



**NEAR EAST UNIVERSITY  
INSTITUTE OF GRADUATE STUDIES  
DEPARTMENT OF NURSING**

**PROMOTING SELF-CARE OF OLDER ADULTS WITH HYPERTENSION:  
A RANDOMIZED CONTROLLED TRAIL**

**Ph.D. THESIS**

**KHITAM SALEH ALSAQER**

**NICOSIA  
September, 2021**

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**KHITAM SALEH ALSAQER**

**Supervisor  
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September, 2021**

## THESIS APPROVAL CERTIFICATE

The thesis study of Nursing Department graduate students KHITAM SALEH ALSAQER with student number 20177734 titled “ **PROMOTING SELF-CARE OF OLDER ADULTS WITH HYPERTENSION: A RANDOMIZED CONTROLLED TRIAL**” has been approved by the jury and has been accepted as a PhD of Public Health Nursing Thesis.

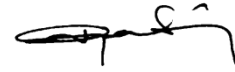
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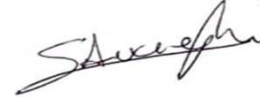
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## DECLARATION

I hereby declare that all information, documents, analysis and results in this thesis have been collected and presented according to the academic rules and ethical guidelines of Institute of Graduate Studies, Near East University. I also declare that as required by these rules and conduct, I have fully cited and referenced information and data that are not original to this study.30 / 09 / 2021

Khitam Saleh Alsaqer

29/09/2021

Signature



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29/ 09 / 2021

Khitam Saleh Alsaqer

**English Abstract**  
**Promoting Self-Care of Older Adults with Hypertension: A Randomized  
Controlled Trial**

**Khitam Saleh Alsaqer**

**Supervisor: Prof. Dr. Hatice Bebis**

**PhD, Department of Nursing**

**September, 2021**

**Introduction:** COVID-19 pandemic has aggravated chronic diseases and health disparities especially hypertension because it is more common among vulnerable populations such as older adults. Hypertension (HTN) is a long-term chronic disease, affects more than 1 billion people around the world

**Aim of the study:** This study aimed to examine the effects of a public health nursing intervention plus m-Health applications for HTN management on enhancing the Self-care, systolic and diastolic of blood pressure, and quality of life in older adults during the lockdown period in Jordan.

**Material and Method:** A longitudinal study going in three-arm groups, two-blind, Pre-test–post-test, a randomized controlled trial. The study had been applied in King Abdullah University hospital in Jordan. The study outcomes were collected between Jun 2020 and Sep 2020 as baseline and after the intervention data. Study participants (N=120) were randomly assigned into three groups: Intervention group (public health nursing interventions and m-Health practices n=40); Two control groups (Health education-self-m-health practice n=40); and Standard care group n=40). Data Collection Tools/ Materials were Demographics data include 13 questions, 4-free m.Apps, changing in systolic and diastolic BP, Self-care (SC-HI) scale, Quality of Life (SF-36) Scale, and Health literacy (CHEWQ).

Ethics committee approval was obtained from the Near East University, Institutional permission was obtained from King Abdullah University Hospital, and written consent was obtained from the participants. The data were evaluated with the

appropriate statistical methods in the SPSS statistical program.  $p=0.05$  was used with 95% confidence interval. Descriptive statistics, Chi-Square or t-test for Homogeneity test a paired-samples t- test or Wilcoxon test for within group, Comparisons ANOVA or the Kruskal-Wallis test for comparison between groups, Mann-Whitny and Kruskal Wallis tests, and Chi-square for relationships.

**Results:** After three months, the interventional group show significantly decreased in systolic blood pressure -14 (**F=16.74; p= 0.001**), greater improvement in self-care maintenance, monitoring, and confidence (+30, +17.75, +40.27;  $p<0.01$ , respectively) compared to the two control groups. Greater improvement in role limitations due to physical health and due to emotional problems, pain, energy/fatigue, emotional well-being, and social functioning of quality of life ( $p< 0.05$ ) compared to the standard care group. No statistical significant difference was found in diastolic blood pressure (**F=3.91; p=0.141**), physical functioning and general quality of life ( $p= 0.613$  and  $0.060$ , respectively).

