

SMOKING OVERWEIGHT AND OBESITY

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Declaration

I hereby humbly declare that the thesis work entitled ‘Smoking overweight & obesity’ a requirement for the degree of Master of Philosophy (MPhil) in Community Nutrition under the faculty of Community Nutrition, Dhaka University (DU), was carried out by me under the guidance of Farzana Saleh, Associate Professor, Bangladesh Institute of Health Sciences for the session 2011-2012.

No part of this work has been submitted elsewhere for any other academic purpose

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Certification

This is to verify that Ms. Ambika Baniya has completed her thesis work entitled “Smoking overweight & obesity” as a requirement for the partial fulfillment for Degree of Master of Philosophy in Community Nutrition under my guidance and supervision. I hereby recommend it for approval.

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This thesis entitled 'Smoking overweight & obesity' is submitted by Ms. Ambika Baniya in partial fulfillment of the requirements for the degree of Master of Philosophy (community Nutrition) under the Faculty of Community Nutrition, Dhaka University, for the Session 2011-2012. Acceptance of the thesis has been approved by:

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ABBREVIATIONS

WC	Waist Circumference
OPD	Out patients Department
ADA	American Diabetes Association
BIHS	Bangladesh Institute of Health Sciences
BMI	Body Metabolic Index
CI	Confidence Interval
DM	Diabetes Mellitus
CVD	Cardio Vascular Disease
IPOQ	International Physical Activity Questionnaire
FAO	Food and Agriculture Organization
PAL	Physical Activity Level
GYTS	Global Youth Tobacco Survey
SBP	Systolic Blood Pressure
DBP	Diastolic Blood Pressure
BP	Blood Pressure
WHO	World Health Organization
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
NCD	Non-communicable disease
VDC	Village Development Committee

WHR	Waist Hip Ratio
IFG	Impaired Fasting Glycaemia
ACP	American College of Physician

ABSTRACT

Background

Smoking is currently the single most important public health problem worldwide, being a modifiable risk factor for the development of numerous morbidities, including cardiovascular disease. However, the association between smoking and obesity is complex. On one hand, smokers have a lower body weight and body-mass index (BMI) than non-smokers. On the other hand, current smokers tend to have a larger waist circumference (WC) and a higher waist-to-hip ratio than non-smokers, suggesting that smoking may favor the accumulation of abdominal fat. However, obesity is also an epidemic disease worldwide as well as Nepal.

Objective: The objectives of the current study was to determine the association between the pattern of smoking and obesity among the type 2 diabetic patients in Nepal

Study design and setting: A cross-sectional study design was followed for this study. Systematic sampling method was used for data collection from 350 type 2 diabetic patients attending two Medical colleges , diabetes clinics outpatient department (OPD) of Chitwan Medical College Teaching Hospital and College of Medical Sciences Teaching

Hospital, Chitwan District of Nepal Data were analyzed using statistical technique, Basic statistic was used for r frequency and percentage, chi –square test was used to determine the association in between dependent variable and associated factors.

Result:

In the present study demonstrated that more than fifty percent (50.9%) used to smoke cigarettes, Bidi, Cigars etc. and 34.3% were smokeless tobacco users and only few (14.8%) were both smoke and smokeless tobacco users. Among the smokers 58% were overweight, 37% were normal weight and 6% were under weight. Out of 350 subjects, fifty percent had high physical activity level thirty percent subjects had medium physical activity level and twenty percent subjects had low physical activity level.

. Among the overweight 18 (35%) smoker, 29(56%) were smokeless tobacco user and (5)9.6% both smoke and smokeless user here ($\chi^2/p=0.43/0.93$). Among over weight (center obesity) 20 (33.3%) smoker, 36(60%) smokeless tobacco use and 4(6.7%) both smoke and smokeless tobacco use, of tobacco user were using both smoking and smokeless tobacco, however ($\chi^2/p=4.47/0.38$).

Conclusion:

Pattern of smoking and abdominal obesity did not establish any association. Regarding pattern of smoking, three types of smoking were considered (smoke, smokeless tobacco user and both user) to establish the association with obesity. However, no association was seen with abdominal obesity ($\chi^2/p=0.43/0.93$).

CHAPTER 1: INTRODUCTION	
This chapter includes	
1.1	Background
1.2	Statement of the Problem
1.3	Rational of the Study
1.4	Research Question
1.5	Objective of the Study
1.6	Operational Definition
1.7	Conceptual Framework

CHAPTER 1

INTRODUCTION

1.1 Background

Smoking is currently the most important public health problem worldwide, being a modifiable risk factor [1] for the development of numerous morbidities, including cardiovascular disease [2-4]. However, the association between smoking and obesity is complex. On one hand, smokers have a lower body weight and body-mass index (BMI) than non-smokers. On the other hand, current smokers tend to have a larger waist circumference (WC) and a higher waist-to-hip ratio than non-smokers, suggesting that smoking may favor the accumulation of abdominal fat. However, obesity is also an epidemic disease worldwide. In Nepal, the proportion of overweight and obesity was 7.2% (95% CI, 8, 9.) to 1.7% (95% CI, 0.9, 2.5) in both men and women [5]. Obesity, particularly central obesity, is a major risk factor for cardiovascular diseases [1-2], mainly affecting adults and the elderly [8], especially type 2 diabetes people. Abdominal fat is an indicator of the presence of visceral fat, which has an atherogenic profile [9] causing metabolic complications [2-3, 10]. Tobacco use is quite high in the South East Asian region, where 5.2 million smokers in Nepal [6-7].

In this region tobacco is consumed in smoked and non -smoked form [19]. The smoking forms are cigarette, bidi, hookah, sulfa and chillum or kankat[20] and the smokeless forms are pan masala, betel quid, gutka, mishri and snuffed through the nose [21]. Though nicotine in cigarette increases energy expenditure in human but there is strong evidence that smoking helps in accumulation of visceral fat, greater insulin resistance, risk of metabolic syndrome and type 2 diabetes[18]. Abdominal fat deposition is influenced by several factors, some of which are well known, including age, gender [11-13] and alcohol consumption [14-15]. The protective effect of physical activity seems more evident in individuals who engage in regular physical activities over a long period of time [16]. The association between smoking and indicators of fat distribution has been

little explored, and few studies have consistently shown this association when potential confounders are controlled [13].

Concurrently the, proportional mortality from chronic non-communicable diseases (NCDs) in Nepal is 42% [5]. From the above discussion it has been shown that smoking affects body fat distribution and it is associated with central obesity. Researches have shown that smoking and obesity together may pose a triple health threat in addition to the increased risks for heart disease, cancer and diabetes [13]. Though the government of Nepal has taken many steps to control tobacco (mainly smoking) consumption but the prevalence of smoking remains high and the occurrence of obesity in the population is increasing in Nepal [5]. So this study will simultaneously contribute to establish one of the danger points and problem of smoking.

1.2 Statement of the Problem

Tobacco smoking consists of drawing into the mouth, and usually the lungs, smoke from burning tobacco. The type of product smoked is most commonly cigarettes, but can also include cigarillos, cigars, pipes or water pipes. 'Smokeless' tobacco is also popular in some parts of the world. This typically involves using tobacco preparations for chewing, sniffing into the nose or placing as a wad in the mouth between the cheeks and gums [22] and smokeless tobacco use has features that are similar to smoking and can carry significant health risks[22]. Tobacco use means consumption of any form of tobacco products either smoked and smokeless. Smoking tobacco is one of the major causes of preventable mortality and morbidity worldwide [23] and cigarette, cigars, pipe tobacco and favored Surti/khaini, Panmasala, and Gutkha are the most common forms of tobacco products.

The growing use of tobacco is a cause of great concern around the world due to its serious effects on health. Non-communicable diseases (NCDs) like ischemic heart diseases, cancers, diabetes, chronic respiratory diseases are the leading causes of death globally and associated with tobacco use. Available data from WHO demonstrate that thirty-eight million people die each year from NCDs, of which nearly 85% of NCD

deaths occur in low- and middle-income countries [24]. This huge burden of NCDs can be attributed to increasing use of tobacco. Tobacco is a major risk factor for a number of diseases affecting all age groups. WHO data shows that tobacco uses kill nearly six million people in a year. Around five million of those deaths are the result of direct tobacco use while more than 600,000 are the result of non-smokers being exposed to second-hand smoke. One person dies every six seconds due to tobacco. Up to half of current users will eventually die of a tobacco-related disease [25,26].

Consequences of tobacco use:

1) Cancers associated with tobacco

Tobacco is also associated with cancer of respiratory tract, lung, upper gastrointestinal tract, liver, pancreas, kidney, urinary bladder, oral cavity, nasal cavity, cervix, etc. Smokeless tobacco (chew tobacco, snuff etc.) is a major cause of cancer of the oral cavity.

2) Cardiovascular diseases

Stroke is vascular disease of the brain where tobacco causes either constrict of blood vessels or rupture leading to loss of consciousness and paralysis. Tobacco affects coronary vessels of the heart leading decrease of blood supply or death of heart muscles which is known as ischemic or coronary heart disease. Smoking acts synergistically with other risk factors like high cholesterol and blood pressure to increase the risk of Coronary Heart Diseases (CHD).

3) Respiratory Diseases

Chronic Obstructive Pulmonary Disease: It includes chronic bronchitis and emphysema. Similarly, smoking is associated with acute attacks of asthma and Tuberculosis

4) Effects on pregnancy, newborns and childhood

Maternal tobacco use during pregnancy and exposure of child to second hand smoke in childhood is known to be a risk factor for: Maternal smoking is associated with congenital malformations in baby like orofacial clefts, clubfoot and atrial-septal defects, Increased risk of allergies, Higher blood pressure in childhood, Increased likelihood of obesity, Stunted growth, Poorer lung function and Increased likelihood of developing asthma

It has been found that over half of Nepalese men consume tobacco. There is an urgent need to fully implement Nepal's Tobacco Control and Regulation Act which will ban smoking in public places; enforced plain packaging and display of health warnings over 75% of the packaging, and has banned selling of tobacco products to those under 18 years of age. There is a need to increase the social unacceptability of tobacco in Nepal by raising awareness through different electronic and cultural media. Anti-tobacco campaigns should focus on those who are less educated, have manual occupations, are in poorer economic groups, and are from the Terai region of Nepal [27].

Next, Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health. Body mass index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m^2). For adults, WHO defines overweight and obesity as: overweight is a BMI greater than or equal to 25; and obesity is a BMI greater than or equal to 30 [28]. Obesity increases the likelihood of various diseases and conditions, particularly cardiovascular diseases, type 2 diabetes, certain types of cancer, osteoarthritis, and depression [29,30]. Obesity is a leading preventable cause of death worldwide, with increasing rates in adults and children [31]. In 2015, 600 million adults (12%) and 100 million children were obese in 195 countries [32]. Obesity is more common in women than men [31] and authorities view it as one of the most serious public health problems of the 21st century [32].

