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Master of Science Thesis

**ASSESSMENT OF ADULT KNOWLEDGE TOWARDS ARTERIAL
BLOOD PRESSURE**

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ASSESSMENT OF ADULT KNOWLEDGE TOWARDS ARTERIAL
BLOOD PRESSURE

BY

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ETHICS STATEMENT

The thesis entitled “Assessment of Adult Knowledge Towards Arterial Blood Pressure” which was prepared and presented as a thesis, was written by myself and in accordance with the scientific, academic rules and ethical conduct. The idea/hypothesis of my thesis solely belongs to my supervisor and to me. The research pertaining to the thesis was conducted by myself and therefore, all of the used sentences and interpretations within the work belongs to me.

I declare the aforementioned issues to be correct.

Signature

Ahmed Khudair Ahmed AL-KHALAF

ABSTRACT

ASSESSMENT OF ADULT KNOWLEDGE TOWARDS ARTERIAL BLOOD PRESSURE

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Master of Science in Nursing

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Hypertension is a considerable cause of many other serious diseases. It led to cardiovascular diseases and may cause premature death. Worldwide, several studies showed that adults are more vulnerable to hypertension because they had most of the hypertension factors. Therefore, a massive quantity of hypertension medication had been used all over the world to treat this disease and more financial budgets had been spent on treatment and education programs.

A descriptive-correlational design was applied to measure the knowledge of the patients with hypertension. The study started on 8th Mar 2022. Data collection started on 17th May 2022 after the approval of DOH and ended on 18th Sep 2022. The study has a purposive sample that consists of 401 patients, 182 males and 219 females. Six participants had been excluded because of incorrect or uncompleted answers. Of the remaining 394 patients of 178 males and 216 had participated in the study by answering the questions. The study implements a pre-proposed assessment tool published by (Kumait 2015). A previously proposed evaluation tool published by Kumait (2015) was applied in the study. The tool consists of two parts: the first part: demographic data; This section consists of 8 items focusing on the patient's demographic characteristics (age, gender, marital status, residence, educational level, concomitant chronic disease, and income). Part Two: Knowledge; This section consists of 28 items focusing on informational characteristics for hypertensive patients. As a result of the study, the majority of the study participants were middle-aged (49-58 years old), about 33.5%, more than half (54.8%) were women, 88.3% were married, and 40.6% were literate. At the

level of education: it was noted that 90.4% had a positive family history of high blood pressure and 72.4% had no additional chronic disease. consider outcomes in terms of levels of knowledge in the study; It was concluded that the knowledge levels of the patients changed according to their demographic information. It was determined that the level of knowledge of women was higher than that of men, those who lived in cities were higher than those who lived in rural areas, those without chronic diseases were more than those without chronic diseases, and those at younger ages were more knowledge with those who live in rural areas. In the study, there were differences between patients' educational levels in terms of signs and symptoms. When results are compared as a lifestyle; It was observed that the patients' lifestyle changed according to the age group, education, place of residence, and income, whether they had a chronic disease or not ($p < 0.05$).

This study concluded that adults have good knowledge of arterial blood pressure and that the relationship between demographic information and signs and symptoms is highly significant, and further studies are needed.

2023, 88 pages

Keywords: Adult, Arterial, Blood pressure, Hypertension, Knowledge.

ÖZET

ARTERİYEL KAN BASINCINA YÖNELİK ERİŞKİN BİLGİLERİNİN DEĞERLENDİRİLMESİ

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Şubat 2023

Hipertansiyon diğer birçok ciddi hastalığın önemli bir nedenidir. Kardiyovasküler hastalıklara yol açmakla beraber, erken ölüme neden olabilir. Dünya çapında birçok çalışma, erişkinlerin hipertansiyon faktörlerinin çoğuna sahip oldukları için hipertansiyona karşı daha savunmasız olduklarını göstermiştir. Bu nedenle, tüm dünyada bu hastalığı tedavi etmek için çok büyük miktarda hipertansiyon ilacı kullanılmış ve tedavi ve eğitim programlarına daha fazla mali bütçe harcanmıştır.

Hipertansiyonu olan hastaların bilgilerini ölçmek için tanımlayıcı-kesitsel bir çalışma planmıştır. Çalışma 8 Mart 2022'de başlamıştır. Veri toplama, Sağlık Bakanlığı'nın onayından sonra 17 Mayıs 2022'de başlamış ve 18 Eylül 2022'de sona ermiştir. Araştırmanın amaçlı örnekleme, 182 erkek ve 219 kadın olmak üzere 401 hastadan oluşmaktadır. Altı katılımcı yanlış veya tamamlanmamış cevaplar nedeniyle hariç tutulmuştur. Kalan 394 hastadan 178 erkek ve 216 kadın soruları yanıtlayarak çalışmaya katılmıştır. Çalışmada Kumait (2015) tarafından yayınlanan önceden önerilen bir değerlendirme aracı uygulanmıştır. Araç iki bölümden oluşmaktadır: Bölüm I: demografik veriler; bu bölüm, hastanın demografik özelliklerine (yaş, cinsiyet, medeni durum, ikametgâh, eğitim düzeyi, eşlik eden kronik hastalık ve gelir) odaklanan 8 maddeden oluşmaktadır. Bölüm II: bilgi; bu bölüm, hipertansiyonu olan hastaların bilgi özelliklerine odaklanan 28 maddeden oluşmaktadır. Çalışmanın sonucunda araştırmaya katılanların çoğunun orta yaşta (49-58 yaş) yaklaşık olarak oranının %33,5 olduğu yarisından fazlasının (%54,8) kadın, %88,3 kişinin evli olduğu, eğitim seviyesinde ise %40,6'sının okuma yazma bildiği, %90,4'nün ailelerinde hipertansiyon öyküsünün

pozitif olduđu ve %72,4'nün ek kronik hastalıđa sahip olmadığı görüldü. Çalışmada bilgi düzeyleri bakımından sonuçlara bakıldığında; hastaların demografik bilgilerine göre bilgi düzeylerinin değıştiđi sonucuna ulaşılmıştır. Kadınların bilgi düzeyinin erkeklere göre, kentlerde yaşayanların kırsal bölgede yaşayanlara göre, kronik hastalıđı olmayanların kronik hastalıđı olanlara göre ve daha genç yaştakilerin bilgi düzeylerinin daha fazla olduđu belirlendi. Çalışmada işaret ve semptomlar bakımından sonuçlarda ise, hastaların eğitim düzeyleri arasında farklılıklar olduđu görüldü. Yaşam şekli olarak sonuçlar karşılaştırıldığında ise; hastaların yaş kategorisine göre, eğitimine göre, yaşadığı yere, gelirine, kronik hastalıđa sahip olup olmamasına göre yaşam şeklinin değıştiđi görüldü ($p<0,05$).

Bu çalışma, erişkinlerin arteriyel kan basıncına ilişkin bilgisinin iyi olduđu ve demografik bilgiler ile belirti ve semptomlar arasındaki ilişkinin oldukça anlamlı nitelikte olduđu ve daha geniş çaplı araştırmaların yapılması gerektiđi sonucuna varılmıştır.

2023, 88 sayfa

Anahtar Kelimeler: Arter, Bilgi, Erişkin, Hipertansiyon, Tansiyon.

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I dedicate my master's thesis to you. (Assessment of adult knowledge of arterial blood pressure).

We ask God Almighty to crown it with success and acceptance from the honorable members of the discussion committee.

Ahmed Khudair Ahmed AL-KHALAF

Çankırı-2023

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INDEX OF ABBREVIATIONS AND SYMBOLS

%	percentage
>	Greater-than
<	Less-than
≥	Greater-than or equal to
=	Equal to



LIST OF ABBREVIATIONS

ACE	Angiotensin-Converting–Enzyme
ANS	Autonomic Nervous System
ARBs	Angiotensin-Receptor Blockers
CDP	Disease Control and Prevention
CKD	Chronic Kidney Disease
CVD	Cardiovascular Disease
df	Degree of freedom
DM	Diabetes Mellitus
DMI	Body Mass Index
DMT2	Diabetes Mellitus type 2
DOHN	The Directorate of Health in Nineveh
EDN	Electronic Disease Notification system
Egfr	Estimated Glomerular Filtration Rate
ER	Emergency Room
etc	et cetera
HELLP	Hemolysis, Elevated Liver Enzymes, Low Platelet syndrome
HK-LS	Hypertension Knowledge-Level Scale
HTN	Hypertension
LDL	Low Density Lipoprotein
MMAS-8	Morisky Medication Adherence
mm Hg	millimeter of mercury
mg/dL	milligram per decileter
MOH	Ministry of Health
p	Paragraph
PHCCs	Primary Health Care Centers
RAAS	Renin Angiotensin-Aldosterone System
SNS	Sympathetic Nervous System
SPSS	The Statistical Package for Social Science
TSH	Hyperthyroidismis decreased serum
WHO	World Health Organization

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1. INTRODUCTION

Hypertension is a considerable cause of many other serious diseases. It led to cardiovascular diseases and may cause premature death. Worldwide, several studies showed that adults are more vulnerable to hypertension because they had most of the hypertension factors. Therefore, a massive quantity of hypertension medication had been used all over the world to treat this disease and more financial budgets had been spent on treatment and education programs (Mills 2020).

Several factors led patients to have hypertension or increase the complexity of their cases. Factors such as sociodemographic, health care providers, treatment, patient condition, and patient personal status, are considerable factors that may cause hypertension or lead to more diseases, especially in adults. Elderly aged people had more risk factors according to their health conditions. Patients with hypertension at this age may have more complications of other diseases (Burnier and Egan 2019).

Most patients with hypertension have a low level of knowledge and they had serious conditions and other resulted diseases that are related to hypertension (Rajkumar and Romate 2020). In fact, knowledge about hypertension is an important factor that affected patients' conditions. Many public health departments had operated health programs to raise the level of knowledge about hypertension among patients and their relatives to decrease the risk factors of the disease. These programs had an important role in the treatment of hypertension. The participants had increased their knowledge about hypertension and became more capable to avoid the other risk factors in their lives (Campbell *et al.* 2018, Gore *et al.* 2020).

Knowledge about hypertension as a dimension of the risk factors consisted of other sub-dimensions. These sub-dimensions allow for assessing the level of knowledge among patients with hypertension. The obtained assessment may enhance the conditions of patients and allow them to have a normal life. In addition, the assessment of the knowledge may enhance the level of health care and provide medications and health

programs that are targeting a special category of patients to provide support and treatment for them (Campbell *et al.* 2018).

In Iraq, statistical information from the World Health Organization showed that 25.2% of Iraqi adults had hypertension in 2015. There is no available information about the epidemiology of hypertension in Iraq during the later years (WHO 2019) (WHO 2020). But several studies showed that adult patients have no chance to avoid hypertension and its complications according to the physiological changes (Younis and Ibrahimet 2009). Some studies had been presented to assess the knowledge level among Iraqi patients with hypertension in other cities, but not Mosul, such as Baghdad and Kirkuk. These studies showed that there is a lack of knowledge about hypertension among patients in those cities (Kumait 2015).

This ratio may cause serious problems that may confuse the Iraqi health department. In fact, for the adult patients with hypertension in Mosul city, no recent assessment had been presented about hypertension.



1.1 Importance of the study

The importance of this study came after some points that showed its uniqueness in the current time and its potential to participate in health program development. This study would illustrate the importance in the following part of this section.

According to the reports of the World Health Organization, nine million patients died annually because of the complications of hypertension. The number of dead patients increased in the last two decades. The World Health Organization stated that 57% of patients had information about hypertension, but only 40.6% of them take their anti-hypertension medications. Only 13.2% of the patients with hypertension had a good and controlled blood pressure (Mohammed *et al.* 2019).

Assessment of knowledge among patients with hypertension reveals the reality of the knowledge level of those patients. Thus, assessment results can provide strategies or plans to increase the knowledge among them to avoid some complicated conditions such as ischemic stroke, myocardial infarction, cerebrovascular and renal disease (Abate *et al.* 2019, Nassr and Forsyth *et al.* 2019).

Some studies showed that adults and elder patients are more vulnerable to hypertension and uncontrolled hypertension. They are a productive and important category of the population in all countries. This can affect the entire society if they had a lack of knowledge about their disease (Nassr and Forsyth 2019).

Although some studies had performed assessments about the knowledge level of patients with hypertension, the re-assessment of the knowledge may suggest more accurate plans and modifications on health care support that are required to improve and enhance the health services and programs such as E-healthcare providing (Aljuboori *et al.* 2021).

Several organizations like the Centers for Electronic Disease Notification system (EDN) and Disease Control and Prevention (CDP) in the US, had a great interest in hypertension and its risk factors via assessment of this disease among different populations in different countries and societies to evaluate the risk factors that affected on hypertension and gather more information about its development. The assessment of knowledge allows a practical comparison of the effects of risk factors among patients in those populations and proper strategies to prevent unexpected complications (Kumar *et al.* 2020).