**Conclusions:** This study supports the adoption of technology with nursing intervention as a method of supporting the continuity of self-management of chronic illness in older adults during pandemic, and its potential implications for future delivery of health care, not just in Jordan, but across the world.

**Key Words:** COVID-19, Hypertension, Self-care, m-Health, Public Health Nurse, Older adults.

## TÜRKÇE ÖZET

### Hipertansiyonlu Yaşlıların Öz- Bakımını Geliştirmek: Randomize Kontrollü

#### Çalışma

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**Giriş:** COVID-19 pandemisi, incinebilir yaşlı popülasyonlar da daha yaygın olduğu için, kronik hastalıkları ve sağlık eşitsizliklerini, özellikle de hipertansiyonu ağırlaştırdı. Hipertansiyon dünya çapında 1 milyardan fazla insanı etkileyen uzun süreli kronik bir hastalıktır.

**Çalışmanın Amacı:** Bu çalışma da, karantina döneminde Ürdün'de yaşayan yaşlılara halk sağlığı hemşiresi tarafından uygulanan hemşirelik girişimlerinin Özbakımı beceri puanı, sistolik ve diyastolik kan basıncı ve yaşam kalitesini puanı üzerine etkisini araştırmak amaçlandı.

**Gereç Yöntem:** Çalışmanın tipi randomizes kontrollü bir çalışma (RKÇ) olarak tasarlandı. Çalışma katılımcıları (N=120) rastgele üç gruba ayrıldı: Müdahale grubu (halk sağlığı hemşireliği müdahaleleri ve m-Sağlık uygulamaları) (n=40); Kontrol grubu (2 grup) (Sağlık eğitimi-kendi kendile m-sağlık uygulaması (n=40); Standart bakım grubu (n=40)). Çalışma çift kör üç ay süreyle uygulandı. veriler sistolik ve diyastolik KB'de değişiklik, Öz-bakım (SC-HI) ölçeği, Yaşam Kalitesi (SF-36) Ölçeği ve Sağlık okuryazarlığı (CHEWQ) ölçeklerle yüz-yüze before- after toplandı. Etik komite izni Yakın Doğu Ünivesitesinde, Kurum izni Kral Abdullah Hastanesinde ve Katılımcılardan yazılı onam alındı. Veriler Spss istatistik programında uygun istatistik yöntemlerle değerlendirildi. %95 güven aralığı ile  $p=0.05$  kullanıldı. Tanımlayıcı istatistikler, Homojenlik için Ki-Kare veya t-testi, grup içi için eşleştirilmiş örnekler t-testi veya Wilcoxon testi, gruplar arası karşılaştırma için Karşılaştırmalar ANOVA veya Kruskal-Wallis testi, Mann-Whitny ve Kruskal Wallis testleri ve Chi -ilişkiler için kare.



**Sonular:** Ü ay sonra girişimsel grup sistolik kan basıncında önemli derecede düşüş gösterdi (-14 (F= 16.74; p= 0.001), iki kontrol grubu ile karşılaştırıldığında öz bakım, izleme ve güvende (sırasıyla +30, +17.75, +40.27; p<0.01) daha fazla gelişme belirlendi. Standart bakım grubuna kıyasla fiziksel sağlıkta gelişme, emosyonel problemler, ağrı, enerji/yorgunlukta azalma, emosyonel esenlik ve sosyal işlevsellik rollerinde iyileşme görüldü (p<0.05). Fakat, diyastolik kan basıncı (F=3.91; p=0.141), fiziksel fonksiyon ve genel yaşam kalitesi (sırasıyla p= 0.613 ve 0.060) arasında istatistiksel anlamlı bir fark bulunmadı.