In this context, Diabetes is a group of diseases in which blood sugar levels are higher than normal. Most of the food a person eats is turned into glucose (a kind of sugar) for the body's cells to use for energy. The pancreas, an organ near the stomach, makes a hormone called insulin that helps glucose get into the body's cells. Diabetes body either doesn't make enough insulin or can't use the insulin very well. Less glucose gets into the cells and instead builds up in the blood [33]. Type 2 is the most common in adults and accounts for more than 90% of all diabetes cases. Fewer people have type 1 diabetes, which most often develops in children, adolescents, or young adults [34]. In fact, smokers

are 30–40% more likely to develop type 2 diabetes than nonsmokers and people with diabetes who smoke are more likely than nonsmokers to have trouble with insulin dosing and with controlling their disease [35]. The more cigarettes you smoke, the higher your risk for type 2 diabetes [35].

Similarly, obesity is believed to account for 80-85% of the risk of developing type 2 diabetes, while recent research suggests that obese people are up to 80 times more likely to develop type 2 diabetes than those with a BMI of less than 22. Both type 2 diabetes and obesity are associated with insulin resistance. Most obese individuals, despite being insulin resistant, do not develop hyperglycemia. Pancreatic β -cells of the islet of Langerhans release adequate amounts of insulin that are sufficient to overcome insulin level reductions under normal circumstances, thus maintaining normal glucose tolerance [36].

Type 2 diabetes mellitus is a leading underlying cause of mortality from cardiovascular disease, and it also leads to other adverse consequences such as kidney failure and blindness[37]. Obesity has long been established as a major risk factor for diabetes, but the association between cigarette smoking and diabetes has only more recently been elucidated. The results of a meta-analysis of 51 prospective cohort studies in the 2014 Surgeon General's report demonstrated that cigarette smokers have a 30–40 percent greater risk of diabetes than nonsmokers and that there is a strong dose–response relationship, with the risk increasing with the number of cigarettes smoked per day [37]. In addition to having an increased risk of developing diabetes, evidence also indicates that, among patients with diabetes, cigarette smokers are more likely to suffer cardiovascular complications and to have higher mortality rates. Based on this body of evidence, the 2014 Surgeon General's report concluded that cigarette smoking is a cause of diabetes [37].

So, this study has been focused to determine smoking pattern and BMI among type 2 diabetic patients and calculate association among and between the variables.

1.3 Rationale of the Study

Obesity and smoking are major health problems in the world as well as in Nepal. More than 50% people have died due to the NCDs and the major risk factors for NCDs are obesity and smoking. Many studies have been conducted about the risk factors of CVDs in the several parts of the world. However, studies in this area are rare in Nepalese context. Therefore, I am interested to carry out the study on overweight/ obese and smoking. The results of this study will contribute to design more effective and specific strategies for screening and controlling overweight/ obesity and smoking in Nepal .

Many researches have shown that smoking and obesity together may pose a triple health threat in addition to the increased risks for heart disease, cancer and diabetes. Though the government of Nepal has taken many steps to control tobacco (mainly smoking) consumption by becoming the member of Frame Work Convention of Tobacco Control but the prevalence of smoking remains high and the occurrence of obesity in the population is increasing in Nepal . So this study will simultaneously contribute to establish one of the danger points and problem of smoking.

This study will help to guide diabetes people, health managers, health services providers and policy makers regarding the consequences of the association between smoking and central obesity and also help them for developing appropriate truthful policy

1.4 Research Questions

- What is the pattern of smoking?
- What is the pattern of obesity?
- What is the association between smoking and obesity?

1.5 Objectives

1.5.1 General Objective

- To assess the association between the pattern of smoking and obesity among the type 2 diabetic patient in Nepal

1.5.2 Specific Objectives

- To find out the pattern of smoking in type 2 diabetic patient
- To determine the obesity among type 2 diabetic patients
- To assess association between the pattern of smoking and obesity among type 2 diabetics patient
- To assess the pattern of physical activity level among of obese of type 2 diabetes patient (DM II)

1.6 Operational Definitions

1.6.1 Smoker

Current smoker: Who have been smoking regularly at least for one year .

Past smokers: Who have smoked in past and quitted at least for one year .

Non-smokers: Who have never been smoked.

1.6.2 Physical activity level

Physical exercise related to work, transportation and leisure time was assessed in terms of minutes that caused them breathless or feeling of palpitation. However continuous activity of at least ten minutes was taken into account to add up to the total minutes of activity for the day. Then the total duration was converted into metabolic equivalents (MET minutes/week). Based on MET minutes/week, low physical activity category

(<600), moderate physical activity category (600 -3000) and high physical activity category (>3000) [47].

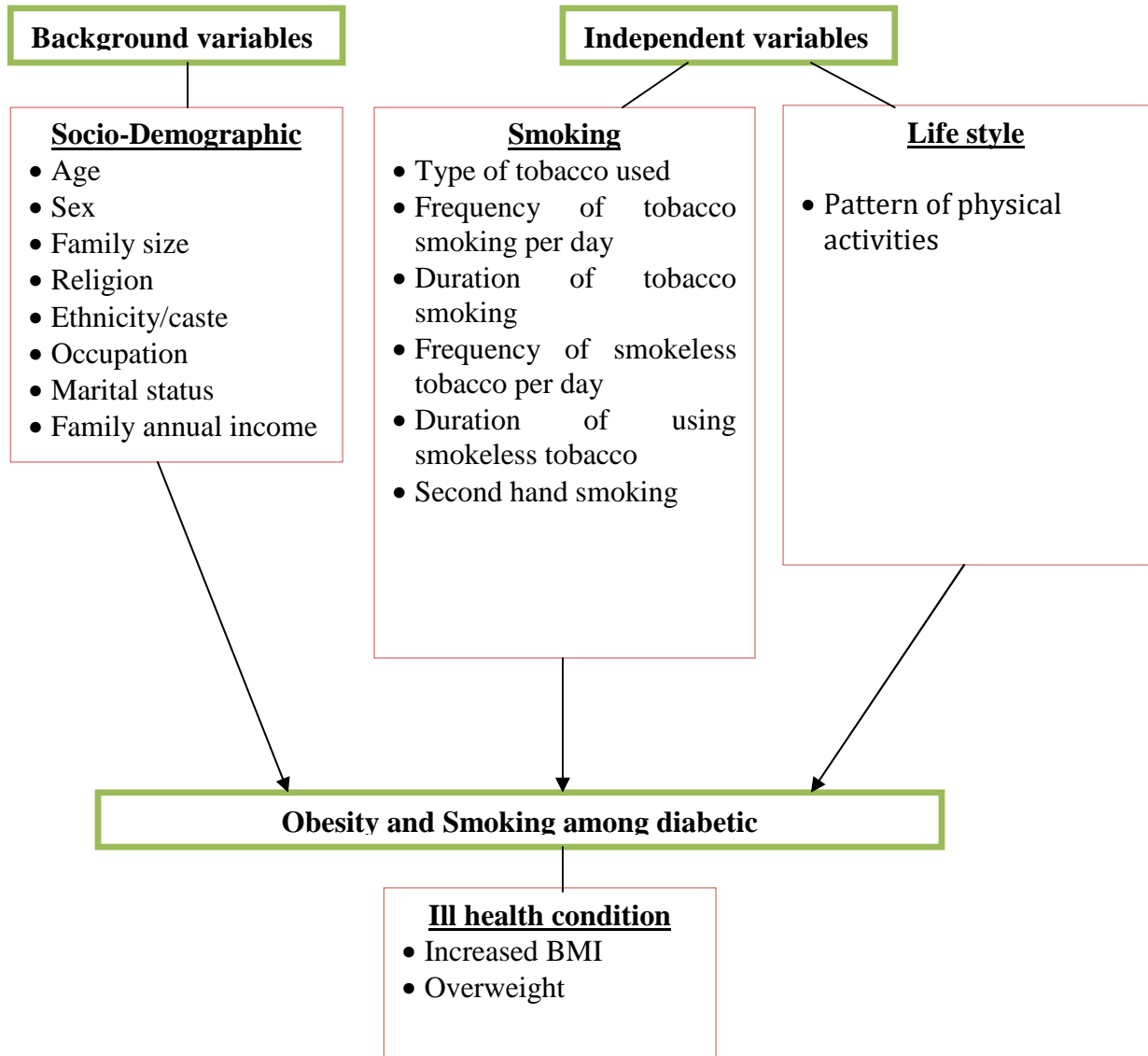
1.6.3 Over weight

Weight that is higher than what is considered as a healthy weight for a given height is described as overweight. Body Mass Index, or BMI, is used as a screening tool for overweight.

1.6.4 Obesity

Obesity is a medical condition that occurs when a person carries excess weight or body fat that might affect their health.

1.7. Conceptual Framework



CHAPTER 2: LITERATURE REVIEW

This chapter includes

2.1	Overweight and obesity
2.2	Raised blood pressure (hypertension)
2.3	Blood glucose (diabetes mellitus)
2.4	Tobacco use

CHAPTER 2

LITERATURE REVIEW

Literatures were searched in the light of objectives. Only most relevant, updated and the information of similar setting have been incorporated in this study. Smoking and obesity are leading public health concern in modern life. Both increase the risk of cardiovascular diseases, cancer, and metabolic abnormalities [38]. A large-scale survey of steel workers in South Wales has shown a considerable difference between the body weights of smokers and of non-smokers. The weight increases with age so that men over 40 years who have never smoked are on average 13 lb (5.9 kg) heavier than smokers. Even so, smokers are about 15 lb (6.8 kg) heavier than the weight standard considered desirable by the Metropolitan Life Insurance Company, while non-smokers are nearly 30 lb (13.6 kg) heavier [39]. The tobacco use is quite high in South East Asian region, where 5.2 million smokers live in Nepal [40-41]. The proportional mortality from chronic non-communicable diseases (NCDs) in Nepal is high. Studies conducted about SES has shown that several variables may mediate the influence of attitudes toward obesity and thinness among women in developed societies that result in the inverse relationship between SES and obesity [42]. Studies done in different parts of the world have reported that smoking affects body fat distribution and it is associated with central obesity and insulin resistance [38, 42].

Smoking and obesity are leading causes of morbidity and mortality worldwide [12, 14]. The co-occurrence of overweight and smoking has substantial consequences for health. According to the Framingham study, the life expectancy of obese smokers was 13 y less than that of normal-weight nonsmokers [15]. In the same cohort, one-third to one-half of obese smokers died between the ages of 40 and 70 y, whereas only 10% of normal-weight nonsmokers did so.

Tobacco use increases the risk of development of a number of diseases. Even if current tobacco use stopped, the residual burden of disease among past users would cause disease for decades in the future¹. Tobacco is a plant for its leaves, which are smoked, chewed or sniffed for a variety of effects. There are many more reasons to quit using tobacco. Knowing the serious health risks may help motivate you to quit. When used over a long period, tobacco and related chemicals, such as tar and nicotine, can increase your risk of many health problems [40]. It is an addictive substance as it contains nicotine. In addition to nicotine, tobacco contains at least 43 known carcinogens and more than 4,000 chemicals [54].

