REPUBLIC OF TURKEY

HACETTEPE UNIVERSITY

INSTITUTE OF PUBLIC HEALTH

PREVALENCE AND RELATED FACTORS OF HYPERTENSION AMONG SCHOOL TEACHERS IN KABUL CITY-AFGHANISTAN

Dr. Ahmad Khalid AALEMI

Epidemiology Program

MASTER OF SCIENCE THESIS

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APPROVAL

This thesis has been approved by the committee above in conformity of the regulations and by laws of Hacettepe University Graduate Programs and has been accepted by the Board of Directors of the Institutes of Public Health.

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Ahmad Khalid AALEMI

ABSTRACT

Aalemi Ahmad Khalid. Prevalence and related factors of hypertension among school teachers in Kabul City, Afghanistan. Hacettepe University, Institute of Public Heath, Epidemiology Program, Master of Science Thesis, Ankara, 2015. Hypertension is the single greatest preventable cause of death in humans and one of the most important modifiable risk factors for cardiovascular diseases. The objectives of this study were to determine the prevalence of hypertension among school teachers in Kabul City, Afghanistan, and to assess the related factors of hypertension in the targeted population. In this cross sectional study, the data were gathered via a structured pre-tested questionnaire developed by the researcher. The self-administered questionnaires were filled under observation; height, weight and blood pressure measurements were taken by the researcher in the surveyed schools. The data were analyzed by using IBM SPSS 21.0 Statistics program. Findings were presented in marginal and contingency tables. Mainly Chi-Square test was used with $\alpha = 0.05$ to find out the significance level of difference and then binary logistic regression was used to assess the strength of association between hypertension status and related factors. Three different models were tested. The overall prevalence of hypertension was 16.7% (16.0% in males and 17.0% in females). Prevalence of hypertension was significantly higher in teachers aged ≥ 40 years than teachers aged <40 years (25.2% and 7.2% respectively) ($p<0.001$); in teachers who had more than 4 children (25.0%) ($p<0.001$) and among obese teachers (27.0%) ($p<0.001$). Opposite to the expectancies, hypertension prevalence was highest among teachers that stated their economic status as "good" (21.7%) ($p=0.042$). Logistic Regression analysis illustrated that older age (≥50 years OR=5.54, 95% CI= 2.39-12.82), higher economic status (excellent or good OR=3.62, 95% CI= 1.45-9.03) and number of children (≥5 children OR=2.03, 95% CI= 1.06-3.90) were highly related factors for hypertension in this study.

Key Words: Prevalence, Hypertension, teacher, Afghanistan.

ÖZET

Aalemi Ahmad Khalid. Öğretmenlerde Hipertansiyon Prevalansı ve İlişkili Faktörler, Kabil, Afganistan. Hacettepe Üniversitesi, Halk Sağlık Enstitüsü, Epidemiyoloji Programı, Yüksek Lisans Tezi, Ankara, 2015. Hipertansiyon, ölüm nedenleri arasında en önemli tek önlenebilir ve kardiyovasküler hastalıklar için de en önemli değiştirebilir risk faktörlerinden birisidir. Bu çalışmanın amacı, Afganistan'in Kabil Kenti'ndeki öğretmenlerde hipertansiyon prevalansını belirlemek ve hedef popülasyonda hipertansiyon ile ilişkili risk faktörlerini değerlendirmektir. Bu kesitsel çalışmada, veriler araştırmacı tarafından geliştirilen yapılandırılmış ve ön denemesi yapılmış anket formu aracılığı ile toplanmıştır. Anketler araştırmanın yürütüldüğü okullarda, öğretmenler tarafından gözlem altında doldurulmuş; katılımcıların boy uzunluğu, vücut ağırlığı ve kan basıncı ölçümleri araştırmacı tarafından yapılmıştır. Veriler, IBM SPSS 21.0 istatistik programı kullanılarak analiz ediliştir. Bulgular, marjinal ve çapraz tablolar şeklinde sunulmuştur. Farkların önemlilik düzeyini bulmak için Ki-kare testi kullanılmış (α =0.05), sonrasında hipertansiyon ve ilişkili faktörler arasındaki ilişkinin gücünü değerlendirmek için ikili lojistik regresyon analizi ile üç farklı model test edilmiştir. Hipertansiyon prevalansı %16.7 olarak bulunmuştur (kadınlarda %17.0, erkeklerde %16.0). Hipertansiyon prevalansı 40 yaşından büyük öğretmenlerde, 40 yaşından küçük olan öğretmenlere göre (sırası ile, %25.2 ve %7.2) ($p<0.001$), 4 ten daha fazla çocuğu olan (25.0%) ($p<0.001$) ve obez olan öğretmenlerde (27.0%) ($p<0.001$) önemli derecede daha yüksektir. Beklenenin aksine, ekonomik durumunu "iyi" olarak belirten öğretmenlerde hipertansiyon prevalansı daha yüksek bulunmuştur (21.7%) ($p=0.042$). Lojistik regresyon analizi sonunda ileri yaşta olmanın (≥50 yaş OR=5.54, 95% CI= 2.39-12.82), daha yüksek ekonomik durumun ("mükemmel" yada "iyi" OR=3.62, 95% CI= 1.45-9.03) ve dörtten fazla çocuk sayısının (≥5 çocuk OR=2.03, 95% CI= 1.06-3.90) hipertansiyon için yüksek düzeyde ilişkili faktörleri olduğu bilirlenmiştir.

Anahtar Kelimeler: Prevalans, Hipertansiyon, Öğretmen, Afganistan

CONTENTS

ABREVATIONS

ACE	Angiotensin Converting Enzyme
ACSM	American College of Sports Medicine
ATP	Adenosine triphosphate
AWASH	Australian Division of World Action on Salt and Health
BP	Blood Pressure
BMI	Body Mass Index
CVD	Cardiovascular Disease
DASH	Dietary Approach to Stop Hypertension
DBP	Diastolic Blood Pressure
Ea	Elastance
EMR	Eastern Mediterranean Region
ESPVR	End Systolic Pressure Volume Relation
JNC	Joint National Committee
HBP	High Blood Pressure
HDL	High Density Lipoprotein
ISH	International Society of Hypertension
KMU	Kabul Medical University
LEAN	Leaders Encouraging Activity and Nutrition
LVEDV	Left Ventricular End Diastolic Volume
MVPA	Moderate to Various Physical Activity
OR	Odds ratio
PE	Physical Education
QoL	Quality of Life
USA	United States of America
WHO	World Health Organization

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1. INTRODUCTION

1.1. Rationale

Hypertension is most likely the most common disease on Earth (1, 2). Overall, 26.4% of the world's adult population in 2000 had hypertension and it is expected that by the year 2025, approximately 1 in 3 adults aged over 20 years will have the disease (1). Hypertension accounts for an estimated 54 percent of all strokes and 47 percent of all ischemic heart disease events globally (3). It represents the single greatest preventable cause of death in humans and one of the most important modifiable risk factors for cardiovascular diseases (2). The direct positive relationship between blood pressure (BP) and cardiovascular risk was found to be strong, continuous, graded, consistent, independent, predictive, and etiologically significant for those with and without coronary heart disease (4). The prevalence of hypertension is increasing, and cardiovascular disease (CVD) is rapidly becoming an important factor in developing countries. Death and disability from coronary heart disease and cerebrovascular disease are also increasing so quickly with the rise of hypertension prevalence in those parts of the world (5).

Industrialization, urbanization, and international migration are processes with short- and long-term effects on the environment as well as repercussions on the morbidity and mortality profiles. Declining mortality levels were correlated with a shift in the causes of disease and death from infectious disease, malnutrition and poor reproductive health to rising chronic and degenerative diseases. Towards the early 1970's, sedentarism, diets with rich animal fat, smoking and alcohol abuse led to the emergence of non-communicable diseases. CVD was increasingly presented as a product of lifestyle changes. Based on current estimates, by the year 2020, CVD will be the primary cause of death worldwide, as the living standards of the developing nations rise and their populations adopt the "Western lifestyle" (6).

Hypertension is a multifactorial disease, developed by a combination of genetic, environmental and lifestyle factors (7). Among the lifestyle risk factors of hypertension, previous studies have listed obesity, excessive salt intake, deficiency in

minerals such as potassium, magnesium and calcium, alcohol intake, smoking, physical inactivity and psychosocial stress. The WHO-ISH guideline in 1999 mentioned that lifestyle measures reduce the risk of cardiovascular disease (6). This seems likely given all the other evidence suggesting that the benefits of antihypertensive treatment are determined primarily by the blood pressure reduction rather than by any other independent effect of particular treatment modalities. It is clear that one of the biggest challenges facing public health authorities and medical practitioners is the control of hypertension worldwide, both in individual patients and at the population level (6). To meet this challenge, epidemiological and clinical research should be conducted by recognizing the risk factors and how closely they are related to blood pressure level (8).

According to World Health Organization WHO report, hypertension is responsible for 12.8% (7.5 million) of total deaths worldwide. South Asian region is no exception to this fact that hypertension is increasingly the major threat to human life and major cause of disability (9). The standard fact for the underlining cause of hypertension is known to many people but the fact that who are most at risk and most susceptible groups are indeed difficult to rule out owing to the diverse nature of the country, their culture, topographical location, food habits and many more. But the basic fact is that hypertension is global concern and public health challenge.

The estimated total number of adults with hypertension in 2000 was 972 million (CI= 957-987 million); 333 million (CI= 329-336 million) in economically developed countries and 639 million (CI= 625-654 million) in economically developing countries. The number of adults with hypertension in 2025 is predicted to increase by about 60% to a total of 1.56 billion (CI= 1.54-1.58 billion) and this predicts also side-by-side increase in chronic disease burden which is closely linked with hypertension; 51% of stroke (cerebrovascular disease) and 45% of ischemic heart disease deaths are attributable to high blood pressure (10).

According to the WHO, the Eastern Mediterranean Region (EMR) consists of 21 countries such as (Afghanistan, Pakistan, Iran, Iraq, Sudan) with diverse population size, land area, sociopolitical environment, economy and health care

systems. Each country has epidemiological and geographical factors that may contribute to risks for developing hypertension. Currently, there are no published estimates of the number of people suffering from hypertension in Afghanistan (11).

The prevalence data related to hypertension as well as other non-communicable diseases are very rare to find in Afghanistan. A cross sectional study was conducted during 2006 – 2007 in Zahedan Iran, with total sample of 2300 subjects randomly selected aged 30 year and above has detected prevalence of hypertension as 27.08%. Since Afghanistan share similar geographical location with Iran and in lieu of certain similar cultural believes, this survey can have certain positive signal to country like Afghanistan to verify the fact and act to protect the health of general public (12).

A study done in 13 districts of Kabul province (n=1169), in 2011-2012 which aimed to determine the prevalence of obesity found the prevalence of hypertension among those aged ≥40 years as 33.0% but there was no other information related to the distribution of hypertension by the characteristics of the study group (13). Another study carried out in 17 districts of Kabul City (n=1169), during the year 2011-2012 found the prevalence of hypertension among those aged ≥40 years to be 46.2% (44.9% in males and 46.8% in females) (14). As of present, there are no more studies carried out with regard to the prevalence and risk factors associated with hypertension in Afghanistan. As such, this study aims to highlight on the prevalence of hypertension and related factors.

Due to the geographical conditions and security concerns, it is very hard to make population survey in order to learn the real figures of main public health problems as hypertension in Afghanistan. For this reason, the target population has been limited to school teachers working in Kabul City in this study. However, Kabul City is a metropolitan city with diverse ethnic groups giving the study the benefit of studying prevalence of hypertension across various ethnic groups and it could give an idea about the prevalence of hypertension among school teachers in Afghanistan, which will be of an advantage with regards to further studies.

1.2.Research question

What are the prevalence and related factors of hypertension among school teachers in Kabul City, Afghanistan?

1.3. Research objectives

1.3.1. Short term objectives

- To determine the prevalence of hypertension among school teachers in Kabul City, Afghanistan.
- To assess the related factors of hypertension in the targeted population.

1.3.2. Mid-term objectives

- To develop some recommendations for primary and secondary prevention against hypertension, among school teachers in special.

1.3.3. Long term objectives

- To obtain all teachers of Kabul City a hypertension free life.

2. GENERAL KNOWLEDGE

2.1. What is Hypertension?

Hypertension is persistently raised blood pressure above the designated threshold (a persistent raised blood pressure of 140/90 mmHg or above). For many years, blood pressure readings of systolic 160 mmHg and diastolic 95 mmHg had been the "cut-off" point recommended by the WHO Expert Committee on Arterial Hypertension. In 1997, the Joint National Committee (JNC) on prevention, detection, evaluation and treatment of high blood pressure in the United States of America (USA) described three stages of high blood pressure associated with increasing risk of cardiovascular event and renal disease in its sixth report (JNC 6). It used cut-off points of 140-159 mmHg (systolic) and 90-99 mmHg (diastolic) to define Stage 1 hypertension, 160-179 (systolic) and 100-109 (diastolic) to define Stage 2 and ≥ 180 (systolic) and ≥110 (diastolic) to define Stage 3 (15).

The seventh report of Joint National Committee (JNC 7) in 2003 designates values of 120-139 / 80-89 as pre-hypertension, as patient with this values are at increased risk for progression to hypertension (16). There are two types of hypertension: One is essential hypertension or primary hypertension, the term essential hypertension is usually referred to high blood pressure without any evident cause. Most of the hypertensive patients, up to 90-95%, are found to have this type of hypertension. Second one is secondary hypertension, the hypertension caused by a result of diseases. Usually the secondary hypertension is caused by the renal disease, disorders of endocrine gland, coarctation of the aorta, neurological disorders and other diseases (17, 18).

Most hypertensive people have no symptoms at all. There is a common misconception that people with hypertension always experience symptoms, but the reality is that most hypertensive people have no symptoms. Sometimes hypertension causes symptoms such as headache, shortness of breath, dizziness, chest pain, palpitations of the heart and nose bleeds. It can be dangerous to ignore such symptoms but neither can they be relied upon to signify hypertension. Hypertension has a serious warning sign that significant lifestyle changes are required. The condition can be a silent killer and it is important for everybody to know their blood pressure readings (17).

There are four possible mechanisms for hypertension

1. The volume ejected from the left ventricular (LV) can be too high. This could result from an excessive contraction during systole (a very high ESPVR)[1]. This mechanism is described in the medical literature but is not typical. A hyperdynamic circulation is thought to play a role in the hypertension seen in some young, otherwise fit African-American males (19).
2. The intravascular volume may be too high causing an excess of venous return, leading to an elevated left ventricular end diastolic volume (LVEDV). The very full heart would then eject a large volume into the arterial tree thus leading to hypertension. The high intravascular volume could be caused by renal dysfunction with subsequent fluid retention or it could be due to exogenous administration. There does seem to be a subset of patients that has an elevated intravascular volume. Nevertheless, the excessive intravascular volume mechanism appears to occur infrequently since many newly diagnosed hypertensive patients actually have a contracted intravascular volume. The excessive intravascular volume mechanism also implies that the cardiac output would be elevated, but it is usually normal (19).
3. Excess venous return could also occur even with a reduced intravascular volume if the venous tone were significantly elevated. This would cause a rise in the LVEDV even with a normal or low actual blood volume. Whether this occurs as a regular feature of hypertension is not known (19).
4. The effective arterial elastance (Ea)[2] can be too high. This can occur either because the resistance is too high or because the compliance is too low. Many forms of hypertension are associated with an elevated arterial resistance. Furthermore, in older humans, the arterial tree becomes stiffer and less compliant. Thus, for a given stroke volume delivered into the arterial tree, the pressure goes up, especially the systolic pressure (19).

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[1] ESPVR= End-systolic pressure volume relation. This also called Emax or Es which stands for maximal elastance or elastance at end-systole, respectively. This characterizes the strength of the LV irrespective of the systolic load it faces.

[2] Ea= Effective arterial elastance. This is characterizes the arterial tree and the load it presents to the LV during systole. Ea is primarily determined by arterial resistance but arterial compliance affects it too.

2.2. Risk Factors of Hypertension

Risk factor of hypertension is divided in to two groups as modifiable and non-modifiable risk factors (17, 18).

Known modifiable risk factors for hypertension are:

- Obesity
- Excessive intake of salt, fat (especially saturated fat), and calories
- Inadequate physical activity
- Uncontrolled hyperglycemic states
- High alcohol consumption
- Tobacco use
- Low potassium intake
- Sleep apnea
- Cold home
- Low birthwieght
- Physical stress (often implicated but difficult to measure).

Non – modifiable risk factors include:

- Age
- Race (e.g. African ancestry)
- Family history of hypertension or diabetes

2.3.Determinants of Hypertension

There are numerous determinants of high blood pressure if not controlled will lead to secondary hypertension and many future complications. The key determinants as discussed in some scholarly articles are described as follows:

2.3.1. High Body Mass Index

Asians comprise the largest single ethnic group in the world and the fastest growing minority ethnic group within the United States. The prevalence of hypertension in most Asian groups is similar to that of non-Asians. The associations with hypertension are similar to those seen in Western populations. Body mass index is a surprisingly strong predictor of

blood pressure, even in very lean Asian populations. Studies in Asian groups suggest that the prevalence of target organ disease as related to hypertension is dependent on other cardiovascular disease risk factors. Stroke is more common than heart disease in Asia. Hypertension treatment data in East Asia is sparse, and treatment methods vary widely. Hypertension control among the world's largest ethnic group remains a challenge. A low physical fitness level and high BMI were independently associated with a high blood pressure and risk of having hypertension in both girls and boys. Interaction was found between BMI and fitness (20).

It was also found that the study on 'Difference in body mass index and waist-hip ratios in North Indian rural and urban populations' revealed that overweight is widely prevalent in the adult urban Delhi population. Among urban men, 35.1% of those surveyed had a BMI of ≥25; this result indicates that overweight and obesity are a major public health problem in urban Delhi Population (21).

A cross-sectional study on obesity was conducted during December 2011-March 2012, of total 1,200 populations aged ≥40 in 13 districts of Kabul province. The overall prevalence of obesity was 31.2% (BMI ≥ 30 kg/m^2) and overweight was 38.1% (BMI ≥ 25 kg/m^2). (Figure 2.7.1) (13).

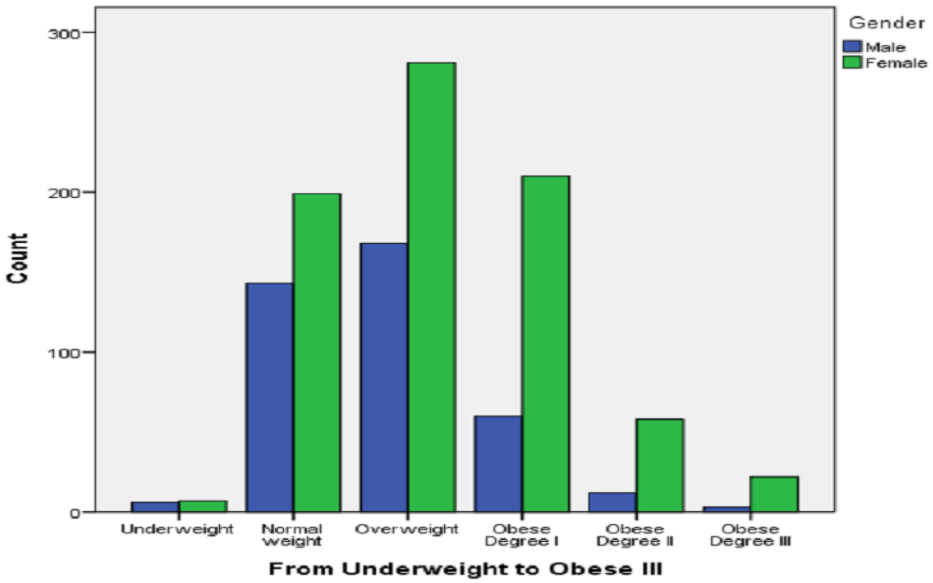

Figure 2.7.1. Distribution of BMI categories by sex (Kabul Province-Afghanistan, 2012) (13).

2.3.2. Physical Exercise

Epidemiologic studies suggest that the relationship between sedentary behavior and hypertension is so strong that the National Heart Foundation, the World Health Organization and International Society of Hypertension, the United States Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure, and the American College of Sports Medicine (ACSM) have all recommended increased physical activity as a first line intervention for preventing and treating patients with pre-hypertension (systolic BP 120–139 mmHg and/or diastolic BP 80–89 mmHg). The guidelines also recommend exercise as a treatment strategy for patients with stage 1 (140–159/80–90 mmHg), or stage 2 (160–179/100–109 mmHg) (22).