**Sonular:** Bu çalışmanın sonuçları, pandemi gibi özel bir durum dahil kronik hastalığın olan yaşlıların, kendi kendine hastalıklarının yönetimi hemşirelik müdahalesi ve teknolojinin birlikte kullanılmasının benimsenmesiyle olumlu gelişme sağladığını ve bunun sadece Ürdün'de değil, gelecekte sağlık hizmeti sunumu üzerindeki potansiyel etkilerini olacağını desteklemektedir.

**Anahtar kelimeler:** COVID-19, Hipertansiyon, Öz bakım, m-Sağlık, Yaşlı.

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## ABBREVIATIONS AND SYMBOLS LIST

<b>PHN</b>	Public Health Nursing
<b>BP</b>	Blood Pressure
<b>HTN</b>	Hypertension
<b>KAUH</b>	King Abdullah University Hospital
<b>SC-HI</b>	Self-care of Hypertension Inventory
<b>n</b>	Sample
<b>p</b>	P value
<b>SBP</b>	Systolic Blood Pressure
<b>COVID-19</b>	Coronavirus
<b>QOL</b>	Quality of life
<b>m-Health</b>	Mobile Health
<b>Apps</b>	Applications
<b>SF-36</b>	36-Item Short Form Survey
<b>HBP</b>	High Blood Pressure
<b>e-Health</b>	Electronic Health
<b>WHO</b>	World Health Organization
<b>m.apps</b>	Mobile applications
<b>RCT</b>	Randomized Control Trail
<b>HRQOL</b>	Health Related Quality of life
<b>JUST</b>	Jordan University Of Science And Technology
<b>N</b>	Population
<b>IRB</b>	Institutional Review Board
<b>CVI</b>	Content validity index
<b><math>\alpha</math> error</b>	alpha error probability
<b>DBP</b>	Diastolic Blood Pressure
<b>SPSS</b>	Statistical Package for the Social Sciences
<b>CI</b>	Confidence Interval
<b>m</b>	Mean
<b>SD</b>	Standard Deviation
<b>PF</b>	Physical functioning
<b>RF</b>	Role limitations due to physical health
<b>RE</b>	Role limitations due to emotional problems
<b>EF</b>	Energy/fatigue
<b>EW</b>	Emotional well-being
<b>SF</b>	Social functioning

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# CHAPTER I

## INTRODUCTION

### 1. Background and Significance of the Problem

COVID-19 pandemic has been affected all health aspects, aggravated chronic diseases health disparities because it's more common among vulnerable populations such as seniors (Mobula et al., 2020). Hypertension (HTN) is a long-term chronic disease, affects more than 1 billion people around the world (WHO, 2019a). In Jordan, HTN deaths rate touched 5% of total deaths, ranks Jordan number 7 in the world and ranks the HTN at number 6 of leading causes of death, after coronary heart disease and stroke; first and second leading causes of death in Jordan (WHO, 2018). Knowing that if the high blood pressure uncontrolled, HTN is the major contributor to heart failure, cardiovascular disease, stroke, kidney disease and death (WHO, 2019a).

Concurrent with COVID-19, care shocks aggravated in the context of lockdown and social distancing. Patients with chronic illness in this period have the possibility that they are not obtaining the necessary hospital care and alternative solutions is required to put in action such as, improving patient's self-care of chronic disease (Blecker et al., 2020). Moreover, during occupation of hospitals with COVID-19 cases, elderly may delay or avoid health care or follow-up because of the perceived threat of COVID-19 (Mobula et al., 2020). Delivering innovative solutions and sustainable methods for patients with HTN to controlling the blood pressure (BP), enhancing self-care, protect them from COVID-19, and ultimately improve the quality of life (QOL) is essential.

Hypertension (HTN) or High blood pressure (HBP) is one of the main causes of stroke, heart, and kidney diseases (Benjamin et al., 2018). HTN is a long-term condition that if not managed can lead to cardiovascular complications and death (WHO, 2019b). Today, about 1 in 5 people live with HTN under control (WHO, 2019a). Controlling the blood pressure (BP) is continues to be a challenge of public health in the world, particularly in developing countries (Koch, 2018). Although a

huge number of studies widely conducted to manage and control the BP, number of patients with uncontrolled BP remains high(WHO, 2019a).