The World Health Organization (WHO) attributes 4.9 million deaths a year due to tobacco i.e. one death every eight seconds. If current trends continue, there will be one death every three seconds by 2030 and a third of them in developing countries and this figure is expected to rise to more than 10 million deaths a year by 2030 [4]. At present, tobacco kills more than Half a million women per year worldwide. The Global Youth Tobacco Survey (GYTS) study covers 140 countries around the world, including Nepal. Currently, out of the 186 million, 34.8 million were using some form of tobacco and 25.8 million were smoking cigarettes [18]. Teens who smoke are much more likely to use alcohol, drugs, engage in fighting and unprotected sex [18]. The rise in the prevalence of overweight and obesity has extremely serious implications, not only for individual health, but also for the nation's health and for the economy. The health. Problems caused by excess weight lead to a wide range of debilitating and life-threatening conditions, including cardiovascular disease, type 2 diabetes, stroke, cancers, osteoarthritis, liver and gall bladder disease, and respiratory and musculoskeletal problems. In addition, obesity may lower self-esteem, lead to social discrimination and contribute to mental illness. The stark reality is that overweight and obese people die prematurely [43].Overweight and obesity are now so common among the world's population that they are beginning to replace under nutrition and infectious diseases as the most significant contributors to ill health [44].

Cigarette smoking is a major component of indoor and outdoor air pollution causing environmental tobacco smoke and secondary smoking in other people. It contributes to a remarkable number of diseases, including coronary heart disease, stroke, chronic obstructive airway disease, peptic ulcer, peripheral vascular disease and many types of cancers[3]. Thus smoking affects several systems of the body, most especially the first line organ, the lungs. The harmful substances which enter the lungs, spread through the body and can reach the brain, heart and other organs within 10 seconds of the first puff [6-2]. Obesity is a disorder in which excess body fat has accumulated to an extent that health may be adversely affected. The most widely used measure of body fatness is currently body mass index (BMI), defined as a person's weight in kilograms divided by the square of their height in meters. Obesity is defined as a BMI of 30 (kg/m²) or more. Overweight is defined as a BMI between 25 and 29.9. BMI cut-off values are ethnic-dependent and appear to be lower in certain populations: a BMI of 27.5 or more in an Asian person is associated with comparable morbidities [45].

Obesity is associated with increased risks of the following cancer types, and possibly others as well: Esophagus, Pancreas, Colon and rectum, Breast (after menopause), endometrium, Kidney, Thyroid and Gallbladder. One study estimated that in 2007 in the United States, about 34,000 new cases of cancer in men (4 percent) and 50,500 in women (7 percent) were due to obesity. The percentage of cases attributed to obesity varied widely for different cancer types but was as high as 40 percent for some cancers, particularly endometrial cancer and esophageal adenocarcinoma [56]

24,459 (63.3%) participants were overweight (BMI \geq 25 kg/m²) and 9,818 (25.4%) were obese (BMI \geq 30 kg/m²). Overall, current smokers were less likely to be overweight than never smokers. However, those who had smoked for more than 20 years and ex-smokers were more likely to be overweight. There were significant interactions with age. Participants 16–24 years of age were no more likely to be overweight if they were current or ex-smokers. The same patterns pertained to obesity. Among current smokers, there was no clear dose-relationship across the range of number of cigarettes smoked daily. Participants who smoked 10–19 cigarettes per day were not significantly different from

those who smoked 1–9 per day in terms of overweight and obesity [57] Definitions of Obesity, Overweight, and Normal Weight For the purposes of this study, obesity was defined as a BMI ≥ 30 , overweight as a BMI ≥ 25 and <30 , and normal weight as a BMI ≥ 18.5 and <25 , according to the definition provided by the National Institutes of Health [42]. BMI was determined by taking actual measurements of the height and weight of participants then computing BMI based on weight (kg) divided by height.

The emerging pandemic of non- communicable diseases (NCDs) is creating major health challenges globally. The burden of non- communicable diseases is also increasingly affecting developing countries such as Nepal. Similar to other low and middle income countries, Nepal is facing a triple burden of diseases: communicable diseases, re-emerging diseases and an escalation of non- communicable diseases. Cardiovascular diseases, cancer, chronic obstructive pulmonary diseases and diabetes have been identified by the World Health Organization (WHO) as the four major NCDs worldwide. These diseases are driven by various forces including ageing, rapid unplanned urbanization and the globalization of unhealthy lifestyles. The World Health Report 2002 states the eight major risk factors (four behavioral and four biological) that contribute most to the development of NCDs (WHO 2002). To reduce NCDs it is important to focus on decreasing the risk factors associated with these diseases and mapping the epidemic of NCDs and their risk factors. In Nepal, the first national-level NCD risk factor survey was conducted in 2007/08 to determine the prevalence of modifiable behavioral risk factors; however, this survey did not cover biological risk factors. Against this backdrop, the current study was conducted in 2012/13 (five years later) to collect baseline data on biological risk factors and determine the distribution of modifiable behavioral risk factors (NCD risk factors) among the Nepalese population.

2.1 Overweight and Obesity

Based on body mass index (BMI), one-tenth of respondents (10.4%) were found to be underweight, 67.9% were normal weight, 17.7% were overweight and 4% were obese. Mean waist circumference was 79.8 cm for men and 76.7 cm for women. Mean hip

circumference was 88.1 cm for men and 87.5 for women. Mean waist and hip circumference ratio was 0.9 for both sexes and across all age groups.

2.2 High blood pressure (hypertension)

Around 42.7% of the study population had never had their blood pressure measured. The prevalence of raised blood pressure or hypertension (SBP 140 and/or DBP 90), excluding those on medication, was 23.4% (men 28.7%, women 18.5%) and this figure rose to 25.7% (men 31.1%, women 20.6%) when those currently using medication were included. Among those with raised blood pressure (SBP 140 and/or DBP 90), 3.8% had normal blood pressure with medication, 7.9% were hypertensive with medication and 88.3% were hypertensive without medication.

2.3 Blood glucose (Diabetes Mellitus)

Around 89.2% of respondents had never measured their blood glucose. The prevalence of self-reported diabetes was 1.9% (men 2.4%, women 1.4%). Among those with diabetes, 9.4% were receiving insulin and 63.4% were taking oral drugs for diabetes. The prevalence of impaired fasting glycaemia (IFG), defined as a plasma venous value of blood glucose 110 mg/dl to <126mg/dl, was 4.1% (men 5.1%, women 3.2%). The prevalence of diabetes mellitus, based on plasma venous value of blood glucose 126 mg/dl and including those on medication, was 3.6% (men 4.6%, women 2.7%). This proportion was found to increase with age.

2.4 Tobacco use

The prevalence of smoking among respondents was 18.5% (men 27.0%, women 10.3%). This proportion increased with age among both sexes. Likewise, the prevalence of current daily smoking was 15.8% overall (men 22.1%, women 9.6%). On average, respondents started to smoke at 18.2 years of age (men 18.5 years, women 17.6 years). About 84.8% of current daily smokers smoked manufactured cigarettes; this proportion was higher among men (89.9%) than women (73.5%). The prevalence of smokeless tobacco use was 17.8% (men 31.3%, women 4.8%). Around 77.6% of current users took snuff by mouth (khaini), 23.1% used chewing tobacco and 7.8% used betel or quid. The prevalence of

tobacco use, both smoke and smokeless combined, was 30.8%. Nearly one in every two men aged 15–69 years (48.1%) were found to be using either form of tobacco; however, among women this proportion was much less at 14.1%. More than one-third of respondents (36.1%) had been exposed to second-hand smoke at home and 37.2% in the workplace during the past 30 days.

It can be inferred from these results that NCD risk factors are highly prevalent among the Nepalese population, which is a serious public health problem. Unless urgent and targeted interventions are made to prevent, treat and control non communicable diseases and their risk factors, the burden of NCDs could become unbearable in Nepal. There is an urgent need for concerned agencies to plan interventions to prevent and control these risk factors.

Both obesity and smoking were associated with excess costs for health care. Compared to nonsmokers, average health costs were \$1,275 higher for smokers. The incremental costs associated with obesity were even higher: \$1,850 more than for normal-weight individuals. For those with morbid obesity, the excess costs were up to \$5,500 per year. Significant trends of increasing risk with higher BMI values were observed for death from cancers of the stomach and prostate in men and for death from cancers of the breast, uterus, cervix and ovary in women [47].

The additional costs associated with obesity appeared lower after adjustment for other accompanying health problems (comorbidity). "This may lead to underestimation of the true incremental costs, since obesity is a risk factor for developing chronic conditions.

Smoking and obesity place a growing strain on an already stretched healthcare system. Employers are evaluating wellness programs such as quit-smoking and fitness programs in an attempt to lower costs by reducing health risk factors. Moriarty and coauthors conclude, "Simultaneous estimates of incremental costs of smoking and obesity show that these factors appear to act as independent multiplicative factors." Their study provides new insights into the long-term costs of obesity and smoking, showing that both risk

factors lead to persistently higher health costs throughout a seven-year follow-up period [39].

While cigarette smoking has decreased in western countries, obesity has increased. Recent studies have suggested that today's smokers may have less weight problems than non-smokers. "That's why I wanted to study whether the relationship between smoking and overweight has changed over time," said Lisa Webb, Master of Public Health at NHV".

Approximately 6,000 people have participated in a study on the relationship between smoking and obesity. Two measure of body fat have been used: BMI (body mass index) and WHR (waist hip ratio). The master's thesis "Smoking in the age of obesity: an investigation of secular trends in body fat and cigarette smoking" shows higher WHR for male and female smokers but lower BMI for female smokers, as compared with non-smokers [40].

A particularly noteworthy finding was that the difference between WHR among female smokers and never-smokers increased during the study [40].The study analyzed data for 104,391 postmenopausal women ages 50 to 79 who participated in the National Institutes of Health-funded Women's Health Initiative. Some of the findings of the study are depicted below: Among women without diabetes, women who quit smoking within the past three years had a 26 percent lower risk of developing heart disease compared with women who continued smoking. Women who had quit smoking for more than three years had a 61 percent lower risk. Among women with diabetes, those who quit smoking had about a 60 percent lower risk for heart disease, regardless of how recently they had quit. The majority of women in the study gained less than 11 pounds after they quit smoking and saw the same general drop in their heart disease risk as stated above. The smaller number of women who gained more than 11 pounds had less heart-health benefit from stopping smoking, especially for women with diabetes [41].

CHAPTER 3: MATERIAL AND METHODS	
This Chapter Includes	
3.1	Study design
3.2	Study place and population
3.3	Inclusion Criteria
3.4	Exclusion Criteria
3.5	Sample Size
3.6	Sampling procedure
3.7	Data collection procedure
3.8	Data collection instruments
3.9	Data analysis
3.10	Ethical Considerations

CHEPTER 3

MATERIAL AND METHODS

3.1 Study Design

A cross-sectional study design was followed for this study. Systematic sampling method was used for data collection.

3.2 Study Place and Population

The study was conducted during July 2014 to August 2015 and the data were collected from and College of Medical Sciences Teaching Hospital Bhagalpur, and Chitwan Medical College Teaching Hospital Chitwan Nepal. Study population was Type 2 diabetic patients of both sexes were included who visited outpatient department (OPD) diabetes clinics of College of Medical Sciences Teaching Hospital Bhagalpur, and Chitwan Medical College Teaching Hospital Chitwan Nepal.

3.3 Inclusion Criteria

- Willingness to participate in the study.
- Diagnosed case of Type 2 diabetes.

3.4 Exclusion Criteria

- Not willingness to participate in the study.
- Pregnant women and postnatal mothers were excluded from the study.
- Who were mentally disabled and unconscious

3.5 Sample Size

Sample size for this study, following formula has been obtained.(64)

Calculation formula: $n = \frac{Z^2 PQ}{d^2}$

where, $z = 1.96$; $p =$ Prevalence of smoking in Nepal is : $20.7\% [5] = 0.207$; $q = (1-p) = 0.1270$; $d = 4.4$ and Non-response rate = 12% .