The U.S. General Surgeon, along with the Centers for Disease Control and Prevention and the American College of Sports Medicine, recommend getting a minimum of 30 minutes of moderate-intensity physical activity on most days of the week. It could be done all 30 minutes at once or break it up into 10- or 15-minute periods. Moderate intensity exercise or physical activity is activity that causes a slight but noticeable increase in breathing and heart rate. One way to gauge moderate activity is with the "talk test" - exercising hard enough to break a sweat but not so hard you can't comfortably carry on a conversation. Brisk walking is an ideal moderate-intensity activity. For the average person, brisk walks mean walking 3-4 miles an hour, or about as fast as you'd walk if you were late for a ball-game. It is incumbent that experts develop innovative worksite physical activity and wellness programs (23).

Engaging students in moderate to vigorous physical activity (MVPA) in physical education (PE) prepares them to lead physically active lives and can improve health and academic outcomes. Physical activities do not have to compete with educational goals; in fact, it can help students learn content by enhancing concentration skills and on-task behavior. (24).

2.3.3. Dietary Habits-Salt intake

Hypertension cannot be cured but can be controlled through life style modifications and prescriptive medications if at all necessary. People trying to control hypertension often are advised to follow certain diet regime, such as decrease sodium intake, increase

potassium, watch calories and maintain a reasonable weight. Excess dietary salt is a well-established cause of high blood pressure and vascular disease. National and international bodies recommend a significant reduction in population salt intakes on the basis of strong evidence for health gains that population salt reduction strategies could achieve. The Australian Division of World Action on Salt and Health (AWASH) coordinates the "Drop the Salt!" Campaign in Australia. This aims to reduce the average amount of salt consumed by Australians to six grams per day over five years through three main implementation strategies targeting the food industry, the media and government. This strategy has the potential to achieve a rapid and significant reduction in dietary salt consumption in Australia. With industry and government engagement, this promises to be a highly effective, low cost option for preventing chronic diseases (25).

From mid-century on, feeding experimental animals high-salt/ sodium diets was repeatedly shown to raise blood pressure (26) and data from observational studies in humans indicated a relationship between population average sodium intake and average blood pressure and/or prevalence of hypertension (27, 28). Sodium (Na^+) and chloride (Cl^-) are the principal ions in the fluid outside of cells (extracellular fluid), which includes blood plasma. As such, they play critical roles in a number of life-sustaining processes. Sodium and chloride are electrolytes that contribute to the maintenance of concentration and charge differences across cell membranes. Potassium is the principal positively charged ion (cation) inside of cells, while sodium is the principal cation in extracellular fluid. Potassium concentrations are about 30 times higher inside than outside cells, while sodium concentrations are more than 10 times lower inside than outside cells. The concentration differences between potassium and sodium across cell membranes create an electrochemical gradient known as the membrane potential. A cell's membrane potential is maintained by ion pumps in the cell membrane, especially the sodium, potassium- ATPase pumps. These pumps use ATP (energy) to pump sodium out of the cell in exchange for potassium. Their activity has been estimated to account for 20%-40% of the resting energy expenditure in a typical adult. The large proportion of energy dedicated to maintaining sodium/potassium concentration gradients emphasizes the importance of this function in sustaining life. Tight control of cell membrane potential is critical for nerve impulse transmission, muscle contraction, and cardiac function (29). Absorption of sodium in the small intestine plays an important role in the absorption of chloride, amino acids, glucose, and water. Similar

mechanisms are involved in the reabsorption of these nutrients after they have been filtered from the blood by the kidneys. Chloride, in the form of hydrochloric acid (HCl), is also an important component of gastric juice, which aids the digestion and absorption of many nutrients. Because sodium is the primary determinant of extracellular fluid volume, including blood volume, a number of physiological mechanisms that regulate blood volume and blood pressure work by adjusting the body's sodium content. In the circulatory system, pressure receptors (baroreceptors) sense changes in blood pressure and send excitatory or inhibitory signals to the nervous system and/or endocrine glands to affect sodium regulation by the kidneys. In general, sodium retention results in water retention and sodium loss results in water loss. In response to a significant decrease in blood volume or pressure (e.g., serious blood loss or dehydration), the kidneys release renin into the circulation. Renin is an enzyme that splits a small peptide (Angiotensin I) from a larger protein (angiotensinogen) produced by the liver. Angiotensin I is split into a smaller peptide (angiotensin II) by angiotensin converting enzyme (ACE), an enzyme present on the inner surface of blood vessels, and in the lungs, liver, and kidneys. Angiotensin II stimulates the constriction of small arteries, resulting in increased blood pressure. Angiotensin II is also a potent stimulator of aldosterone synthesis by the adrenal glands. Aldosterone is a steroid hormone that acts on the kidneys to increase the reabsorption of sodium and the excretion of potassium. Retention of sodium by the kidneys increases the retention of water, resulting in increased blood volume and blood pressure (29).

Specific quantities recommendations for salt/sodium intake for hypertensive patients have been available since the mid-1970s and have evolved over time. WHO set up the recommended amount of sodium intake to prevent hypertension as 2,000 milligrams (mg) sodium (5,000 mg salt) per day (30). CDC recommended amount of sodium intake for Americans to prevent hypertension as less than 2,300 mg and further reduce intake to 1,500 mg among persons who are 51 and older and those of any age who are African American or have hypertension, diabetes, or chronic kidney disease (31).

A landmark study called DASH (Dietary Approaches to Stop Hypertension) looked at the effects of an overall eating plan in adults with normal to high blood pressure. Researchers found that in just eight weeks, people following the DASH diet saw their blood pressure decrease. A subsequent study called DASH 2 looked at the effect of following the

DASH diet and restricting salt intake to 1,500 mg per day. Under the DASH 2 diet, people with Stage 1 hypertension had their blood pressure decrease as much or more than any anti-hypertensive medication had been able to lower it (32).

The effect of high and low sodium intake on blood pressure and other related variables in human subjects with idiopathic hypertension may be divided into two groups, "salt-sensitive", in which sodium loading increases blood pressure significantly, and "non-salt sensitive", in which sodium loading does not effect. Non salt-sensitive patients excrete more sodium than salt sensitive patients (33).

An intervention study was conducted in 4 clinical centers (January 2000-June 2001) among 810 adults (mean [SD] age, 50 [8.9] years; 62% women; 34% African American) with above-optimal BP, including stage 1 hypertension (120-159 mm Hg systolic and 80-95 mm Hg diastolic), and who were not taking antihypertensive medications to assess the effect of behavioral intervention on blood pressure. Participants were randomized to one of 3 intervention groups: (i) "established," a behavioral intervention that implemented established recommendations (n = 268); (ii) "established plus DASH", (n = 269); and (iii) an "advice only" comparison group (n = 273). After subtracting change in advice only, the mean net reduction in systolic BP was 3.7 mm Hg (P<0.001) in the established group and 4.3 mm Hg (P<0.001) in the established plus DASH group; the systolic BP difference between the established and established plus DASH groups was 0.6 mm Hg (P =0.43). Compared with the baseline hypertension prevalence of 38%, the prevalence at 6 months was 26% in the advice only group, 17% in the established group (P =0.01 compared with the advice only group), and 12% in the established plus DASH group (P<.001 compared with the advice only group; P =0.12 compared with the established group). The prevalence of optimal BP was 19% in the advice only group, 30% in the established group (P =0.005 compared with the advice only group), and 35% in the established plus DASH group (P<0.001 compared with the advice only group; P =0.24 compared with the established group) (34).

A low fat diet (19%) may not provide sufficient calories, essential fatty acids, and some micronutrients (especially vitamin E and zinc) for healthy untrained individuals, and it also lowered ApoA1 (Apo-lipoprotein A-I) and HDL-Cholesterol. Increasing fat intake to 50% of calories improved nutritional status, and did not negatively affect certain cardiovascular risk factors (35).

3.7.4. Smoking

Tobacco use is the most common cause of avoidable cardiovascular mortality worldwide (36). There are now 1.3 billion cigarette smokers, 82 percent in developing countries, and if current practices continue, there will be an estimated one billion tobacco-related deaths during the 21st century. The immediate noxious effects of smoking are related to sympathetic nervous over activity, which increases myocardial oxygen consumption through a rise in blood pressure, heart rate, and myocardial contractility (37).

Chronically, cigarette smoking induces arterial stiffness which may persist for a decade after smoking cessation (38). The incidence of hypertension is increased among those who smoke 15 or more cigarettes per day (39), and the coexistence of hypertension and smoking decreases left ventricular function in asymptomatic people (40).

With each cigarette, the blood pressure rises transiently and the presser effect may be missed if the blood pressure is measured 30 minutes after the last smoke. The transient rise in blood pressure may be most prominent with the first cigarette of the day even in habitual smokers. In one study of normotensive smokers, there was an average elevation in systolic pressure of 20 mmHg after the first cigarette. Furthermore, ambulatory blood pressure monitoring suggests an interactive effect between smoking and coffee drinking in patients with mild essential hypertension, resulting in a mean elevation in daytime systolic pressure of approximately 6.0 mmHg (41, 42).

Although there are no official figures categorizing how many Afghans smoke, unscientific observations suggest approximately 50% of Afghan men have smoked tobacco at some stage during their lives (43).

3.7.5. Alcohol

About 2 billion people worldwide consume alcoholic drinks, which can have immediate and long term consequences on health and social life. Over 76 million people are currently affected by alcohol use disorders, such as alcohol dependence and abuse. Depending on the amount of alcohol consumed and the pattern of drinking, alcohol consumption can lead to drunkenness and alcohol dependence. It can result in disablement or

death from accidents or contribute to depression and suicide. Moreover, it can cause chronic illnesses such as cancer and liver disease in those who drink heavily for many years (44).

In a prospective cohort study done on 28,848 women and 13,455 men found that a J-shaped association between alcohol intake and hypertension in women and in men; alcohol intake was positively and significantly associated with the risk of hypertension and persisted after multivariate adjustment. Models stratified by baseline systolic blood pressure (<120 versus 120 mm Hg) or diastolic blood pressure (<75 versus 75 mm Hg) did not alter the relative risks in women and men. In conclusion, light to moderate alcohol consumption decreased hypertension risk in women and increased risk in men. The threshold above which alcohol became deleterious for hypertension risk emerged at 4 drinks per day in women versus a moderate level of 1 drink per day in men (45).

In 2012, about 3.3 million deaths, or 5.9% of all global deaths, were attributable to alcohol consumption. There are significant sex differences in the proportion of global deaths attributable to alcohol. For example in 2012, 7.6% of deaths among males and 4.0% of deaths among females were attributable to alcohol. In 2012 139 million DALYs (disability-adjusted life years) or 5.1% of the global burden of disease and injury, were attributable to alcohol consumption. (46).

The relationship between alcohol and cardiovascular disease, especially hypertension and coronary heart disease, is not as clear-cut. In France, the prevalence of coronary artery disease is lower although their diets and their dietary fat content remain the similar, compared with many other Western countries. This was attributed to their tradition of wine drinking and these observations led to the so-called French paradox (47).

The studies have shown link between alcohol and blood pressure, the evidence to date suggests that ethanol, rather than some other constituent of alcoholic beverages or an associated behavior, raises blood pressure. The available evidence suggests that alcohol induced hypertension will indeed lead to the usual hypertensive sequale (48).

In Afghanistan alcohol consumption is near to zero percent, since Islam prohibited consumption of alcohol and also the government does not allow selling of alcoholic beverages in the market.

3.7.6. Socio Economic Status (Income Level)

In a cohort study of young adults on 'socioeconomic trajectories and incident hypertension', the impact of initial socioeconomic status and change in socio-economic status were assessed across 10 years on the development of essential hypertension among black and white young men and women. The study had found that the decline in income from year 5 to 10 tended to be associated with hypertension with a p-value of 0.07 (49).

Several modifiable socioeconomic determinants, such as education and occupation, are associated with hypertension. Additional socioeconomic status markers such as urban or rural dwelling and individual, local or national economic conditions are also associated with hypertension although these associations are complicated and at times somewhat contradictory. Possible explanations for this impact include awareness of hypertension prevention and control and better accessibility and adherence to medical treatment among higher socioeconomic status groups, as well as low birth weight and higher job strain among lower socioeconomic status groups (50). Low socioeconomic status is associated with higher blood pressure.

3.7.7. Quality of Life and Stress

Quality of life (QoL) has become a topic of growing interest in medical and psychiatric practice (51). Recent studies show that psychiatric outpatients experience a poorer QoL compared with members of the general population. However, the presence of specific psychiatric disorders (e.g. effective disorders, anxiety disorders, schizophrenia) and personality disorders are negatively related to QoL (52). In addition to the above-mentioned factors, a potential determinant of QoL is experienced stress. Hence this finding clearly reveals the close association of quality of life with stress. Stress can cause hypertension through repeated blood pressure elevations as well as by stimulation of the nervous system to produce large amounts of vasoconstriction hormones that increase blood pressure. Factors affecting blood pressure through stress include white coat hypertension, job strain, race, social environment, and emotional distress. Furthermore, when one risk factor is coupled with other stress producing factors, the effect on blood pressure is multiplied. Overall, studies show that stress does not directly cause hypertension, but can have an effect on its development. A variety of non-pharmacologic treatments to manage stress have been found

effective in reducing blood pressure and development of hypertension, examples of which are meditation, acupressure, biofeedback and music therapy. Recent results from the National Health and Nutrition Examination Survey indicate that 50 million American adults have hypertension (defined to be a systolic blood pressure of greater than 139 mm Hg or a diastolic blood pressure of greater than 89 mm Hg). In 95% of these cases, the cause of hypertension is unknown and they are categorized as "essential" hypertension. Although a single cause may not be identified, the general consensus is that various factors contribute to blood pressure elevation in essential hypertension. In these days of 70 hour work weeks, pagers, fax machines, and endless committee meetings, stress has become a prevalent part of people's lives; therefore the effect of stress on blood pressure is of increasing relevance and importance. Although stress may not directly cause hypertension, it can lead to repeated blood pressure elevations, which eventually may lead to hypertension (53).

3.7.8. Family History

The study that assessed ‘knowledge, beliefs, and behaviors about hypertension control among middle aged Korean Americans with hypertension’, had found that the vast majority (n=445) had a family history of HBP (ie, HBP in parents or siblings). More than 1 of 10 participants in that study had diabetes. In addition, about 1 in 20 reported that they had had a stroke (54). Genetic factors contribute to an estimated 30 percent of cases of essential hypertension which is defined as high blood pressure of unknown cause. In the United States, high blood pressure occurs more frequently among African Americans than among Caucasian or Asian Americans. Genes are not responsible for all family histories of high blood pressure. Families tend to share the same lifestyle choices and behavioral patterns. A family that leans towards sedentary activities, consumes an unhealthy diet, or has many members who smoke will have higher rates of hypertension than a family that engages in healthy life style (55).

3.7.9. Diabetes

The prevalence of hypertension is 1.5 to 2 times greater in patients with diabetes mellitus compared with matched non-diabetic individuals (56). Type 1 diabetes mellitus is associated with hypertension only when albuminuria and early nephropathy develop, but type two diabetes mellitus may be associated with hypertension at or even preceding

diagnosis (57). In the US population, hypertension occurs in approximately 30% of patients with type one diabetes and in 50% to 80% of patients with type two diabetes (58). A prospective cohort study in the United States reported that type 2 diabetes mellitus was almost 2.5 times as likely to develop in subjects with hypertension as in subjects with normal blood pressure (59). Patients with both hypertension and diabetes are especially vulnerable to cardiovascular and renal complications. In patients with incipient diabetic nephropathy, treatment may be instituted at SBP and DBP values as low as 130 mmHg (17.3kPa) and 85 mmHg (11.3kPa) respectively (60).

Lifestyle modifications are beneficial for control of hyperglycemia, dyslipidemia and hypertension, which often occur in obese patients with insulin resistance. The syndrome of insulin resistance, characterized by central obesity (61), and very closely parallels to non-insulin-dependent diabetes mellitus. Insulin sensitivity can be improved by weight reduction and exercise (60).

Another study on hypertension and glucose intolerance among determined in a random population sample (n = 2,475), showed a highly significant (P<0.001) association from the mildest levels of both conditions, independent of the confounding effects of age, sex, obesity, and antihypertensive medications. Summary rate ratios for hypertension were 1.48 (1.18-1.87) in abnormal tolerance and 2.26 (1.69-2.84) in diabetes compared with normal tolerance. Altogether, 83.4% of the hypertensives were either glucose- intolerant or obese both established insulin-resistant conditions. Fasting and post- load insulin levels in a representative subgroup (n = 1,241) were significantly elevated in hypertension independent of obesity, glucose intolerance, age, and antihypertensive medications. The mean increment in summed 1- and 2- h insulin levels (milliunits per liter) compared with non-obese normotensives with normal tolerance was 12 for hypertension alone, 47 for obesity alone, 52 for abnormal tolerance alone, and 124 when all three conditions were present. The prevalence of concentrations (milliequivalents per liter) of erythrocyte Na+ greater than or equal to 7.0, K+ less than 92.5, and plasma K+ greater than or equal to 4.5 in a subsample of 59 individuals with all combinations of abnormal tolerance obesity and hypertension was compared with those in 30 individuals free of these conditions. Altogether, 88.1% of the former vs. 40.0% of the latter group presented at least one of these three markers of internal cation imbalance (P<0.001). They found that insulin resistance and/or hyperinsulinemia (a)

are present in the majority of hypertensives, (b) constitute a common pathophysiologic feature of obesity, glucose intolerance, and hypertension, possibly explaining their ubiquitous association, and (c) may be linked to the increased peripheral vascular resistance of hypertension, which is putatively related to elevated intracellular sodium concentration (62).

2.4. Socio Demographic Factors

The study of hypertension among elderly identified that male could develop hypertension more than female. Among male group, 35.5% of them developed hypertension and among females 30.5%. In terms of age, late aged elderly (75 or more) had more potential in developing hypertension than early aged elderly (60-74 years old), 40.0% of late aged elderly respondent developed hypertension while only 30.7% of early aged elderly respondents developed hypertension (63).

A cross sectional study on period prevalence and socio demographic factors of hypertension in rural Maharashtra revealed that the overall prevalence was 7.24%. The prevalence of hypertension increased gradually with increase in age, BMI, additional salt intake, alcohol consumption and with diabetes Mellitus (64).

2.4.1. Age

An increase in blood pressure (BP) has always been taken as an inevitable consequence of ageing in industrialized societies, leading to hypertension in a high proportion of elderly subjects. However, the characterization and definition of what constitutes hypertension in the elderly has changed over the years. Data obtained during the Framingham Heart Study, which followed patients for 30 years, agreed that systolic blood pressure (SBP) shows a continuous increase after the ages of 30. Diastolic blood pressure (DBP), however, has a varying pattern with ageing, increasing until the fifth decade and slowly decreasing from the age of 60 to at least 84 years of age. This leads to a steep rise in pulse pressure (PP) with ageing (65). Blood pressure rises with age for most people during the decades from youth through middle age. As a consequence, by middle age, population average systolic and diastolic blood pressure are above optimal levels (below 120/80 mmHg) (66).

Aging is not only a risk factor to develop hypertension but also a risk factor to cause many diseases. However, aging itself is not a disease. Efforts of psychological factors, exercise and diet can contribute to healthy active life expectancy (65)

Cross-sectional surveys, as well as prospective cohort studies, have consistently demonstrated a positive relation between age and blood pressure in most populations with diverse geographical, cultural and socio-economic characteristics (65).

A study on urbanization and health reported that increasing life expectancy is one of reasons of today's increasing hypertension prevalence (67). WHO announced that more than 1,000 million people aged 60 years and over will be living in the world by 2020 and launched in April 1995 a new program on aging and health.

2.4.2. Sex

Early in life there is little evidence of a difference in blood pressure between the genders. Beginning at adolescence, however, men tend to display a higher average level. This difference is most evident in young and middle-aged adults. Late in life, the difference narrows and the pattern may even be reversed (68). While this change late in life is partly accounted for by higher premature death rates of middle-aged men with high blood pressure, post- menopausal changes in women also may be contributory. Studies are in progress to evaluate whether estrogen supplementation protects against the late relative rise of blood pressure in women (60).