Engaging patients in self-care make them an active participants in the management of chronic illness (Riegel et al., 2012). Researchers work to provide patients with the essential knowledge, skills and abilities to follow treatment recommendations and tolerate BP control (Fisher & Curfman, 2018; Glynn et al., 2010). Although, they agreed that the best aspects to prevent and control of HTN are weight loss, sodium restriction, stop smoking, limited alcohol intake, exercise, stress management and medication adherence (Fisher & Curfman, 2018), those lifestyle changes are reasonable options, neither makes management of HTN more difficult, nor easier; they are particularly difficult to appliance and sustain.

Therefore, the big electronic revolution provides a good opportunity to involve patients in the health care process and self-care engagement in the safe space, in order to support constant of healthy behaviour for those suffering from HTN (Milani et al., 2016; Pellegrini et al., 2020). Moreover, in order to adapt to COVID-19 care disruptions telehealth, mobile health (m-health) and other technologies which support the self-care process and facilitate the access to care are appropriate strategies to specifically protect the well-being of vulnerable populations who are living with chronic diseases (Anderson et al., 2016; Lee et al., 2018; Li et al., 2020; Mobula et al., 2020). However, improving the self-care of HTN using the m-health is not a new approach which is studied previously by researchers from different disciplines such as technical medicine, family medicine, and pharmacist (Kim et al., 2016; Moore et al., 2014; Morawski et al., 2018; Persell et al., 2020; Zare et al., 2019; Zha et al., 2020), while less attention was given to the nursing role beside the technical tools.

Nurses play an important clinical role to complete the picture of management away from hospital setting and nurse-led interventions have proved effectiveness to improve controlling of BP and healthy outcomes in hypertensive patients (Clark et al., 2010; Kolcu & Ergun, 2020; Zhu et al., 2018). Phone-based intervention under nurse guidance to enhance the self-care process show a significant effect in many empirical studies; with stroke patients and after hospital discharge care (Ovbiagele,



2015; Wong et al., 2014). While among older adults patients, nurses were able to provide an effective patients outcomes among post-discharge co-morbidities patients and HTN management (Chow & Wong, 2014; Kolcu & Ergun, 2020). Moreover, the public health nursing (PHN) role expand to all aspect of care; patient education, detection, referral and follow up, counselling, coordination of care, diagnostics and medication management, and skill building (Himmelfarb et al., 2016).

Since older adults show better health outcome when self-care intervention demonstrated beside nurse-led and they willing to deal with such m-health tools (Chen et al., 2019; Chow & Wong, 2014; Haramiova et al., 2017; Kolcu & Ergun, 2020). Today, in this period of uncertainty and threat, we need to effective, safe, and costly solutions we can apply to help seniors' patients to manage chronic illness during this and future crisis. Thus, using the personal mobile phones to be a tool assess the healthcare provider in the self-management of chronic diseases consider one method to participate patients in promotion, control, and prevention vie receiving the healthcare services over a distance (Lee et al., 2018; Wright & Caudill, 2020). For example, m-Health intervention was piloted to examined its effectiveness for HTN self- management and monitoring in an underserved urban community, that shown a statistically significant enhancement in systolic BP, better adherence to monitoring of BP, and better medication adherence in the m-Health intervention group (Zha et al., 2020).

A recent systematic review aimed to evaluate the quality, characteristics, and privacy and security methods of mobile apps for older adults. They found that the most common techniques were tracking and monitoring, measurement and data collection, feedback, information, education, tips, and advice options. Some of them involved reminder and memory, strategies, skills, and resource orientation (Portenhauser et al., 2021). A few mobile apps included physical exercises, mindfulness and gratefulness, and tailored interventions, acceptance, pursuing own goals and relaxation exercises, and traditional medicine or alternative medical intervention elements and exposition (Portenhauser et al., 2021). In addition, none of the mobile apps involved a serious games, breathing exercises, or hypnotherapy (Portenhauser et al., 2021).