The sample size we get 348.5 However, 350 samples were considered for this study .

3.6 Sampling procedure

Two medical colleges were selected purposively for this study. Systematic sampling method was applied for data collection. List of the patients obtained from the registration office of the hospitals. Every alternative patient starting from the first one was considered for study by systematic random sampling method. Informed consent was obtained from every patient prior to the data collection.

3.7 Data collection procedure

At first written authority was obtained from the hospital authorities. Then two days orientation training was given to enumerators who were staff nurse and orientation training focused on importance of questionnaire and data collection technique. A brief introduction about the purpose of the study was provided to each respondents. Face to face interview was conducted for about 30 minutes by enumerators with close supervision. To determine the overweight and obesity height, weight and waist circumference were measured following appropriate procedure by an expert technician. Confidentiality was maintained throughout the study period.

3.8 Data collection instruments

3.8.1 Questionnaire

The questionnaire was constructed in simple Nepali language. Opinions were obtained from supervisors, co-supervisors, experts from relevant fields and advisors throughout the period of questionnaire development. The questionnaire was prepared by using the WHO STEPS instruments [47]. Basic demographic information including age, sex and level of education, ethnicity, marital status, employment status, household income, hypertension and diabetes, tobacco use /smokeless tobacco use, physical activity level were recorded by the enumerators and checked by the researcher.

3.8.2 Anthropometric and clinical measurement

Weight: weight was measured by bath room weighing machine. The balance was caliber every day before use and the weight was measure on bare foot to the nearest 0.1 kg.

Height: Height was measured by a standiometer to the nearest 0.1 cm and the height was measured on bare foot in the standing position touching the occiput, shoulder, hip and heels on the wall while gazing horizontally in front and keeping the tragus and lateral orbital margin in the same horizontal place.

Waist circumference: waist circumference (cm) was measured to the nearest 0.5 cm with a soft non-elastic measuring tape.

Blood pressure: Systolic and diastolic blood pressure (mmHg) was measured using aneroid sphygmomanometer (ACP, Japan) after at least 5 minutes of recumbence in a calm d quite environment.

3.9 Data analysis

Collected data were rechecked at the evening on the same day for accuracy. Data analysis was done by using appropriate statistical techniques. All statistical analysis was performed with the software SPSS 17.0 for windows. Variables were expressed in the

form of frequencies and percentage and Chi-square test analysis was used to identify the significant association between smoking and obesity.

3.10 Ethical Considerations

Approval for the study was obtained from Chitwan Medical College and Institutional Review Committee, Informed consent was obtained from each respondents. Besides this, scientific objectivity was maintained, confidentiality of respondents were maintained. Respondents were informed about the nature of the research study and they were free to withdraw from the study at any time.

CHAPTER 4: RESULTS

CHAPTER 4: RESULTS	
4.1	Smoker/ non smoker
4.2	Body Mass Index (BMI)Report
Table 1.	Charecterstics of the respondents
Figure 1.	Smoking status respondents
Table 2.	Smoking pattern
Figure 2.	Smoker according to their consumption period
Figure 3.	Current smoker according to their type of consumption
Figure 4.	Current smoker according to the episode of their smoking
Figure 5.	Smokeless tobacco consume according to their consumption period
Figure 6.	Smokeless tobacco user according to their type of consumption
Figure 7.	Respondents according to their BMI who smoke or consume smokeless tobacco
Figure 8.	Respondents according to their BMI who smoke or consume smokeless tobacco
Figure 9.	Respondents according to the exposure of passive smoking at home
Figure 10.	Exposure of passive smoking at home regularly
Figure 11	Respondents according to the exposure of passive smoking at workplace
Figure 12	Respondents who exposed of passive smoking at workplace regularly
Table 3.	Association between the pattern smoking Vs pattern of obesity
Table 4.	Association between the pattern smoking Vs abdominal obesity
Figure 13.	Distribution of respondents according to their physical Activity level

CHEPTER 4

RESULTS

The overall finding of the study are described under following headings

Table 1: shows that socio-demographic characteristics of the respondents.

Mean age of the respondents was 55.81 ± 12.88 (M \pm SD) min=25yrs, max=89 yrs.

Among them 198(56.6%) were females while others 152(43.4%) were males.

Maximum 322 (92%) were married, 25(7.1%) widow/er and 3(0.9%) were unmarried.

According to Area of leaving 188 (53.3%) were rural and 162(46.3) were Urban.

However with respect to educational level, major proportion 107(30.6%) of respondents were illiterate 72(20%) were just literate, 29(8.3%) were primary, 32(9.1%) were up to secondary, 63(18%) were higher secondary and only 47(13.4%) were Bachelor and above.

According to type of religion 329 (94 %) belonged to Hindu 11 (3.1%) were Buddhist, 6(1.7%) were Christian and 4(1.1%) were Muslim.

According to the occupation, 143(40.9%) were House maker, 107 (30.6%) were Agriculture, were 43(12.3%) Employment, 31(8.9%) were Business, while remaining others 36(7.4%) were unemployed.

Mean income of respondent was NRs 23681.43 ± 24021.04 . On the basis of Monthly economic, 242(69.1%) had income < 25000Rs, 21.1% had income 25000-49999 Rs and 34 (9.7%) had income 50000Rs . Mean income was (M \pm SD) NRs 23681.43 ± 24021.04 .

Mean of the fasting glucose was 159.13 ± 70.443 (M \pm SD).

Mean of the BMI was 26.27 ± 5.121 (M \pm SD).

Mean of the systolic blood pressure was 130.15 ± 21.070 and Mean of the diastolic blood pressure was 82.77 ± 11.355 .

4.1. Smoker/ non smoker

Fig.1 shows that out of 350 respondents 83% were smoker and only 17 % were nonsmoker.

Table 2 Shows that out of 289 respondents 174 (50.9%) were smoker, 99(34.9%) were smokeless tobacco user and only 43(14, 8%) were both smoker and smokeless tobacco user.

Figure 2 shows that out of 147 respondents 80% were past smoker and 20% were current smoker.

Fig.3 Shows that the distribution of current smoking, out of 30 respondents 63% were filter cigarette consumer followed by non-filter smoker 17%, both filter and non -filter 17% and rest of the 3% were consumption tambakhu (Tobacco) smoker 3%.

Figure 4 reveal that out of 30 respondents most of the 87% were smoking less than 2 time per day, 7 % were smoking 2-3 episode per day and 7% were smoke more than 3 time a day.

Figure 5 show the distribution of present smokeless tobacco according there consumption status. Here 67% of respondents were current smoker of smokeless tobacco and only 33% were past smokeless tobacco consumer.

Fig.6 shows that out of 60 respondent 80% use Surti followed by, 8% were Khaini, 5% Pan masala and 2% were Gutkha.

Figure 7 shows that out of 60 respondents most of the 82% were use smokeless tobacco less than 10 times per day.17% were 10-20 time and very few 2% were use more than 20 time per day.

4.2. Body Mass Index (BMI) Report

Comparison

Figure 8 shows that distribution of respondents according to their BMI who smoke smokeless tobacco. Most of the 58% were overweight, 37% were normal and 6% were underweight.

Figure 9 shows that distribution of respondents according to the exposer of passive smoking. 91% were not exposer and only 9% were exposer.

Figure 10 shows that out of 90 respondents 93% were expose of passive smoking at home was less than 7 days a week and 7% were 7 and more days.

Figure 11 shows that out of 90 respondents 96% were not exposure of passive smoking at work place and only 4% were exposer.

Figure 12 out of 90 respondents 97% were less than 7 expose of passive smoking at work place and 3% were expose seven and more.

Table 3 shows that smokers were 18 (35%) among overweight tobacco users. Similarly, 29(56%) of tobacco user patients were using smokeless tobacco. However (5)10% of tobacco user were using both smoking and smokeless tobacco.

Table 4 shows that smokers were 20 (33.3%) among overweight tobacco users. Similarly, 36(60%) of tobacco user patients were using smokeless tobacco. However 4(6.7%) of tobacco user were using both smoking and smokeless tobacco.

Figure 13 shows that out of 350 respondents 48.9% had high physical act

Table 1: Characteristics of the respondents (n=350)

Characteristics		Frequency	Percentage (%)
Age group (in years)	20-30	11	3.1
	31-40	37	10.6
	41-50	79	22.6
	51-60	97	27.7
	> 60	126	36.0
Age (years, mean \pm SD) = 55.81 \pm 12.88			
Sex	Male	152	43.4
	Female	198	56.6
Marital status	Unmarried	3	0.9
	Married	322	92.0
	Widow	25	7.1
Type of family	Nuclear	180	51.4
	Joint	170	48.6
Habitat	Urban	162	46.3
	Rural	188	53.7
Level of Education	Illiterate	107	30.6
	Literate	72	20.6
	Primary	29	8.3
	Secondary	32	9.1
	Higher secondary	63	18.0
	Bachelor and above	47	13.4
Religion	Hindusum	329	94.0
	Islam	4	1.1
	Buddhisum	11	3.1
	Christianity	6	1.7

Cont. Table 1

Characteristics		Frequency	Percentage (%)
Occupation	Employment	43	12.3
	Business	31	8.9
	Agriculture	107	30.6
	House maker	143	40.9
	Others labor etc	26	7.4
Income (Monthly)	< 25000Rs	242	69.1
	25000-49999Rs	74	21.1
	50000Rs	34	9.7
Fasting Blood Glucose (mmol/L)		159.13±70.44	
Blood Pressure			
Systolic (mmHg)		130.15±21.47	
Diastolic (mmHg)		82.77±11.35	
Body Mass Index (kg/m²)		26.27±5.12	
Waist circumferences (cm)		91.21±13.9	

Results expressed by frequency (%) and Mean ± SD

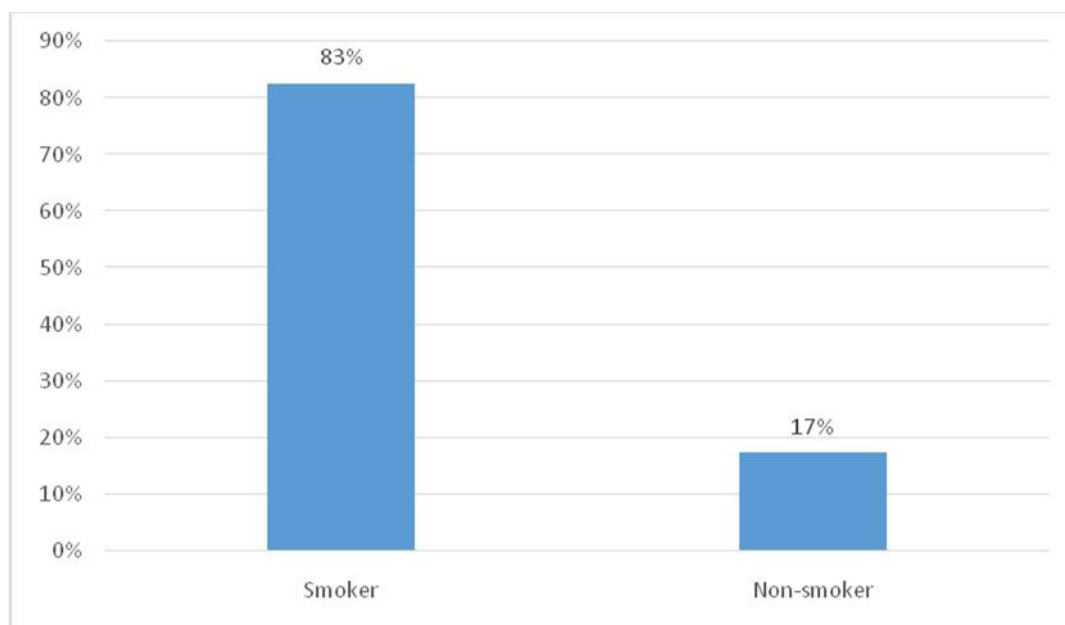


Figure 1: Distribution of the smoking status respondents (n=350)