1.2 Statement of the problem

The knowledge about hypertension affected the treatment of patients with hypertension. Then it may affect the performance of the health department. The assessment of the knowledge's dimensions can provide a clear vision of the expected situation in the future. It also helps health planer in forming their plans, according to the expected level of hypertension complication.

1.3 Objectives of the study

The main purpose of the study is to assess the knowledge of adult patients about hypertension, through knowledge items that relate to their general knowledge about the disease, its symptoms, and their lifestyle.

The risk factors and avoiding them that are beneath the items of the mentioned above dimensions can provide descriptive data to be analyzed and measure the level of knowledge of patients about hypertension.

1.4 Hypotheses

This study has the following hypotheses:

- 1.4.1** There are differences in the knowledge of patients about hypertension according to their demographic information
- 1.4.2** There are not differences in the knowledge of patients about hypertension according to their demographic information

1.5 Research questions

This study has three main questions. They are:

- 1.5.1** What is the patients' tacit knowledge about hypertension?
- 1.5.2** What is the signs and symptoms of patients with hypertension?
- 1.5.3** What is the lifestyle of patients with hypertension?

1.6 Definition of terms

The current study has several essential terms that have to be declared and defined to be used in the chapters of the thesis. They are:

Hypertension: can be defined as “a systolic blood pressure of ≥ 140 mm Hg, or a diastolic blood pressure of ≥ 90 mm Hg, or taking antihypertensive medication” (Adnan *et al.* 2018, Roger *et al.* 2012). There are two main types of hypertension, they are:

Essential hypertension: It is “a rise in blood pressure of unknown cause that increases risks for cerebral, cardiac, and renal events” (Adnan *et al.* 2018, Messerli *et al.* 2007).

Secondary hypertension: It is an “increased systemic blood pressure due to an identifiable cause” (Adnan *et al.* 2018, Mancia *et al.* 2013).

Assessment: is “the process of collecting information/data about the learning outcomes of students (patients with hypertension in this study) in the realms of attitudes, knowledge, and skills”. Knowledge assessment can be defined as “an assessment of intellectual potential which includes factual, conceptual, procedural, and metacognitive knowledge” (Anderson *et al.* 2001).

The operational definition of the assessment is evaluating the level of participants’ knowledge about hypertension by using a questionnaire that consisted of 28 items distributed on the knowledge dimensions that related to the demographic information of participants.

Knowledge: The term “knowledge” referred to “the process of understanding of someone about something, such as facts, information, descriptions or skills, which is acquired by individuals through education, learning, experience or by discovering” (Zenker *et al.* 2018). The researches presented two forms of knowledge. They are:

Explicit Knowledge: which is “a non-homogenous resource, that can be qualified as factual knowledge, it is verbalized, codified, systematic and formal”. Indivisible can easily gain explicit knowledge and it may be transmitted to others. Explicit knowledge can be transferred via written or verbal media. Most of its forms known as “Expressive Knowledge” had been stored in certain media in order to have easy access to its information. The collected information can be stored either in encyclopedias, books, manuals, documents, or videos (Anderson *et al.* 2001).

Tacit Knowledge: It can be defined as obtained or learned skills, procedures, and ideas through experience over time (Pérez-Fuillerat *et al.* 2018). Tacit knowledge is a personal type of knowledge that is hard to be shared via written or verbal media because it has no formal shape. Tacit knowledge can appear in the mind of practitioners. In fact, most people do not care about the importance of tacit knowledge because they gained it over time without additional efforts (Anderson *et al.* 2001).

Operationally, knowledge can be defined as the awareness of the community about hypertension. It can be evaluated by calculating the mean score of the correct answers of the participants about the 28 items that had been categorized as knowledgeable (if the mean score of participants' answers is high) or not knowledgeable (if the mean score of the participants' answers is low).

Adults: The adults are persons of age category that are more than 18 years old from the legal point of view. But in the biological term, adults are people whose ages are more than late childhood (11-14 years). This classification is based on sexual maturity for both males and females. Adolescence (teenager) is the phase in which the human body develops and extends from late childhood through puberty (10 and 18 years for females and 12-24 years for males) to the full adult stage. The beginning and end of puberty are different for humans. Puberty is defined as “the transition of the child's body to the adult body in the sense of sexual maturity through the action of hormones”, a human is known as an "adult" after the completion of adolescence (Herzog 2020).

The operational definition of adults is patients with hypertension whose ages are more than 18 years old. Those are targeted in the assessment of knowledge about hypertension.

1.7 Limitations

The study arises on two limits. They are:

1.7.1 Time limitation

The study had been performed during the period from 16th May to 15th August 2022.

This period was enough to meet the patients with hypertension.

1.7.2 Spatial limitation

The study had been performed at the Primary Health Care Centers (PHCCs) in Mosul city. These PHCCs provider health care for patients with hypertension.

1.8 Hypertension

Hypertension is one of the issues that the health department and organization are focusing on it because of its risky conditions. Anti-hypertensive drugs and health care provided required more human efforts and financial budgets. Thus, many countries and organizations aim to reduce efforts and budgets by increasing the knowledge of patients and families about hypertension in order to reduce the risk or prevent the expected complications (Ostchega *et al.* 2020). In this section, hypertension would be illustrated, and other concerning issues.

1.8.1 History of hypertension

The origin of the description of hypertension backs history to the ancient ages during the ancient Chinese and Indian civilizations in which the physicians practice Ayurvedic

medicine (traditional medicine in India, China, and other neighboring countries). They referred to hypertension as a “Hard pulse”. While the ancient Egyptian physicians composed a letter on the heart that described the blood supply to the whole body in the known The George Ebers Papyrus back to 1550 B.C. It showed that the heart pumped blood to the human organs as a sign of the mechanism that produced the blood pressure in the vessels. Greeks also referred to the pulse and the mechanism of blood pressure (Javaid *et al.* 2020).

The first pioneer Arabian physician Ibn al-Nafis (1210-1288) described pulmonary blood circulation. The theory of Ibn Al-Nafis about pulmonary circulation was ahead of William Harvey (1578-1657). While western physicians depended on Harvey’s theory may be because of its language or the isolation of Arabian Medicine in Europe in the renaissance (Hajar 2018).

In the 18th century, blood pressure was measured by calculating the ratio of the blood pressure on the vessel wall and the column of blood with 9 feet length in 1733 by Reverend Stephen Hales (Vaiman 2022). Later in 1817, the French doctor René Laennec presented an instrument to monitor blood pressure. In the next decade, another French physician Jean Poiseuilleis modified the tube length of one foot by implementing mercury instead of a blood 9-foot tube. In 1847, Karl Ludwig added a float inside the tube at the top of mercury to get the continuous reading possible. Blood pressure was measured indirectly by German physician Samuel Von Basch (1837-1905) in 1881. His instrument consists of a bag full of water to occlude the arterial pulse that connected to a manometer (Javaid *et al.* 2020).

In the 19th century, an Irish-Indian physician Frederick Akbar Mahomed was the first who described “essential hypertension”. He separated it from other vascular changes such as those accompanied by chronic glomerulonephritis. He also described epidemiology in old age persons and some of the symptoms and complications of hypertension, especially those related to the heart, brain, and kidneys. In 1896 the sphygmomanometer had been developed by Scipione Riva-Rocci (Italian Clinician). The instrument had a pneumatic

cuff introduced by the Dunlop Rubber. The small 2 inch cuff is inaccurate because of its small size till nowadays (Mazzarello 2020).

At the beginning of the 20th century, a mercury sphygmomanometer was presented and systolic blood pressure and diastolic blood pressure were defined depending on the appearance and disappearance of the heard Korotkoff sounds via a stethoscope. Nikolai Korotkov (Russian physician) improved his instrument that was capable of recognizing the diastolic blood pressure via the heard sounds in 1905 (Javaid *et al.* 2020).

Eberhard Frank was the first physician that described hypertension that has no known cause in 1911. A group of physicians at the Mayo Clinic presented the term “Malignant hypertension” as a description of very high blood pressure syndrome that relates to kidney function and may develop heart failure and stroke that leads to death. Thus, hypertension was classified into two types “Malignant” and “Benign” (Raghupathi 2019). In 1931, British Professor of Medicine John Hay noted that hypertension was the most dangerous and life-threatening disease since then. Paul White (US cardiologist) confirmed that opinion and insisted on its management and control in 1937 (Javaid *et al.* 2020).

Both the mercury sphygmomanometer and inventions and the quantitative idea of hypertension became an essential routine to examine and control blood pressure in the fifties of the 20th century. In 1993, Panasonic (a Japanese Electronic Company) produced an automatic wrist-cuff device to measure blood pressure in 1993. Then, Withings (a French company) produced a smart device that linked to smartphones and Tabs in 2010 and the invention and production of such devices continued till nowadays (Thompson *et al.* 2020).

1.8.2 Mechanism of blood pressure

In the definition of hypertension, the systolic and diastolic blood pressure. Systolic pressure refers to the maximum pressure in the arteries of the body during the contraction of the heart muscle. While diastolic pressure is the minimum pressure during the

relaxation of the heart muscle between toe beats. Thus, the blood pressure is produced by the blood propelled into the arteries by sequential cardiac beats (Shahoud *et al.* 2021). Both types of pressure press on the arterial wall and this pressure is measured by the mercury-tube sphygmomanometer. The produced blood pressure may increase or decrease according to the diameter of the blood flow in the arteries and the flexibility of the arteries. If the diameter is decreased the blood pressure is elevated and vice-versa. If the flexibility of the arteries is decreased the blood pressure is also elevated and vice-versa. In addition, the increment of hematocrit increases the blood viscosity that results in a secondary increment of the systemic vascular resistance (DeMers and Wachs 2021).

The autonomic nervous system (ANS) has an important role in relaxing the smooth muscles of the arteries that increases the flexibility of their walls due to the sensation of the baroreceptors at the carotid sinus and aortic arch. It is important in controlling blood pressure. On the other hand, when the plasma level decreases, the renal system works on regulating the plasma level which decreases the cardiac output. Triggering rennin launches the renin-angiotensin-aldosterone cascade that increases water and sodium reuptake to elevate the plasma level. This also elevates the blood pressure (DeMers and Wachs, 2021).

1.8.3 Types of hypertension

There are several types of hypertension. The cause of the disease is the most dependent base to classify the hypertension type. The cause of hypertension may be unknown or may be associated with other diseases such as diabetes mellitus. Thus, hypertension can be classified into two well-known types. They are:

Essential hypertension: is elevated blood pressure associated with incremented cardiac output and/or increment of arteries resistance. As mentioned in the mechanism of blood pressure, some hypertension cases are caused by the stroke volume and heart rate while arterial resistance is associated with anatomical changes of the arteries and arterioles (Messerli *et al.* 2007, Saxena *et al.* 2018, Adnan *et al.* 2018).

Secondary hypertension: is defined as “hypertension that persists despite three or more blood pressure medications at appropriate doses, including one diuretic”, it resulted from concomitant diseases such as diabetes, kidney failure, etc. Those diseases may strengthen the blood vessels or narrow them which elevates the resistance of the arteries. In other words, it is a kind of complication of other diseases (Mancia *et al.* 2013, Adnan *et al.* 2018, Tolu *et al.* 2021).

Other types of hypertension had been described such as “Benign hypertension” which can be defined as “a condition of mild to moderate high blood pressure with no identifiable cause” and “Malignant hypertension” which can be defined as “elevated blood pressure with accompanying complications (organ damage) and a poor prognosis” (Sciuva *et al.* 2022).

As a temporary type of hypertension, “postpartum hypertension” affects about 10% of pregnant women in the postpartum period. Another temporary type of hypertension is “de novo hypertension” which may present after delivery, but its exact prevalence is not verified. Both types of hypertension expose the mother to eventually severe complications like eclampsia, stroke, pulmonary edema, and HELLP (hemolysis, elevated liver enzymes, low platelet) syndrome (Katsi 2020).

1.8.4 Epidemiology of hypertension

Hypertension is reported as a life-threatening disease had been declared at the end of 1970s in the high-income countries. Later, hypertension increased in South and Southeast Asia, sub-Saharan Africa, and Oceania which referred to the prevalence of hypertension as higher in low and middle-income countries than the high-income countries (Zhou 2021). The World Health Organization (WHO) reported that there are more than 1.28 billion adult patients aged 30-79 years worldwide who have hypertension. More than 60% of them live in low to middle-income countries. About 46% of adults are unaware of hypertension and 42% are diagnosed and treated. There are 21% of adult patients with hypertension control their blood pressure. Additionally, hypertension is considered a

major cause of premature death all over the world. Thus, reducing the prevalence of hypertension to 33% is the main goal in 2030 (WHO 2021).

The prevalence of hypertension had a one-third increment during the last decade. It increased from 2000 to 2015 (Hussain and Lafta 2019). All the enhancements studies that are related to hypertension aimed to reduce elevated blood pressure in order to prevent the risk of cardiovascular diseases and other hypertension-related complications. These efforts reduced mortality and improve the health of patients with hypertension (Nassr and Forsyth 2019).