In literature, especially nursing literature, there is a lack of sufficient scientific research for the effectiveness of m-Health that guided by nurse's intervention on self-care of HTN, particularly among older adults. Recently, one study was provide a nurse-led program as an example of effective method to HTN management among older adults (Kolcu & Ergun, 2020). The consequences of COVID-19 pandemic include: isolation, social distance, and quarantine indicated major challenges in providing the healthcare for elderly with chronic illness (Blecker et al., 2020; Mobula et al., 2020).

m-Health offers a great potential for providing care during the COVID-19 pandemic, which can be applied via mobile apps (Wright & Caudill, 2020). Thus, examining m-Health Apps that guided by PHN interventions for the management of HTN in older adults during the COVID-19 lockdown period can provide an important empirical evidence of effectiveness of such new innovative self-care of HTN interventional methods. Moreover, mobile apps for older adults may represent a cost-effective and minimum approach to support their health (Portenhauser et al., 2021).

Self-care has been proved as best practice to influence blood pressure control and better cardiovascular outcomes(Eshah & Al-daken, 2016; Gohar et al., 2008). Self-care defined by Orem as an individual's choice of behaviours that maintain and improve his/her health or prevent further complications(Katherine Renpenning & Taylor, 2003). While from the view of the middle-range theory of self-care of chronic illness, self-care has been defined as a process individuals follow to maintaining their health through promoting health practices and managing their illness(Riegel et al., 2004).

Since the health care professionals can understand this process in performing self-care, they can improve both the research and clinical settings by identifying the patient's defect and developing interventions that improve patient's outcomes (Riegel et al., 2012). In order to maintain the self-care of the individual with HTN, we have to promote the health practices which involves; medication adherence, consumption of low-salt and low-fat diet, regular exercise, avoided alcohol, avoided smoking, weight control, self-monitoring blood pressure, regular visiting of healthcare, and stress management (Han, Song, et al., 2014).

A few years ago, most of the existing articles try to measure the self-care of HTN by focusing in measuring medication adherence (Han, Song, et al., 2014). The Hill-bone scale and Morisky scale were widely used by researchers to limit scales that measure the self-care of HTN directly and comprehensively (Han, Song, et al., 2014). However, some studies used the change in the level of blood pressure as a primary outcome; most of them agreed that no significant changes in blood pressure level be an indication to improve the self-care of HTN (Bobrow et al., 2016; Farahmand et al., 2019; Kim et al., 2016; Morawski et al., 2018; Schroeder et al., 2019).

Health care researchers through different research methods need a good scale to assess, screen, or evaluate intervention effectiveness. Hence, changing BP and medication adherence alone is not enough to reflect the patient's self-care, which self-care is a comprehensive concept that includes many aspects. While some developed instruments failed to capture all the HTN self-care domains, even the researchers who tried to develop a comprehensive scale, had poor psychometric properties (Han, Lee, et al., 2014; Han, Song, et al., 2014).

One review carried the self-care of HTN measurements was conducted in 2014, the review's studies were searched for those studies had published before 2012 (Han, Song, et al., 2014). The review aimed to find a guide for assessing the self-care of HTN in the future. However, during the last ten years, researchers accelerated to establish a theoretically based, valid, and reliable scale that included all the critical HTN self-care domains which was recommended by the previous review.

## **2. Purpose of the Study**

In this study, we aim to examine a three patients outcomes; self-care of HTN, change of systolic and diastolic of BP, and quality of life in three groups of older adults patients with HTN: the interventional group (4-free Apps + PHN intervention), and two-control groups (4-free Apps alone and those receiving a standard care) during the imposition lockdown period in Jordan as a result of COVID-19 pandemic.

### **3. Research Hypothesis**

There are no differences between the 3 groups (Standard Care Group, m-Health Apps alone group and m-Health Apps Plus Nurse Intervention Group) for older adults with HTN in three patient's outcome:

H01 HTN self-care (SC-HI) score.