Table 2: Distribution of the smoking pattern (n=289)

Pattern of Smoking	Frequency	Percentage
Smoker	147	50.9
Smokeless tobacco user	99	34.3
Both user	43	14.8

Results expressed by frequency (%)

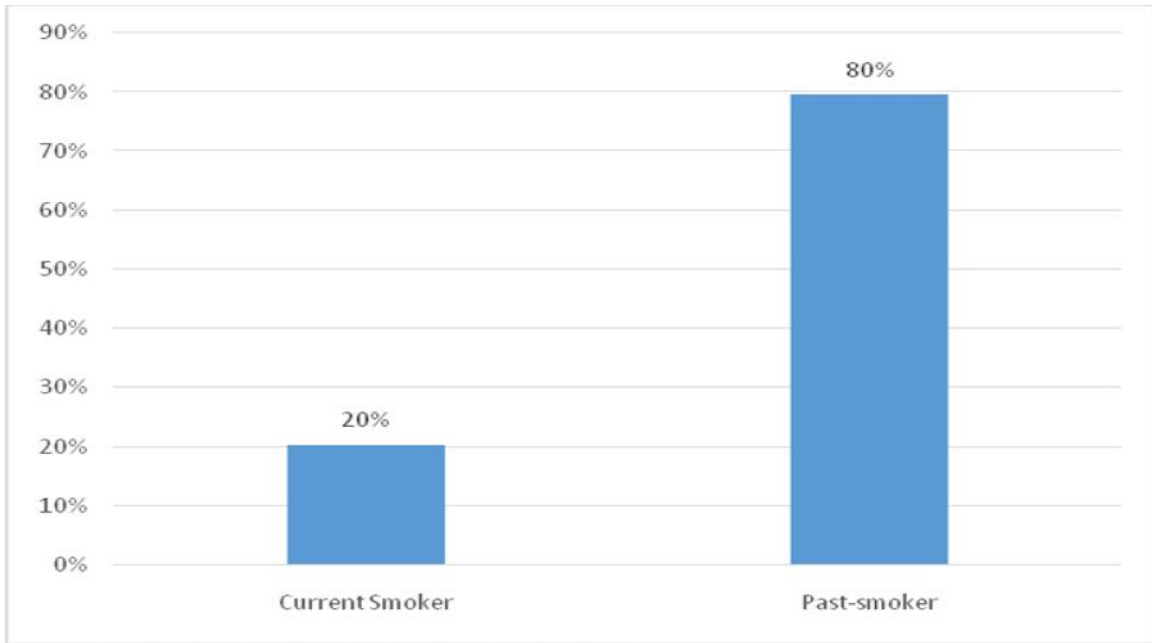


Figure 2: Distribution of the smoker according to their consumption period (n=147)

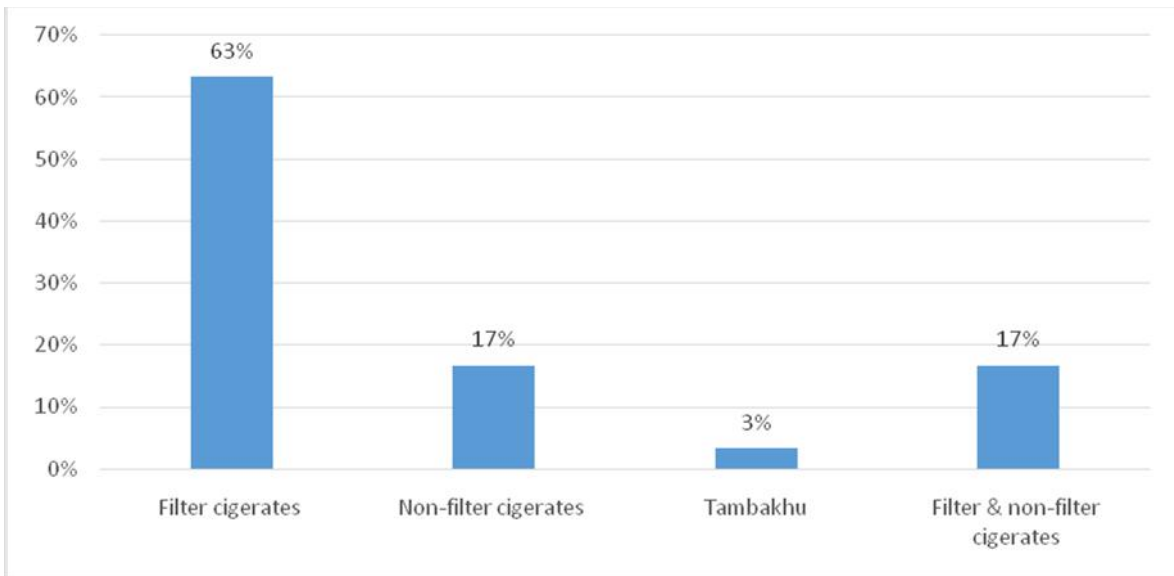


Figure 3: Distribution of the current smoker according to their type of consumption (n=30)

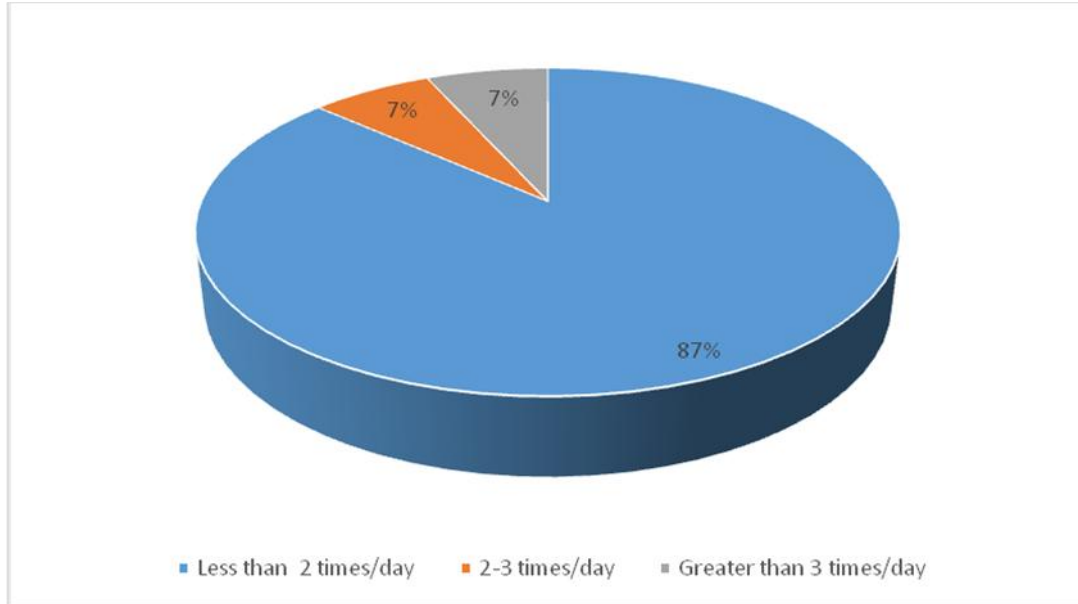


Figure 4: Distribution of current smoker according to the episode of their smoking per day (n=30)

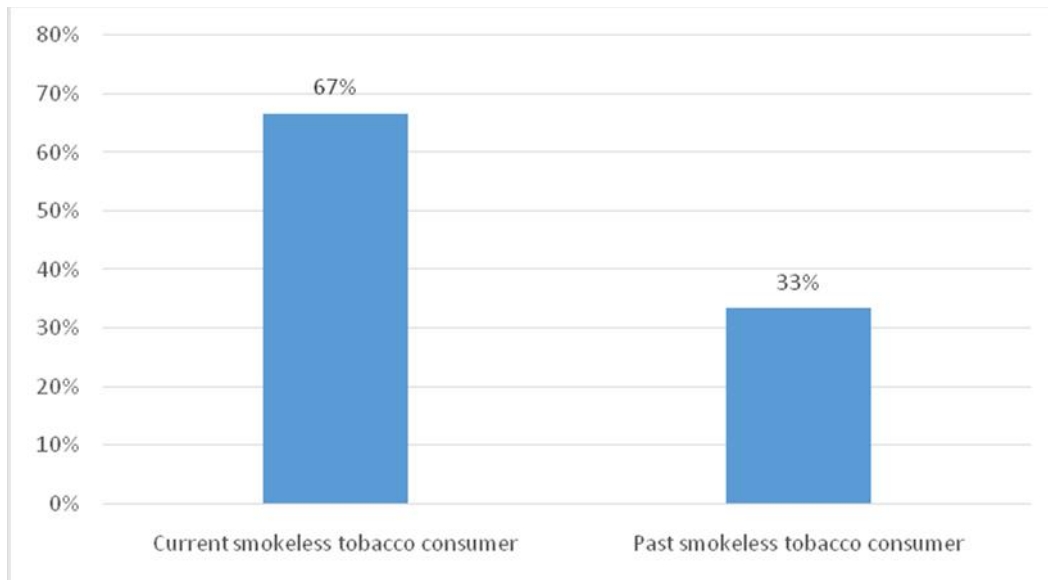


Figure 5: Distribution of the smokeless tobacco consume according to their consumption period (n=90)

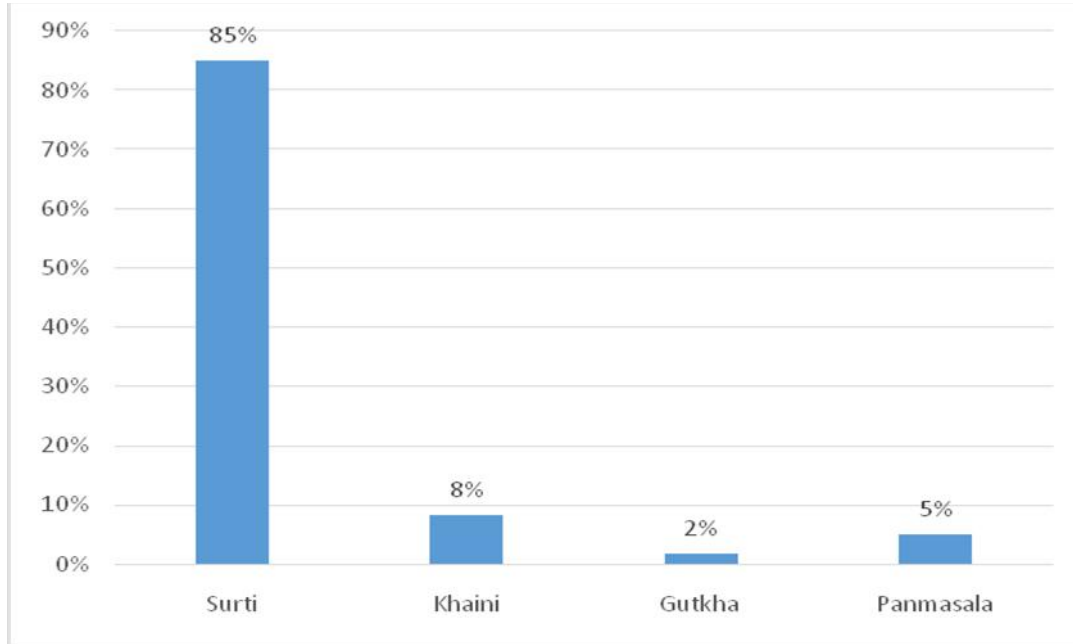


Figure 6: Distribution of the smokeless tobacco user according to their type of consumption (n=60)