There are not enough studies and statistical reports to assess the prevalence of hypertension. According to limited studies, 44% of Iraqi adults have hypertension. Less than half (48.2%) have controlled blood pressure in patients with diabetes. The studies do not provide informative statistics about the causes and factors or mortality of hypertension. Only some studies referred to the enhancement of medical management and health care providing decreased mortality of hypertension. The control of hypertension is still a remarkable issue in hypertension management. Uncontrolled blood pressure is a concern of health care providers. The lack of statistics increased the gap between hypertension and its control. No evidence to be implemented in the strategy of planning or policy that manage hypertension. This fact is reflected in the knowledge of patients. There are about 33% of the patients unaware of the disease and 54% are untreated. While just 34% of the patients have controlled blood pressure (Nassr and Forsyth, 2019).

In Nineveh governorate, the collected data represented the intended patients with hypertension to the ER departments and consulting clinics at hospitals, and primary health care centers PHCCs. Table 1.1 and Figure 1.1 illustrate the patients' numbers.

Table 1.1 Number of Intended Patients with Hypertension at the Hospitals and PHCCs for the last three years (2019-2021). (Nineveh DOH 2020) (Nineveh DOH 2021) (Nineveh DOH 2022).

Years	2019		2020		2021	
Gender	Male	Female	Male	Female	Male	Female
Department						
ER	3396	2897	3358	2526	5323	4396
Consulting clinics	10962	12504	3767	4542	3765	3567
PHCCs	6921	6555	6976	6792	10477	8962
Totals	21279	21956	14101	13860	19565	16925

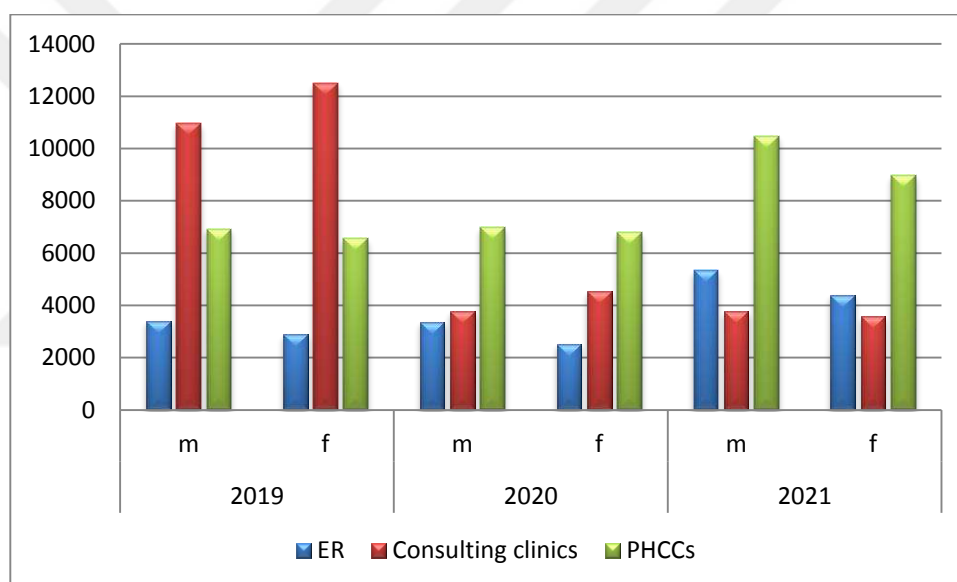


Figure 1.1 Number of intended patients with hypertension at the hospitals and PHCCs for the last three years (2019-2021). (Nineveh DOH 2020) (Nineveh DOH 2021) (Nineveh DOH 2022).

These numbers referred to the number of patients who intended to the official hospitals and PHCCs. Patients who intended private hospitals and clinics more than these numbers. Therefore, no accurate statistic has existed.

1.8.5 Signs and symptoms of hypertension

The most-risky condition of hypertension is the absence of clinical signs and symptoms. Thus, it is also known as a “Silent Killer”. Many patients with hypertension have no appeared either signs or symptoms till the professionals measure the blood pressure level (Ali and Reza 2021).

In other cases, many studies reported some common signs and symptoms of hypertension. They include:

- Irregular heart rhythms,
- Headaches,
- Vision changes,
- Nose bleeding and
- Buzzing in the ears.

Other signs and symptoms may appear in severe cases of high blood pressure, they are:

- Nausea,
- Fatigue,
- Vomiting,
- Anxiety,
- Confusion,
- Chest pain and
- Muscle tremors (Manzoor *et al.* 2020).

1.8.6 Diagnosis of hypertension

Diagnosis of hypertension is performed by initially measuring the blood pressure. Blood pressure is measured by physicians or professional healthcare workers. The measurements of the blood pressure determine the stage of the disease according to the

readings of the Hg sphygmomanometer or modern devices. These self-measurements are informative reading during management (Tucker *et al.* 2022). Table 1.2 illustrated the measurements of the blood pressure with mmHg units.

Table 1.2 The Measurements of Blood Pressure (Tucker *et al.* 2022).

No	Blood Pressure Case	Measurements	
		Systolic mmHg	Diastolic mmHg
1	Normal Blood Pressure	120	80
2	Elevated Blood Pressure	120-129	80
3	Hypertension Stage 1	130-139	80-89
4	Hypertension Stage 2	140	90
5	Hypertensive crisis	> 180	> 10

Hypertension patients have readings more than 140/90 mm Hg and it may be more in severe cases. Patients can measure their blood pressure at home by their selves or trained person in order to control the blood pressure. Both arms are used to measure blood pressure because some differences may occur in the vines of the arms (Boffa *et al.* 2019).

1.8.7 Risk factors of hypertension

Hypertension as well as other diseases have several risk factors that elevated blood pressure in patients with hypertension. Many studies had suggested these risk factors for hypertension. The following are risk factors with corresponding studies.

1.8.7.1 High fatty foods

High cholesterol obtained from high-fatty food has a great effect on elevating blood pressure. Most of the patients have high cholesterol (Tucker *et al.* 2022). Having fatty food at dinner may disrupt digestion and disorder sleep. Both lead to obesity and weight gain which is a cause and risk factor for hypertension (Anto *et al.* 2020).

Fats usually accumulated as plaques in the blood vessels causing strengthening and narrowing of the blood flow diameter. It is one of the direct causes of elevated blood pressure. Consuming more high fat increases the risk of hypertension and its complication (Tolu *et al.* 2021).

1.8.7.2 Salt intake

Salt had a great role in the water balance in the human body. It allows water to osmose into the wall of cells. All sodium is completely absorbed by the kidney then the required sodium is extracted (Gupta and Pushkala 2022). The overloads of salt may increase the water in the body tissues and the blood flow in the arterial vessels. This may cause an elevation of the blood pressure (Grillo *et al.* 2019).

Many studies have been presented that dealt with salt intake and its relation with hypertension. The WHO determined that “Excessive sodium” consumption is more than 5 grams a day (Yan and Mu 2021). More salt consumption had a relation to increased hypertension and its probable complications (Guo *et al.* 2022). Having less salt reduces hypertension and its complications. It also reduced the deaths linked to hypertension and other cardiovascular diseases (Vega-Solano *et al.* 2021, Guo *et al.* 2022). Some studies showed that having less salt and salty foods causes a significant reduction of blood pressure irrespective of gender or race (Leeming *et al.* 2018).

1.8.7.3 Alcohol intake

Alcohol intake is one of the common factors for most diseases including hypertension (Mahmood *et al.* 2018). No clear information about the mechanism of alcohol related to the elevation of blood pressure. Therefore, several studies were presented based on evidence (Husain *et al.* 2014). These studies showed decreased blood pressure after alcohol intake, but it would increase after the effect ended. High doses of alcohol reduced blood pressure at the effect time till 12 hours. This may affect the central nervous system,

and baroreceptors, or increase vascular reactivity. This led to relaxation loss and increased blood pressure in the arterial vessels (Tasnim *et al.* 2020).

Many studies confirmed the effect of alcohol intake on the elevation of blood pressure even in healthy patients with hypertension especially related to high doses of alcohol (Fuchs and Fuchs 2021, Verma *et al.* 2021, Aynalem *et al.* 2021).

1.8.7.4 Smoking

Smoking cigarettes or other tobacco products is one of the common factors of many diseases such as heart and cardiovascular diseases. It is highly related to morbidity and mortality (Rigotti *et al.* 2022). Some studies were presented to illustrate the effects of smoking especially that related to hypertension. Even after quitting smoke, the quitters are more vulnerable to hypertension than the non-smokers (Ioannidou *et al.* 2021, Turana *et al.* 2021, Nagao *et al.* 2021). It is also an indirect risk factor for hypertension by being a risk factor for another disease that led to hypertension such as arteriosclerosis (Mohialdeen *et al.* 2022).

Other studies showed that there is a significant relationship between smoking and hypertension in which an increasing number of cigarettes increases the level of blood pressure. It is also noticed that smoking reduced the response to the anti-hypertension treatment (Ioannidou *et al.* 2021, Mohialdeen 2022).

1.8.7.5 Obesity

Obesity is considered a risk factor for many diseases including hypertension. Many studies reported that obesity which is overweight is a considerable risk factor for hypertension in different ages (Gruber *et al.* 2021, Litwin and Kułaga 2021). The level of blood pressure normally is regulated by neurohormonal systems that are responsible for providing the proper quantity of blood to the organs and tissues of the human body. Increasing body mass increases the body mass index (BMI). In such cases, the elevation

of blood pressure is required to ensure proper blood perfusion. Therefore, heavy-weight persons are more vulnerable to hypertension (Yunita and Sartika 2021).

For the ratio between (65–75%) of the patients with primary (essential) hypertension, obesity was a risk factor that led to cardiovascular and kidney diseases as complications (Hall *et al.* 2021). In another way, obesity is a risk factor in cardiovascular diseases and it is an indirect risk factor for hypertension (Powell-Wiley *et al.* 2021).

1.8.7.6 Associated chronic diseases

The patients with hypertension usually had another chronic disease that was either a cause or a result of hypertension. There are several chronic diseases associated with hypertension. The following are some of these diseases.

Diabetes Mellitus (DM) is a metabolic disorder of glucose level in the blood (hyperglycemia) related to insulin resistance in type 1 DM, or non-dependent insulin in type 2 DM and other specific types (Preechasuk *et al.* 2022, Goyal and Jialal 2022). Both type 1 DM and 2 DM, can cause hypertension. Hyperglycemia leads to vessels disease, endothelial cells layer narrowing vessels, or endothelial dysfunction which increases the blood pressure (Faselis *et al.* 2019).

Hyperthyroidism is decreased serum TSH in sequential tests during 6 months, separated by at least two weeks. It is related to the dysfunction of thyroid glands. It is associated with cardiovascular deaths as a secondary cause (Lillevang-Johansen *et al.* 2019). Hyperthyroidism may be a cause of hypertension because it increases the heart rate and heart output of blood. The incremented output leads to hypertension (Edl *et al.* 2022, Rivas *et al.* 2021).

High cholesterol levels are characterized by cholesterol levels exceeded (240 mg/dL). It is a common cause of cardiovascular disease (Jeong *et al.* 2018). In high cholesterol disease, arteries become hard and narrow because of cholesterol plaque and calcium.

Thus, the heart must pump more blood through the arteries that increases blood pressure (Acharya *et al.* 2018).

Chronic kidney disease (CKD) is a clinical syndrome secondary to the definitive change in the function and/or structure of the kidney. Its pathology represents a higher risk of complications and mortality (Ammirati 2020). CKD is recognized as a public health problem that increases the risk of cardiovascular disease in addition to other complications (Lv and Zhang 2019).

CKD may be a cause of hypertension but at the same time, it may be a complication of hypertension. The high blood pressure impaired the kidney, increased sodium retention, extracellular volume expansion, and reduced nephron mass (Ku *et al.* 2019). In CKD, the estimated glomerular filtration rate (eGFR) is <60. This means more sodium dysregulation which is a leading cause of hypertension (Noordin *et al.* 2021).

1.8.7.7 Psychological conditions

Stress is “a pathological process resulting from psychophysiological responses triggered by threats to homeostasis” (Kolacz *et al.* 2019). Chronic psychosocial stress increases blood pressure that may lead to the development of hypertension (Chamik *et al.* 2018). Chronic conditions are known predictors of hypertension such as anger, depressive aspects, sleep disorders, cognitive-behavioral disorders, depression, high levels of stress, and increased levels of anxiety (Conversano *et al.* 2021).

Many studies and reviews showed that depression, anxiety, and perceived stress are meaningful clinical symptoms that associated with hypertension and depressive, and anxious, disorders are psychiatric conditions in most patients with hypertension (Fugger *et al.* 2019, Liu *et al.* 2017).

1.8.7.8 Irregular medication

Medication-taking behavior is still unrecognized because it is usually reported by the patient. Thus, no available registers or data to evaluate the patient's commitment to medication-taking. Some studies presented some strategies to evaluate this commitment but it still to be enhanced and with inaccurate results. Irregular medication for hypertension may lead to other complications such as acute aortic dissection (Dong *et al.* 2019).