H02 Health-related quality of life (SF-36) score.

H03 Management of systolic and diastolic BP level.

### **4. Definition of Study's Variables**

#### **4.1. Hypertension**

HTN or High blood pressure (HBP), the silent killer illness, is one of the main causes of cardiovascular diseases and stroke, which are considered as the first and second leading causes of death worldwide, respectively (Benjamin et al., 2018). HTN is a chronic disease or a long-term condition, that if not managed can lead to cardiovascular complications (Fisher & Curfman, 2018). Today, about 1.13 billion people in the world live with HTN and two-thirds of them are from low- and middle-income countries, an predictable 26% of the population in the world and is estimated to increase to 29% by 2025 (WHO, 2019a). Controlling the blood pressure (BP) is continues to be a challenge of public health in the world, particularly in developing countries (Koch, 2018). While the huge numbers of studies widely conducted to manage and control the BP, number of patients with uncontrolled BP remains high (WHO, 2019a).

##### **4.1.1. What is HBP?**

HBP is happened when the force of blood flowing in the blood vessels, resulted an elevated in the blood pressure level. BP consider as high according classifications depend in the two BP numbers (Systolic and Diastolic).

#### 4.1.2. BP categories: **(Figure1)**

##### A. Normal

BP < 120/80 mm Hg is reflected the normal range. If the reading results of BP level fall within this group range, patients have to pole with a healthy habits such as following a healthy diet and performing a regular exercise.

##### B. Elevated

BP is considering elevated in case the BP reading range falls between 120-129 in systolic and < 80 mm Hg in diastolic. Patients with elevated BP are expected to develop HBP unless patient taken some precautions to control his/her condition in this category group.

##### C. Hypertension Stage 1

BP is considering Stage 1 in case BP ranges 130-139 in systolic or 80-89 mm Hg in diastolic BP. At this stage changes lifestyle are likely to prescribe by doctor and adding antihypertensive medication in some cases based on patient's risk.

##### D. Hypertension Stage 2

BP is considering Stage 2 when BP ranges 140/90 mm Hg or more in diastolic and systolic. At this stage, antihypertensive medications with lifestyle changes are likely to prescribe by doctors.

##### E. Hypertensive crisis

This stage needs more medical attention. In case the BP readings suddenly go above 180/120 mm Hg, repeating the reading after five minutes is required. But if the reading remains abnormally high, the patient should contact his doctor or calling the emergency number immediately.

BLOOD PRESSURE CATEGORY	SYSTOLIC mm Hg (upper number)		DIASTOLIC mm Hg (lower number)
NORMAL	LESS THAN 120	and	LESS THAN 80
ELEVATED	120 – 129	and	LESS THAN 80
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130 – 139	or	80 – 89
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	140 OR HIGHER	or	90 OR HIGHER
<b>HYPERTENSIVE CRISIS</b> (consult your doctor immediately)	HIGHER THAN 180	and/or	HIGHER THAN 120

**Figure 1:** Categories of BP levels.

#### 4.1.3. What BP numbers mean:

BP is recorded as two numbers; the first number expressing the blood pressure is the Systolic (SBP) and it comes according to the pressure level that blood is applying against the walls of artery once the heart contracting (beats). The second number expressing the blood pressure is the Diastolic (DBP) and it come according to the pressure level of the blood is applying against the walls of artery when the heart is relaxing (between beats).

#### 4.1.4. Which number is important?

Typically, more emphasis is given to SBP as a major indicator for cardiovascular disease for people 50 years and above. SBP rises gradually with age as result of the stiffness of main arteries is increasing, long-term accumulation of plaque with an increasing incidence of cardiac and vascular problems. However, either systolic or diastolic elevated reading may be indicator to make a diagnosis of HBP (Taylor et al., 2011).

#### 4.1.5. Signs and symptoms

HBP is a “silent killer” that most of patients feel no clear symptoms. However, some physical characters and lifestyle behaviours can increase the risk for HBP. When HBP left untreated, the damage happened to the circulatory system is consider a significant contributing factor to heart diseases, stroke, kidney diseases and additional health complications.