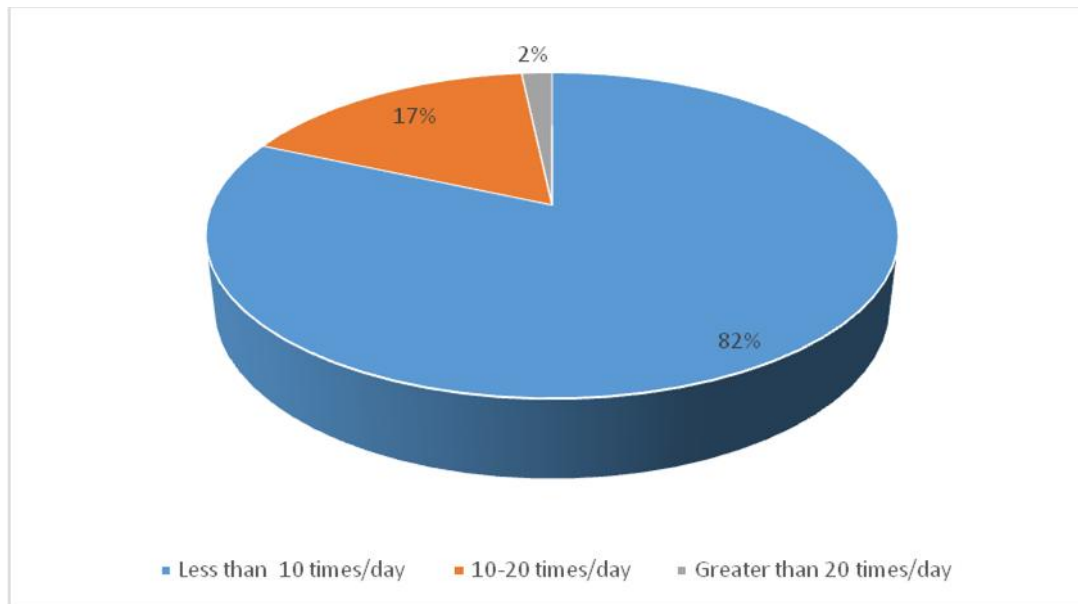


Figure 7: Distribution of the smokeless tobacco user according to their frequency of consumption (n=60)

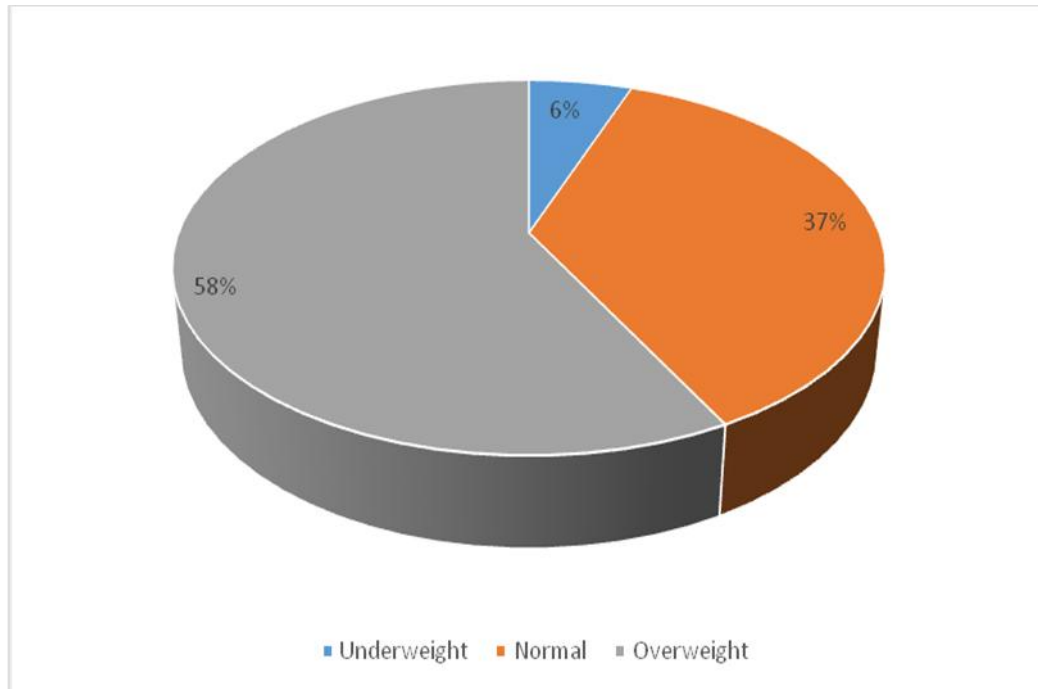


Figure 8: Distribution of the respondents according to their BMI who smoke or consume smokeless tobacco (n=90)

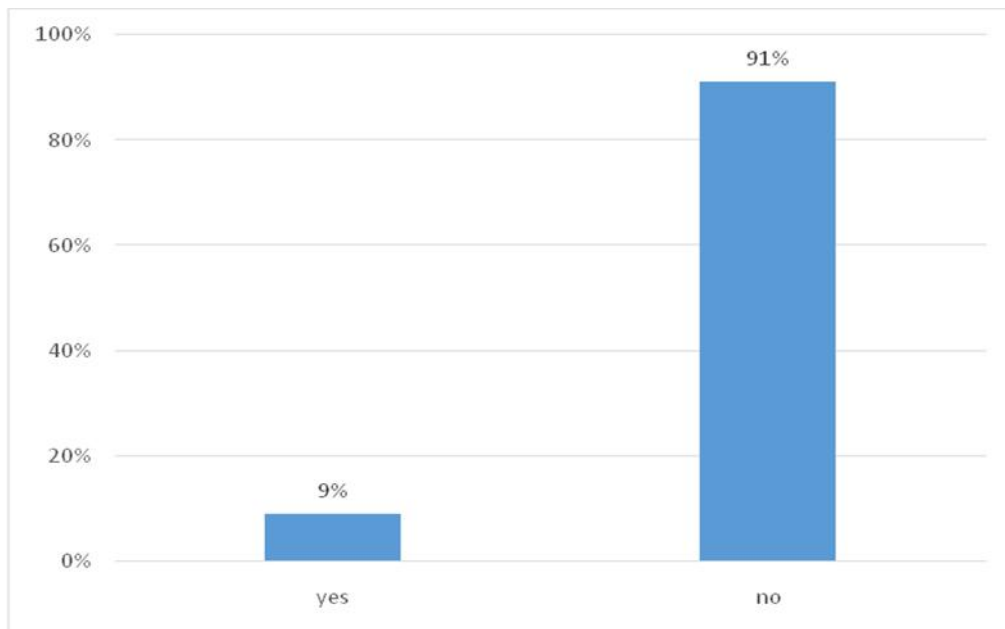


Figure 9: Distribution of the respondents according to the exposure of passive smoking at home (n=90)

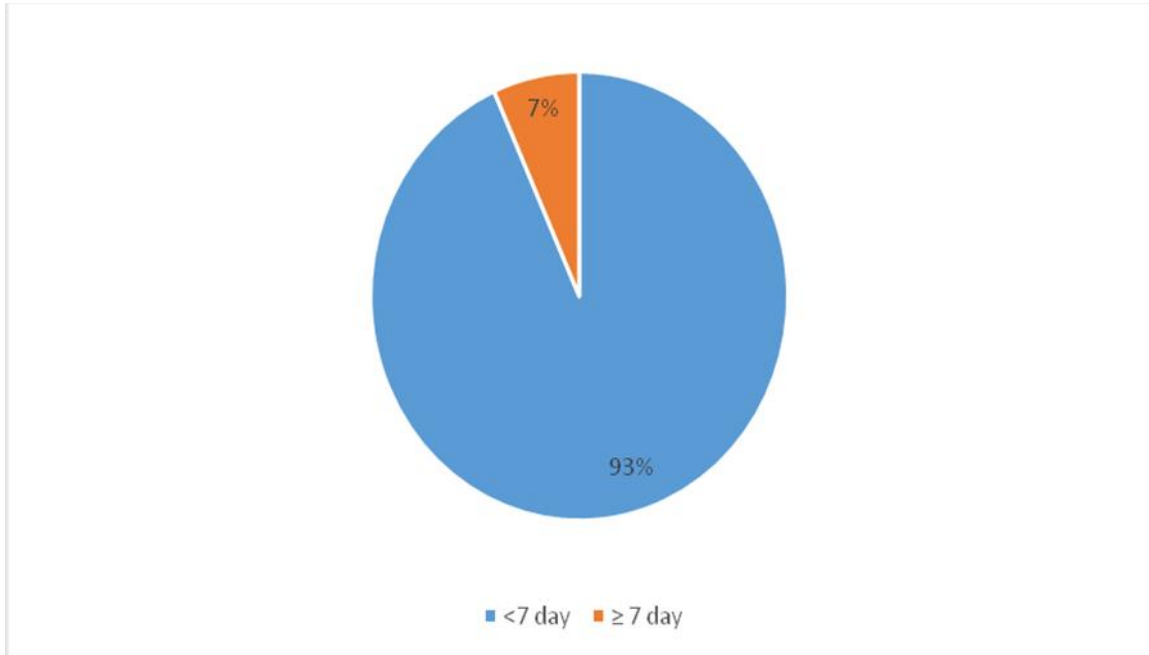


Figure 10: Distribution of the respondents who exposed of passive smoking at home regularly (n=90)