1.8.7.9 Genetics factor

Many studies were presented which were dealing with the genes that are supposed to be responsible for hypertension. These genes are found in samples containing first and second-degree relatives with hypertension. These studies reported that both males and females who had hypertension are vulnerable at the age of 20-39 years. Thus, genetic factor is considered a risk factor for hypertension (Morrell *et al.* 2019).

1.8.8 Treatment of hypertension

After a proper diagnosis of hypertension, the patient has to be treated immediately to avoid other complications and mortality. The following section deals with the principles of hypertension treatment.

At the beginning and after diagnosis of hypertension, an initial assessment has to be performed to determine the cause and effects of hypertension. Coexisting conditions are considered such as diabetes mellitus, cardiovascular disease, chronic kidney disease, and any elevated risk of cardiovascular disease. In order to perform the required assessment, some laboratory tests must be performed such as fasting blood glucose, complete blood count, lipid profile, serum creatinine with eGFR, serum sodium, potassium, calcium, thyroid-stimulating hormone, urinalysis, and electrocardiogram. While additional lab

tests can optionally perform such as echocardiogram, uric acid, urinary albumin to creatinine ratio (Whelton *et al.* 2017).

The initial drug can be determined to reduce blood pressure. In fact, it is one of four drugs: angiotensin-converting-enzyme (ACE) inhibitors, angiotensin-receptor blockers (ARBs), calcium-channel blockers, and thiazide-type diuretics. One or more may be combined according to the patient's condition. In addition to the clinical characteristics, the lifestyle, and coexisting conditions of the patient should be considered in order to select a drug. Thus, patients with a high level of salt intake by eating Salty foods may have reduced blood pressure after taking a diuretic drug. While patients with restricted salt intake had a greater response to the same drug. In diuretic drugs, another lifestyle must be considered especially in patients with low sodium in the blood. The calcium-channel blockers may cause a side effect represented by primary edema for the dihydropyridine agents (nifedipine, amlodipine, and others) and constipation for the non-dihydropyridines (verapamil and diltiazem). In such cases, these agents are preferred to be used as additional therapy if blood pressure is still uncontrolled. Patients with certain coexisting conditions are preferred to use specific agents. Sustained-release beta-blockers are usually used in patients with congestive heart failure, pre-myocardial infarction, arrhythmias, and for migraine prophylaxis. It also decreased hypertension. An ACE inhibitor or ARB must be used in chronic kidney disease with albuminuria (Taler 2018).

Sometimes the first selected agent produced unacceptable side effects. In such a case, this agent must be stopped, and start another agent from a different drug class. While in case of accepted side effects and without effects on hypertension, the dose can be increased, or start the second agent as the complementary mechanism. The scientific studies reported that dual therapy at a low dose had the same effect as higher-dose in monotherapy. It is meant to decrease side effects. Using combination agents may reduce the pill burden and decrease the required time to reach blood pressure goals. It is recommended to use combination drugs after ensuring the accepted side effects because using dual therapy leads to stopping both drugs (Guerrero-García 2018).

1.8.9 Life style of patients with hypertension

Patients with hypertension absolutely affected by their lifestyle before and after hypertension had been diagnosed. Therefore, lifestyle conditions must be considered in order to assess the patient's case. In fact, changing lifestyle is a step in the treatment of hypertension (Alefan *et al.* 2019).

1.8.9.1 Definitions

The term lifestyle in origin is two combined words, life and style. It refers to the pattern of life that include adequate food, time spent, social and physical activities, the influence of physical and mental functioning, and life habits. Lifestyle is “related to aspects that reflect the attitudes, values, and opportunities in a person's life, and can be defined as a behavior pattern that affects, in some way, the human health”. Thus, adopting a lifestyle determines the quality of life of adults and old people (Debon *et al.* 2019).

Therefore, the WHO presented a definition of the healthy lifestyle “as a way of living that reduces the risk of being severely ill, dying at an early age, and helps enjoy more aspects of life” (La Victoire *et al.* 2022). This leads to defining the unhealthy lifestyle which is “a way of living that consists of activities or ways of living that are detrimental to one's health”. The features of an unhealthy lifestyle include no breakfasts, more meals with low-density lipoprotein (LDL), excessive alcohol intake or soda, using technologies (such as mobile or TV), smoking, physical inactivity, excessive weight, many salty foods (La Victoire *et al.* 2022).

1.8.9.2 Lifestyle factors of patients with hypertension

The lifestyle has several patterns that affect the life of patients with hypertension. The pattern is known as factors. Some of these factors have effects on patients' lifestyles that may increase or decrease the risks for patients with hypertension. Thus, hypertension is known as a lifestyle disease (Majzner *et al.* 2020).

1.8.9.2.1 Nutrition

Salt causes fluid in the body because it pulls fluid outside the cells from being expelled, thereby increasing blood volume and pressure. In about 60% of cases of primary hypertension, there is a response to lowering blood pressure by reducing salt intake. In people who consume 3 grams of salt or less, the average blood pressure is low, while the average blood pressure is higher in people who consume about 7-8 grams of salt (Lesmana *et al.* 2021, Adeagbo *et al.* 2019).

Many studies reported that eating fast food is a risk factor for patients with hypertension. Fast food contains high saturated fat, salt, and sugar and is low in dietary fiber as well as contains preservatives, coloring, and flavoring (Nufus and Abdullah 2019, Ab Hamid *et al.* 2022).

Fast foods, and the availability of various foods, also lead to an increase the obesity prevalence. While commitment to dietary guides, vegetables and fruit consumption with limited red meat may result in a loss in weight. This may successfully reduce or eliminate hypertension (Fernandez 2021).

The pathophysiology of obesity related to hypertension is multifactorial and highly time-dependent. Overfeeding rapidly activates the sympathetic nervous system (SNS) and renin-angiotensin-aldosterone system (RAAS), before a high increment in body weight while decreased caloric intake like in voluntary food restriction may reduce blood pressure and metabolic disorders in patients with hypertension and obesity (Hall *et al.* 2021).

1.8.9.2.2 Physical activities

Many studies and researchers reported that physical activities have beneficial effects on reducing blood pressure for patients with hypertension. Physical activities with

continuous medical observation and medication can remarkably reduce blood pressure in patients with hypertension (Noone *et al.* 2018).

Some intervention programs had been performed during different durations. It consisted of a walking group that walk for example 120 min/week and with other sociocultural activities, furthermore physical activity. Such activities may reduce the risk of CVD and blood pressure. It enhances the health-related quality of life for patients with hypertension (Arija *et al.* 2018).

1.8.9.2.3 Alcohol and smoking consumption

Alcohol and smoking consumption are common risk factors for many diseases. Many studies reported that increasing alcohol intake increases incidences and increasing blood pressure (Roerecke *et al.* 2018). Other studies reported that low to moderate alcohol intake has beneficial effects on hypertension (Surma and Więcek 2022). The mechanism of the alcohol effect on hypertension is still unclear to be a concept in hypertension treatment (Liang 2022). In fact, many studies showed that blood pressure increased with low to moderate alcohol intake, especially after 12 hours (Wang *et al.* 2022).

Some studies showed that dietary alcohol is advised to prevent or reduce hypertension for both non-alcoholic persons and patients with hypertension during management. It has significant direct effects on the control of blood pressure. Many studies determine stop of alcohol intake is one of the steps of lifestyle change in the treatment because of its positive effects on a patient's condition and quality of life. Some of these studies showed the long-term effect of alcohol intake either with low intake (Wake 2021).

There are several studies that dealt with the differences in the smokers' heart rates increased as the blood pressure elevated. It is faster the non-smokers. Thus, the results of such studies pointed out that smoking tobacco products increase blood pressure. This incremented heart rate is caused by the nicotine in tobacco. Tobacco as a toxic material fastens the heart rate and narrows the blood vessels and resulting in elevated blood

pressure. The systolic blood pressure increased by 10 to 25 mm Hg in smokers. Excessive smoking may cause persistent constriction of the arteries for patients with a long history of excessive smoking. After a period of time, the smooth muscle in the arterial wall deteriorates, and the inner layer of vessels gradually arteriosclerosis forms, elevating blood pressure (Mohialdeen 2022).

Other studies showed that smoker patients with hypertension are less sensitive to antihypertensive drugs. It is difficult to control blood pressure with antihypertensive drugs even with increased doses. Hypertension is a non-curable disease. Thus, quitting smoking is an important step of management even if temporarily controlled by medication (Mohialdeen 2022).

1.8.9.2.4 Patient commitment

Usually, the patient with hypertension starts medication to reduce blood pressure. Then physician advises changing the conditions of lifestyle. Thus, it is necessary to follow the instruction and take medicines as prescribed (Noone *et al.* 2018). The patient's commitment is an essential part of the treatment to control and maintain the blood pressure at a normal level. Many studies presented that dealt with the commitment of patients with hypertension. These studies confirmed the relation between the commitment of the patients with their awareness about their disease, they also showed that the psychiatric condition is an effective factor in the patient's commitment that may have effects on the treatment (Zargar *et al.* 2019).

Some studies showed that poor adherence during the treatment of hypertension as a chronic disease has great effects on treatment failure. Measuring tools are implemented to evaluate the commitment and adherence to physician instructions and medications. These studies showed that the relationship between medication adherence and health literacy in patients with hypertension. It showed that poor adherence that came after health literacy leads to uncontrolled and elevated blood pressure (Goudarzi *et al.* 2020).

1.8.10 Knowledge about hypertension

There are many issues that concern healthcare providers in all countries about the treatment of chronic diseases. According to the incremental of patients, the healthcare providers must increase the financial investments and studies to maintain the health situation of the societies. The patients themselves are essential partners in these issues. Patients can self-manage the disease if they had enough knowledge about the disease and its treatment. Especially, patients with hypertension a chronic disease, can control their blood pressure and avoid possible risk factors (Vainauskienė and Vaitkienė 2021). The following subsections define the Knowledge, its sources about hypertension, and assessment of the patient's knowledge.

1.8.10.1 Definitions

In general, the term knowledge can be defined as “understanding gained through either study or experience”. Or it may be defined as “an accumulation of facts, procedural rules or heuristic” (Tognoli *et al.* 2020). According to the previous definition, knowledge represents facts and rules the person understands from learning or the life events or the experiments.

But this study is related to the health knowledge of the patients. The knowledge of the patients about their disease is “vital for the individual to obtain, process and understand the basic health information and required health services that are important to maintain the outcome of the patient's health and prevent further harm” (Australian Patients Association 2022).

1.8.10.2 Types of knowledge

In social and education studies, knowledge classified into two types. The are:

a) Explicit knowledge:

Explicit knowledge is organized and communicated according to formalism, a symbol, or appropriate natural language. Therefore, it is easy to be transmitted and recorded in artifacts structured forms such as reports, procedures, guidelines, strategies, etc (Chergui *et al.* 2020).

b) Tacit knowledge:

Tacit knowledge is the capability of possessing to go beyond what humans can express. It can be obtained via actions, experiences, and the commitment of actors in a specific context. It is difficult to formalize, communicate and transfer (Chergui *et al.* 2020).

1.8.11 Sources of knowledge of patients with hypertension

The availability of sources of any information related to a specific disease in any community may affect the patient's perceptions about their disorder signs. These perceptions have an influence on patients' decisions with considering health-seeking behavior and the management of their conditions. The knowledge of hypertension as a chronic disease was confirmed by many studies (Kodom *et al.* 2022).

The media as means of mass communication and broadcasting is the one of most effective sources of knowledge about hypertension. Such educational programs in TV and Radio channels, internet websites, and social communication are very useful to introduce the solutions and perfect lifestyle to prevent the effects of hypertension and its complications (Kowalewska *et al.* 2022).

According to the nature of Iraqi society, relative patients or friends may be considered a source of knowledge about hypertension. The patients usually had many visitors who discussed the conditions of the disease, medications, lifestyle features, and its probable

complications. Some visitors gained a good level of information in this way (Hussain *et al.* 2020).

Many programs and communication seminars had been held in healthcare institutions to educate the intended patients in the hospitals and healthcare centers. The health care providers aimed to elevate the level of knowledge about hypertension and its complications as a life-threatening disease. They advised attendance patients and their companies' relatives to change their lifestyle by either direct lectures or distributing brochures (Hussain and Mohammed 2020).

Medical books and research may be considered a source of knowledge about hypertension. But it may have not the same effectiveness as the previous mentioned sources of knowledge. Most of these books and research are composed with a complex scientific language that is difficult to be understood even by the educated patients (Kowalewska *et al.* 2022).

The previously mentioned sources are tacit knowledge sources. While the explicit knowledge sources are limited for the low grade of education. Only some qualifications (colleges and institutions) of medicine, nursing, and pharmacy may have a good level of explicit knowledge that had been gained via their academic study (Kowalewska *et al.* 2022, Kodom *et al.* 2022).