As characteristics of study subjects of clinical researches related to hypertension, it has been found that female subjects are usually older than male subjects. A study to assess sex-based differences in presentation reported that the women were older than the men and had significantly higher rates of diabetes, hypertension, and prior congestive heart failure among 12,142 patients (3662 women and 8480 men) with acute coronary syndromes (69). Another study of sex differences in the treatment and outcome of acute myocardial infarction reported that women were older and more often had histories previous hypertension and previous congestive heart failure among 4,891 consecutive patients, including 1659 women, were hospitalized for acute myocardial infarction in 19 hospitals in the Seattle (Wash) metropolitan area (70). A survey conducted in 3,615 Shinawatra employees in Thailand aged

18-60 years reported the prevalence of hypertension was more common in males and the prevalence increased sharply after the age of 25 years in males and 40 years in females (71).

2.4.3. Occupation

In countries that are in the post-transitional stage of economic and epidemiological change, consistently higher levels of blood pressure and a higher prevalence of hypertension have been noted in lower socio-economic groups. This inverse relation has been noted with levels of education, income and occupation. However, in societies that are transitional or pre-transitional; higher levels of blood pressure and a higher prevalence of hypertension have been noted in upper socio-economic groups. This probably represents the initial stage of the epidemic of cardiovascular disease. Experience in most societies has revealed a reversal of the social groups affected as the epidemic (60).

2.4.4. Educational background

Educational background is also a predictor to judge socio-economic status as well as occupation (6). Education is associated with greater health care and awareness that may overcome the risk related to low physical activity (72).

2.5.Distribution of Hypertension in the World

The World Health Report 2002 identified hypertension or high blood pressure as the third ranked factor for disability-adjusted life years. Hypertension is one of the primary risk factors for heart disease and stroke and the leading causes of death worldwide. Recent analyses have shown that as of the year 2000, there were 972 million people living with hypertension worldwide, and it is estimated that this number will escalate to more than 1.56 billion by the year 2025. Nearly two-thirds of hypertensives live in low and middle income countries, resulting in a huge economic burden (11).

The overall age-adjusted prevalence of hypertension among U.S. adult population aged 18 and over was 28.6% in 2009–2010. Among adults with hypertension, 81.9% were aware of their hypertension and 76.4% were currently taking medication to lower their blood pressure. Among hypertensive patients who were being treated, 53.3% were being controlled (73).

Prevalence of hypertension among Turkish adult population aged >17 year in north-east of Düzce-Turkey was 42% the rate was 39% in males and 43% in females (2005) (74). According to Turkish Hypertension Study (PatenT, 2003) prevalence of hypertension was 31.8% and the prevalence was high in females (36.1%) then males (27.5%) (75). Prevalence of hypertension among adults aged ≥25 in Kocaeli was 33.6%; only 59.3% were aware of their condition, hypertension was controlled in 8.7% of the subjects (76).

Prevalence of hypertension among adult population aged 15 – 64 in Saudi Arabia was 25.5% (2011). Only 44.7% of hypertensive patients were aware, 71.8% of them received pharmacotherapy, and only 37.0% were controlled (77).

2.6. Distribution of Hypertension in Neighbor Countries

Prevalence of hypertension among Iranian adults aged 20 – 74 year in urban population of Yazd was 25.6% (2007). Overall 53.7% of those with hypertension were aware of condition, 45% were treated and 33.9% of treated were controlled (78). In Golestan province of Iran, prevalence of hypertension was 42.7% among adults aged 40 – 75 year (2008). Among hypertensive patients 46.2% were aware of their disease, 17.6% were receiving antihypertensive medication, and 32.1% of the treated patients had controlled hypertension (79). Prevalence of hypertension among Indian adult population aged >20 was 32.8% in urban and 14.5% in rural areas of Lucknow district, capital of Uttar Pradesh (2004) (80).

Prevalence of hypertension among Chinese adult population aged 35 – 74 year was 27.2%. The overall prevalence of hypertension was slightly higher among men than women. The prevalence of hypertension increased with age in both men and women. Overall, 44.7% of those with hypertension were aware of their diagnosis, only 28.2% were taking prescribed medication to lower their BP, and only 8.1% achieved BP control. Among hypertensives who were being treated, only 28.8% were being controlled (81). Prevalence of hypertension among low income adult population aged >18 was 26% in Karachi Pakistan. The prevalence was higher in males (34%) then females (24%) (82).

2.7. Distribution of Hypertension in Afghanistan

According to WHO estimations using data from other countries and specific country characteristics, prevalence of hypertension among adults aged ≥25 year in Afghanistan estimated as 27.2% in men and 27.9% in women (11). A study done in 13 districts of Kabul province (n=1169), in 2011-2012 which aimed to determine the prevalence of obesity found the prevalence of hypertension among those aged ≥40 years to be 33% but there was no other information related to the distribution of hypertension by sex and age groups (13). Another study carried out in 17 districts of Kabul City (n=1169), during the year 2011-2012 found the prevalence of hypertension among those aged ≥40 years to be 46.2% (44.9% and 46.8% among males and females respectively) (14).

2.8. Some Samples of the Distribution of Hypertension in Teachers

A study carried out on school teachers in Jeddah, Saudi Arabia (n=1476) at the year of 2007 found the prevalence of hypertension among those aged 22-60 years as 25.2%. Among all diagnosed hypertensive cases, only 30.4% were aware of being hypertensive. Among those aware of the problem 4.7% had controlled hypertension. The prevalence of hypertension was higher in males then females (29.5, 20.4%) (83). A study which was done on female school teachers in Basrah, Iraq (n=403) in the year 2008 found the prevalence of hypertension among the study population aged 22-61 years as 21.3%, and about one-fifth of them (20.3%) were pre-hypertensive (84).

3. METHODOLOGY

3.1. Research Design

This is a cross-sectional study aimed to study the prevalence and related factors of hypertension among school teachers in Kabul City, Afghanistan.

3.2. Study Area and Population

The study was carried out in Kabul City, Afghanistan (Figure 3.2.1). Afghanistan is located in South Central Asia and completely surrounded by neighbor countries. The countries that border Afghanistan are Iran in the South and West; Pakistan in the South and East; Turkmenistan, Uzbekistan and Tajikistan in the North; and China in the far North-East. The country is located at the center of major North-South and East-West trade routes.

The total population of Afghanistan in the year 2012 – 2013 was estimated around 27 million of which 51% were male and 49 % female. Distribution of population between urban and rural areas shows that out of the settled population, 19,4 million are living in rural and 6,1 million in urban areas; in addition, 1,5 million are living as Nomads (85).

Kabul is the capital and the largest city of Afghanistan (Figure 3.2.2). It is also the capital of Kabul Province, located in the Eastern section of Afghanistan. According to 2012 estimates, the total population of Kabul is 4 million (3,3 million of them live in urban area and 0,7 million in rural area, which includes Tajiks, Pashtuns, Hazaras and smaller numbers of Afghans belonging to other ethnic groups). Its area with square kilometer is 4523.9. It is the 64^{th} largest and the 5^{th} fastest growing city in the world. Major occupation of Kabul people is employer and business (trade). Literacy rate in the total population is 47.5%. Access rate to safe drinking water is 56% and to nearest health facility within one hour by any means of transport is 96% (85).

Kabul city divided in to 17 urban districts (Figure 3.2.3); there are 595 schools located in Kabul (152 of them are primary schools, 61 secondary schools and 382

high schools). The number of teachers in these schools are 23,154 (17,297 of them are females and 5,860 of them are males) (86).

Since there exist security problems and the majority of population lives in the urban part of Kabul province, the study was conducted in the schools which are located at the 17 urban districts of Kabul City.

Figure 3.2.1. Map of Afghanistan and its neighbor countries, 2008 (87).

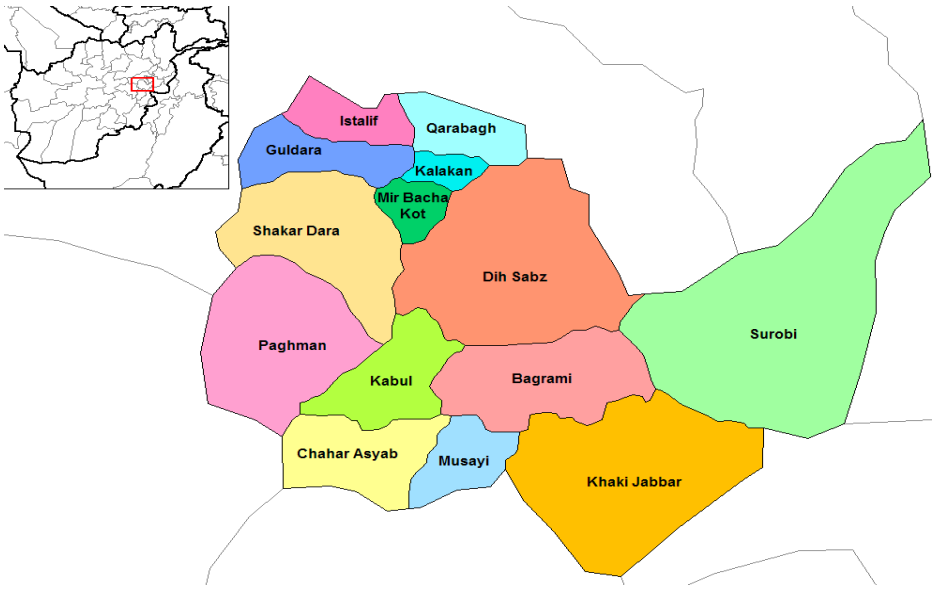

Figure 3.2.2. Map of Kabul Province-Afghanistan, 2007 (88).

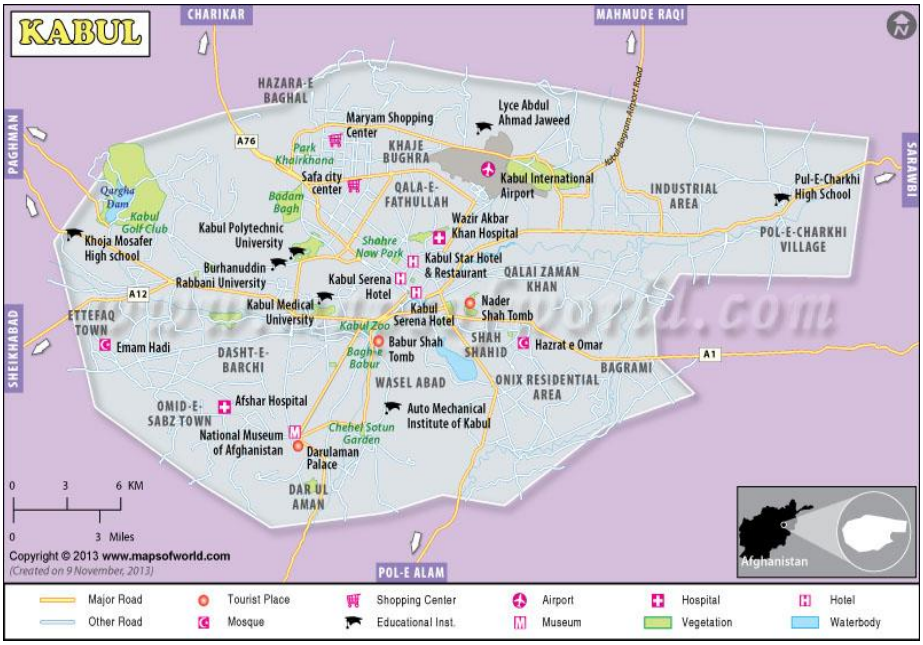

Figure 3.2.3. Map of Kabul City, Kabul-Afghanistan, 2013 (89).

3.3. Sample Size and Sampling Technique

The sample size was calculated by using the following equation:

$$n = \frac{Z^2_{(1-\frac{\alpha}{2})} P(1-P)}{d^2} \text{ x DE}$$

Where:

n= sample size

Z= the desired confidence level

P= expected prevalence

d= the desired width of the confidence interval (precision)

DE= design effect

Assuming a design effect of 2, confidence level of 95 percent (for α=0.05, Z=1.96), prevalence of hypertension (P) of 25[3] percent (0.25) and a desired width of the confidence interval of ± 5 percent (d = 0.05), the minimum sample size was calculated as follows;

[3] This figure is taken from school teacher's study which performed in Ceddah (28).

$$n = \frac{1.96^2\ 0.25(1-0.25)}{0.05^2} \text{ x } 2$$

n = 289 x 2= 578

To increase the study power and cover the probable non-response rate, with the10% increase in the required sample size, the final sample size was calculated to be:

587 + (0.10 x 578) = 636

The teachers were selected by using multi-stage cluster sampling technique. There are 16 educational regions/zones in Kabul City. It was unable to find how many teachers were teaching in every school in Kabul City. But it is about 100 as learned from the director of education in Kabul City. So it was assumed that the number of teachers in each school was 100. Depending on the calculated sample size, first, 7 districts were selected randomly among 16 educational districts and then in each educational districts one school was randomly selected (Table 3.3.1). All teachers of selected school were interviewed and their BP and BMI were measured. From the total 7 school, only 24 (3.7%) did not agree to participate in the study.

Table 3.3.1. Distribution of participants by the sampled schools (Kabul City-Afghanistan 2014)

Schools	**n**	**%**
Abdul Rahim Shahid	187	29.5
Ayesha Durrani	62	9.8
Al Fatah	86	13.6
Qari Abdullah	79	12.5
Prof. Rasol Amin	55	8.7
Rokhshana	60	9.5
Saidal Naseri	104	16.4
Total	633	100.0

Table 3.3.2. Distribution of the participants by the type of schools (Kabul City-Afghanistan 2014)

Type of School	n	%
Primary School	237	37.5
Middle School	168	26.5
High School	228	36.0
Total	633	100.0

3.4.Study Variables

3.4.1. Dependent Variable

- Blood pressure (hypertension status)

3.4.2. Independent Variables

- Sex
- Age
- Marital status
- Number of children
- Family type
- Economical status
- Some characteristic considered to make stress
- Educational level
- Additional salt intake
- Pattern of physical activity
- Obesity status
- Chronic disease status
- Smoking habit
- Alcohol consumption habit
- Duration of sleep per day (sleeping hours)

3.5. Terms and Criteria

3.5.1. Blood Pressure

The blood pressure was analyzed in to 3 groups as normotensive, pre-hypertensive and hypertensive.

Table 3.5.1. Definitions and classification of Blood Pressure levels (15, 16, 18)

Category	Systolic BP (mmHg)	Diastolic BP (mmHg)
Normal BP	**<120**	**<80**
Prehypertension	**120 – 139**	**80 – 89**
Hypertension	**≥140**	**≥90**

3.5.2. Body Mass Index (BMI)

Body mass index (BMI) is defined as weight (in kg) divided by square of height (in m) kg/m^2. The cut-off point to divide the subjects into normal and overweight groups in this study was BMI 25.0 (Table 3.5.2) (90).

Table 3.5.2. Classification of weight by BMI in adults (90)

Classification	BMI (kg/m^2)
Underweight	**<18.5**
Normal Range	**18.5-24.9**
Overweight	**25.0-29.9**
Obese	**≥30.0**

3.5.3. Pattern of physical activity

Definition of physical activity was accepted as "at least 3 days in a week each lasting about 30 minutes and resulting in sweating" (91). The type of physical activities and approximate frequencyof physical activity were also asked.

3.5.4. Health status (Chronic Disease)

Whether the respondents have been diagnosed as having any chronic disease or not was asked and also it was probed whether having kidney diseases, diabetes, heart diseases and cerebrovascular diseases.

3.5.5. Smoking

This is referred to as consumption of any tobacco products in the past and current.

3.5.6. Alcohol

This is referred to as consumption of any alcoholic beverages in the past and current.

3.5.7. Educational Level

In Afghanistan, there are three type of teachers namely, teachers that are graduated from high school, teachers that are graduated from teacher's institute and teachers that are graduated from the university. Usually most of the teachers were graduated from teacher's institute (The duration of study is 2 years for teachers who attend teacher's institute).

3.5.8. Working hours

Usually in Afghanistan school teachers work half day (4 hours) or full day (8 hours).

3.5.9. Sleeping hours

The healthy adults sleeping hours accepted as seven to eight hours per day (92).

3.6. Data Collection Tool and Pre-testing

A self-administered questionnaire was developed to gather information on socio demographic characteristics, preventive behaviors and health knowledge which was developed from review of the published articles and research reports. The questionnaire was consisted of two parts. In the first part, questions related to some socio demographic characteristics such as age, economic status, marital status,

educational level and etc. were asked. In the second part, questions were assessing the individual behaviors with regards to dietary habits, physical exercise, smoking, alcohol consumption and stress producing factors. At the end of the questionnaire, there was a separate part in which the blood pressure, height and weight measures was recorded (Appendix A).

Questionnaire was translated to Persian (local language) and pretested among teachers in Mahmud Hotaki High School located in a different district far from and not part of the sampled schools for the main study. Pre-testing of the data collection procedure was carried out on 32 teachers for one day by researcher and his four trained assistants. During the pre-testing none of the questions found to be unclear and need modification.

3.7. Man Power

Eight data collection assistants (last year student of Public Health Faculty) were hired and trained by the researcher. One week orientation class was conducted for them and trained with the basic skills of conducting research, using questionnaires and communicating effectively with the respondents in the local language (Persian)

1. First day: information about hypertension and its risk factors
2. Second day: information about research
3. Third day: information about the objective of this study and questionnaire
4. Fourth day: practice on data collection
5. Fifth day: general review and selection of 4 research assistants. After the orientation class among 8 students 4 of them were selected as research assistants according to ability and merits.

3.8. Data Collection Procedure

The data were collected from school teachers of Kabul City. As per the planned schedule, the data was collected in two months, July - August 2014.

In the day of interview, first the weighing machine was placed on a flat and firm place, height-meter was nailed to a wall perpendicular to a flat firm surface.

Then the teachers were asked to enter the class. Teachers were briefed about the objective of the study and questionnaires were distributed. After they completed filling of questionnaires, measurement of blood pressure, weight and height was done. The teachers who had classes were excused to attend their class and came back for measurements later.

3.9. Measurements

Measurements were conducted for all participants in the study by the researcher himself and two assistants. The measurements included: blood pressure (BP), weight (in kg) and height (in cm). The standard and valid instruments were used for blood pressure, height and weight measurement.

3.9.1. Measurement of Blood Pressure

In order to record the blood pressure, teachers were seated quietly for at least 5 minutes on a chair with their backs supported and then their arms bared and supported at heart level. Two readings, separated by 30 minutes were taken and then averaged. In cases where the first two readings differed by more than 5 mm Hg, an additional reading was obtained and averaged with the previous reading. If some teachers ate food or drank coffee in last 30 minutes the measurement of those teachers were delayed for about 1 hour. The blood pressure readings were taken by using WHO recommended Mercury Sphygmomanometer (17, 18).

3.9.2. Measurement of Height and Weight

Standing weight and height were measured with light clothes and without shoes, using a standardized method. Weight was measured with a portable beam scale and approximated to the nearest half kilogram (Kg). Height was measured while teacher is standing perfectly at close proximity (the back touching the wall loosely) to a vertical wall. A scaled portable steel ruler (height-meter) was used to measure the height with the aid of a firm straight ruler placed flat on top of the head. The measurement at the point of intersection on the portable steel ruler and the firm ruler read and recorded approximated to the nearest half centimeter (cm). The measurement

of height and weight was done by separate and same trained research assistant whose duty was only taking the measurements.

3.10. Data Analysis

The data entered to personal computer by using IBM SPSS 21.0. Data entry, cleaning, processing, preliminary analysis and final report writing was done by the researcher. A p-value <0.05 was considered as statistically significant. The socio-demographic characteristics and general information were presented by frequency, percentage and dispersion statistics. Bivariate analysis of the relationship between the independent variables and the dependent variable were analyzed by using Chi-square test. Independent sample t test and Mann Whitney U test were used to compare means (or medians) between various independent variables.

Binary Logistic Regression Analysis was used to assess the strength of association between dependent and independent variables which were found to be associated with the dependent variable during the bivariate analysis. At bivariate analysis, all independent variables with p-value less than 0.20 (sex, age, number of children, marital status, life satisfaction, economical status, obesity status, chronic patient at home and sleeping hours) were included in the model except additional salt intake that has showed an inverse relation than expected. This situation might ruin the other relations between dependent and independent variables and thought that the teachers who were already diagnosed hypertension might change their life habits according to their problem. The analysis was performed by using backward conditional method. Odds Ratio (OR) with corresponding 95% Confidence Interval (CI) was used to estimate the strength of association between the retained independent predictors of hypertension. Three models were tested: in the first model, dependent variable was categorized as “normal and pre-hypertensive” versus “hypertensive”. In the second model, pre-hypertensive teachers were removed from analysis and the dependent variable was categorized as “normal” versus “hypertensive”. In the last model, hypertensive teachers were removed from analysis and the dependent variable was categorized as “normal” versus “pre-hypertensive”.