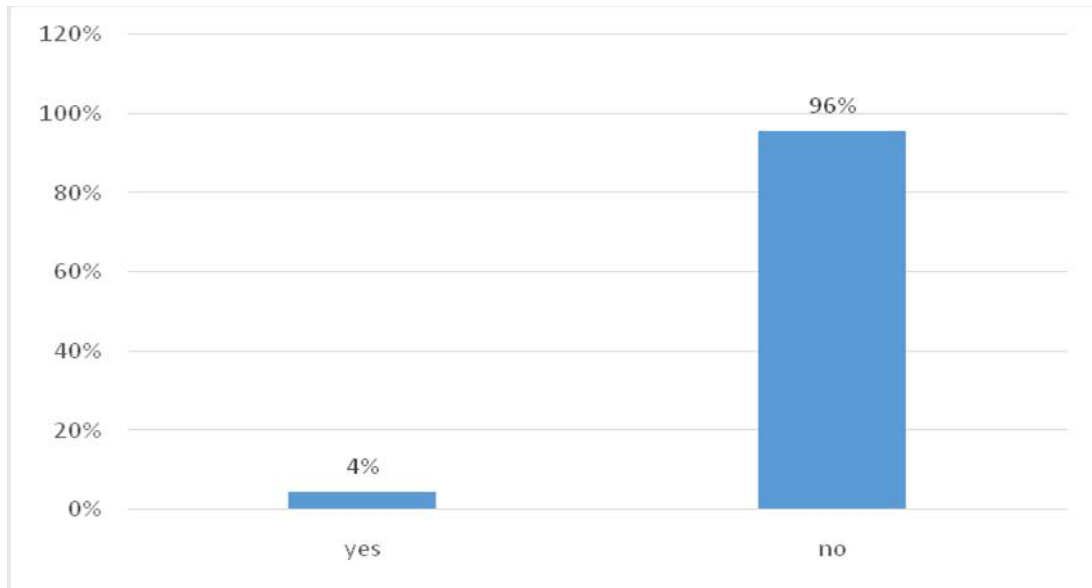


Figure 11: Distribution of the respondents according to the exposure of passive smoking at workplace (n=90)

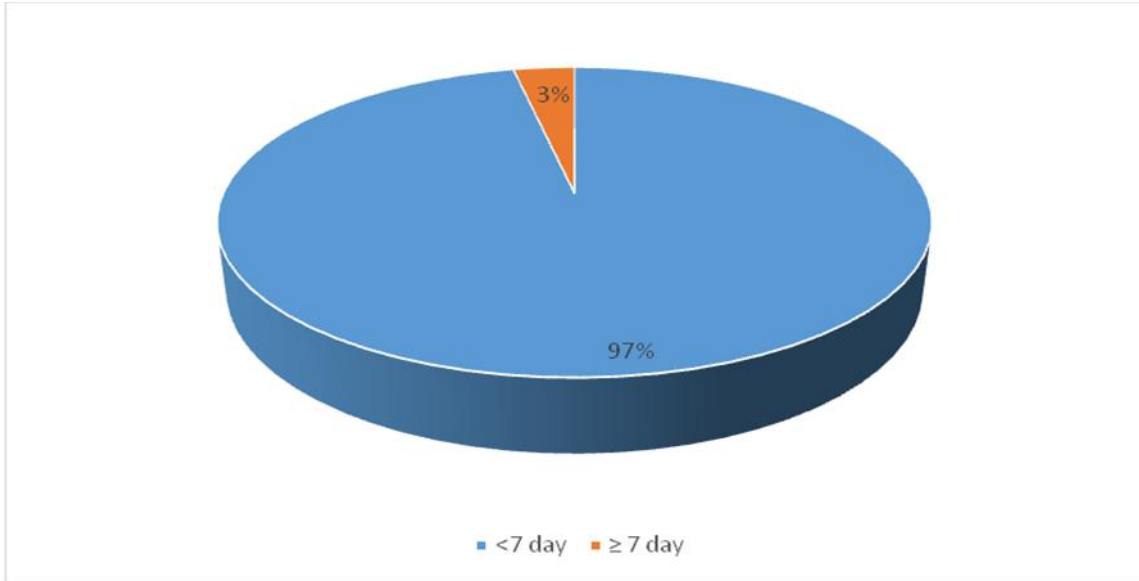


Figure 12: Distribution of the respondents who exposed of passive smoking at workplace regularly (n=90)

Table 3: Association between the pattern smoking Vs pattern of obesity (n=90)

Pattern of smoking	Underweight	Normal	Overweight
Smokers	2(40%)	10(30.3%)	18(34.6%)
Smokeless tobacco user	3(60%)	23(69.7%)	29(55.8%)
Both User	0(0%)	0(0%)	5(9.6%)
$\chi^2/p=4.47/0.38$			

Result are expressed as no (%) and Chi square test was performed as the test of significance

Table 4: Association between the pattern smoking Vs abdominal obesity (n=90)

Pattern of smoking	Normal	Overweight
Smokers	10(33.3%)	20(33.3%)
Smokeless tobacco user	19(63.3%)	36(60%)
Both User	1(3.3%)	4(6.7%)
$\chi^2/p=0.43/0.93$		

Result are expressed as no (%) and Chi square test was performed as the test of significance

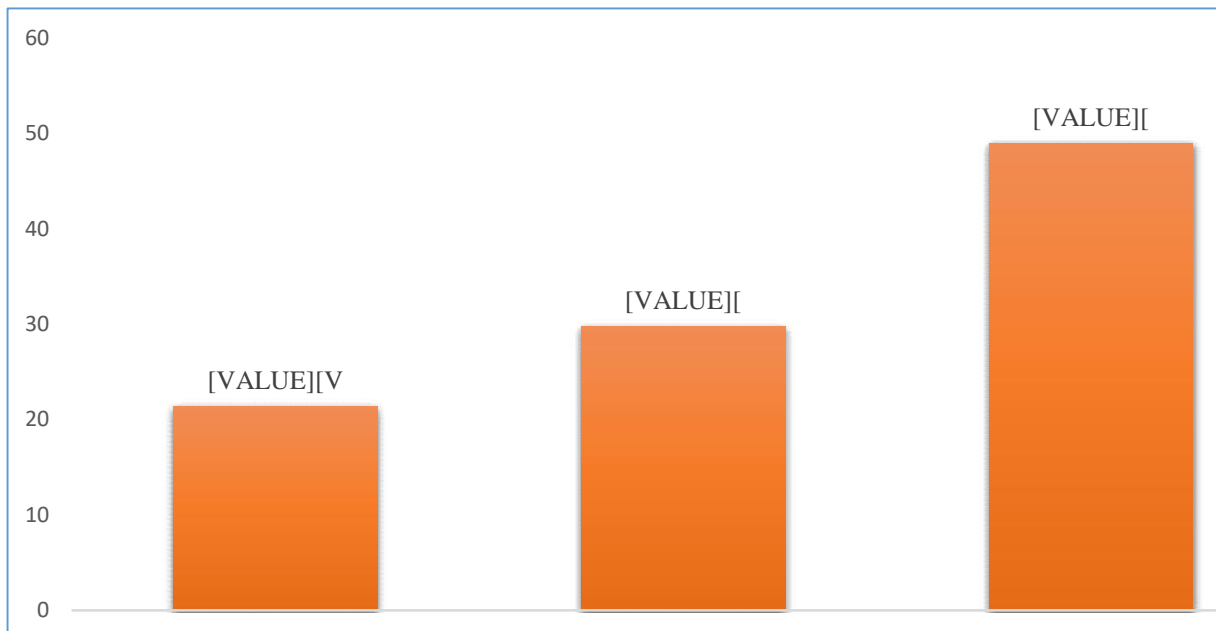


Fig.13: Distribution of respondents according to their physical Activity level (PAL) (n=350)

CHAPTER-5

DISCUSSION

CHAPTER 5

DISCUSSION

A total of 350 diabetic subjects were included in this study. This study attempted to assess the pattern of smoking, type of obesity and association between the pattern of smoking and obesity among type 2 diabetic patients in Nepal. Socio demographic variables like age, sex, ethnicity, literacy status and religion were assessed. Similarly, occupation and income of the subjects were also included in the study.

Additionally, fasting blood glucose, systolic and diastolic blood pressure of the subjects was recorded and mean and standard deviation of those findings were also calculated.

Pattern of smoking

This study revealed that 50.9% were smoker, 34.3% were smokeless tobacco user and 14.8% were both user (Table 2). A study carried out in Pakistan demonstrated that cigarette smoking among type 2 diabetic patients was 27% and there was significant association of male sex ($p= 0.00$). [66] Similar study carried out in India also indicated that diabetic American Indian/Alaska natives were more likely to smoke cigarettes than without diabetes (29.8% vs 18.8%; $P<.01$). Smoking rates were 2 to 3 times higher among diabetic American Indians and Alaska Natives for each age category ($P<.001$) [67]

Consistent with our study, another study published in British Medical Journal by Khosla and Lowe clearly pointed out that 65% of the men were smoking some type of tobacco, 20% were attempting to get rid of the habit, and 15% had never smoked and study was carried out among 35 and above year's subjects. (23). Study of Health in Pomerania (SHIP) and the German National Health Interview and Examination Survey (GNHIES) also reported about the variation of smoking habit of diabetic and non-diabetic subjects which reported the percentage of current smokers was lower among persons with than

without Type 2 diabetes mellitus in SHIP (17.3% vs. 38.0%) and in GNHIES 98 (24.7% vs. 32.1%). Only in men, there were more former smokers in Type 2 diabetic patients than in subjects without diabetes in both studies. Among current and former smokers, the number of cigarettes smoked was higher among persons with than without Type 2 diabetes mellitus.[67]

Pattern of obesity

Type 2 diabetes is a global public health crisis that threatens the economies of all nations, particularly developing countries. Fueled by rapid urbanization, nutrition transition, and increasingly sedentary lifestyles, the epidemic has grown in parallel with the worldwide rise in obesity.[68]

Present study indicated that out of 90 type 2 diabetic subjects who smoke or consume smokeless tobacco 58% were overweight and only 37% presented with normal body mass index (Figure 8). Consistent with our study, similar type of finding was obtained from the very popular document published in Public Health in England with the title Adult obesity and Diabetes clearly mentions that being overweight or obese is the main modifiable risk factor for type 2 diabetes. In England, obese adults are five times more likely to be diagnosed with diabetes than adults of a healthy weight. Currently 90% of adults with type 2 diabetes are overweight or obese. People with severe obesity are at greater risk of type 2 diabetes than people with a lower BMI (49). Being overweight or obese (a BMI of 25kg/m² or more) is the main modifiable risk factor for type 2 diabetes. (50) The risk of developing type 2 diabetes is associated with incremental increases in body weight in early adulthood with greater risk among people who have been obese for longer periods of time[51] . Consistent with our study similar finding was demonstrated, however, childhood obesity and duration of obesity was not studied in the present study. A study conducted at eastern Nepal among adult males also demonstrated overweight and obesity among 32.9% and 7.2% respectively and the same study also depicted physical inactivity was more associated with obesity in older population[52] In February 2014, Dr. Joel's study shows that diabetes and obesity are very complex, and the development of type 2 diabetes is not as simple as we think. Not all patients with diabetes are obese, and not all

obese are diabetics[69] However, our present study depicted that significant number of diabetic subjects (58%) were overweight or obese.

Physical Activities

This study revealed that the respondents involved in moderate physical activities 39% and vigorous activities 48.9% and 21.4 % (Figure 13) low physical activities. than the respondents who were not doing physical activities both moderate and .Study conducted by M Basnet in rural area of Nepal shows that those respondents who are not involved in sweating activities are two times more likely to be obese than those who involved in daily sweating activities like fieldwork, household work and exercises. Similarly, respondents who get involved in moderate physical activities like walking, household work, gardening, field work for more than 30 minute a day were found having inverse relationship with obesity [53].

