars and pipes (89%), dentures and poor dentition (80%) and weakened immune system

(75%) are the major reasons behind oral & oropharyngeal cancers. Being infected with human papillomavirus (HPV) (55%) is also a vital reason for OPC.

Few people thought that prolonged sun exposure (UV Radiation), nickel exposure, poor diet/nutrition, using mouthwash more than twice in a day, smokeless tobacco intake, drinking of strong 'filter' coffee, drinking decaffeinated coffee, overeating, losing of all their teeth, over 50 years old age these are also responsible for OPC. The study also reveals that women (45%) are more prone to OPC than man (31%).

From the study of diet among this pupil we have come to know that majority of the participants knew that low intake of Vitamin C (68%), Beta Carotenes (59%), Vitamin A&E (50%) and Iodine deficiency (53%) are responsible for oropharyngeal cancer where few people know that high fat intake is responsible for high risk of oropharyngeal cancer where high intake of Fruits & Vegetables are responsible for reducing oropharyngeal cancer.

From another study that claims that tobacco and alcohol use are the main risk factors for oral and oropharyngeal cancers, yet, dietary habits may also be of importance. Data from a series of case-control studies conducted in 9 countries worldwide (1,670 cases and 1,732 controls) were used to investigate the role of several food groups. After adjustment for potential confounders, high intake of fruits and vegetables significantly reduced the OR of cancer compared to low intake among ever-tobacco users, although not among never-tobacco users. Similarly, the protective effect of high fruit and vegetable consumption was present among ever-drinkers, but not among never-drinkers (Macy *et al.*, 2013).

In conclusion, vegetables and fruits may modulate the carcinogenic effects of tobacco and alcohol. This study also supports our survey in the magnitude of the impact of diet in chronic development of oral and pharyngeal cancers.

The analysis also suggests that most (87%) of the participants did not know about the treatment of oropharyngeal cancers, only few (13%) have idea about this. 39% participant's preferred chemotherapy for oropharyngeal cancer treatment where 38% prefer surgery, 15.4% pupil suggested for radiation therapy and 6.60% for targeted therapy but only 1% participants preferred immunotherapy. Among these 62% participants thought that if

people take vaccine of HPV then OPC can be cured where 38% people were not agreed with this because vaccination cannot cure oropharyngeal cancers when other factors are responsible for this.

The study suggests that 7% of the participants thought that OPC can be prevented by stopping use of tobacco products where 5% and 3% thought, it can be prevented by stopping use of alcohol and leading healthy life style. Test 85% thought OPC can be prevented by stopping all these things.

From the study we have come to know that, majority of the participants know the preventive ways of oropharyngeal cancer. They are agreed that tobacco products, reducing alcohol consumption and leading healthy life style all these things are responsible or capable to reduce or improve oropharyngeal cancers.

From this study we have got some vital evidence about oropharyngeal cancers from a developing country like Bangladesh that we have got a clear idea about the factors those are responsible for oropharyngeal cancer and its magnitude of impact over the people. We also come to know about the thought of the people about oropharyngeal cancers, its treatment procedure, diet, its vaccination, preventive ways and also the awareness of the people that helps us to study more or to find new things based on this study information.

## **Chapter 6: Conclusion**

Oral cavity and oropharyngeal cancer knowledge and risk awareness is sensible among this student population. The students of the health professionals department have more knowledge about the oral and pharyngeal cancers. Though having some limitations like participants were not doctor diagnosed, only students were participated, mass people were not involved and random yes/no answers from the students but through this study we have got some vital information. Most of the students haven't clear idea about these cancers type and also the magnitude of impact on individuals. Increasing the awareness about other non-smoking related risk factors, especially those related to sexual behavior, may prove to be more effective in preventing oral cavity and oropharyngeal cancer among university aged students. In addition, since oral cavity and oropharyngeal cancer risk factors are largely prevalent among young adults, it may be of value to increase awareness of cancer risk factors and primary prevention strategies among elementary, middle and high school students, as many of the risk behaviors are likely to be initiated even before college age. This study gives us some vital evidence about oropharyngeal cancers from a developing country like Bangladesh that we have got a clear idea about the factors those are responsible for oropharyngeal cancer and its magnitude of impact over the people. We also come to know about the thought of the people about oropharyngeal cancers, its treatment procedure, diet, its vaccination, preventive ways and also the awareness of the people that helps us to study more or to find new things based on this study information. As much as health behavior is associated with risk perception, and oral cavity and oropharyngeal cancer occurrence is increasingly flowing towards younger adults, interventions must be tailored to this group in order to improve prevention and control. Prevention of oral cavity and oropharyngeal cancers may pose a difficult challenge without first improving the knowledge of oral cavity and oropharyngeal cancers among high risk groups, particularly university aged youth in Bangladesh