3.11. Ethical Consideration

The proposal was submitted to the Research and Ethical Board of Kabul Medical University, under Ministry of Higher Education, Government of Afghanistan. The questionnaire was reviewed by the board and then the board did suggest some modifications (removal of the question related to ethnicity). The desired modifications were made in the questionnaire and resubmitted to the board. Formal approval from the Research and Ethical Board of KMU was secured only after the necessary corrections were done in both original and translated version of the questionnaire form. After this procedure, the researcher was coordinated with the official responsible of educational districts and explained the objectives of the study to obtain approval and full cooperation for program implementation. A letter of permission was also taken form the responsible of the educational districts. In each school, a meeting was conducted with school director to give information about the study and set one specific day for data collection.

In each school, the participants were briefed on the nature and scope of study. They were also sensitized on the risk of developing hypertension and possible risks associated with future complication of hypertension. At the top of the questionnaire there was a paragraph like informed consent after reading it and agreeing to participate in the study they were asked to answer the questionnaire and then their measurements (BP and BMI) were taken, the newly diagnosed cases of hypertension referred to the hospital. At the day of interview some preventive advises for obese and pre-hypertension teachers were given.

3.12. Limitations

This study was the first of its kind to look at the prevalence of hypertension in a specific group of people in the country (Afghanistan). Due to the geographical conditions and security concerns, it was very hard to make general population surveys in order to learn the real figures of main public health problems such as hypertension in Afghanistan. For this reason, the target population had to be limited to school teachers working in Kabul City. We were not able to find the list of school teachers in Kabul City so we used multi stage cluster sampling.

4. FINDINGS

The objective of this study was to find the prevalence and related factors of hypertension among school teacher in Kabul City, Afghanistan. The data were gathered from 633 teachers in seven schools of Kabul City during July-August 2014; 24 teachers were refused to participate in the study (15 females and 9 males). The data collection was performed by the researcher and four research assistants with structured pre-tested questionnaire which was developed for the purpose of the research by the researcher. The results of this study are presented in three parts as follows:

4.1. Socio Demographic Characteristics of the Teachers

The total number of male teachers in the study group was 187 which constitute 29.5% and the female teachers were 446 (70.5%).

Table 4.1.1. Distribution of teachers by age and sex (Kabul City-Afghanistan, 2014)

	Sex					
Age	**Male**		**Female**		**Total**	
Groups	**n**	**%**	**n**	**%**	**n**	**%**
< 25	9	4.9	49	10.6	51	8.8
25-29	36	19.6	52	14.9	95	16.4
30-34	24	13.0	36	9.1	60	10.3
35-39	17	9.2	40	10.1	57	9.8
40-44	19	10.3	82	20.7	101	17.4
45-49	6	3.3	70	17.6	76	13.1
50-54	15	8.2	51	12.8	66	11.4
55-59	33	17.9	42	3.5	47	8.1
≥ 60	25	13.6	13	0.8	28	4.8
Total*	184	31.7	397	68.3	581**	100.0

* Row percentages; others are column percentages.

** 52 none-responses (3 male and 49 female).

About half of the teachers fill within the age of less than 40 years (45.3%) (Table 4.1.1).

Table 4.1.2. Descriptive statistics of the age of teachers (years) by sex (Kabul City-Afghanistan, 2014)

Statistics	Male (n=184)	Female (n=397)	Total (n=581)	p-value
Mean ± SD	42.76 ± 13.54	39.06 ± 10.28	40.23 ± 11.53	
Median	41	41	41	
1st Quartile	30	29	29	0.001
3rd Quartile	56	47	49	
Min-Max	22 – 66	19 – 62	19 – 66	

The mean age of the male teachers in the study group was 42.67 ± 13.54 years and female teachers were 39.06 ± 10.28 years. Statistically significant difference was observed between the mean ages by sex (p=0.001) (Table 4.1.2).

Table 4.1.3. Distribution of teachers by educational level (Kabul City-Afghanistan, 2014)

Educational Level	n	%
High School Graduate	56	8.8
Teachers' Institute	362	57.2
Bachelor's Degree	208	32.9
Master's Degree	7	1.1
Total	633	100.0

Educational level of teachers categorized in four types: high school, teachers' institute, bachelor and master's degree (34). Among 633 teachers, 208 (32.9%) of teachers had a bachelor's degree and 362 (57.2%) of them were graduated from education institute (teacher's institute) (Table 4.1.3)

Table 4.1.4. Distribution of teachers by marital status (Kabul City-Afghanistan, 2014)

Marital Status	**n**	**%**
Single	133	21.0
Married	478	75.5
Widowed	20	3.2
Divorced/Separated	2	0.3
Total	633	100.0

Among 633 teachers 478 (75.5%) of them were married and 133 (21.0%) were single (Table 4.1.4).

Table 4.1.5. Distribution of ever-married teachers by the number of children (Kabul City-Afghanistan, 2014)

Number of Children	**n**	**%**
0	23	4.8
1-2	107	22.4
3-4	163	34.2
5-6	129	27.0
≥ 7	55	11.5
Total	477*	100.0
Mean ± SD=3.95±2.18; Median=4; 1st Quartile=2; 3rd Quartile=5; Min-Max=0-11		

* 23 none-responses.

The number of children ranged from 0 to 11. Average number of children was 3.95 ± 2.18. More than one-third of the teachers had 5 or more children (38.5%) (Table 4.1.5).

Table 4.1.6. Distribution of teachers by family type (Kabul City-Afghanistan, 2014)

Family Type	**n**	**%**
Nuclear family	342	54.0
Extended family	291	46.0
Total	633	100.0

Among 633 teachers, 342 (54.0%) of them were living in a nuclear family and 291 (46.0%) of them extended family (Table 4.1.6).

Table 4.1.7. Distribution of teachers by the number of household members (Kabul City-Afghanistan, 2014)

Number of Household Members	**n**	**%**
≤ 4	98	16.1
5-6	177	29.1
7-8	167	27.5
9-10	90	14.8
≥11	76	12.5
Total	608*	100.0
Mean ± SD=7.41±3.43; Median=7; 1st Quartile=5; 3rd Quartile=9; Min-Max=2-27		

* 25 none-responses.

The number of household members ranged from 2 to 27; average number was 7.41 ± 3.43. More than one-fourth of the teachers had more than 9 household members (27.3%) (Table 4.1.7).

Table 4.1.8. Distribution of teachers by the perceived economical status (Kabul City-Afghanistan, 2014)

Perceived Economical Status	n	%
Excellent	43	6.8
Good	141	22.3
Medium	342	54.0
Bad	91	14.4
Very bad	16	2.5
Total	633	100.0

Economic status of teachers was evaluated by their perception. According to their own evaluation, more than half of the teachers stated their economic status as medium (54.0%), 22.3% as good and 14.4% as bad (Table 4.1.8).

4.2. Characteristics Related to Hypertension

Table 4.2.1. Distribution of teachers by obesity status and sex (Kabul City-Afghanistan, 2014)

	Sex					
Obesity	**Male**		**Female**		**Total**	
Status	**n**	**%**	**n**	**%**	**n**	**%**
Under Weight	14	7.5	9	2.0	23	3.6
Normal	107	57.2	141	31.6	248	39.2
Pre-obese	57	30.5	190	42.6	247	39.0
Obese	9	4.8	106	23.8	115	18.2
Total*	187	29.5	446	75.5	633	100.0
p-value<0.001						

* Row percentages; others are column percentages.

Table 4.2.1 showed the obesity status of the teachers by sex. Almost one-fifth of the teachers were obese (18.2%) and 39.0% of them were pre-obese. The prevalence of obesity and pre-obesity were higher in females than males (p<0.001).

Table 4.2.2. Distribution of teachers by perceived obesity status and sex
(Kabul City-Afghanistan, 2014)

Perceived Obesity Status	Sex					
	Male		Female		Total	
	n	%	n	%	n	%
Under Weight	50	26.7	50	11.2	100	15.8
Normal	113	60.4	291	65.2	404	63.8
Pre-obese	19	10.2	76	17.0	95	15.0
Obese	5	2.7	29	6.5	34	5.4
Total*	187	29.5	446	75.5	633	100.0
p-value<0.001						

* Row percentages; others are column percentages.

According to self-reported obesity status, among 633 teachers two-third of them stated their obesity level normal (63.8%) and only 5.4% of them stated as obese (Table 4.2.2).

Table 4.2.3. Distribution of teachers by perceived and measured obesity status (Kabul City-Afghanistan, 2014)

Perceived Obesity Status	Measured Obesity Status									
	Under Weight		Normal		Pre-obese		Obese		Total*	
	n	%	n	%	n	%	n	%	n	%
Under Weight	18	18.0	63	63.0	17	17.0	2	2.0	100	15.8
Normal	5	1.2	179	44.3	181	44.8	39	9.7	404	63.8
Pre-obese	0	0.0	6	6.3	37	38.9	52	54.7	95	15.0
Obese	0	0.0	0	0.0	12	35.3	22	64.7	34	5.4
Total	23	3.6	248	39.2	247	39.0	115	18.2	633	100.0
p-value<0.001										

* Column percentages; others are row percentages.

Among 404 teachers who stated their obesity status as normal 181 (44.8) of them were pre-obese and 39 (9.7%) obese (Table 4.2.3).

Table 4.2.4. Distribution of teachers by physical activity status and sex (Kabul City-Afghanistan, 2014)

Physical Activity Status	Sex					
	Male		Female		Total	
	n	%	n	%	n	%
Never	34	18.2	128	28.7	162	25.6
Occasionally	127	66.8	296	66.4	421	66.5
Consistently	28	15.0	22	4.9	50	7.9
Total*	187	29.5	446	75.5	633	100.0
p-value<0.001						

* Row percentages; others are column percentages.

More than half of the teachers did physical activity occasionally (66.5%), one-fourth of them did not do physical activity (25.6%) and 7.9% of teachers (50) did physical activity

consistently. Prevalence of conducting physical activity was higher in males than females ($p<0.001$) (Table 4.2.4).

Table 4.2.5. Distribution of physically active teachers by type of physical activity that they did and sex (Kabul City-Afghanistan, 2014)

Type of physical Activity (n=471)	Sex					
	Male		Female		Total	
	n	%	n	%	n	%
Walking	87	56.8	270	84.9	357	75.8
Running/Jogging	20	13.1	47	14.8	67	14.2
Football/Volleyball	24	15.7	12	3.8	36	7.6
Aerobic	8	5.2	22	6.9	30	6.4
Bicycling	22	14.4	2	0.6	24	5.1
Swimming	3	2.5	3	0.9	6	1.3
Taekwondo	6	3.9	0	0.0	6	1.3
Fitness	4	2.6	4	0.8	4	0.8

* More than one answer; the percentages were calculated from the total (n=471) separately.

More than two-third of the teachers did walking (75.8%) and 59 teachers did walking with one more type of physical activity (Table 4.2.5).

Table 4.2.6. Distribution of teachers by self-reported dietary habits and sex
(Kabul City-Afghanistan, 2014)

Dietary Habits	Sex					
	Male		Female		Total	
	n	%	n	%	n	%
Unhealthy	12	6.4	9	2.0	21	3.3
Healthy	139	74.3	341	76.5	480	75.8
Very Healthy	19	10.2	64	14.3	83	13.1
No idea	17	9.1	32	7.2	49	7.7
Total*	187	29.5	446	75.5	633	100.0
p-value=0.017						

* Row percentages; others are column percentages.

Dietary habits of teachers were evaluated by their own opinions. According to their own evaluation more than 75% of the teachers stated their dietary habits healthy and 3.3% of them stated as unhealthy. Females' dietary habits were healthy than males (p-value=0.017) (Table 4.2.6).

Table 4.2.7. Distribution of teachers by additional salt intake and sex
(Kabul City-Afghanistan, 2014)

Additional Salt Intake	Sex					
	Male		Female		Total	
	n	%	n	%	n	%
No	121	64.7	338	75.8	459	72.5
Yes	66	35.3	108	24.2	174	27.5
Total*	187	29.5	446	75.5	633	100.0
p-value=0.004						

* Row percentages; others are column percentages.

Among 633 teachers one-fourth of them used additional salt (27.5%) and 72.5% of them did not use additional salt. Males taken more additional salt than females (p=0.04) (Table 4.2.7).

Table 4.2.8. Distribution of teachers by making diet for losing weight in the last year and sex (Kabul City-Afghanistan, 2014)

	Sex					
Diet in	**Male**		**Female**		**Total**	
Last Year	**n**	**%**	**n**	**%**	**n**	**%**
No	160	85.6	330	74.0	490	77.4
Yes	27	14.4	116	26.0	143	22.6
Total*	187	29.5	446	75.5	633	100.0
p-value=0.001						

* Row percentages; others are column percentages.

Among 633 teachers 143 of them (22.6%) did diet in last year and 490 of them (77.4%) didn't. Females did diet more than males (p<0.001)(Table 4.2.8).

Table 4.2.9. Distribution of teachers by eating habits related to food groups (Kabul City-Afghanistan, 2014)

Food Groups	Many times a day %*	Once a day %*	Many times a week %*	1- 4 times a month %*	Never %*	Total n
Fish, chicken, meat	6.1	13.9	32.3	42.3	5.4	570**
Milk	9.7	29.2	21.6	26.7	12.8	565**
Yogurt, cheese	14.9	32.4	24.8	23.0	5.0	565**
Egg	4.6	17.9	30.9	32.2	13.5	570**
Bean, pea	4.0	13.5	34.0	42.0	6.6	579**
Fresh fruits	25.9	38.3	20.7	14.2	0.9	583**
Fresh vegetables	34.9	35.3	19.2	9.7	0.9	578**
Cooked vegetables	16.9	27.1	32.5	21.8	1.7	579**
Bread	88.6	9.0	1.2	0.9	0.3	589**
Rice, spaghetti	8.7	26.0	38.4	23.4	3.5	576**
Fruit juice	10.2	31.5	23.6	22.9	11.7	571**
Cola, Fanta, soda	3.7	9.7	13.6	37.0	36.0	567**
Chocolate, sugar, sweet	18.2	49.9	9.1	10.1	12.2	573**
Cake, cookies	3.2	17.5	15.2	39.5	24.6	532**
Chips	3.1	11.0	24.6	41.7	19.6	552**
Pizza, Turkish pancake, hamburger	2.5	9.2	21.9	51.6	14.8	556**
Black tea	18.4	7.0	1.0	7.0	66.6	583**
Green tea	69.1	12.9	3.8	5.5	9.0	586**

* Row percentages.

* *There were different amount of none-response for each food group.

One-fifth (20.0%) of the teachers ate meat one or more than once a day. 12.8% of the teachers never drank milk. 13.5% of the teachers never ate egg. More than half (51.5%) of the teachers ate bean and pea at least many times a week. Tow-third (64.2%) of teachers

ate fresh fruits at least once a day. More than two-third (72.2%) of the teachers ate fresh vegetable at least once a day. 88.6% of the teachers ate bread many times a day. More than one third (36.0%) of the teachers never drank cola or soda. More than two-third (68.1%) of the teachers ate sugar or chocolate at least once a day. More than two-third (69.1%) of the teachers drank green tea and less than one-fifth of them drank black tea many times a day (Table 4.2.9).

Table 4.2.10. Distribution of teachers by smoking status (Kabul City-Afghanistan, 2014)

Smoking Status	**n**	**%**
Never	578	91.3
Used to	47	7.4
Currently Smoking	8	1.3
Total	633	100.0

Table 4.2.10 shows the distribution of smoking among teachers. Ninety-one point three percent (574) of the teachers in the study group never smoked in their life and 8.7% (55) of them smoked. Among smokers only two of them were female.

Table 4.2.11. Distribution of teachers by alcohol consumption (Kabul City-Afghanistan, 2014)

Alcohol Consumption	**n**	**%**
Never	621	98.7
Used to	2	0.3
Drink Socially	6	1.0
Total	629*	100.0

* 4 none-responses.

Table 4.2.11 shows the distribution of alcohol consumption among teachers. 98.7% (621) of the teachers never consumed alcohol in their life, only 1.3% (8) of the teachers consumed alcohol in their life. Among teachers consumed alcohol only one of them was female.

Table 4.2.12. Distribution of teachers by consumption of addictive substances (Kabul City-Afghanistan, 2014)

Addictive Substances Consumption	n	%
Never	624	99.7
Ever	2	0.3
Total	626*	100.0

* 7 none-responses

Table 4.2.12 shows the distribution of addictive substances among teachers. Only two teachers (0.3%) had consumed addictive substances in their life.

Table 4.2.13. Distribution of teachers by self-reported chronic disease (Kabul City-Afghanistan, 2014)

Chronic Disease	Sex					
	Male		Female		Total*	
	n	%	n	%	n	%
No	135	72.2	321	72.0	456	72.0
Yes	52	27.8	125	28.0	177	28.0
• **Hypertension**	22	11.8	64	14.3	86	13.6
• **Kidney Diseases**	18	9.6	53	11.9	71	11.2
• **Diabetes**	6	3.2	15	3.4	21	3.3
• **Cardiac Diseases**	11	5.9	11	2.5	22	3.5
• **Others****	3	1.6	3	0.7	6	1.0
Total	187	29.5	446	75.5	633	100.0
p-value=0.168***						

* More than one answer had been chosen.

** No information about the type of disease.

*** The difference between having any chronic disease by sex.

More than one-fourth of the teachers had chronic disease (28.0%). percentage of chronic disease is higher in males than females; the difference was not statistically significant

(p=0.168). According to their self-report among 633 teachers 86 of them had hypertension (13.6%) (11.8% males and 14.3% females), 71 teachers had kidney disease (11.2%) (9.6% male and 11.9% female), 21 teachers had diabetes (3.3%) and 22 teachers had cardiac diseases (3.5%) (5.9% male and 2.5% female) (Table 4.2.13).

Table 4.2.14. Distribution of teachers by self-reported health status and sex
(Kabul City-Afghanistan, 2014)

	Sex					
Health	**Male**		**Female**		**Total**	
Status	**n**	**%**	**n**	**%**	**n**	**%**
Excellent	33	17.6	41	9.2	74	11.7
Good	49	26.2	148	33.2	197	31.1
Medium	82	43.9	219	49.1	301	47.6
Bad	20	10.7	30	6.7	50	7.9
Very bad	3	1.6	8	1.8	11	1.7
Total*	187	29.5	446	75.5	633	100.0
p-value=0.009						

* Row percentages; others are column percentages.

Forty-two point eight percent of the teachers stated their health status good or excellent and only 9.6% of them stated their health status as bad or very bad (Table 4.2.14).

Table 4.2.15. Distribution of teachers by their attention to health and sex (Kabul City-Afghanistan, 2014)

Attention to Health	Sex					
	Male		Female		Total	
	n	%	n	%	n	%
Very much	48	25.7	98	22.0	146	23.1
Much	58	31.0	121	27.1	179	28.3
Moderate	63	33.7	167	37.4	230	36.3
Little	14	7.5	46	10.3	60	9.5
None	4	2.1	14	3.1	18	2.8
Total*	187	29.5	446	75.5	633	100.0
p-value=0.467						

* Row percentages; others are column percentages.

Almost one-fourth of the teachers stated that they pay attention to their own health very much (23.1%) and 12.3% stated as little or none (Table 4.2.15).

Table 4.2.16. Distribution of teachers by sex and self-reported level of life satisfaction and (Kabul City-Afghanistan, 2014)

Level of Life Satisfaction	Sex					
	Male		Female		Total	
	n	%	n	%	n	%
Dissatisfied	35	18.7	29	6.5	64	10.1
Moderate	68	36.4	153	34.3	221	34.9
Satisfied	84	44.9	268	59.2	348	55.0
Total*	187	29.5	446	75.5	633	100.0
p-value<0.001						

* Row percentages; others are column percentages.

More than half of the teachers (55.0.5) stated that they were satisfied from life. On the other hand, every one out of ten teachers was dissatisfied from their life. Males were more dissatisfied than females (p<0.001) (Table 4.2.16).