1.9 Knowledge Assessment of Patients

Elevating the level of knowledge about the disease is a common goal for both patients and healthcare providers. The patients aimed to discover their situation and keep their regular quality of life. While the health departments plan to control the epidemiology of diseases such as hypertension. Those two partners wonder toward the same goals with the same mean. Therefore, the health care providers assess the patient level to reduce the effect of diseases in the society (Sommer *et al.* 2018). Thus, it is important to define the assessment of the knowledge, its dimension, and its importance.

1.9.1 Definition of knowledge assessment

The assessment is a tool to measure the outcome of a specific learning process in any field. Thus, assessment can be defined as “a process of collecting information about the learning outcomes of persons in the realms of attitudes, knowledge, and skills” (Wibowo and Rahmah 2021). Knowledge is a field where the assessment is used. Therefore, the knowledge assessment can be defined as an “assessment of intellectual potential which includes factual, conceptual, procedural, and metacognitive knowledge” (Wibowo and Rahmah 2021). This definition described the process of measuring the obtained level of knowledge that had been accumulated in learners' or persons' minds which had effects on their attitude, lifestyle.

1.9.2 Dimensions of patients' knowledge of hypertension

In any assessment process, the dimension to be measured must be determined to obtain the results of the evaluation. The patients' knowledge about hypertension has several essential dimensions that can be assessed. The demographic information about the patients and their history of the disease is the most common dimension of the knowledge assessment about hypertension. It includes several variables such as age, gender, level of education, date of diagnosis, and other demographic variables. The information about hypertension is a dimension used to measure the knowledge of patients. It includes general information and its symptoms. The lifestyle dimension is also an important dimension to assess the patient's knowledge. It includes several variables such as nutrition, medication, physical activity, and other variables that are related to the risk factors of hypertension. Other specific dimensions had been used in knowledge assessment about hypertension (Hussain *et al.* 2020).

1.9.3 Importance of patients' knowledge about hypertension

The assessment of knowledge has many advantages that are very important in hypertension management and controlling the prevalence of the disease. The following are the most important advantages of patients' knowledge of hypertension.

- 1- The assessment of knowledge provides informative data about the condition of patients with hypertension that allows for a proposal of suitable management of the disease.
 - 2- It provides informative data about the prevalence of the disease in the society in which the assessment is performed. Its results are used to suggest proper healthcare planning in a specific area to support the required medication and other equipment.
 - 3- It provides informative data about the expected complications that may occur for patients with hypertension which is used in health care planning to support the developed or complicated cases by providing specialists and qualified nursing staff to manage the expected complications of the disease.
 - 4- It supports healthcare providers with data that describes the level of knowledge of the patients with hypertension to design the education policy of the health department to improve these levels of knowledge.
 - 5- It supports healthcare providers with data by which they can plan the human resource development programs according to the assessment results in order to prepare an efficient staff to manage hypertension and its complications.
- (Rajkumar and Romate, 2020).

1.10 Nursing role in hypertension

Nursing has an effective role in the management of hypertension. Starting from receipting the intended patients to the health institutes and ending with providing educational advice and mental support (Song *et al.* 2020).

In both ER and outpatient clinics, nurses can recognize hypertension from the appeared symptoms in the patients or by measuring the BP. In some cases, the patients did not know that they had hypertension, but nurses can diagnose the disease according to its signs and symptoms (Biswas *et al.* 2019). At observation, the nurses support the maintenance of the BP by performing sequential measures of BP. They also observed the diet of the patients during treatment, especially in complicated cases. Medication must be accurately provided in both dose and timing (Dinnocenzio and Benenson 2020).

In addition to the diagnosis and observation, the nurses had a great role in increasing the awareness and knowledge of patients about hypertension. They provide several pieces of advice about the conditions of the patient, the recommended lifestyle conditions, and avoiding risk factors. Their advice is not only for the patient, they provided it to the family members who intended with the patients. This may increase the awareness and knowledge of the patient's families. These pieces of advice may improve self and family care that can enhance the treatment and observation. It also increased the level of quality of life for the patients (Song *et al.* 2020).

The nursing educational health has contributions in developing and raising the level of knowledge of patients with high blood pressure, as it has a significant and positive impact on what is going on in their minds in the way of personal dealing with their diseases. The educational nursing intervention can enable hypertensive patients to learn how to deal with their conditions and pathological conditions in better ways, increase their interest in health measures, and reduce the complications of high blood pressure and other chronic diseases by understanding the signs and symptoms of their diseases and adhering to their daily lifestyle practices (Tam *et al.* 2020).

It is known that a person suffering from arterial hypertension disease increases the complications of the disease as the person advances in age, so the ways to deal with high blood pressure and manage its treatment steps will be a great burden towards the nursing staff all over the world.

Hypertension is one of the most common cardiovascular diseases in developed and developing countries. The prevalence of hypertension among adults in the United States was reported 29.1%.

Hypertension has an obvious impact on people's health and social relations, and increases mortality. Therefore, careful attention to appropriate treatment is essential. Evidence indicates that the United States and Canada have been successful in achieving optimal control of the disease

Chronic illnesses threaten not only the physical health of patients, but also their mental and social health. Therefore, measuring the lifestyle especially in chronic diseases, is of particular importance. Lifestyle is identified as one of the main indicators of cardiovascular health. Additionally, it is considered as an important measure of treatment outcome and in order to improve the health status and treatment outcome in patients with hypertension, it is necessary to find appropriate interventions to improve their nursing services and application of nursing theories, and integrated care interventions (e.g. case management, multidisciplinary teams) on improving the patients nursing roles with chronic conditions (Khademian *et al.* 2020).

Hypertension treatment may continue throughout life, but some patients ignore its treatment; that is why they need to have regular follow-ups. Self-efficacy is one of the main structures in Bandura's social cognitive theory and it refers to the assurance of an individual about his ability to perform certain behaviors. It is believed that the sense of self-efficacy and related behaviors is the key to successful treatment, increased self-care behaviors, and improved quality of life for patients with hypertension.

The role of nurses is not limited to educating, raising awareness, giving treatments, dressings, and nursing practices in emergency rooms and wards for patients with high blood pressure, but there is a fabric of nursing staff specialized in support, guidance, and psychological counseling to reduce anxiety and depression among patients with high blood pressure, which has an important role in treating them and reducing the risks High blood pressure through psychological practices and methods provided by a nursing staff

specialized in the psychological aspect, such as conducting a dialogue with the patient to remove what is inside of anxiety, fear and depression, and providing psychological support and targeted and encouraging praises to work to avoid the risks and complications of high blood pressure for them (Liu *et al.* 2019).

In the past, studies did not shed light on the important role and nursing intervention played by male and female health workers towards patients in health institutions, private clinics, and homes. But now there are many studies praising the role of health professionals for the great and important service they provide to segments and groups of society, especially patients with chronic diseases, including high blood pressure, because of the seriousness and great complications it poses to patients' lives, as 88% of the nursing staff provides educational services and health care to these The category of patients in the community in various ways and methods to increase knowledge and learn about the practices of normal and correct lifestyles to reduce the increase in the risk of chronic diseases such as blood pressure, diabetes, and others (Spies et al. 2018).

2. MATERIAL METHODS

This chapter illustrates the methodology of the study. A non-experimental approach using descriptive design will be applied in order to achieve the objectives of the study. The following sections dealt with the site of the study and its implemented tool that is used in patients' knowledge about hypertension.

2.1 Study site

Mosul is the second-largest Iraqi governorate according to its population. More than 4,030,006 is the population of Nineveh in 2021. About 1,586,145 of them live in rural while the rest 2,443,861 live in urban. Most of them live in Mosul city (1,943,590). Those people receive health care from (9) hospitals and (34) PHCCs. These numbers of healthcare institutions do not meet the requirements of Mosul society. In addition to the lack of medications and specialist centers.

The bad situation of the health care that provided by official PHCCs leads the patients to intend private hospitals and clinics either in Mosul city, other cities, or outside Iraq. Patients with hypertension are among those patients who do not intend to PHCCs or are unaware of their disease. Thus just 19,439 patients with hypertension intended to the PHCCs in Nineveh Governorate during 2021. This number does not reflect the epidemiology of Hypertension in the governorate because of the lack of health records in both private and official health care providers. Despite inaccurate number of patients but it is noticed that the increased by up to 33% than 2020.

The incremented number of patients came after several causes including the recovery of PHCCs in Mosul city after the ISIS crisis, and incremented supplies, and medications provided without charge by the Iraqi MOH. The stability of the city brings back most of the refugees from the other cities. Thus, without accurate health care planning, the incremented numbers can cause huge problems to perform and provide reasonable services.

2.2 Administrative arrangements

Formal administrative approval was obtained to start the data collection in Mosul city's PHCCs in order to conduct the study. The Directorate of Health in Nineveh (DOHN) approved the study based on the presented description, sample, and goals. The approval included permission to meet the patient in the PHCCs in Mosul city (Appendix A1). The approval was granted in 15th May 2022 and the approval of the Ethics Committee of Çankırı Karatekin University was obtained on 3rd August 2022, as shown in Appendix 5.

2.3 Design of the study

The study is a descriptive - correlational design that is applied to measure the knowledge of patients with hypertension. The study started on 8th Mar 2022. Data collection started on 17th May 2022 after the approval of DOH and ended on 18th Sep 2022.

2.4 Sample of the study

The perfect number of the study had been calculated according to the theoretical method presented by Kumait (2015) as shown in Equation 2-1:

$$n = \frac{n_g * N}{n_g + N - 1} \quad \dots (2-1)$$

Where:

n: the obtained sample size.

n_g: the initial size of sample (considered = 394).

N: the study environment size.

The perfect size sample is 342 patients that provide an informative assessment of the knowledge of patients with hypertension.

The study has a purposive sample that consists of 401 patients, 182 males and 219 females. Six participants had been excluded because of incorrect or uncompleted answers. Of the remaining 394 patients of 178 males and 216 had participated in the study by answering the questions. The sample consisted of the following criteria:

- 1- Hypertensive patients:** the sample included just patients with Hypertension with /without any other chronic disease.
- 2- Age of patients:** They are patients aged (≥ 18) years with hypertension. It includes several age categories that perform the productive age in Iraqi society. Less than 18 years old patients had been excluded.
- 3- Patient with hypertension:** The sample included patients with recent blood pressure tests and higher than 140\ Hgmm systolic and 90mm diastolic pressure. Less than these measures are excluded.

2.5 Validity and reliability of the tool

The proposed tool is approved to be used by its author. The proposed tool had been tested for its validity and reliability by Kumait (2015). The tool had been approved by the Iraqi Ministry of Health. Thus, the current study depends on its pre-tested validity and reliability.

2.6 Data collection

The data collection started at Al-Mansour typical center PHCC with the implemented tool at interview as a means of data collection. For each patient, 10 – 15 min are required to answer the items. The items had been clearly explained to the patients. Then, the data had been collected from other PHCCs in Mosul city.

2.7 Study period

The data collection started on 17th May 2022 and ended on 18th Sep 2022 at different PHCCs and hospitals in Mosul city.

2.8 Limitation of the Study

The study faced some limitation, they are:

- 1- Incorrect answers of some patients.
- 2- Different languages were obstacles in data collection.
- 3- Short time for data collection.
- 4- Gap of information about hypertension in the study environment.

2.9 Data analysis through statistical procedure

The data obtained in the research were analyzed using the SPSS (Statistical Package for Social Sciences) for Windows 25.0 program. Descriptive statistical methods (number, percentage, mean, standard deviation) were used while evaluating the data.

In the comparison of the data, an independent t-test was used for the difference between two independent groups, and a one-way analysis of variance was applied in the comparison of more than 2 independent groups, and Bonferroni was used to find the group that made a difference when there was a difference.:

A. Descriptive Statistical Data Analysis:

This strategy was applied through the measurement of the following:

- 1- Frequencies,
- 2- Percentage,

- 3- Mean,
- 4- Median,
- 5- Standard deviation.

B. Inferential Statistical Data Analysis:

This strategy was applied through the measurement of the following:

The implemented tool was designed for Iraqi society thus, no normalized test was used to describe the nature of the study universe. The previous tests depended on this study.

This strategy was applied through the measurement used the followings:

1. Independent T-test to detect the effects of both variables associated with knowledge.
2. One-way ANOVA To compare the averages between the knowledge variable and the demographic information variables for more than two variables.
3. Bonferroni was used to find the group that made a difference when there was a difference.

3. RESULTS

This chapter dealt with the analyzed data and the results of the current study based on the participants' answers. The chapter includes a demographic description of the sample, the knowledge of patients with hypertension, and the measured scores.

3.1 Sample description

The studied sample had varied demographical information, The knowledge level of the patients. The following some discriptives of the studied sample.

3.2 The Tool of the Study

The study implements a pre-proposed assessment tool published by Kumait (2015). The tool consisted of two parts. They are:

1. **Demographical Data:** this part consists of 8 items that focus on the patient's demographic characteristics such as age, gender, marital status, residence, level of education, concomitant with chronic disease, and income.
2. **Knowledge:** this part consists of 28 items that focused on the knowledge characteristics of patients with hypertension. These items were divided into two subgroups that covered the general information that includes tacit knowledge and signs and symptoms and patients' lifestyle conditions.