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8. Do you use mouthwashes?  Yes  No  Often

If yes, then how many times you use it in a day?  Once daily  Twice daily  More than twice daily

9. Do you know that mouthwashes contains high alcohols that may cause Oral cancer if use it more than twice daily?  Yes  No

10. Have you ever felt a lump or thickening inside the mouth? -----

If yes, then do you consult with a Doctor for this?  Yes  Often  Never

If never, why?.....

11. Have you ever experienced Bleeding in the mouth? -----

If yes, then do you consult with a Doctor for this?  Yes  Often  Never

If never, why?.....

12. Have you ever felt a painful mouth sore that doesn't heal? -----

If yes, then do you consult with a Doctor for this?  Yes  No

13. Have you ever felt Pain or difficulty swallowing or chewing and Difficulty moving the jaw or tongue? -----

If yes, then do you consult with a Doctor for this?  Yes  No

If never, why?.....

14. Do you feel all these problems are due to your less attention on dental health?

Yes  No  Don't know / May be

15. Have you consult with a dentist to check up you oral health?  Yes  No

16. How long ago was your last visit to the Dentist?

- Within the past year       1 to 2 years ago       More than 2 years ago

Why? .....

17. In general do you go to the Dentist for:  A regular check-up       An occasional check-up       Only when having trouble with your teeth

18. When did you last visit your GP?

- Within the past year       1 to 2 years ago  
 More than 2 years ago       Never been to the GP

19. What you normally do for maintaining your oral health?

.....  
.....

20. Compared with other people around you about the same age, what would you say your dental health is?       Good       Bad

If bad, why?.....

**Part 2: Awareness and Knowledge on Oropharyngeal and Oral cancer**

21. Do you know what oropharyngeal cancer is?       Yes       May be       Don't know

22. In which part of oropharynx this cancer may develop?

- Tonsils       Base of tongue       Back of throat       Above all

23. Tick (on the reason behind oropharyngeal cancer you think..?)

- a. Smoking tobacco.....

- b. Being infected with human papillomavirus (HPV).....
- c. Consuming heavy alcohol.....
- d. Poor diet/nutrition.....
- e. Using mouthwash more than twice in a day.....
- f. Smokeless tobacco intake.....
- g. Using Cigars and Pipes.....
- h. Dentures and Poor Dentition.....
- i. Prolonged sun exposure (UV Radiation).....
- j. Nickel exposure.....
- k. Weakened immune system.....
- l. Drink strong 'filter' coffee
- m. Drink decaffeinated coffee
- n. Overeat
- o. Have lost all their teeth
- p. Are over 50 years old
- q. Are a man
- r. Are a woman
- s. Marijuana use

24. Is any of your family member has oropharyngeal cancer?  Yes  No

If yes, then do you think you may be at a risk of oropharyngeal cancer?

Yes  May be  Don't know  May be

25. Which of the following diet factor may cause Oral Cancer? Tick Yes or No

Low intake of Vitamin C	Yes	No
Low intake of Beta- Carotene	Yes	No
Low intake of Vitamin A & E	Yes	No
Iodine deficiency	Yes	No

High Fat intake	Yes	No
High intake of Fruits & Vegetables	Yes	No

26. Do you have any idea about the treatment options for oral and oropharyngeal cancer?

- Yes                       No

If Yes, Then what should be the treatments from following you think?

Surgery    radiation therapy    Chemotherapy    Immunotherapy    Targeted therapy

27. Do you think HPV (Human Papilloma Virus) vaccine will help you to keep free from oropharyngeal cancer?                       Yes                       No

If No, then specify the reason you think:.....

28. What should be the recommended age for getting this vaccine?

- 9-26 year's old                       26-50 year's old                       After birth

29. To keep yourself safe from oropharyngeal cancer which one is more preferable to you?

a therapeutic vaccine while getting affected with HPV    a preventative vaccine before infected with HPV

30. What should be the preventive ways to get free from oropharyngeal cancer you think?

- Stopping the use of tobacco Products                       Stopping the intake of alcohols
- Making healthy lifestyle choices                       Above all