Table 4.2.17. Distribution of teachers by some characteristic considered as source of stress (Kabul City-Afghanistan, 2014)

	Sex					
	Male		Female		Total	
Characteristics	**n**	**%**	**n**	**%**	**n**	**%**
Debt (n=631*)					p-value<0.001	
• **No**	81	43.5	287	64.5	368	58.3
• **Yes**	105	56.5	158	35.5	263	41.7
Chronic patient at home (n=624)**					p-value=0.014	
• **No**	96	52.5	278	63.0	374	59.9
• **Yes**	87	47.5	163	37.0	250	40.1
Problem with family members (n=633)					p-value=0.259	
• **No**	172	92.0	397	89.0	569	89.9
• **Yes**	15	8.0	49	11.0	64	10.1
Problem with other teachers (n=633)					p-value=0.378	
• **No**	175	93.6	425	95.3	600	94.8
• **Yes**	12	6.4	21	4.7	32	5.2
Problem with manager (n=633)					p-value=0.501	
• **No**	184	98.4	435	97.5	619	97.8
• **Yes**	3	1.6	11	2.5	14	2.2
Working hours/day (n=633)					p-value<0.001	
• **4 hours**	122	65.2	395	88.6	517	81.7
• **8 hours**	65	34.8	51	11.4	116	18.3

* 2 none responses.

** 9 none responses.

Forty-one point seven percent (263) of teachers had debt; 40.1% had chronic patient at home; 10.1% had problem with their family; 5.2% had problem with other teachers in their school and 2.2% had problem with their manager. Almost one-fifth of teachers' (18.3%) works full day (8 hours) and 81.7% half day (4 hours). The percentages of teachers who works 8 hours per day and had debt were higher in male teachers than female teachers ($p<0.001$) (Table 4.2.17).

Table 4.2.18. Distribution of teachers by their sleeping hours and sex
(Kabul City-Afghanistan, 2014)

Sleeping Hours (per day)	**Sex**					
	Male		**Female**		**Total**	
	n	**%**	**n**	**%**	**n**	**%**
<7 hours	82	48.2	149	35.5	231	39.2
7-8 hours	77	45.3	225	53.6	302	51.2
>8 hours	11	6.5	46	11.0	57	9.7
Total*	170	28.8	420	71.2	590**	100.0
Mean ± SD=6.99±1.49; Median=7; 1st Quartile=6; 3rd Quartile=8; Min-Max=1-14						
p-value=0.01						

* Row percentages; others are column percentages.

** 43 none-responses.

Sleeping hours of the teachers ranged from 1 to 14 hours per day. Average sleeping hours was 6.99 ± 1.49, more than half of the teachers (51.2%) stated that they were sleeping 7-8 hours per day, 39.2% of the teachers stated less than seven hours per day and 9.7% stated more than eight hours per day. Males slept less than females per day ($p=0.01$) (Table 4.2.18).

Table 4.2.19. Descriptive statistics of the sleeping hours of teachers by age group (Kabul City-Afghanistan, 2014)

Statistics	<40 (n=245)	≥40 (n=298)	Total (n=5433)	p-value
Mean ± SD	7.16 ± 1.57	6.86 ± 1.40	7.00 ± 1.49	
Median	7.00	7.00	7.00	
1st Quartile	6.00	6.00	6.00	0.016
3rd Quartile	8.00	8.00	8.00	
Min-Max	2.00 – 14.00	2.00 – 14.00	2.00 – 14.00	

Among teachers aged <40 years the mean of sleeping hours was high (7.16 ± 1.57) than teachers aged ≥40 years (6.86 ± 1.40); the difference was statistically significant (p=0.016) (Table 4.2.19).

Table 4.2.20. Distribution of teachers by family history of hypertension and sex (Kabul City-Afghanistan, 2014)

Family History of Hypertension	Sex					
	Male		Female		Total	
	n	%	n	%	n	%
No	151	80.7	323	72.4	474	74.9
Yes	36	19.3	123	27.6	159	25.1
Total*	187	29.5	446	75.5	633	100.0
p-value=0.046						

* Row percentages; others are column percentages.

One fourth of the teachers had family history of hypertension (25.1%). Family history of hypertension was higher in females than males (p=0.046) (Table 4.2.18).

Table 4.2.21. Distribution of teachers by some symptoms related to hypertension and sex (Kabul City-Afghanistan, 2014)

Symptoms	Sex					
	Male		Female		Total	
(n=633)	n	%	n	%	n	%
Headache					p-value<0.001	
• **No**	137	73.3	258	57.8	395	395
• **Yes**	50	26.7	188	42.2	238	238
Dizziness					p-value=0.124	
• **No**	146	78.1	322	72.2	468	468
• **Yes**	41	21.9	124	27.8	165	165
Blurry vision					p-value=0.142	
• **No**	126	67.4	273	61.2	399	399
• **Yes**	61	32.6	173	32.8	234	234
Chest pain					p-value=0.075	
• **No**	174	93.0	394	88.3	568	568
• **Yes**	13	7.0	52	11.7	65	65
Total*	187	29.5	446	75.5	633	100.0

* Row percentages; others are column percentages.

More than one third of teachers complained from headache and blurry vision (37.6% and 37.0% respectively), followed by dizziness (26.1%) and chest pain (10.3%). Although all hypertension symptoms are higher in females than males the difference was significant for only "headache" (p-value<0.001) (Table 4.2.21).

Table 4.2.22. Distribution of teachers by checking their blood pressure at home and sex (Kabul City-Afghanistan, 2014)

Checking of Blood Pressure at Home	Sex					
	Male		Female		Total	
	n	%	n	%	n	%
No	172	92.0	379	85.0	551	87.0
Yes	15	8.0	67	15.0	82	13.0
Total*	187	29.5	446	75.5	633	100.0
p-value=0.017						

* Row percentages; others are column percentages.

Among 633 teachers only 13% of them have checked their blood pressure at home (among females 15% and males 8%). Females checked their blood pressure at home more than males (p=0.017) (Table 4.2.22).

4.3. Hypertension Status and Related Factors

Two or three separate blood pressure readings was averaged and final result was categorized in to four broad groups i.e. Normal, prehypertension, mild hypertension and moderate hypertension (33). Forty-three point nine percent of teachers had normal level of blood pressure whereas 39.4% (n=249) were pre-hypertensive, 13.4% (n=85) were mild hypertensive and 3.3% (n=21) were moderate hypertensive. Hence, the overall prevalence of hypertension among the study subject was 16.7%, taking in to consideration the accumulative figure of respondents having mild and moderate hypertension (Table 4.3.1) (Figure 4.3.1).

Table 4.3.1. Distribution of teachers by the level of blood pressure (Kabul City-Afghanistan, 2014)

Level of Blood Pressure	n	%
Normal	279	44.1
Prehypertension	248	39.2
Mild (Stage 1) hypertension	85	13.4
Moderate (Stage 2) hypertension	21	3.3
Total	633	100.0

Table 4.3.2. Distribution of teachers by the measured blood pressure and self-reported hypertension status (Kabul City-Afghanistan, 2014)

	Measured Blood Pressure							
Self-reported	**NBP**		**Pre-H.**		**HBP**		**Total***	
Hypertension	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
No	267	48.8	215	39.3	65	11.9	547	86.4
Yes	12	14.0	33	38.4	41	47.7	86	13.6
Total	279	44.1	248	39.2	106	16.7	633	100.0
p-value<0.001								

* Column percentages; others are row percentages.

Among 86, teachers who stated that they had hypertension 41 (47.7%) of them had hypertension (Table 4.3.2).

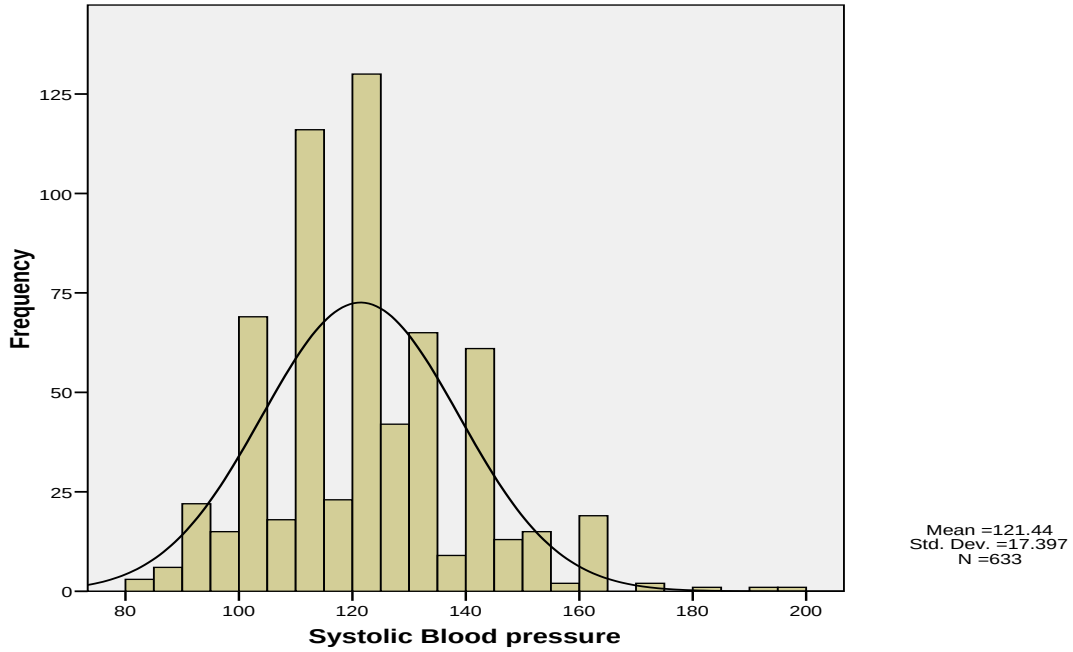

Figure 4.3.1. Distribution of systolic blood pressure of teachers (Kabul City-Afghanistan, 2014)

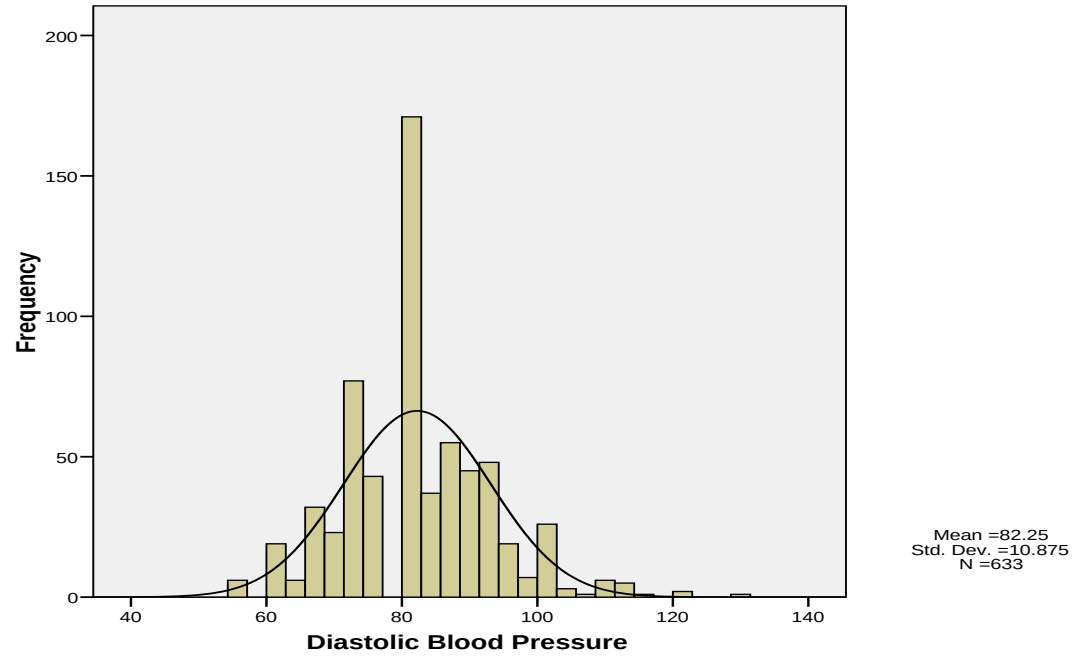

Figure 4.3.2. Distribution of diastolic blood pressure of teachers (Kabul City-Afghanistan, 2014)

Table 4.3.3. Distribution of teachers by self-reported blood pressure and hypertensive medicine (Kabul City-Afghanistan, 2014)

	NBP		Pre-H.		HBP		Total*	
Drug Intake	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
No	2	8.0	14	56.0	9	36.0	25	29.1
Yes	10	16.4	19	31.1	32	52.5	61	70.9
Total	12	14.0	33	38.4	41	47.7	86**	100.0

* Column percentages; others are row percentages.

** Only self-reported hypertensive cases.

Among 86 self-reported hypertensive teachers 70.9% (n=61) of them were taking hypertensive medicine. Among the teachers who were taking medicine 16.4% of them were controlled, 31.1% of them shifted to the pre-hypertension group and 52.5% of them were uncontrolled (Table 4.3.3).

Table 4.3.4. Distribution of teachers by blood pressure and sex (Kabul City-Afghanistan, 2014)

	NBP		Pre-H.		HBP		Total*	
Sex (n=633)	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Male	89	47.6	68	36.4	30	16.0	187	29.5
Female	190	42.6	180	40.4	76	17.0	446	70.5
Total	279	44.1	248	39.2	106	16.7	633	100.0
p-value=0.507								

* Column percentages; others are row percentages.

The distribution of blood pressure was the same in male and female, 16% of male and 17% of female had hypertension, 36.4% of male and 40.4% of female had pre-hypertension; the differences were not statistically significant p-value=0.507 (Table 4.3.3) (Figure 4.3.4).

Table 4.3.5. Descriptive statistics of the blood pressure of teachers by sex (Kabul City- Afghanistan, 2014)

Statistics	Male (n=184)	Female (n=397)	Total (n=633)	p-value
Systolic BP				
Mean ± SD	121.04 ± 16.66	121.61 ± 17.71	121.44 ± 17.39	
Median	122	121	122	
1st Quartile	112	111	112	0.710
3rd Quartile	132	133	132	
Min-Max	88 – 182	82 – 200	82 – 200	
Diastolic BP				
Mean ± SD	81.91 ± 10.65	82.39 ± 10.97	82.25 ± 10.87	
Median	82	82	82	
1st Quartile	72	75	72	0.618
3rd Quartile	90	90	90	
Min-Max	57 – 120	57 – 130	57 – 130	

Mean of systolic blood pressure in male teachers was 121.04 ± 16.66 mmHg and in female teachers was 121.61 ± 17.71 mmHg; this differences was not statistically significant p-value=0.710 (Independent Sample t-Test). The distribution of systolic blood pressure was normal and variance homogeneity was assumed (Table 4.3.5).

Mean of diastolic blood pressure in male teachers was 81.91 ± 10.65 mmHg and in female teachers was 82.39 ± 10.97 mmHg; this difference was not statistically significant p-value=0.618 (Independent Sample t-Test). The distribution of systolic blood pressure was normal and variance homogeneity was assumed (Table 4.3.5).

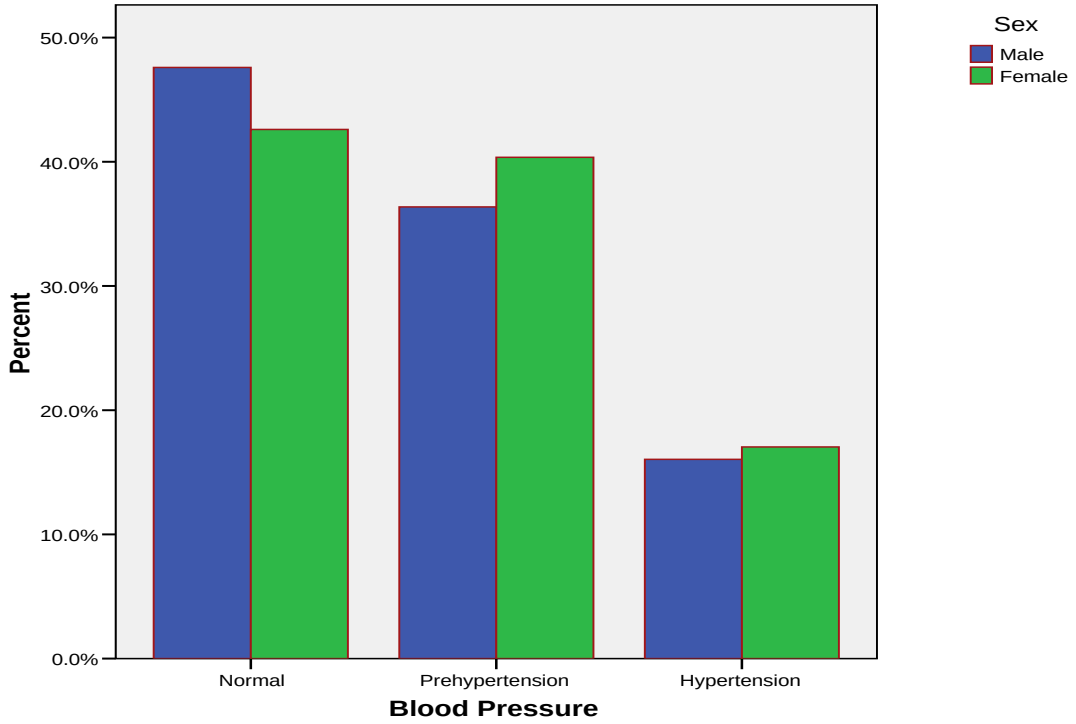

Figure 4.3.3. Distribution of teachers by blood pressure level and sex (Kabul City-Afghanistan, 2014)

Table 4.3.6. Distribution of teachers by blood pressure and age (Kabul City-Afghanistan, 2014)

	NBP		Pre-H.		HBP		Total*	
Age	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
<30	92	63.0	45	30.8	9	6.2	146	25.1
30-39	61	52.1	46	39.3	10	8.5	117	20.1
40-49	69	39.0	71	40.1	37	20.9	177	30.5
50-59	30	26.5	49	43.4	34	30.1	113	19.4
≥60	6	21.4	13	46.4	9	32.1	28	4.8
Total	258	44.4	224	38.6	99	17.0	581**	100.0
p-value<0.001								

* Column percentages; others are row percentages.

** 52 none-responses

The high blood pressure was significantly lower in <40 years age group and it was high in the age group ≥40 years. It was observed that hypertension is significantly associated with the increasing age with the p-value<0.001 and lower in the younger and mid-younger age groups.

Mean of systolic blood pressure in teachers aged lower than 40 years was 115.75±14.66 mmHg and in teachers aged higher than 40 years was 126.17±18.42 mmHg; this differences were statistically significant p-value<0.001. The distribution of systolic blood pressure was normal and variance homogeneity was not assumed (Table 4.3.7). Mean of diastolic blood pressure in teachers aged lower than 40 years was 78.93±9.54 mmHg and in teachers aged higher than 40 years was 84.80 ±11.37 mmHg; this difference were statistically significant p-value<0.001 (Independent Sample t-Test). The distribution of systolic blood pressure was normal and variance homogeneity was not assumed (Table 4.3.7).

Table 4.3.7. Descriptive statistics of the blood pressure of teachers by age group (year) (Kabul City- Afghanistan, 2014)

Statistics	**<40 (n=263)**	**≥40 (n=318)**	**Total (n=581)**	**p-value**
Systolic BP				
Mean ± SD	115.75 ± 14.66	126.17 ± 18.42	121.44 ± 17.39	
Median	112	122	122	
1st Quartile	105	112	112	<0.001
3rd Quartile	122	142	132	
Min-Max	82 - 190	82 – 200	82 – 200	
Diastolic BP				
Mean ± SD	78.93 ± 9.54	84.80 ± 11.37	82.25 ± 10.87	
Median	80	82	82	
1st Quartile	72	80	72	<0.001
3rd Quartile	85	92	90	
Min-Max	57 - 120	57 – 130	57 – 130	

Between systolic blood pressure and age there was a moderate and positive correlation (+0.35) and it was statistically significant p<0.001. Figure 4.3.4 showed the correlation of systolic blood pressure and age by scatterplot graph. Between diastolic blood pressure and age there was also a weak and positive correlation (+0.297) and it was statistically significant p<0.001. Figure 4.3.5 showed the correlation of diastolic blood pressure and age by scatterplot graph.