In the second part, pre-proposed items had been implemented according to the previously presented studies that dealt with hypertension. After searching, the current study implemented the tool by Kumait (2015) to assess the level of knowledge in patients with hypertension. The author approved to use of the tool in the current study.

As mentioned, the second part of the tool consisted of 28 items. General information had 9 items, signs and symptoms had 11 items and lifestyle practices had 8 items. The answers

of the participants had been distributed on the Likert scale option (True, Uncertain, and False) their weights are shown in Table 2.1. Some of the questions had reversed weights.

Table 3.1 Distribution of Weights

Answer	True	Uncertain	False
Weight	3	2	1

The currently proposed tool is illustrated in Appendix C. It is approximately suitable for the Iraqi environment and its traditions.

3.2.1 Demographic data

The sample consists of six age categories that covered the patients in the studied sample and The sample contains both male and female patients with hypertension and The participants had different marital statuses. The table illustrate the distribution of the sample based on marital status. The environment of the study includes both urban and rural areas. The sample contains both rural and urban dwellers, The sample contained several types of qualification levels. The patients with hypertension had different graduating levels matching the conditions of their lives, The income of the patients' families was in various conditions. Either they had a good, fair, or not-fair income, The sample includes many patients who had relatives of patients with hypertension. While few portions of the patients had no relative patients, The sample includes patients with concomitant chronic disease in addition to hypertension more than patients without any other chronic disease. All this was shown in both Table 3.1 and in Figures.

The participants had varied answers to the paragraphs 1-8 that represented the demographic data of the participants as follows:

Table 3.2: Demographical Data

N=394	Variables	Frequency	Percentage
Age	18 – 28 years	26	6.6
	29 – 38 years	60	15.2
	39 – 48 years	82	20.8
	49 – 58 years	132	33.5
	59 – 68 years	64	16.2
	>69 years	30	7.6
Gender	Male	178	45.2
	Female	216	54.8
Marital Status	Married	348	88.3
	Single	46	11.7
Residence	Urban	276	70.1
	Rural	118	29.9
Education	Illiterates	160	40.6
	Primary	146	37.1
	Secondary	56	14.2
	Acadmeic	32	8.1
Income Condition	Good	106	26.9
	Fair	150	38.1
	Not fair	138	35
Family History	Non realative Patients	38	9.6
	Relative patients	356	90.4
Concomitant Chronic Disease	With Concomitant Chronic Disease	286	72.4
	Without Concomitant Chronic Disease	108	27.6

1- Age

According to the obtained age frequencies, the majority of the sample was of 49-58 years which is 132 participants with 33.5% of the studied sample. Both 26 patients (18-28 years) and 30 patients (>69 years) had approximately equal ratios 6.6% and 7.6%.

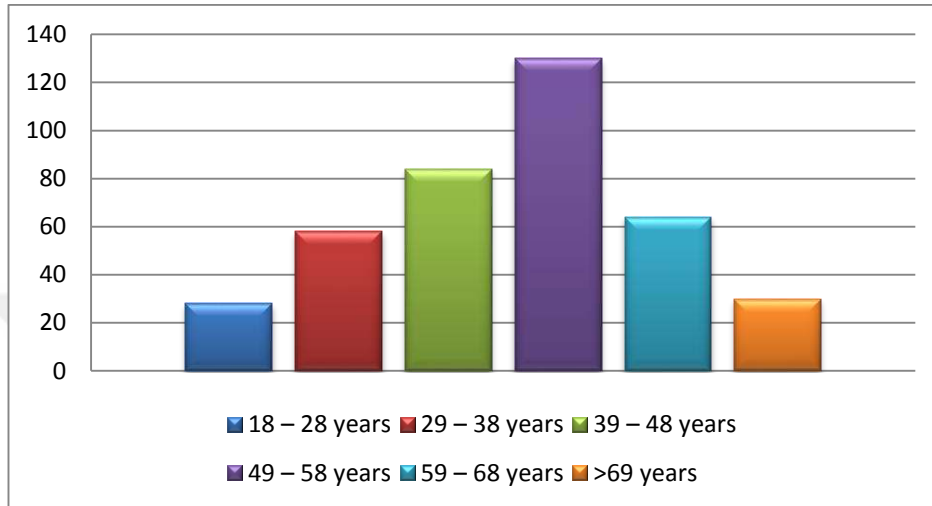


Figure 3.1 Age of The Patients.

2- Gender

Figure 3.2 showed that both male 45% and female 55% patients with hypertension are approximately equal in the sample. Clearly,

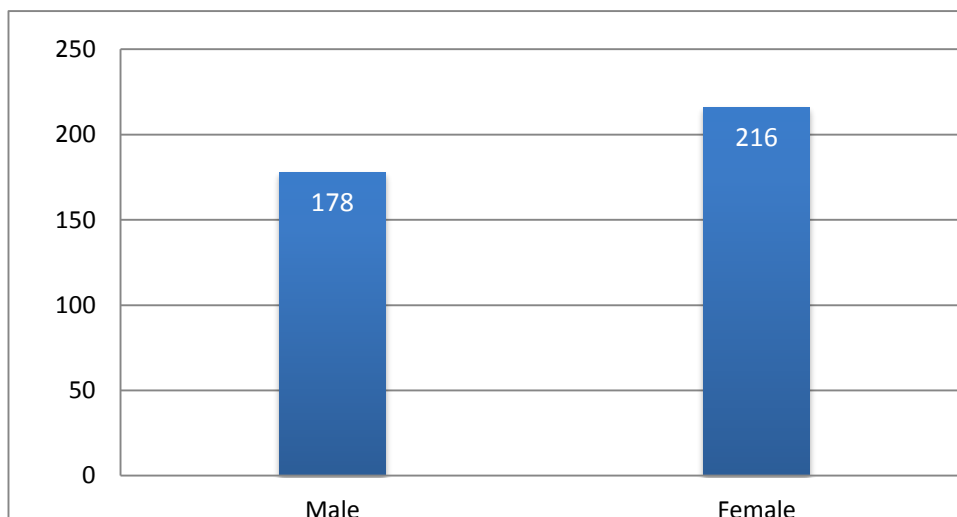


Figure 3.2 Gender of The Patients.

3- Marital Status

In Figure 3.3, the married had a great ratio which means 88.3% of the sample, while the singles including other special conditions were 11.7%.

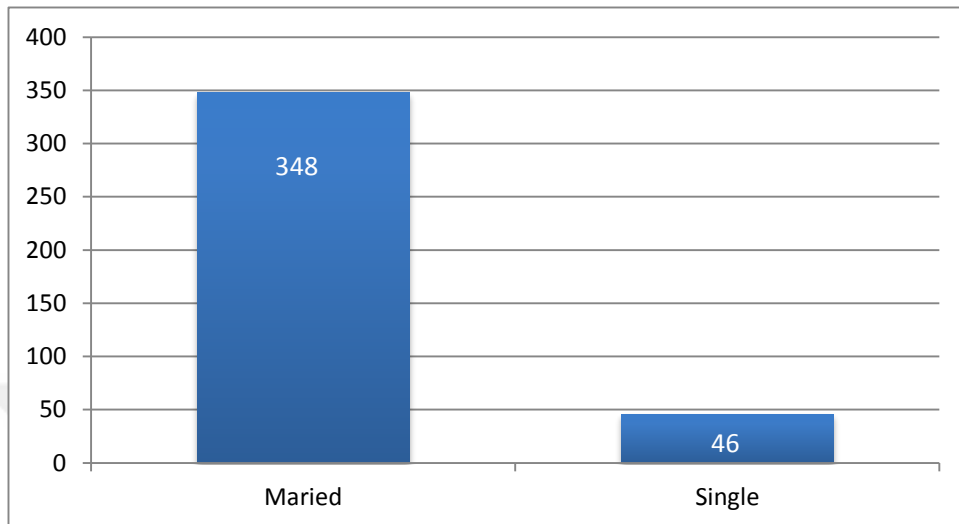


Figure 3.3 Marital Status of Participants in The Sample.

4- Residence

In Figure 3.4, the study area covered Mosul city. But the patients who intended to PHCCs and hospitals came from rural areas near or far from Mosul. The number of urban dwellers (70.1%) was higher than the number in rural areas (6%).

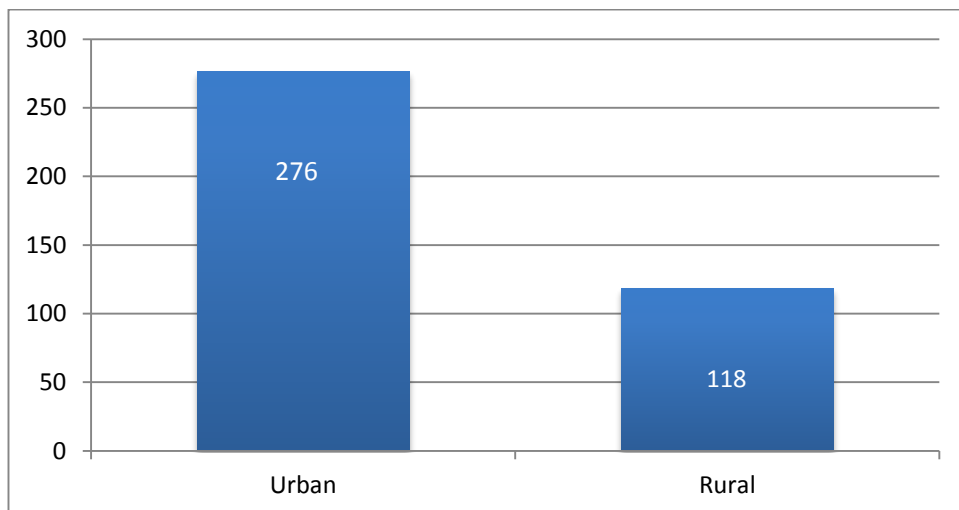


Figure 3.4 Residence.

5- Qualification

In Figure 3.5, the majority of the participants in the sample had no qualification 40.6%. They were illiterate, while 37.1% had just primary school. The rest had secondary and academic qualifications

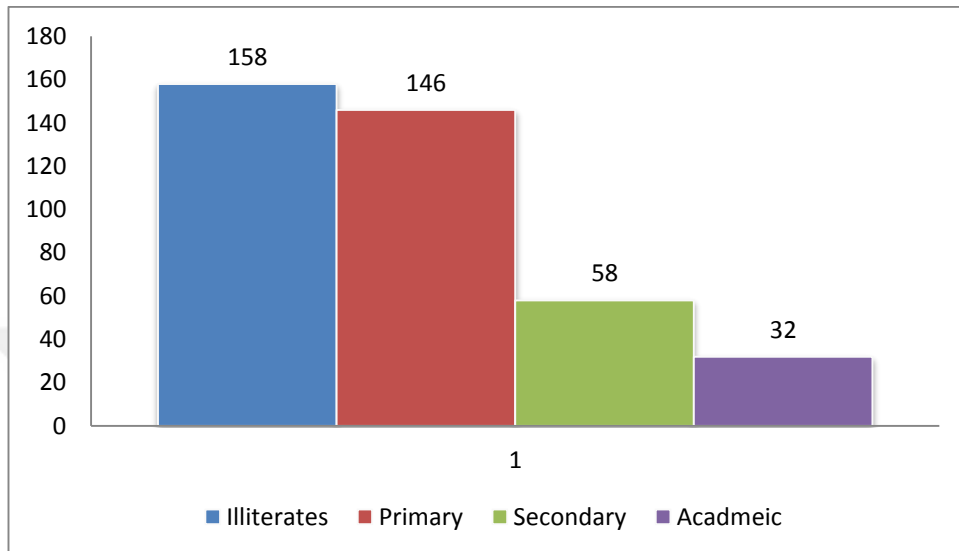


Figure 3.5 Qualification Level.

6- Family Income.

In Figure 3.6, the majority of the families had fair income (38.01%). While 35% of the families had not-fair income and just 26.9% had a good income. In fact, good income does not mean high income.

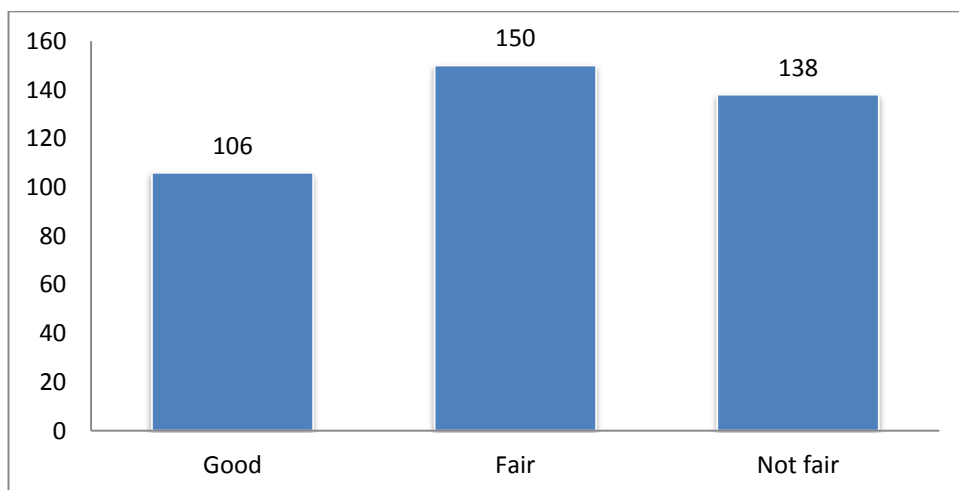


Figure 3.6 Family Income.