Smoking and obesity

Present study indicate that 34.6% smoker,55.8% smokeless tobacco user and 9.6% both tobacco and smokeless tobacco user were overweight (Table 3) ,Smoking and obesity are leading causes of morbidity and mortality worldwide [12, 14]. The co-occurrence of overweight and smoking has substantial consequences for health. According to the Framingham study, the life expectancy of obese smokers was 13 y less than that of normal-weight non-smokers [15]. Studies done in different parts of the world have reported that smoking affects body fat distribution and it is associated with central obesity and insulin resistance[22,26] . In contrary to this study, finding of the study carried out in South Wales has shown a considerable difference between the body weights of smokers and of non-smokers. The weight increases with age so that men over 40 years who have never smoked are on average (5.9 kg) heavier than smokers[23].

Association between abdominal obesity and pattern of smoking

There is increasing evidence that smoking is associated with abdominal obesity and other risk factors for the metabolic syndrome [65]. In our present study it was also attempted to see the association between pattern of smoking and abdominal obesity which demonstrated a strong association in between smokers, smokeless tobacco users with and increased abdominal obesity. The current study depicted 33% subjects had abdominal obesity among the smokers and smokeless tobacco users showed a greater abdominal obesity i.e. 60%.

In other studies, it has been demonstrated that smokers tend to have both a larger waist circumference and a smaller hip circumference than do non-smokers [62, 63] these findings reflect not only greater abdominal fat deposition but also less muscle mass at hip level. The combination of a high WHR with a low BMI, which some authors consider a “paradox” [64], is more frequent in smokers than in non-smokers. Conflicting with our findings, A study conducted to find out the influence of smoking on health and anthropometric measures was investigated in one study which demonstrated no differences in total body fat and/or body fat distribution were found between non-smokers, smokers and former smokers; however, among daily smokers, the number of cigarettes smoked per day was significantly associated with higher body weight ($p=0.001$) and BMI ($p=0.009$). (65)

CHAPTER-6

CONCLUSION, RECOMMENDATION AND LIMITATION

CHEPTER -6

CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

6.1. Conclusions

Around 83% are smoker in total sample. Among them, smokers are 50.9%; 34.3% consuming smokeless tobacco and 14.8% are both user. And in smoker, 20% are current smoker and 80% are past smoker. Currently, about 67% consume smokeless tobacco.

More than half of the respondents (58%) are found overweight who smoke or consume smokeless tobacco.

No significant association are found between overweight and pattern of smoking.

Higher physical activity is found among 48% samples.

6.2. Recommendations

This would be better if study can be conducted covering large sample size and wider areas using some other important variables such as, skin fold thickness, dietary pattern etc.

Further study on smoking and obesity related factor should be conducted continuously so that it can contribute to observe and prevent smoking, obesity and its related complication in the future.

Continuous efforts should be made by providing Health education programs on harmful effects of smoking and obesity and benefits of life style modication in all health institutions

6.3 Strength and limitations of the study

Strengths

Sampling frame and sample size calculated was done scientifically. Probability sampling was done, that is one of the strength of the study. Similarly, standard tools were used for data collection i.e. pretesting of the questionnaire was done before actual data collection and questionnaire used in the study were published standard questionnaire.

Limitations

Being a cross sectional study it has all potentialities of limitation. This study was limited to only two medical colleges of Nepal so national representation of whole diabetic subjects cannot be done by this study. Out of 350 subjects we found only 90 patients who were smoker and consumed smokeless tobacco therefore, this study can not be generalized for whole country.

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Annex- 1: Questionnaire

Interview Questionnaire Form

This questionnaire is prepared to assess smoking overweight & obesity among type 2 diabetic subjects. It is divided in different sections such as Socio-demographic, History of tobacco use, History of diabetes, History of blood pressure, Anthropometric measurement, Blood pressure, Blood glucose level, Physical activities related question and Dietary assessment. Information obtained used only for research purpose. Confidentiality will be maintained throughout the study.

Demographic Information		
1	ID no of the respondent	Date Source
2	Name	
3	Address	VDC Municipality
4	Contac no.	
5	Sex	0 Male 1 Female
7	How old are you? (year)	
8	Level of Education	0. Illiterate 1. primary-secondary 2. Graduate-above
9	What is your religion?	0. Hindu 1. Islam 2. Buddhist 3. Christian Others: please specify.....
13	What is your occupation?	0. Service holder 1. Self employed 2. Unemployed 3. Non paid, Student House maker
14	Your Monthly income? (in Rs)	

History of Tobacco Use		
16	Do you currently smoke any tobacco products, such as cigarettes, cigars or pipes?	0. No 1. Yes , if yes If yes please Specify.....
17	Do you currently smoke tobacco products daily?	0. No 1. Yes If yes please Specify.....
18	How old were you when you first started smoking daily?	0. Don't know Age in year
19	Do you remember how long ago it was? (in years)	
20	On average, how many of the following do you smoke each day?	Manufactured cigarettes
		Hand-rolled cigarettes
		Pipes full of tobacco
		Cigars, cheroots, cigarillos
		Other (please specify):
21	In the past, did you ever smoke daily?	0. No 1. Yes If yes ho w many/day
22	How old were you when you stopped smoking daily?	0. Don't know Age (year).....
23	How long ago did you stop smoking daily?	Years/ Months / Weeks.....
24	Do you currently use any smokeless tobacco such as snuff, chewing tobacco betel?	0. No 1. Yes Specify.....
25	Do you currently use smokeless tobacco products daily?	0. No 1. Yes Specify.....
26	On average, how many times a day do you use	Snuff, by mouth
		Snuff by nose
		Chewing tobacco
		Betel, quid

		0. Other Specify.....
27	In the past, did you ever use smokeless tobacco such as [snuff, chewing tobacco, or betel] daily?	0. No 1. Yes Specify.....
28	During the past 7 days, on how many days did someone in your home smoke when you were present?	0. Don't know or don't 1. Number of days..... work in a closed area
29	During the past 7 days, on how many days did someone smoke in closed areas in your workplace (in the building, in a work area or a specific office) when you were present?	0. Don't know or don't 1. Number of day Work in a closed area
History of Diabetes		
31	Drugs (medication) that you have taken in the past two weeks	0. No 1. Yes
History of Blood Pressure		
38	Have you ever had your blood pressure measured by a doctor or other health worker?	0. No 1. Yes
39	Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension?	0. No 1. Yes
40	Have you been told in the past 12 months?	0. No 1. Yes
41	Drugs (medication) that you have taken in the past two weeks	0. No 1. Yes
Anthropometric Measurement		
48	Height (cm)	
49	Weight (kg)	
50	Waist circumference (cm)	

51	Skin fold thickness (mm)	
		Bicep (mm)
		Triceps (mm)
		Subscapular (mm)
		Suprailliac (mm)
Blood Pressure		
52	Reading 1	Systolic (mmHg) Diastolic (mmHg)
	Reading 2	Systolic (mmHg) Diastolic (mmHg)
	Reading 3	Systolic (mmHg) Diastolic (mmHg)
53	During the past two weeks, have you been treated for raised blood pressure with drugs (medication) prescribed by a doctor or other health worker?	0. No 1. Yes
Blood Glucose		
54	Fasting blood glucose (mmol/l, mg/dl)	
55	Today, have you taken insulin or other drugs (medication) that have been prescribed by a doctor or other health worker for raised blood glucose?	0. No 1. Yes
Lipid profile mmol/l, mg/dl		
56		Total cholesterol
		Triglyceride
		LDL
		HDL
Physical Activities related Question		
57	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like [carrying or lifting heavy loads, digging or construction work] for at least 10 minutes continuously?	0. No 1. Yes Number of days..... Time..... Hours/minutes
58	In a typical week, on how many	

	days do you do vigorous-intensity activities as part of your work?	Number of days..... Time..... Hours/minutes
59	How much time do you spend doing vigorous-intensity activities at work on a typical day?	Hours/minutes.....
60	Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking [or carrying light loads] for at least 10 minutes continuously?	0. No 1. Yes Number of days..... Time..... Hours/minutes
61	In a typical week, on how many days do you do moderate-intensity activities as part of your work?	Number of days..... Time..... Hours/minutes
62	How much time do you spend doing moderate-intensity activities at work on a typical day?	Number of days..... Time..... Hours/minutes
63	Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places?	0. No 1. Yes Number of days..... Time.....Hours/minutes.
64	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days..... Time.....Hours/minutes.
65	How much time do you spend walking or bicycling for travel on a typical day?	Number of days..... Time.....Hours/minutes
66	Do you do any vigorous-intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate like [running or football] for at least 10 minutes continuously?	0. No 1. Yes Number of days..... Time.....Hours/minutes.
67	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational (leisure) activities?	Number of days..... Time.....

68	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Number of days..... Time.....Hours/minutes.
69	Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate such as brisk walking, [cycling, swimming, volleyball] for at least 10 minutes continuously?	0. No 1. Yes Number of days..... Time.....
70	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (leisure) activities?	Number of days..... Time.....Hours/minutes.
71	How much time do you spend doing moderate-intensity sports, fitness or recreational (leisure) activities on a typical day?	Number of days..... Time.....Hours/minutes.
72	How much time do you usually spend sitting or reclining on a typical day?	Number of days..... Time.....Hours/minutes.

Dietary assessment 24 hours recalled method

Dietary assessment						
Meal time	Name of food	Cooking procedure	Quantity	Portion size	CF	Amount
Morning						
Mid morning						
Lunch						
Snack						
Dinner						
Bedtime meal						
Other						

Annex- 2: Verbal Consent Form

I MPhil student of Community Nutrition of Bangladesh Institute of Health Sciences want to assess Smoking Overweight & Obesity among type 2 diabetes mellitus patients. This study will be submitted as a thesis in fulfillment of the Master of Philosophy in Public Health. I am grateful for your participation for this interview. The interview will take about 20-30 minutes to complete. Whatever information you provide will be kept strictly confidential and will not be disclosed to other persons. If you feel any discomfort to participate, you can leave at any time as your wish or you need not to participate in an interview.

Thank You

May I proceed with the questions? Yes/No

“I have read the consent form completely before the interview and the respondent voluntarily agreed to participate in the study”.

Interviewer's name

Date_____

Annex-3: Work Schedule

Activities	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Selection of topic												
Literature review												
Selection of study area												
Planning and designing												
Preparation for questionnaire												
Ethical approval and data collection												
Data compilation												
Data analysis												
Report writing												
Submission of thesis												

Annex- 4

Ethical Approval Letter



CMC-IRC Chitwan Medical College- Institutional Review Committee



Ref: CMC-IRC - 90
12-June , 2014

To,
Ms. Ambika Baniya
Chitwan Medical College
Bharatpur -10, Chitwan

Sub: Ethical Approval

Institutional Review Committee of Chitwan Medical College (CMC-IRC) has granted ethical approval to research on “**Smoking, Obesity and Diabetes**” to you. CMC- IRC also declares that this proposal represents valid work.

.....
Prof. Dr. Muni Raj Chhetri
Chair-Person
CMC-IRC

Bharatpur-10, Chitwan, Nepal

Annex-3: Photography



Plate 1: Map showing data collection area, Chitwan District, Nepal



Plate 2: Map of Chitwan District

Examples of Typical Physical Activities



Plate 3: Moderate activities



Plate 4: Vigorous activities during leisure time



Plate 5: Examples of vigorous activities at work



Cigarette



Biri



Khaini



Hukka



Sulpha

Plate 6: Tobacco Products



etel nut



Chewing tobacco, Surti



Betel leaf



Snuff

Plate 7: Locally viable smokeless tobacco product