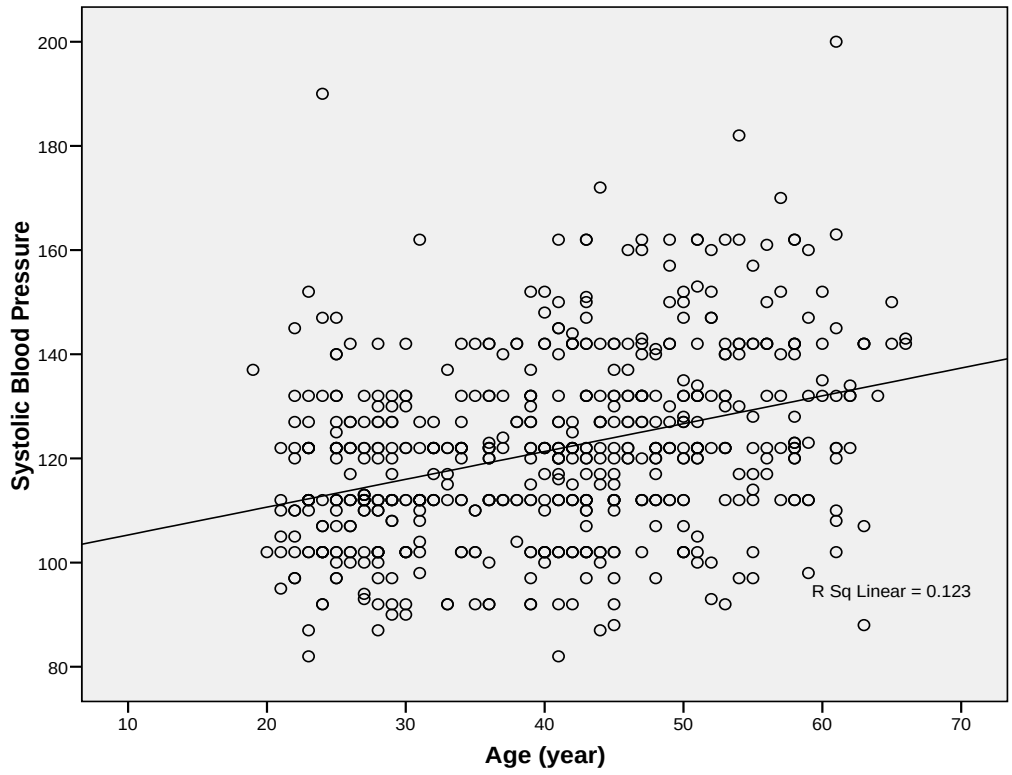

Figure 4.3.4. Scatterplot of age and systolic blood pressure of teachers (Kabul City-Afghanistan, 2014)

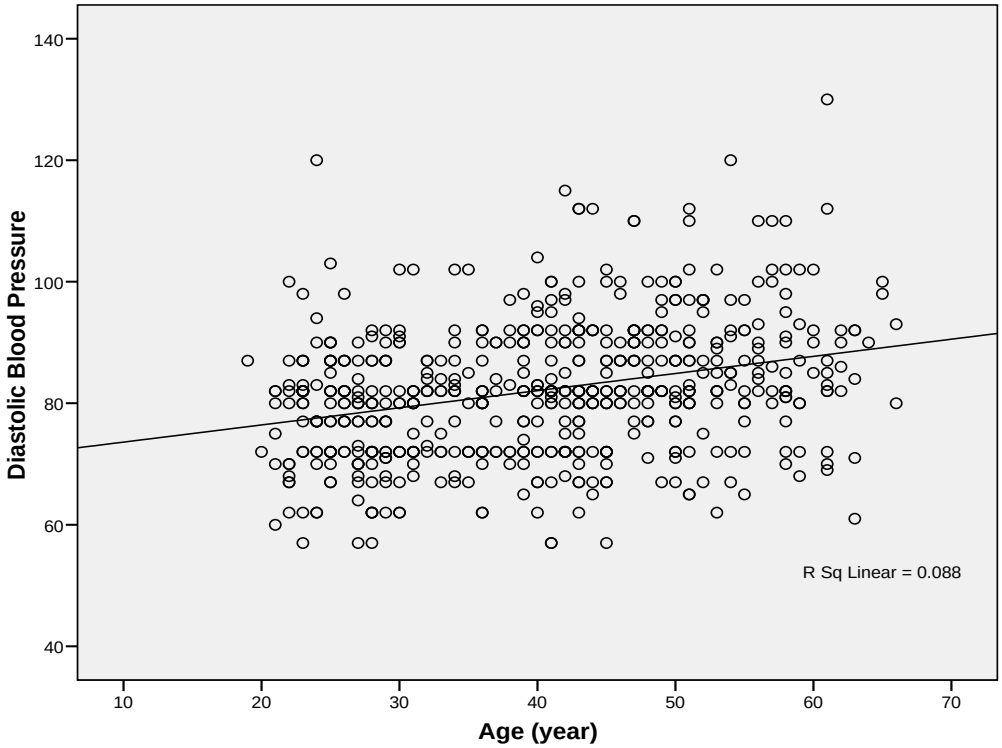

Figure 4.3.5. Scatterplot of age and diastolic blood pressure of teachers (Kabul City-Afghanistan, 2014)

Table 4.3.8. Distribution of teachers by blood pressure and marital status (Kabul City-Afghanistan, 2014)

	NBP		Pre-H.		HBP		Total*	
Marital status	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Never Married	63	40.6	71	45.8	21	13.5	155	24.5
Ever Married	216	45.2	177	37.0	85	17.8	478	75.5
Total	279	44.1	248	39.2	106	16.7	633	100.0
p-value=0.129								

* Column percentages; others are row percentages.

Among single teachers the prevalence of hypertension was 13.5% and in married teachers it was 17.8%; the difference was not statistically significant (p=0.129) (Table 4.3.8).

Table 4.3.9. Distribution of teachers by blood pressure and level of educational (Kabul City-Afghanistan, 2014)

Educational level	NBP		Pre-H.		HBP		Total*	
	n	%	n	%	n	%	n	%
High school	23	41.1	22	39.3	11	19.6	56	8.8
Teachers Institute	159	43.9	144	39.8	59	16.3	362	57.2
Bachelor's degree	97	45.1	82	38.1	36	16.7	215	34.0
Total	279	44.1	248	39.2	106	16.7	633	100.0
p-value=0.965								

* Column percentages; others are row percentages.

Prevalence of hypertension was higher (19.6%) among teachers with the educational level of high school than others; the difference was not statistically significant (p=0.965) (Table 4.3.9).

Table 4.3.10. Distribution of teachers by blood pressure and number of children (Kabul City-Afghanistan, 2014)

Number of Children	NBP		Pre-H.		HBP		Total*	
	n	%	n	%	n	%	n	%
0	15	65.2	6	26.1	2	8.7	23	4.8
1-4	146	54.1	87	32.2	37	13.7	270	56.6
≥5	49	26.6	89	48.4	46	25.0	184	38.6
Total	210	44.0	182	38.2	85	17.8	477**	100.0
p-value<0.001								

* Column percentages; others are row percentages.

** 156 none responses.

Prevalence of hypertension was higher among those teachers that had more than 4 children than teachers with less than 5 children; the difference was statistically significant (p<0.001) (Table 4.3.10).

Table 4.3.11. Distribution of teachers by hypertension status and family type (Kabul City-Afghanistan, 2014)

Family type	NBP		Pre-H.		HBP		Total*	
	n	%	n	%	n	%	n	%
Nuclear	143	41.8	140	40.9	59	17.3	342	54.0
Extended	136	46.7	108	37.1	47	16.2	291	46.0
Total	279	44.1	248	39.2	106	16.7	633	100.0
p-value=0.457								

* Column percentages; others are row percentages.

Among teachers that had nuclear family prevalence of hypertension was 17.3% and in teachers that had extended family prevalence of hypertension was 16.2% but this difference statistically was not significant (p=0.457) (Table 4.3.11).

Table 4.3.12. Distribution of teachers by blood pressure and number of house hold member (Kabul City-Afghanistan, 2014)

Number of House Hold Member	NBP		Pre-H.		HBP		Total*	
	n	%	n	%	n	%	n	%
≤4	53	54.1	28	28.6	17	17.3	98	16.1
5-8	146	42.4	141	41.0	57	16.6	344	56.6
≥9	71	42.8	67	40.4	28	16.9	166	27.3
Total	270	44.4	236	38.8	102	16.8	608	100
p-value=0.224								

* Column percentages; others are row percentages.

Prevalence of pre-hypertension was higher in teachers who had more than 4 house hold members than teachers less than 5 house hold members; the difference was not statistically significant (p=0.224) (Table 4.3.12).

Table 4.3.13. Distribution of teachers by blood pressure and perceived economic status (Kabul City-Afghanistan, 2014)

Perceived Economic Status	NBP		Pre-H.		HBP		Total*	
	n	%	n	%	n	%	n	%
Good	78	42.4	66	35.9	40	21.7	184	29.1
Medium	143	41.8	145	42.4	54	15.8	342	54.0
Bad	58	54.2	37	34.6	12	11.2	107	16.9
Total	279	44.1	248	39.2	106	16.7	633	100.0
p-value=0.042								

* Column percentages; others are row percentages.

Among teachers that stated their economic status good the prevalence of hypertension was 21.7%, in teachers that stated their economic status medium the prevalence of hypertension was 15.8% and in teachers that stated their economic status as bad the prevalence of hypertension was 11.2%; the differences were statistically significant (p=0.042) (Table 4.3.13).

Table 4.3.14. Distribution of teachers by blood pressure and obesity status (Kabul City-Afghanistan, 2014)

Obesity Status	NBP		Pre-H.		HBP		Total*	
	n	%	n	%	n	%	n	%
Under weight	17	73.9	5	21.7	1	4.3	23	3.6
Normal	141	56.9	74	30.6	31	12.5	248	39.2
Over weight	95	38.5	109	44.1	43	17.4	247	39.0
Obese	26	22.6	58	50.4	31	27.0	115	18.2
Total	279	44.1	248	39.2	106	16.7	633	100.0
p-value<0.001								

* Column percentages; others are row percentages.

The prevalence of hypertension was high among obese teachers (27.0%) than other teachers and it was statistically significant (p<0.001) (Table 4.3.14).

The correlation between systolic blood pressure and BMI was a positive and moderate correlation (0.335), it was statistically significant p<0.001. Figure 4.3.6 showed the correlation of systolic blood pressure and BMI by scatterplot graph. Between diastolic blood pressure and BMI there was also a positive and moderate correlation (0.324) and it was statistically significant p<0.001. Figure 4.3.7 showed the correlation of diastolic blood pressure and BMI by scatterplot graph.

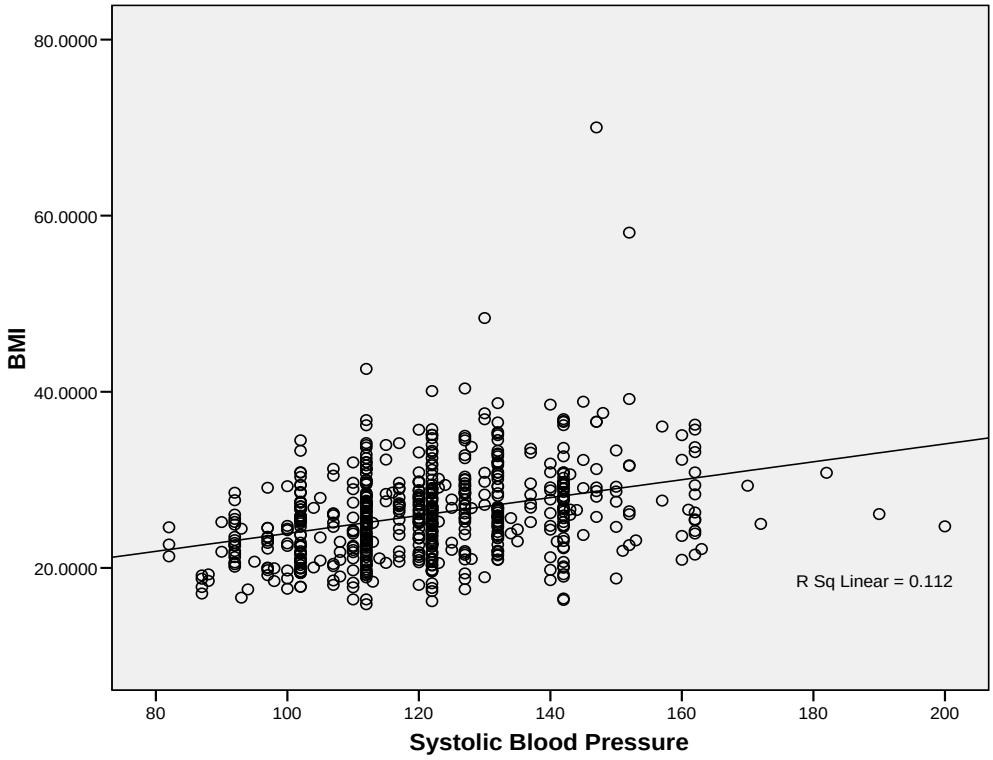

Figure 4.3.6. Scatterplot of systolic blood pressure and BMI of teachers (Kabul City-Afghanistan, 2014)

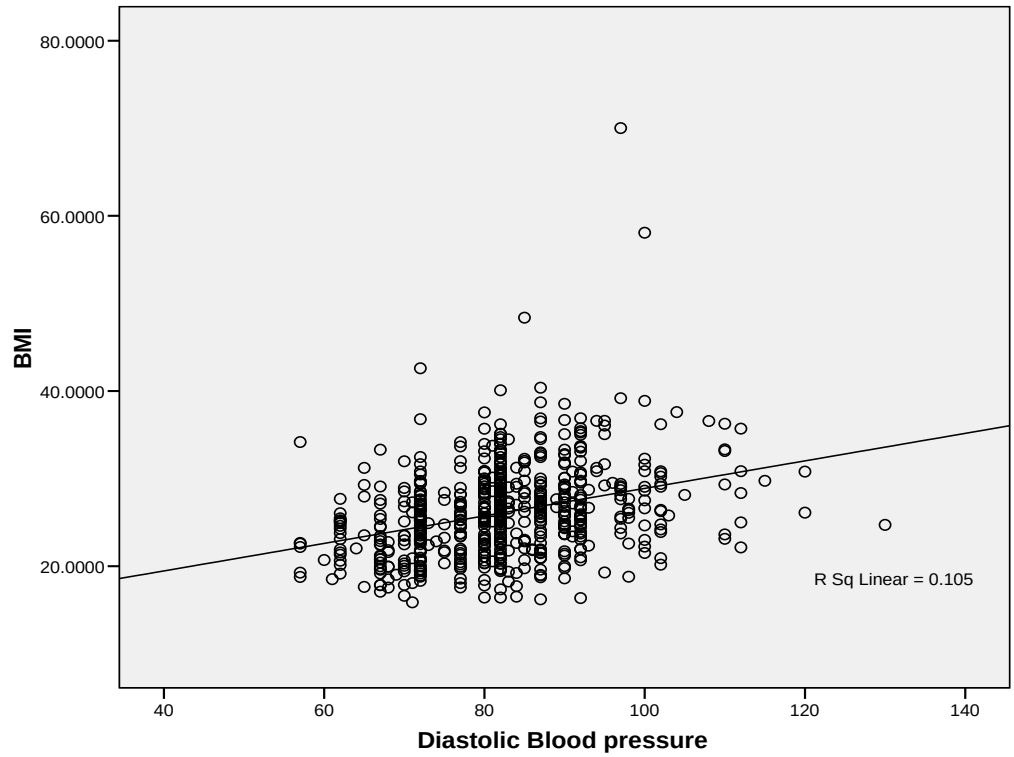

Figure 4.3.7. Scatterplot of diastolic blood pressure and BMI of teachers (Kabul City-Afghanistan, 2014)

Table 4.3.15. Distribution of teachers by blood pressure and physical activity status (Kabul City-Afghanistan, 2014)

Physical Activity Status	NBP		Pre-H.		HBP		Total*	
	n	%	n	%	n	%	n	%
Never	74	45.7	63	38.9	25	15.4	162	25.6
Ever	205	43.5	185	39.3	81	17.2	471	74.4
Total	279	44.1	248	39.2	106	16.7	633	100.0
p-value=0.837								

* Column percentages; others are row percentages.

The prevalence of hypertension was high among those teachers that did physical activity (17.2%) but it was not statistically significant (p=0.837) (Table 4.3.15).

Table 4.3.16. Distribution of teachers by blood pressure and level of life satisfaction (Kabul City-Afghanistan, 2014)

Level of Life Satisfaction	NBP		Pre-H.		HBP		Total*	
	n	%	n	%	n	%	n	%
Dissatisfied	37	57.8	20	31.3	7	10.9	64	10.1
Medium	91	41.2	97	43.9	33	14.9	221	34.9
Satisfied	151	43.4	131	37.6	66	19.0	348	55.0
Total	279	44.1	248	39.2	106	16.7	633	100.0
p-value=0.077								

* Column percentages; others are row percentages.

Prevalence of hypertension was high among teachers that satisfied from their life (19.0%) then other teachers but it was not statistically significant (p=0.077) (Table 4.3.16).

Table 4.3.17. Distribution of teachers by blood pressure and self-reported health status (Kabul City-Afghanistan, 2014)

Self-Reported Health Status	NBP		Pre-H.		HBP		Total*	
	n	%	n	%	n	%	n	%
Good	119	43.9	111	41.0	41	15.1	271	42.8
Medium	134	44.5	117	38.9	50	16.6	301	47.6
Bad	26	42.6	20	32.8	15	24.6	61	9.6
Total	279	44.1	248	39.2	106	16.7	633	100.0
p-value=0.467								

* Column percentages; others are row percentages.

Prevalence of hypertension was high among those teachers stated their health status as bad than other teachers but it was not statistically significant (p=0.467) (Table 4.3.17).

Table 4.3.18. Distribution of teachers by blood pressure and their attention to health (Kabul City-Afghanistan, 2014)

Attention to Health	NBP		Pre-H.		HBP		Total*	
	n	%	n	%	n	%	n	%
Much	140	43.1	128	39.4	57	17.5	325	51.3
Moderate	107	46.5	86	37.4	37	16.1	230	36.3
Little	32	41.0	34	43.6	12	15.4	78	12.3
Total	279	44.1	248	39.2	106	16.7	633	100.0
p-value=0.845								

* Column percentages; others are row percentages.

Prevalence of hypertension was higher in teachers (17.5%) who stated that they pay attention to health much than teachers who pay attention moderate or little (16.1% and 15.4% respectively); the difference was not statistically significant (p=0.845) (Table 4.3.18).

Table 4.3.19. Distribution of teachers by blood pressure and additional salt intake (Kabul City-Afghanistan, 2014)

Additional Salt Intake	NBP		Pre-H.		HBP		Total*	
	n	%	n	%	n	%	n	%
No	175	38.1	190	41.4	94	20.5	459	72.5
Yes	104	59.8	58	33.3	12	6.9	174	27.5
Total	279	44.1	248	39.2	106	16.7	633	100.0
p-value<0.001								

Prevalence of hypertension was higher in teachers who didn't use additional salt (20.5%) than teachers who used (6.9%); the difference was statistically significant (p<0.001) (Table 4.3.19).

Table 4.3.20. Distribution of teachers by blood pressure and debt
(Kabul City-Afghanistan, 2014)

	NBP		Pre-H.		HBP		Total*	
Debt Status	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
No	155	42.1	144	39.1	69	18.8	368	58.3
Yes	123	46.8	103	39.2	37	14.1	263	41.7
Total	278	44.1	247	39.1	106	16.8	631**	100.0
p-value=0.252								

* Column percentages; others are row percentages.

** 2 none responses

Prevalence of hypertension was higher among teachers who hadn't debt (18.8) than teachers who had debt (14.1%); the difference was not statistically significant (p=0.252) (Table 4.3.20).

Table 4.3.21. Distribution of teachers by blood pressure and chronic patient at home
(Kabul City-Afghanistan, 2014)

Chronic Patient at Home	NBP		Pre-H.		HBP		Total*	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
No	172	46.0	135	36.1	67	17.9	374	59.9
Yes	100	40.0	111	44.4	39	15.6	250	40.1
Total	272	43.6	246	39.4	106	17.0	624**	100.0
p-value=0.115								

* Column percentages; others are row percentages.

** 9 none responses

Prevalence of pre-hypertension was higher in teachers who had chronic patient at home (44.4%) than teachers who hadn't (36.1%); the difference was not statistically significant (p=0.115) (Table 4.3.21).