7-Family History.

As shown in Figure 3.7, just 9.6% of the participants had no relative patients with hypertension. While the majority of them (90.4%) had relative patients who had been diagnosed with hypertension.

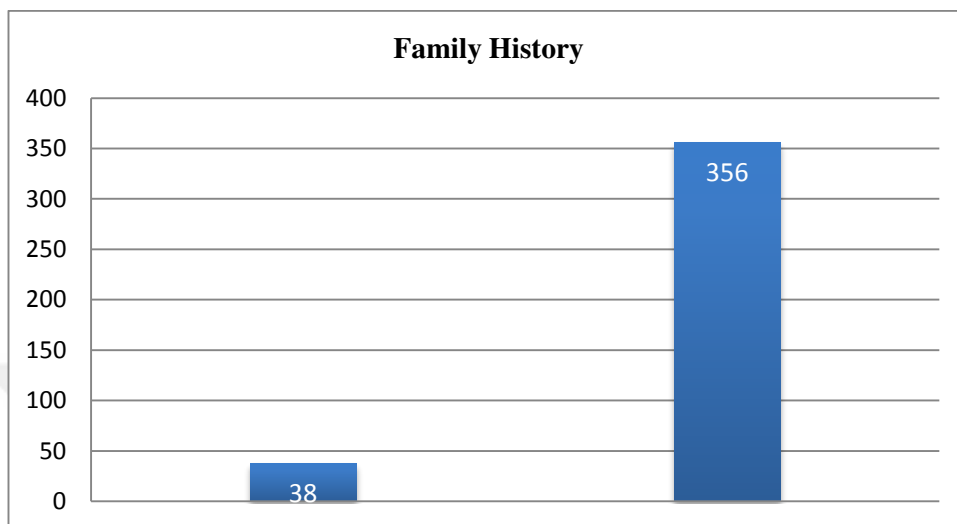


Figure 3.7 Family History.

8-Concomitant Chronic Disease.

Figure 3.8, the majority of the sample (72.4%) had another concomitant chronic disease. The less ratio of participants (27.6%) had no other concomitant chronic disease.

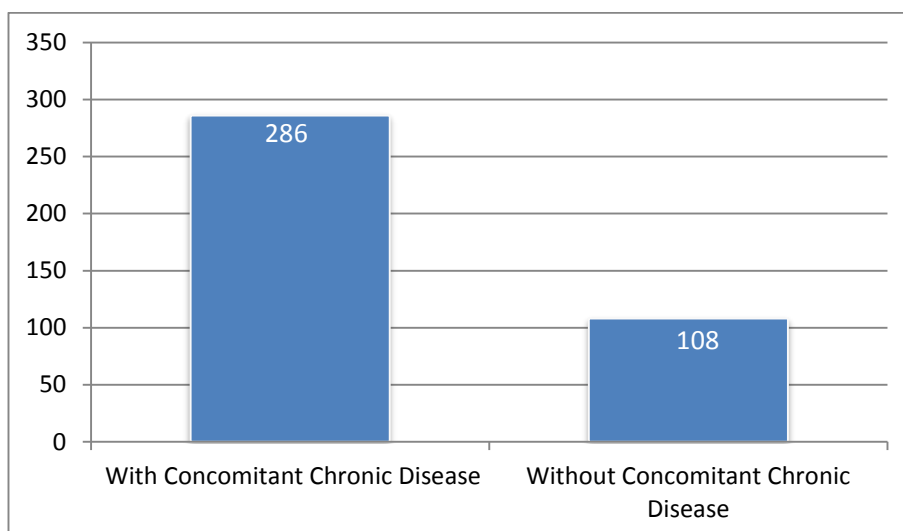


Figure 3.8 Concomitant Chronic Disease.

3.2.2 The General Knowledge Factors

The second parts of the study tool measures the general knowledge of patients through the factors of knowledge. It includes two factors. They are: the general knowledge which include tacit knowledge and symptoms that had been gained by paricipants about hypertension.

Table 3.3: Score of The General Knowledge Factors

	Mean±Standart deviation	95% Confidence Interval of the Difference	
		Lower	Upper
Tacit Knowledge	14.99±2.39	14.75	15.23
Sings and Symptoms	19.28±2.37	19.05	19.52
Lifestyle Practices	13.73±2.09	13.52	13.93

Descriptive statistics of the scores of general information factors are given in Table 3.3. It is 14.99±2.39 (14.75, 15.23) for “Tacit Knowledge”, 19.28±2.37 (19.05, 19.52) for “Sings and Symptoms” and 13.73±2.09 (13.52, 13.93) for “Lifestyle Practices”.

3.2.2.1. The tacit knowledge

For the tacit knowledge, nine paragraphs had been answered by the participants. The answers had been classified as shown in Table 3.4.

Table 3.4 The Results of The Participants' Response to The Tacit Knowledge Questions

Items No.	Items	False		Uncertain		True	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1	Hypertension is defined as a systolic pressure of 140mm hg and a diastolic pressure of 90 mm hg	156	39.6	114	28.9	124	31.5
2	Hypertension is defined as a silent killer	166	42.1	186	47.2	42	10.7
3	HT causes early death if not treated	206	52.3	150	38.1	38	9.6
4	BP is considered normal if systolic pressure is less than 140mm hg and diastolic pressure is less than 80 mm hg	184	46.7	120	30.5	90	22.8
5	HT for a long period may be a cause to destroy the vascular in the kidneys, brain, and limbs	206	52.3	138	35.0	50	12.7
6	Most people suffering from HT for many years without any symptoms	168	42.6	100	25.4	126	32.0
7	Increase the risk for BP with developing years	318	80.7	62	15.7	14	3.6
8	BP is more common in males at the beginning of half age but in women after menopause	100	25.4	160	40.6	134	34.0
9	BP is a chronic disease	322	81.7	50	12.7	22	5.6

The results of the responses given by the participants to the “Tacit Knowledge” questions are given in Table 3.4. It is seen that 34% of the participants answered the question "BP is more common in males at the beginning of half age but in women after menopause" as true, and 81.7% answered the question "BP is a chronic disease" as false

3.2.2.2.The Signs and Symptoms

For the signs and symptoms, eleven paragraphs had been answered by the participants. The answers had been classified as shown in Table 3.5.

Table 3.5 The Results of The Participants' Response to Signs and Symptoms Paragraphs.

Items No.	Items	False		Uncertain		True	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1	Dizziness	286	72.6	78	19.8	30	7.6
2	Shortness of breathing	118	29.9	130	33.0	146	37.1
3	Palpitation	196	49.7	110	27.9	88	22.3
4	Nausea	214	54.3	94	23.9	86	21.8
5	Chest pain	134	34.0	126	32.0	134	34.0
6	Spontaneous Epistaxia	212	53.8	106	26.9	76	19.3
7	Poly urea	166	42.1	108	27.4	120	30.5
8	Conjectival hemorrhage	134	34.0	156	39.6	104	26.4
9	Flashed face	260	66.0	96	24.4	38	9.6
10	Headache	366	92.9	18	4.6	10	2.5
11	No signs and symptoms	62	15.7	86	21.8	246	62.4

The results of the responses given by the participants to the “Signs and Symptoms” questions are given in Table 3.5. It is seen that 62.4% of the participants answered the "No signs and symptoms" question as true, and 92.9% answered the "Headache" question as false.

3.2.2.3.The Lifestyle Practices

For the lifestyle practices, eight paragraphs had been answered by the participants. The answers had been classified as shown in Table 3.6.

Table 3.6 Results of Participants' Response to Lifestyle Practices Questions.

Items No.	Items	False		Uncertain		True	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1	Take drugs and attend clinic regularly	282	71.6	52	13.2	60	15.2
2	Take much table salt	354	89.8	14	3.6	26	6.6
3	Take drugs when I have symptoms	0	0.0	10	2.5	384	97.5
4	Use condiments in cooking	46	11.7	132	33.5	216	54.8
5	Take plenty of fruits	258	65.5	94	23.9	42	10.7
6	Smoke or use tobacco a lot	250	63.5	106	26.9	38	9.6
7	Take plenty of vegetables	228	57.9	116	29.4	50	12.7
8	Take plenty of red meat	326	82.7	36	9.1	32	8.1

The results of the responses given by the participants to the “Lifestyle Practices” questions are given in Table 3.6. It is seen that 97.5% of the participants answered the question "Take drugs when I have symptoms" as true, and 89.8% answered the question "Take much table salt" as false.

3.3 The Relation Between Demographical Information and the Knowledge

Table 3.7: The relation between demographical information and the Knowledge

	Variable	Tacit Knowledge.			Signs and Symptoms.			Lifestyle Practices		
		Mean $\pm$ Standart dev.	Sig.	Bonferroni	Mean $\pm$ Standart dev.	Sig.	Bonferroni	Mean $\pm$ Standart dev.	Sig.	Bonferroni
Age Category	18 – 28 years (1)	16.15 $\pm$ 2.07	0.019^{*b}	1>3	18.69 $\pm$ 1.93	0.192 ^b		14.54 $\pm$ 1.94	0.032^{*b}	1>3
	29 – 38 years (2)	15.10 $\pm$ 2.47			19.57 $\pm$ 1.74			13.30 $\pm$ 1.86		
	39 – 48 years (3)	14.36 $\pm$ 2.54			18.90 $\pm$ 2.39			13.32 $\pm$ 2.13		
	49 – 58 years (4)	14.89 $\pm$ 2.44			19.33 $\pm$ 2.72			13.80 $\pm$ 2.02		
	59 – 68 years (5)	15.31 $\pm$ 2.36			19.75 $\pm$ 2.57			14.12 $\pm$ 2.36		
	>69 years (6)	15.20 $\pm$ 1.35			19.07 $\pm$ 1.08			13.80 $\pm$ 1.90		
Gender	Male	14.27 $\pm$ 2.31	0.000^{*a}		19.38 $\pm$ 2.30	0.457 ^a		13.50 $\pm$ 2.04	0.057 ^a	
	Female	15.58 $\pm$ 2.30			19.20 $\pm$ 2.42			13.91 $\pm$ 2.11		
Marital Status	Single	14.92 $\pm$ 2.42	0.109 ^a		19.36 $\pm$ 2.38	0.073 ^a		13.65 $\pm$ 2.10	0.064 ^a	
	Married	15.52 $\pm$ 2.17			18.69 $\pm$ 2.18			14.26 $\pm$ 1.94		
Residence	Urban	15.48 $\pm$ 1.93	0.007^{*a}		19.32 $\pm$ 1.90	0.858 ^a		14.13 $\pm$ 1.99	0.010^{*a}	
	Rural	14.77 $\pm$ 2.54			19.27 $\pm$ 2.55			13.55 $\pm$ 2.10		
Qualification	Illiterates (1)	15.81 $\pm$ 1.94	0.000^{*b}	1>2, 1>3, 1>4, 2>4, 3>4	19.73 $\pm$ 2.16	0.015^{*b}	1>2	13.94 $\pm$ 1.83	0.001^{*b}	1>4, 2>4
	Primary (2)	14.83 $\pm$ 2.50			18.94 $\pm$ 2.42			13.94 $\pm$ 2.29		
	Secondary (3)	14.27 $\pm$ 2.51			19.21 $\pm$ 2.42			13.24 $\pm$ 2.05		
	Academic (4)	12.94 $\pm$ 1.98			18.75 $\pm$ 2.70			12.56 $\pm$ 1.90		
Family Income	Good (1)	14.68 $\pm$ 2.19	0.223 ^b		19.32 $\pm$ 2.44	0.750 ^b		13.11 $\pm$ 2.01	0.001^{*b}	2>1, 3>1
	Fair (2)	15.20 $\pm$ 2.53			19.39 $\pm$ 2.29			13.83 $\pm$ 1.97		
	Unfair (3)	15.04 $\pm$ 2.37			19.17 $\pm$ 2.40			14.13 $\pm$ 2.16		
Family History	Relative patients	14.43 $\pm$ 1.89	0.108 ^a		19.57 $\pm$ 2.37	0.406 ^a		13.19 $\pm$ 1.45	0.020^{*a}	
	Non relative Patients	15.06 $\pm$ 2.44			19.25 $\pm$ 2.37			13.79 $\pm$ 2.14		
Other Chronic Disease	Chronic history	14.55 $\pm$ 2.38	0.026^{*a}		19.55 $\pm$ 2.40	0.181 ^a		13.15 $\pm$ 1.88	0.001^{*a}	
	Non chronic history	15.15 $\pm$ 2.38			19.19 $\pm$ 2.35			13.94 $\pm$ 2.12		

Abbreviations: ^a student t test, ^b one-way ANOVA

For the comparison of the knowledge scores of the participants according to their demographic characteristics, an independent t-test was used in the comparison of two independent groups, and a one-way analysis of variance was used in the comparison of more than two independent groups. As a result, it is seen that there is a statistically significant difference between the “Tacit Knowledge” and “Lifestyle Practices” scores according to the age categories of the participants ($p<0.05$). Bonferroni was applied to find the group that made the difference. It is seen that the “Tacit Knowledge” and “Lifestyle Practices” scores of the participants between the ages of 18 and 28 are higher than the participants between the ages of 39 and 48.