Table 4.3.22. Distribution of teachers by blood pressure and working hours (Kabul City-Afghanistan, 2014)

Working hours	NBP		Pre-H.		HBP		Total*	
	n	%	n	%	n	%	n	%
4 hours	229	44.3	204	39.5	84	16.2	517	81.7
8 hours	50	43.1	44	37.9	22	19.0	116	18.3
Total	279	44.1	248	39.2	106	16.7	633	100.0
p-value=0.777								

* Column percentages; others are row percentages.

Among teachers that worked half day the prevalence of hypertension was 16.2% and in teachers that worked full day prevalence of hypertension was 19.0% but this difference statistically was not significant (p=0.777) (Table 4.3.22).

Table 4.3.23. Distribution of teachers by blood pressure and sleeping hours (Kabul City-Afghanistan, 2014)

Sleeping Hours	NBP		Pre-H.		HBP		Total*	
	n	%	n	%	n	%	n	%
<7	101	43.7	90	39.0	40	17.3	231	39.2
7-8	134	44.4	112	37.1	56	18.5	302	51.2
>8	24	42.1	29	50.9	4	7.0	57	9.7
Total	259	43.9	231	39.2	100	16.9	590**	100.0
p-value=0.186								

* Column percentages; others are row percentages.

** 43 none responses.

Prevalence of pre-hypertension was higher among those teachers who slept more than eight hours per day (50.9%) than other teachers; the difference was not statistically significant (p=0.186) (Table 4.3.23).

Table 4.3.24. Distribution of teachers by blood pressure and family history of hypertension (Kabul City-Afghanistan, 2014)

Family History of Hypertension	NBP		Pre-H.		HBP		Total*	
	n	%	n	%	n	%	n	%
No	207	43.7	192	40.5	75	15.8	474	74.9
Yes	72	45.3	56	35.2	31	19.5	159	25.1
Total	279	44.1	248	39.2	106	16.7	633	100.0
p-value=0.391								

* Column percentages; others are row percentages.

Prevalence of hypertension was higher among those teachers (19.5%) who had family history of hypertension than teachers who hadn't (15.8%); the difference was not statistically significant p-value=0.391 (Table 4.3.24).

Table 4.3.25. Distribution of teachers by blood pressure and some symptoms related to hypertension (Kabul City-Afghanistan, 2014)

Symptoms (n=633)	NBP		Pre-H.		HBP		Total*	
	n	%	n	%	n	%	n	%
Headache							p-value=0.461	
• **No**	167	42.3	158	40.0	70	17.7	395	62.4
• **Yes**	112	47.1	90	37.8	36	15.1	238	37.6
Dizziness							p-value=0.007	
• **No**	189	40.4	196	41.9	83	17.7	468	73.9
• **Yes**	90	54.5	52	31.5	23	13.9	165	26.1
Blurry vision							p-value=0.002	
• **No**	189	47.4	159	39.8	51	12.8	399	63.0
• **Yes**	90	38.5	89	38.0	55	23.5	234	37.0
Chest pain							p-value=0.350	
• **No**	253	44.5	244	39.4	91	16.0	568	253
• **Yes**	26	40.0	24	36.9	15	26.1	65	26
Total	279	44.1	248	39.2	106	16.7	633	100.0

* Column percentages; others are row percentages.

Prevalence of hypertension was higher in teachers who complained from blurry vision and chest pain than teachers who didn't; the difference was statistically significant only for blurry vision (p=0.002). Prevalence of hypertension was lower in teachers who complained form headache and dizziness than teachers who didn't; the difference was statistically significant only for dizziness (p=0.007) (Table 4.3.25).

Logistic regression analysis was done to test the strength of association between the independent variables which have an p-value <0.2 (sex, age, number of children, marital status, life satisfaction, economical status, obesity status, chronic patient at home and sleeping hours) and hypertension, except additional salt intake that has showed an inverse relation than expected. This situation might ruin the other relations between dependent and independent variables and thought that the teachers

who were already diagnosed hypertension might change their life habits according to their problem. The analysis was performed by using binary logistic regression and backward conditional method. Odds Ratio (OR) with corresponding 95% Confidence Interval (CI) was used to estimate the strength of association between the retained independent predictors of hypertension. Three models were tested: in the first model, dependent variable was categorized as "normal and pre-hypertensive" versus "hypertensive" (Table 4.3.26). In the second model, pre-hypertensive teachers were removed from analysis and the dependent variable was categorized as "normal" versus "hypertensive" (Table 4.3.27). In the last model, hypertensive teachers were removed from analysis and the dependent variable was categorized as "normal" versus "pre-hypertensive" (Table 4.3.28).

Table 4.3.26. The remaining independent risk factors for hypertension at the end of the logistic regression analysis for school teachers (normotensive and pre-hypertensives versus hypertensives) (Kabul City-Afghanistan, 2014)

Independent variable (n=414*)		**β**	**SE**	**p-value**	**OR**	**95% CI**
Age	<40**				1	
	40-49	1.11	0.42	0.009	3.04	1.32-6.99
	≥50	1.71	0.43	<0.001	5.54	2.39-12.82
Economic Status	Bad**				1	
	Medium	0.99	0.42	0.018	2.70	1.18-6.15
	Good	1.29	0.46	0.006	3.62	1.45-9.03
No of Children	≤4**				1	
	≥5	0.71	0.33	0.034	2.03	1.06-3.90

* 219 none responses.

** Reference category.

Table 4.3.26 shows results of comparing normotensive and pre-hypertensive as a group with hypertensive teachers. Odds Ratios (ORs) revealed that participants ≥ 50 years were 5.54 (95% CI= 2.39-12.82) ($p<0.001$) times more likely to have hypertension than the

participants with < 40 years, participants who stated their economical status as "good" 3.62 (95% CI= 1.45-9.03) (p=0.006) times more likely to have hypertension than bad and hypertension occurred also 2.03 (95% CI= 1.06-3.90) times more among teachers who had more than 4 children than others.

Table 4.3.27. The remaining independent risk factors for hypertension at the end of the logistic regression analysis for school teachers (normotensive and pre-hypertensives versus hypertensives) (Kabul City-Afghanistan, 2014)

Independent variable (n=256*)		**β**	**SE**	**p-value**	**OR**	**95% CI**
Age	<40**				1	
	40-49	1.07	0.47	0.024	2.91	1.15-7.35
	≥50	2.16	0.49	<0.001	8.66	3.29-22.83
Economic Status	Bad**				1	
	Medium	1.19	0.49	0.014	3.30	1.27-8.59
	Good	1.34	0.54	0.013	3.83	1.32-11.09
No of Children	≤4**				1	
	≥5	0.98	0.40	0.013	2.68	1.23-5.84
Obesity Status	Normal**					
	Pre-obese	0.38	0.37	0.306	1.47	0.70-3.07
	Obese	1.28	0.46	0.005	3.61	1.46-8.95

* 129 none responses and pre-hypertensive teachers were removed.

** Reference category.

Table 4.3.27 shows results of comparing normotensive with hypertensive. When the pre-hypertensive removed from the model, Odds Ratios (ORs) revealed that participants ≥ 50 years were 8.66 (95% CI= 3.29-22.83) (p<0.001) times more likely to have hypertension than the participants with < 40 years. Hypertension occurred also 3.83 (95% CI= 1.32-11.09) (p=0.013) times more among teachers which stated their economical status as good than bad, teachers with the BMI ≥ 30, 3.61 (95% CI= 1.46–8.95) (p=0.005) times more likely to have

hypertension than teachers with BMI less than 25 and teachers who had more than four children 2.68 (95% CI= 1.23-5.84) (p=0.009) times more likely to have hypertension than others.

Table 4.3.28. The remaining independent risk factors for pre-hypertension at the end of the logistic regression analysis for school teachers (Kabul City-Afghanistan, 2014)

Independent variable (n=336*)		**β**	**SE**	**p-value**	**OR**	**95% CI**
Age	<40**				1	
	40-49	0.41	0.27	0.133	1.51	0.88-2.58
	≥50	1.39	0.31	<0.001	4.02	2.19-7.38
Obesity Status	Normal**				1	
	Pre-obese	0.90	0.27	0.001	2.46	1.45-4.19
	Obese	1.64	0.34	<0.001	5.17	2.62-10.22

* Reference category.

** 191 none responses and hypertensive teachers were removed.

Table 4.3.28 shows results of comparing normotensive with pre-hypertensive teachers. Odds Ratios (ORs) revealed that participants ≥ 50 years were 4.02 (95% CI= 2.19-7.38) (p<0.001) times more likely to have pre-hypertension than the participants with < 40 years. Hypertension occurred also 5.17 (95% CI= 2.62-10.22) (p<0.001) times more among teachers with the BMI ≥ 30 than teachers with the BMI less than 25.

5. DISCUSSION

This study assessed the prevalence and related factors of hypertension among school teachers in Kabul City-Afghanistan. The data gathered form 633 teachers based on the objectives of the study.

The prevalence of hypertension among school teachers in Kabul City was found as 16.7%.

5.1. Socio Demographic Characteristics of the Teachers

Seventy point five percent of the teachers in the study group were female; female/ male ratio was 2.38 and the mean age of the teachers was 40.23 ± 11.53 years (Table 4.1.2). Due to the security concerns female employers gathered in big cities such as Kabul, Herat and Mazar in Afghanistan. The reason of the high percentage of female teachers might be this situation. On the other hand, in Afghanistan, parents and elder brothers as well as family elders do not let the young female family members to be the occupations which considered as "male occupations" like engineering etc. parallel to this trend, most of the females tend to be physician or teacher in Afghanistan. More than three fourth of the teachers (75.5%) in the study group were married and only two teachers were separated from their husbands (Table 4.1.4). In Afghanistan divorce is associated with loss of esteem. In general, the stigma is greater for the women, but even men lose status as a consequence of divorce. According to culture and customs of Afghanistan, termination of marriage by either part is regarded as a disgrace, and the social stigma attached to it usually compel couples to remain married. The mean number of children was 3.95 ± 2.18. More than one third of the teachers (38.5%) had more than four children (Table 4.1.5). The total fertility rate in Afghanistan is 5.1 (93), and the proportion of children under 15 years old is among highest in the world and significantly higher than neighbor countries (85). Early marriage and less family planning method use also influence the number of children (94, 95). More than half of the teachers (54.0%) have nuclear family (Table 4.1.6). For the rest of the most of the population in Afghanistan, this figure could be lower since the study group was consisted of highly educated people and they could tend to have nuclear family. However the mean number of household members was 7.41 ± 3.43. More than one-fourth of the teachers (27.3%) had more than 9 household members (Table 4.1.7). In a study done in Khama

District of Nangarhar Province-Afghanistan, the mean number of household members was found as 10.7 ± 3.5 and 29.2% of the participants had more than 13 household members (96). The difference may be due to difference in level of education of the two study groups.

More than half of the teachers (54.0%) stated their economic status as medium, 22.3% as good and 14.4% as bad (Table 4.1.8). Usually, the economic condition of teachers in Afghanistan is not good. Teachers are financially one of the worst hit people of the society. The teachers in Afghanistan have the lowest salary among the world teachers, which is about 5000 Afghanis (100 USD). Only around 6 percent of the national budget was being used on education sector in 2005 but right now, it could be higher (97). This figure for Turkey in 2014 was 12.8% (98)

5.2. Characteristics Related to Hypertension

Almost one-fifth of the teachers were obese (18.2%) and 39.0% of them were pre-obese. The prevalence of obesity and pre-obesity were significantly higher in female teachers than males ($p<0.001$) (Table 4.2.1). A study which was done on school teachers in Jeddah, Saudi Arabia found the prevalence of obesity as 35.8% and pre-obesity as 36.8% (83). Another study done on female school teachers in Basrah-Iraq found the prevalence of obesity as 37.7% and pre-obesity 40.9% (84). Although the pre-obesity prevalence was similar with the countries in the region but the obesity prevalence was lesser in the study group than those countries. The discrepancy could be sourced from differences of dietary habits of three study groups. The prevalence of obesity was lower in teachers than other citizens of Kabul City (13).

Seven point nine percent of the teachers (n=50) stated that they kept in training, more than half of them occasionally (66.5%) and one-fourth of them were not physically active (25.6%) (Table 4.2.4). This finding is in agreement with a study done by Ibrahim et al. (2007) found 53.0% of teachers did physical activity in their life (83). Physical activity is not common in Afghanistan especially among females because there aren't any places to do physical activity.

More than 75% of the teachers stated their dietary habits healthy and 3.3% of them as unhealthy. Females' dietary habits were healthy than males ($p=0.017$) (Table 4.2.6). A

study done by Lars Johansson et al. (1999) in Norway found which 55.7% of males in the study group pay attention to healthy diet as "moderate" and 28.3% as "high". 54.5% of females pay attention to healthy diet as "moderate" and 38.8% as "high" (99). One-fourth of the teachers used additional salt (27.5%) (Table 4.2.7). A study done by Janki Bartwal et al. (2013) in Haldwani Uttarakhand, India revealed that 40.65% of the participants used additional salt (100). It might be sourced from differences in level of knowledge of two study groups.

Twenty two point sex percent of the teachers did diet in last year (Table 4.2.8). Almost half of the teachers had taken milk and milk products once a day; more than half of them had taken meat, egg and bean many times a week; more than two-third had taken fresh vegetable and fruits once a day; 88.6% of the teachers had taken bread many times a day and 36.0% had never taken cola or soda (Table 4.2.9). Generally dietary habits of the teachers are good and it could be sourced from high level of education and knowledge about healthy food.

Opposite to the neighbor and western countries, (101) ninety-one point three percent (n=574) of the teachers in the study group never smoked in their life; ever smoking prevalence was 8.7%. Among smokers, only two of them were female (Table 4.2.10). This result is in agreement with the findings of chronic disease risk factors study in Kabul that showed 86.7% of the participants was never smoked (14). The prevalence of ever smokers was very low in the study group than the Jeddah school teachers' study (83). The difference could be sourced that smoking is not common in Afghanistan and culturally it is assumed bad behavior. Alcohol consumption was also in low level; only 1.3% (n=8) of the teachers stated that they consumed alcohol in their life and only one of them was female (Table 4.2.11). The prevalence of current alcohol consumers among population aged ≥ 15 years in Turkey (2003) was 25.6% (102). Consumption of alcohol is also not accepted in Afghanistan since Afghanistan is an Islamic country, and according to Afghanistan laws, using of alcohol accepted as a crime (103). Only two teachers (0.3%) stated that they have consumed addictive substances in their life (Table 4.2.12). In fact, consumption of addictive substances is more common than alcohol in Afghanistan; Afghanistan is one of the biggest producers of opium in the world (104). The low level of addictive substance consumption

could be related to the educational characteristic of the study group who were highly educated people.

More than one-fourth of the teachers had a chronic disease diagnosed by a physician (28.0%); there was no difference by sex (p=0.168) Among 633 teachers, 86 of them had hypertension (13.6%) 71 had kidney disease (11.2%), 21 had diabetes (3.3%) and 22 teachers had cardiac diseases (3.5%) (Table 4.2.13). In America 45.0% of the adults aged 18 to 64 years had at least one chronic condition and 20.0% of them had two or more chronic conditions (105). This percentage might be high for teachers and it could be sourced from low economical status.

Forty-two point eight percent of the teachers stated their health status "good" or "excellent" and only 9.6% of them stated their health status as "bad" or "very bad" (Table 4.2.14). Half of the teachers stated that they pay attention to their health "very much" and "much" (51.4%), one-third of the teachers as "medium" and 9.5% of them stated as "little" (Table 4.2.15). As it is expected, the teachers' pay attention to their health more than the ordinary people; it could be sourced from the high level of education as well as their role status in the population.

More than half of the teachers stated that they were satisfied form their life (55.0%), one-third of them (34.9%) neither satisfied nor dissatisfied and 10.1% dissatisfied (Table 4.2.16). It could be sourced from low economical status and security concerns in Afghanistan. There are some countries that had the highest life satisfaction rate in the world such as Canada, Denmark, Norway and Switzerland (106).

Some characteristic considered as source of stress were also asked; 41.7% of the teachers had debt; 40.1% had chronic patient at home and 10.1% had problem with family members; these percentages were high in males than females except problem with family members (Table 4.2.17).

The mean value of sleeping hours in teachers was in a normal range however, 39.2% of them slept less than 7 hours per day. Female teachers slept more than males (p=0.01) (Table 4.2.18). This might be sourced from the short working hours of female teachers.

One fourth of the teachers had family history of hypertension (25.1%) with a significant increase in female teachers (27.6%) than males (19.3%) (p=0.046) (Table 4.2.20). There are some symptoms thought to be related with hypertension such as headache, dizziness, blurry vision and chest pain (107); more than one-third of the teachers had headache and blurry vision (37.6% and 37.0%, respectively), one fourth of them dizziness (26.1%) and 10.3% chest pain. The hypertension symptoms were higher in female teachers than males (Table 4.2.21). About half of the teachers have at least one symptom related to hypertension and it would be pave the ground for developing hypertension in the future.

Among 633 teachers, only 13.0% of them were following their blood pressure at home (females 15.0% and males 8.0%) (p=0.017) (Table 4.2.22). It is thought that, in Afghanistan, most of the people don't know how to check blood pressure and don't have sphygmomanometer in their homes.

5.3. Hypertension Status and Related Factors

The present study revealed that the overall prevalence of hypertension among teachers was 16.7% and pre-hypertension was 39.2% (hypertension in teachers aged 40 years or older was 25.2% and pre-hypertension was 41.8%). Saeed et al. reported a prevalence rate of 33.0% hypertension and 48.5% of pre-hypertension among Kabul citizen aged 40 years or older in 2012 (13). This discrepancy may be due to the differences of the composition of two study groups (teachers versus all population) and use of different measurement instruments in two studies. Result of a study in Jeddah-Saudi Arabia which was performed on school teachers aged 22 to 60 years showed that the prevalence of hypertension was 25.2% and pre-hypertension was 43.0% (83) while another study conducted in Basrah-Iraq reported a prevalence of 21.3% hypertension and 20.4% pre-hypertension among female school teachers aged 22 to 61 years (84). Similar rate (18.6%) to this study was also reported among adults aged 30 years or older from Iran (108) and adults aged 18 years or more from India (16.1%) (109).

A higher rate than that of the current study (26.2%) was reported from a multi-centric cross sectional study performed in five great cities of Iran (110) and TEKHARF study in Turkey (31.8%) in the year 2003 (75). The prevalence of hypertension found to be lower in the school teachers than other people and also it is lower from school teachers of

other countries. This could be due to the low consumption of fatty foods and high consumption of fresh fruit, fresh/cooked vegetables and fruit juice, and high prevalence of physical activity of teachers. Among self-reported hypertensive cases 16.4% of them were controlled, 31.1 % of them shifted to the pre-hypertension group and 52.5% of them uncontrolled (Table 4.3.3). It thought to teachers did not take their medicine on time.

Prevalence of hypertension in the study group was slightly higher in female teachers (17.0%) than males (16.0%) but it was not statistically significant (p=0.507) (Table 4.3.4). Similar differences were obtained from Saeed et al study (44.9% and 48.8% respectively) (14). Mean of systolic blood pressure in male teachers was 121.04±16.66 mmHg and in female teachers was 121.61±17.71mmHg; the difference was not statistically significant (p=0.710) as of diastolic blood pressure (male teachers was 81.91±10.65 mmHg, female teachers was 82.39±10.97mmHg) (p=0.618) (Table 4.3.5). This finding is in contradiction with a study done by Vijaya Kumar et al. (2013) on school teachers in Warangal, Andhra Pradesh, India. This study showed that the mean of systolic and diastolic blood pressure was higher in male teachers than females (111). It could be sourced from cultural and dietary habits differences of two study groups.

In the present study, the prevalence of hypertension was increased with the advancing age (p<0.001), which agrees with the results of the studies from Saudi Arabia (83), Portugal (112), China (113), Canada (I14) and Philippines (115). As revealed in a similar study conducted by Shirakawa et al. (2006) which demonstrated old age as a potential risk factor for high blood pressure (116). Similarly, a study conducted by Xing Lin Feng et al. (2012) showed that hypertension is a major public health concern in all ages but especially in the elderly (117). A community based cross sectional study done by Helelo et al. (2013) in Ethiopia, found the prevalence of hypertension higher in age 41 to 50 years old participants than 31 to 40 years old (118).

The prevalence of hypertension among single school teachers was 13.5% and in married teachers 17.8%, however this difference was not found statistically significant (p=0.129) (Table 4.3.8). Similarly Ibrahim et al. (2007)

found the prevalence of hypertension higher among married teachers than others (83).

Prevalence of hypertension was higher among those teachers that had more than 4 children than teachers with less than 5 children; the difference was statistically significant ($p<0.001$) (Table 4.3.10). No study could be found which examines this relation in the literature. It is thought that this difference might be related to increasing in responsibility and this could be considered as a reason for stress. Besides, due to the composition of the study group, even the prevalence was slightly higher among females, the highest hypertension prevalence in the group who had 5 or more children could be related to the parity.

The prevalence of hypertension among teachers with nuclear family was 17.3% and in teachers with extended family was 16.2%; the difference was not statistically significant ($p=0.457$) (Table 4.3.11). This finding is not in agreement with a study done by Ibrahim et al. (2007) the prevalence was higher among teachers who lived in extended family than others (83).

Even the difference was not statistically significant ($p=0.224$), the prevalence of hypertension was similar between teachers who had more than 4 house hold members and less than 5 house hold members while the prevalence of pre-hypertension was higher in teachers who had more than 4 house hold members than less than 5 house hold members (Table 4.3.12). Similarly Ibrahim et al. found the prevalence of pre-hypertension high among teachers with the "crowding index" which is more than two person per room than teachers with the crowding index less than three (83).

Another important factor that was found significantly associated with hypertension was economical status. The prevalence of hypertension among teachers were stated their economic status as "good" was 21.7%, as "moderate" 15.8% and as "bad" 11.2% ($p=0.042$) (Table 4.3.13). This finding has been inversely revealed in studies conducted by Matthews et al. (2002) which reported that the decline in income tended to be associated with hypertension (49). It is generally believed that people who are at higher income strata can afford to have rich diets and mostly live sedentary life; hence the possibility of developing hypertension is presumably high in higher income strata.

The prevalence of hypertension was significantly higher among obese teachers (27.0%) than others (p< 0.001) (Table 4.3.14). This finding is in agreement with the studies done by Bays et al. (2007) (119), and Cercato et al. (2004) (120). In both studies, it is also documented that an increase in body mass index generally associated with an increase in risk of metabolic disease such as hypertension, diabetes and dyslipidemia. Another study conducted among elementary school teachers in USA found that elevated blood pressure was higher among teachers with high level of BMI (121).

The prevalence of hypertension among teachers that did physical activity was higher (17.2%) than other teachers (15.4%); the difference was not statistically significant (p=0.837) (Table 4.3.15). There is a contradiction with the study conducted in India by Chaudhary et al. (2005) which showed significantly lower prevalence of hypertension among the subjects who participated in physical exercise (122). Similarly Pescatelo et al. (2004) illustrated exercise as corner stone therapy for the primary prevention, treatment and control of hypertension (123). In this study opposite scene obtained. Since the public transportation conditions are very poor in Afghanistan, most of the teachers had to walk in order to reach their work places and they might express this situation as doing physical exercise.

Prevalence of hypertension was higher among teachers who satisfied from their life (19.0%) then others but the difference was not statistically significant (p=0.077) (Table 4.3.16). There was same relation between economical status and high blood pressure as well. This might be explained as that the teachers who had a good economical level could also be satisfied from life.

Prevalence of hypertension was higher among teachers stated their health status as "bad" than other teachers but the differences was not statistically significant (p=0.465) (Table 4.3.17). As it is clear their health status was not good and they are more suitable for developing hypertension. There was no relation with the level of attention to health and blood pressure level (Table 4.3.18).

Prevalence of hypertension was higher in teachers who didn't use additional salt (20.5%) than teachers who used (6.9%); the difference was statistically significant (p<0.001) (Table 4.3.19). This finding is contradicted with a study done by Michael (2000) showed that

salt intake and hypertension has a positive association (124). Similar results have been found by Barba et al. (2004) in Pozzuoli, Italy (125) and Janki Bartwal in Haldwani Uttarkhand, India (100). As this study is a cross-sectional study, some teachers had been diagnosed hypertension already before the study and they might use less salt for controlling their blood pressure.

Even it has been shown that stress factors are strongly related with hypertension (126), in this study no relation were found between the examined stress factors such as debt, chronic patient at home and hypertension (Tables 4.3.20, 4.3.21).

As it is expected, the prevalence of hypertension among teachers worked full day was higher (19.0%) than teachers worked half day (16.2%); however, the difference was not statistically significant (p=0.777) (Table 4.3.22).

There was no relation with duration of sleep and hypertension (p=0.186) (Table 4.3.23) but in other studies such as Calhoun et al. study (2010), showed that the prevalence of hypertension was higher among subjects slept 5 hours or less per night than others. Insomnia with objective short sleep duration also is associated with increased hypertension risk (127). Similarly result was found by Tadesse et al. (2014) (128).

The prevalence of hypertension among teachers who had family history of hypertension was 19.5% and in teachers who hadn't family history was 15.8%. Although the difference was not statistically significant (p=0.391) (Table 4.3.24), this result was supported by a study done by Helelo (2013) which revealed that a person who had family history of hypertension is more suitable for having hypertension than others (118). Marianne et al. (1997), in their community based survey in Gambia, identified that the positive family history of hypertension as a strong risk factor for hypertension, demonstrating higher proportion of hypertension among the participants who had family history of hypertension than those who did not (129).

Results of the logistic regression model for comparing normotensives and pre-hypertensives as a group with hypertensive teachers revealed three factors: the teachers aged ≥ 50 years were 5.54 (95% CI= 2.39-12.82) (p<0.001) times more likely to have hypertension than < 40 years and the teachers who stated their economical status as good 3.62 (95% CI= 1.45-9.03) (p=0.006) times more likely to have hypertension than bad and

hypertension occurred also 2.03 (95% CI= 1.06-3.90) times more among teachers who had more than 4 children than others. (Table 4.3.26).

Results of logistic regression model for comparing normotensives with hypertensive teachers (pre-hypertensives excluded) shows that the teachers aged ≥ 50 years were 8.66 (95% CI= 3.29-22.83) (p<0.001) times more likely to have hypertension than < 40 years, the teachers stated their economical status as good 3.83 (95% CI= 1.32-11.09) (p=0.013) times more likely to have hypertension than bad, the teachers with BMI ≥ 30, 3.61 (95% CI= 1.46–8.95) (p=0.005) times more likely to have hypertension than BMI < 25 and teachers who had more than four children 2.68 (95% CI= 1.23-5.84) (p=0.009) times more likely to have hypertension than others.

Results of logistic regression model for comparing normotensives with pre-hypertensive teachers (hypertensives excluded) revealed the teachers aged ≥ 50 years were 4.02 (95% CI= 2.19-7.38) (p<0.001) times more likely to have pre-hypertension than < 40 years, the teachers with BMI ≥ 30, 5.17 (95% CI= 2.62-10.22) (p<0.001) times more likely to have pre-hypertension than BMI < 25.

The risk assessment model obtained by logistic regression analysis, in the current study, showed that age, BMI ≥30, number of children more than 4 and economic status were significantly associated with hypertension in different models with different OR levels. Similarly, results of the studies from Philippines (130), Taiwan (131) and India (132) found that age and BMI were predictors of hypertension which were held on general population. In another study done in China, multivariate analysis results illustrated that overweight and obesity were the risk factors for hypertension (133). The studies of school teachers in Benghazi, Libya and Jeddah Saudi Arabia reported that age, gender and BMI were predictors for occurrence of hypertension and cardiovascular diseases (83, 134). Similarly to current study Jeddah School teachers study found that age and BMI were the predictors of pre-hypertension (83).

6. CONCLUSION AND RECOMMENDATION

6.1.Conclusion

This cross-sectional study was conducted among school teachers in Kabul City, Afghanistan, during July to August 2014 in order to determine the prevalence and related factors of hypertension, among the study group. Data gathered from 633 teachers. Seventy point five percent of the teachers in the study group were female and the mean age of the teachers was 40.23 ± 11.53 years. More than three fourth of the teachers (75.5%) in the study group were married. The mean number of children was 3.95 ± 2.18. Almost one-fifth of the teachers were obese (18.2%) and 39% of them were pre-obese, the prevalence of obesity and pre-obesity were higher in female teachers than males. More than half of the teachers stated that they kept in training occasionally (66.5%) and one-fourth of them were not physically active. Ninety-one point three percent (n=574) of the teachers in the study group never smoked in their life; ever smoking prevalence was 8.7%. The prevalence of hypertension and pre-hypertension among the study group were (16.7% and 39.2% respectively). The prevalence of hypertension found to be lower in the school teachers of Kabul City than other people and also it is lower from school teachers of other countries.

Bivariate analysis was done between dependent and independent variables and p-value <0.05 was considered as statistically significant. Multivariate analysis was done between dependent and all independent variables with p-value less than 0.20 were.

Findings and results in this study, in consistent with earlier studies but with different study subjects, revealed the fact that the high blood pressure is directly associated with increasing age and similarly with high economical status. However, the economic status was quite controversial. Some studies have shown that the lower income has higher chances of hypertension.

This study has also revealed that the participants with high BMI was more vulnerable to development of hypertension and vice versa. Significant association was also found between the number of children and hypertension. Even various studies have been found association between alcohol consumption, smoking and

hypertension, since in this study the number of teachers who were ever smoker or ever consumer of alcohol was very low it could not be possible to show the situation for Afghan teachers.

Risk to develop hypertension among teachers aged ≥ 50 years was five times higher than teachers aged < 40 (OR= 5.54, 95% CI= 2.39-12.82). Risk to develop hypertension among teachers stated their economic status good or excellent was three times higher than teachers stated bad (OR= 3.62, 95% CI= 1.45-9.03). Risk to develop hypertension among teachers who had more than 4 children was two times higher than others (OR= 2.03, 95% CI= 1.06-3.90)

In conclusion, the prevalence rate of hypertension among school teachers in Kabul City, Afghanistan was 16.7%. However, the actual prevalence might be higher, since this group had different characteristics than the rest of the population.

6.2. Recommendations

6.2.1. For the Study Group:

- For the teachers with high blood pressure follow-up appointments should be arranged for them to have blood pressure screening twice a year in order to prevent the development of other related illnesses; such as, heart diseases, liver diseases, atherosclerosis, heart failure, retinopathy, etc.
- The teachers with normal blood pressure should be educated on prevention and care of possible illnesses with emphasis on hypertension. In case of patients at high risk of developing hypertension, they should be educated and advised on prevention of hypertension and related illnesses. Awareness raising campaigns should be conducted and the campaigns should focus on chronic disease including hypertension and other subsequent illnesses.
- With the collaboration of Ministry of Health and Education, within the promotion of health activities regular education sessions should be organized for teachers on prevention, symptoms, diagnosis and treatment of hypertension.

- Hypertension prevention programs should focus on controlling body weight. The prevalence of obesity among the study subjects was high especially in females. Controlling body weight is the most important issue for further promotion. When obesity and diabetes were combined, the risk to develop hypertension was elevated.

6.2.2. For the General Population as well as Teachers:

- Educating the public on primary prevention of HBP must be a priority. Awareness of possible lifestyle changes can be proposed. This can intend empower the individual as care takers of their own health
- Readings from blood pressure measurements should also be explained. This will assist in improving the general knowledge of normal blood pressure readings. It will also create awareness as differences between measurements can be accessed independently.
- Finally, understanding the etiology of HBP is as well important. The public's view of "stress" as one of the main causes of HBP must also be addressed by health care workers. Knowledge that risky lifestyle behaviors (excess alcohol consumption and salt intake, sedentary lifestyle, smoking, unhealthy nutrition) are the main causes of HBP even though there are other hereditary factors. Lifestyle modification education must thus be one of the main focuses of education sessions on HBP.
- Health and community related information and materials should be provided and developed as learning resources (community learning center) for student and it could be one of channels to pass the true knowledge to the elder family members.
- Campaigns and activities should be conducted on the 17th of May which is World Hypertension Day and also on the 7th of April which is World Health Day.
- A nationwide health promotion campaign on the reduction of salt intake should be prioritized. This is a cost effective public health approach that has a long term effect on the general health of the population as a whole. Educating of the population, especially women will have a great impact

on the health of the family, society and nation. This is due to the fact, Afghans culture basically consider the woman as the leading role in the kitchen.

- Hypertension prevention programs should focus on controlling body weight. Controlling body weight is the most important issue for further promotion. When obesity and diabetes were combined, the risk to develop hypertension was elevated. Health promotion programs on controlling body weight should be extended especially to diabetes patients.
- People of all age groups (children, adults and the elderly) should be well-prepared before entering the elderly age; they should grow older with good quality of life and health security and become skilled individuals with high productivity.

6.2.3. Other Recommendations

- Future studies should focus on the prevalence of hypertension in the whole province of Kabul as well as whole country.
- In the future studies questionnaire should be conducted face to face and the number of questions should be lessened.
- Studies on capacity building of community and family leaders for behavior change and monitoring food consumption to prevent hypertension, health problems and subsequent chronic illnesses should be conducted.
- Studies should be conducted to find the association between hypertension and income level with different study groups.

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APPENDIX

A. QUESTIONNAIRE

PEVALENCE AND RELATED FACTORS OF HYPERTENSION AMONG TEACHERS IN KABUL CITY

Form No: _____

Dear Sir/ Madam,

The aim of this study is to determine prevalence and related factors of hypertension among teachers in Kabul City. This study is being performed by a lecturer of Kabul Medical University. The information you give would not be used out of objectives of the study. Thank you for taking the time to complete this questionnaire. Your correct answers are important and will help us to meet your health care needs.

Dr. Ahmad Khalid Aalemi

1. Name, surname: _____
2. School: _____
3. What is your birth date (year)? 19 _____
4. Indicate your sex.
    1. Male
    2. Female
5. What is your level of education?
    a. High school graduate
    b. College
    c. Bachelor's degree
    d. Master's degree
    e. Other (Please specify) _____
6. What is your current marital status?
    1. Single (if you are "single", go on with the 9th question)
    2. Married
    3. Divorced
    4. Widowed
    5. Other (Please specify) _____
7. How many children do you have? _____

8. With whom are you living in your house?
    1. Husband/wife and my children
    2. Others Please specify (for example; mom, dad, mother in law, etc)

9. How many person do you live within your house?_____

10. On which classes do you have lesson? Please specify _____

11. How many hours do you work in school? Please specify _____

12. How many years have you been living in Kabul City?
    1. Since my birth (go on with the 14th question)
    2. Since _____ years

13. Before starting living in Kabul where did you live_____

14. Do you have to pay some debt?
    1. No
    2. Yes

15. How satisfied are you with your life conditions?
    1. Dissatisfied
    2. Neither satisfied nor dissatisfied
    3. Satisfied

16. Comparing with your friends, how would you describe your economic status?
    1. Excellent
    2. Good
    3. Average
    4. Bad
    5. Very bad

17. Is there any patient in your home that needs care continuously?
    1. No
    2. Yes

18. Do you have some problem with your family members?
    1. No
    2. Yes

19. Do you have some problem with other teachers working in your school?
    1. No
    2. Yes

20. Do you have some problem with your school manager?
    1. No
    2. Yes

21. How would you rate your health?
    1. Excellent
    2. Good
    3. Average
    4. Bad
    5. Very bad

22. Do you pay attention to your health?
    1. Very much
    2. Much
    3. Average
    4. Little
    5. None

23. In average how many hours do you sleep? _____ hours

24. Do you do physical exercise (at least 3 days in a week each lasting about 30 minutes and resulting in sweating)?
    1. No I don't (If your answer is "No", go on with the 26th question).
    2. Occasionally
    3. Yes, I do consistently

25. What type of physical activity do you currently do? (more than one choice could be choose)
    1. Football/volleyball
    2. Bicycling
    3. Running/Jogging
    4. Swimming
    5. Walking
    6. Others (please specify)_____

26. In last one year did you do any diet for losing weight?
    1. No
    2. Yes

27. What do you think about your weight?
    1. Under weight
    2. Normal
    3. Over weight
    4. Obese

28. Do you use salt before testing foods?
    1. No
    2. Yes

29. What is your perception about your eating habits?
    1. Un healthy
    2. Healthy
    3. Very healthy
    4. No idea

30. Indicate how often you consume the food groups listed below. Indicate the appropriate choice marking with 'X'.

Groups of food	Many times a day	Once a day	Many times a week	1- 4 times a month	Never
Chocolate, sugar, sweet	□	□	□	□	□
Cake, cookies	□	□	□	□	□
Potatos chips,	□	□	□	□	□
Pizza (bolani), hamburger	□	□	□	□	□
Fresh fruits	□	□	□	□	□
Fresh vegetables	□	□	□	□	□
Cooked vegetables	□	□	□	□	□
Fruite juice, limon water	□	□	□	□	□
Cola, fanta, soda	□	□	□	□	□
Black tea	□	□	□	□	□
Green tea	□	□	□	□	□
Meat, chicken	□	□	□	□	□
Milk	□	□	□	□	□
yogurt, cheese	□	□	□	□	□
Egg	□	□	□	□	□
Bean, pea	□	□	□	□	□
Rice, spaghetti	□	□	□	□	□
Bread	□	□	□	□	□

31. Do you smoke cigarettes?
    1. No. I have never smoked (If your answer is "No", go on with the 33rd question).
    2. I used to smoke, but I stopped.
        i. How long did you smoke? _____
        ii. On average how many cigarettes did you use to smoke in a day (sticks)? _____
    3. Yes, I am still smoking
        iii. How long have you been smoking? _____
        iv. On average, how many cigarettes do you smoke in a day (sticks)? _____

32. How old were you, when you smoked a cigarette for the first time?
    1. _____ years old
    2. I don't remember

33. Is there anyone who smokes in your family? (more than one choice could be choose)
    1. No
    2. Yes, my husband/wife smokes
    3. Yes, my dad smokes
    4. Yes, my mum smokes
    5. Yes, my brother smokes
    6. Yes, my sister smokes
    7. Yes, my children smokes
    8. Other (Please specify) _____

34. Do you drink alcohol?
    1. No, never
    2. I used to drink. But stopped.
    3. Yes, I drink alcohol socially
    4. Yes, I drink alcohol daily

35. Do you use any addictive substances?
    1. No
    2. Yes

36. Do you have any chronic disease diagnosed by doctor?
    1. No
    2. Yes (if yes please specify) _____

37. Has your doctor told you that you have High Blood Pressure?
    1. No (If your answer is "No", go on with the 39th question).
    2. Yes
    3. Don't remember

38. Do you take any medications for hypertension?
    1. No
    2. Yes

39. Do you take any medication right now?
    1. No
    2. Please specify_____

40. Do you take your blood pressure at home?
    1. No (if your answer is "No", go on with the 42nd question)
    2. Yes

41. What was the last reading?_____ and _____months ago

42. Which of the following complaints have you had? (more than one choice could be choose)
    1. None
    2. Blurry Vision
    3. Chest Pain
    4. Dizziness
    5. Headache
    6. Other_____

43. In the last 6 months, have you been to the emergency room (ER) for high blood pressure?
    1. No
    2. Yes, (if your answer is "yes") how many times? _____
    3. Don't remember

44. Is there any one in your family that has hypertension?
    1. No
    2. please specify _____

45. Which of the following disease do you have? (more than one choice could be choose)
    1. Kidney disease
    2. Diabetes
    3. Cardiac disease
    4. CVA (brain haemorrhage)

THE QUESTIONNAIRE IS OVER. THANK YOU FOR YOUR RESPONSES.

THIS PART OF THE QUESTIONNAIRE WIL BE FILLED BY THE INTERVIEWER

Form No: _____

Name /Surname: _____

Interviewer No: _____

Blood Pressure: _____/_____

Weight: _____kg

Current Height: _____cm

B. ETHICAL APPROVAL

Ministry of Higher Education

Kabul Medical University (KMU)

Research Center

No: 88

Date: 30/05/2014

Research Protocol Evaluation

The research protocol of Dr. Ahmad Khalid Aalemi on "**Prevalence and Related Factors of Hypertension among School Teachers in Kabul City**" was discussed in monthly research committee meeting at Kabul Medical University on Tuesday, 24 June, 2014. During which justification, objectives and method of research protocol were checked. It was decided that (according to the research principles and ethics, it is approved if: (a) Informed consent is taken. (b) Male and female data collectors be recruited to collect data from same gender. (c) The detected hypertensive cases who are not aware of it, should be advised to seek medical consultation.)

Associate Prof. Dr. Ahmad Farid Danish

Head of Research Center

Prof. Dr. Shirinaqa Zafif

Chancellor of Kabul Medical University (KMU)