It is seen that there is a statistically significant difference between the “Tacit Knowledge” scores according to the gender of the participants ($p<0.05$) and the “Lifestyle Practices” scores of female participants are higher than male participants.

It is seen that there is a statistically significant difference between the “Tacit Knowledge” and “Lifestyle Practices” scores according to the residence of the participants ($p<0.05$) and the “Tacit Knowledge” and “Lifestyle Practices” scores of the participants living in the urban areas are higher than the participants living in the rural areas.

It is seen that there is a statistically significant difference between the scores of “Tacit Knowledge”, “Signs and Symptoms” and “Lifestyle Practices” according to the qualification of the participants ($p<0.05$). Bonferroni was applied to find the group that made the difference. It is seen that the “Tacit Knowledge” scores of the illiterate participants are higher than the participants whose proficiency is primary, secondary, and academic and the “Tacit Knowledge” scores of the participants with primary and secondary qualifications are higher than the participants with academic qualifications.

It is seen that the "Signs and Symptoms" scores of illiterate participants are higher than the participants with primary qualifications and the "Lifestyle Practices" scores of the illiterate and participants with primary qualifications are higher than the participants with academic qualifications.

It is seen that there is a statistically significant difference between the participants' "Lifestyle Practices" scores according to their family income ($p < 0.05$). Bonferroni was applied to find the group that made the difference. It is seen that the "Lifestyle Practices" scores of the participants with fair or unfair family income are higher than the participants with good family income.

It is seen that there is a statistically significant difference between the "Lifestyle Practices" scores according to the family history of the participants ($p < 0.05$). It is seen that the participants who have no family history have higher "Lifestyle Practices" scores.

It is seen that there is a statistically significant difference between the "Tacit Knowledge" and "Lifestyle Practices" scores of the participants according to the presence of other chronic diseases ($p < 0.05$). It is seen that the participants who do not have other chronic diseases have higher "Tacit Knowledge" and "Lifestyle Practices" scores (Table 3.8).

4. DISCUSSION

After the statistical analysis had been performed on the collected data from the participants' responses, it is possible to discuss the knowledge level of the sample and compared it with the other studies.

For the age categories, the frequency of the 49 – 58 years category was 132 patients and it was about 33.5% of the sample. It was followed by 39 – 48 years with a frequency of 82 which is about 20.8% of the sample. This showed that most of the sample are between 39-58 years. The age categories had a significant difference in the tacit knowledge. Most of the sample had a good level of knowledge 282 which is about 71.6% of the sample. The rest of the sample was 112 patients about 28.4% which means no poor level of tacit knowledge. It is obvious that the sample had a good level of tacit knowledge. In study of Kumait (2015), the age categories had no significant difference in tacit knowledge. They are approximately from the same category of age (45-64 years) which is about 62% of the sample. In fact, the study did not mention the score of the age categories or other demographic information. In the study of Baez (2016), the age categories had no significance on tacit knowledge, too. The age categories between 40-59 are the majority of the sample. In the study of Eshah and Al-daken (2015), the age categories had no significance difference on tacit knowledge too. The age categories between 46-60 are the majority of the sample. In the study of (Baliz *et al.* 2012), the age categories had no significance difference on tacit knowledge, too. The age categories between (30-49) are the majority of the sample. Only in the study of Buang *et al.* (2019), the age category had a significant difference with unknown numbers. The range of ages is less than in the other studies. The age is a common factor for hypertension on the current study as well as in the studies of Buang *et al.* (2019, Kumait (2015), Baez (2016), Eshah and Al-daken (2015), Baliz *et al.* (2012) about hypertension. The ages of the patients in all studies are prevalent to have hypertension.

For the signs and symptoms, the current study showed that age categories had no significance in signs and symptoms. About 71.1% of the sample had a good score of signs and symptoms. In study of Kumait (2015), the age had a significant difference with a

moderate level. Although the absence of a relation in the current study, it agreed with study of Kumait (2015) that reported increasing age reduced the level of awareness about signs and symptoms associated with no signs and symptoms may appear in patients with hypertension.

For lifestyle practices, the current study showed that age categories had a significance difference in lifestyle practices with 67.5% having good lifestyle practices. In the studies of Baliz *et al.* (2012) and Eshah and Al-daken (2015), the lifestyle practices had no significant difference with age categories, too, however, most of the participants had moderate lifestyle practices. The current study agreed with Baliz *et al.* (2012) that reported increasing age may decrease, as age increased and a healthy lifestyle practicing is very important to prevent hypertension from developing other chronic diseases.

For the gender of the participants in the current study, the number of males was 178 which is about 45.2% of the sample and the number of females was 216 which is about 54.8% of the sample. In study of Kumait (2015), there were 148 females which was about 74 % of the sample. The current study agreed with study of Kumait (2015) that reported hypertension is common in both males and females.

In the current study, gender had a significant difference in tacit knowledge. The results showed that females gained good scores of tacit knowledge while males had fewer scores and moderate tacit knowledge. In both study of Kumait (2015) and Eshah and Al-daken (2015), gender had a significant difference in tacit knowledge and the current study agreed with it. However, in the study of Baliz *et al.* (2012), there were no significant differences in tacit knowledge and both males and females had moderate tacit knowledge.

In the current study, gender had no significant difference in signs and symptoms. The results showed that both males and females gained fair and moderate scores of signs and symptoms. In the study of Kumait (2015), there were significant differences in signs and symptoms, according to gender, and both males and females had moderate signs and symptoms that the current study agreed with.

In the current study, gender had no significant difference in lifestyle practices. The results showed that both males and females gained fair and moderate score for lifestyle practices. In the studies of Kumait (2015), Eshah and Al-daken (2015), the lifestyle practices had no significant differences that the current study agreed with.

For the marital status of the participants in the current study, the number of singles was 46 which is about 11.7% of the sample and the number of married was 348 which is about 88.3% of the sample. The marital status had no significant differences in tacit knowledge. Both single and married participants had a moderate level of tacit knowledge. In the study of Eshah and Al-daken (2015), there were no significant differences that the current study agreed with.

The marital status had no significant differences in both signs and symptoms and lifestyle practices. Both singles and married had moderate levels of signs and symptoms and lifestyle practices. In the study of Eshah and Al-daken (2015), there were no significant differences in lifestyle practices that the current study agreed with.

For the residence of the participants in the current study, the number of urban residents was 276 which is about 70.1% of the sample and the number of rural residents was 118 which is about 29.9% of the sample. The residents had significant differences in tacit knowledge. Both urban and rural area residents had moderate levels of tacit knowledge. The residence had no significant differences in signs and symptoms. Both urban and rural area residents had good levels of signs and symptoms. The residence had significant differences in lifestyle practices. Both urban and rural area residents had moderate levels of lifestyle practices. The urban residents had more knowledge about hypertension.

The qualifications of the participants, there were 160 illiterate which is 40.6% of the sample, 146 participants were primary school graduates 37.1%, 56 participants were secondary school graduates (14.2%), and academic participants were 32 patients (8.1%). The qualifications had significant differences in tacit knowledge. Our study showed that those with a low level of education (illiterates) have more knowledge than other groups, and this result is not consistent with other studies of Eshah and Al-daken (2015), Baliz *et*

al. (2012) that showed that a good educational level contributes to increasing knowledge. It seems that knowledge about health issues does not depend on the academic qualification, as the person may be uneducated and have knowledge about the disease as a result of frequent or regular visits to the doctor and adherence to health recommendations. Also, family history contributes to increasing health knowledge as a result of repeated dealing with the disease for a long time. In this study showed that those with low educational level (illiterates) have more knowledge (tacit knowledge, signs and symptoms) and lifestyle than other groups, and this finding is not consistent with other studies of Eshah and Al-Daken (2015), Baliz et al. (2012) which showed that a good educational level contributes to an increase in knowledge and lifestyle practices. It appears that knowledge of health issues does not depend on academic qualification, as a person may be uneducated and have knowledge of the disease as a result of frequent or regular visits to the doctor and adherence to health recommendations.

Family history also contributes to an increase in health knowledge as a result of repeated dealing with the disease for a long time. The current study considered the qualification as an important factor in the participant's knowledge about hypertension.

For the family income, the number of participants that had good income was 106 which is 26.9% of the sample, 150 participants had fair income, and 135 participants (35%) had not fair income. The family income had no significant difference in the tacit knowledge. The participants gained moderate levels of tacit knowledge. In the study of Eshah and Al-daken (2015), the family income also had no significant difference in the tacit knowledge that the current study agreed with. The family income had no significant difference in the signs and symptoms. The participants gained good levels of signs and symptoms. The family income had significant differences in lifestyle practices. The participants gained moderate levels of lifestyle practices. Family income is considered an effective factor in the knowledge in this study.

The number of patients who had relatives of patients with hypertension was 356 which is 90% of the sample. While 38 patients (9.6%) had no relative patients. The family history had no significant difference in tacit knowledge. Both categories had moderate levels of

tacit knowledge. In the study of Eshah and Al-daken (2015), family history also had no significant difference in the tacit knowledge that the current study agreed with. The family history had no significant difference in signs and symptoms. Both categories had good levels of signs and symptoms. The family history had a significant difference in lifestyle practices. Both categories had moderate levels of lifestyle practices. In the study of Eshah and Al-daken (2015), family history also had no significant difference in the lifestyle practices that the current study agreed with.

For concomitant chronic disease, the patients with concomitant chronic disease were 286 which is about 72.4% of the sample. While the number of patients without other chronic disease were 108 patients which are about 27.6% of the sample. The concomitant chronic disease had significant differences in tacit knowledge. Both categories had moderate levels of tacit knowledge. The concomitant chronic disease had no significant differences in signs and symptoms. Both categories had good levels of signs and symptoms. The concomitant chronic disease had significant differences in lifestyle practices. Both categories had moderate levels of lifestyle practices. In the study of Eshah and Al-daken (2015), concomitant chronic disease also had significant differences in lifestyle practices that the current study agreed with.

5. CONCLUSION

With regard to the discussion and interpretations of the results, the study concludes the following:

1. This study concluded that adult knowledge of arterial blood pressure was good knowledge approximately 71.6%.
2. Most of the participants in the study are in middle age (49-58 years) approximately 33.5%. More than half of the sample participating in the study were women (54.8%). The majority of the marital status of the sample was married (88.3%). Finally, the vast majority of the participants were city dwellers and a high rate is estimated 70.1%.
3. Most of the participants in the study of them possess middle-class family income approximately 38.1%.
4. This study concluded that the level of knowledge about hypertension may vary according to the demographic characteristics of the patients.

Recommendations

On the basis of the study results and its interpretation, this study recommends the following:

1. This study recommended that must be raising knowledge among members of Iraqi society through specialized teams in health centers, it is necessary to work with the Iraqi Ministry of Health and Environment for create, construct and improve educational programs for the hypertension risks.
2. Providing at least one psycho nurse in health centers to aid adults in health education processes that focus in prevent hypertension through using regular diet.
3. The researcher recommend using leaflets and scientific seminars in health institutions that used as cue to action in attention the adults towards hypertension risks.
4. Providing special centers to treat hypertension cases for all aged stages and follow them.
5. Adding a subject in universities regarding the phenomenon and hypertension risks on human health among members of society.
6. There is a need to conduct future studies based on the application health education on large number of the Iraqi population with the goal of changing People's behavior the direction of hypertension risks.

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APPENDICES

APPENDIX 1. Administrative Approval Decision To Collect The Sample.

APPENDIX 2. The approval of the Iraqi Ministry of Health and the Nineveh Health Department to collect the sample.

APPENDIX 3. Administrative Approval of The Joint Supervision of The Assistant Supervisor.

APPENDIX 4. Administrative approval of the university on the title of the thesis and the assistant supervisor.

APPENDIX 5. Approval of the University Ethics Committee.

APPENDIX 6. Linguistic proofreading certificate

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Dear Participant

PLEASE TAKE THE TIME TO READ THIS DOCUMENT CAREFULLY.



Part II:- Knowledge factors in adults

A- knowledge .





B- lifestyle practices



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