#### 4.1.6. Preventing and managing HBP

Changes can make to manage HBP:

- a. Eating a well-balanced diet
- b. Limit or stopping alcohol
- c. Regular physical exercises
- d. Stress management strategies
- e. Controlling the body weight and the body mass index
- f. Limit or quit smoking
- g. Adhering to prescribed medications
- h. Keeping contact and follow your doctor instructions
- i. Get well balanced healthy nutrition
- j. Healthy diet:
  - Low-fat food products
  - Fruits and Vegetables
  - White meat like: chicken and fish
  - Nuts and legumes
  - Whole-grains
  - Non-tropical vegetable oils

Limited to:

- Salt diet
- Saturated fats
- Red meat
- Sweets and sugar-sweetened drinks

k. Exercise:

- Regular physical exercise aids to decrease the HBP, control the body weight, and reduce stress level.
- The healthy people have to get the alike of at least 150 minutes (30 minutes a day) each week of non-intensity physical activity (e.g. walking).
- Physical exercise should be distributed over all the week days (e.g. 30 minutes a day, five days a week).
- Physical exercise should include flexibility and extending exercises.
- Physical exercise should include muscle-strengthening exercises at least two days per week.
- Patients and especially older adult's people shouldn't be afraid to be active.
- All activities like (walking or running, riding bicycle, stair-climbing; swimming, and fitness games...etc.) are beneficial especially when they demonstrate regularly.

#### **4.2. Self-Care**

Self-care has been revealed to be associated with improved BP control and more better health outcomes for cardiac patients (Eshah & Al-daken, 2016; Gohar et al., 2008). Self-care has been defined by Orem as an individual's choice of behaviours that maintain and improve his/her health or prevent further complications (Riegel et al., 2004). While from the view of *middle range theory of self-care of chronic illness*, the self-care has been defined as "a process of maintaining person's health through promoting of health practices and managing diseases" (Riegel et al., 2004). That if the professionals in health care can understand this process to performing the self-care, they can identify where patients defect and they could be able to advance interventions that improve patient's outcomes (Riegel et al., 2012).

In context of HTN, the self-care is a comprehensive domains and multi-dimension (Han, Song, et al., 2014). According to guidelines of evidence-based and literature, adherence to antihypertensive medications and lifestyle modifications are vital to



HTN management (Ferdinand et al., 2017; Glynn et al., 2010; Gohar et al., 2008). In addition to the healthy lifestyle; healthy food, engaging in physical activities, avoid smoking, stress management, enough sleep, and control body weight (Dickson et al., 2017) which are mainly depends on patients themselves. Hence, self-care of HTN elements for the patients with HTN are complicated, and patients often faced compliance difficulties, the best method to facilitate patient's compliance is the big challenge for healthcare researchers (Fisher & Curfman, 2018).

A recent study in Jordan revealing the size of the poor management and self-care among hypertensive patients, that among those who were on antihypertensive medications, just 30.7% and 35.1% of men and women, respectively had their BP controlled (Khader et al., 2019). As well as other studies in Arabic regions and worldwide, this demonstrates the extent of the problem nationwide (Fryar et al., 2017; Khayyat et al., 2017; Motlagh et al., 2016).

Therefore, in order to confirm a better effect on self-care behaviours for the elderly as well as the youth patient, Self-care providers should expand the educational programme, improve their creativity in actions, and the communication methods with patients (Motlagh et al., 2016).

Hill-bone scale and Morisky scale were widely used in literature as primary outcomes of HTN self-care (Han, Song, et al., 2014). Hence, they were not an effective to address all the critical features of the HTN self-care (Han, Lee, et al., 2014; Han, Song, et al., 2014), researchers now need to move forward on direct assessment measures for HTN self-care. Developing a compressive instrument to measure the HTN self-care was recently addressed by many researchers (Dickson et al., 2017; Eghbali-Babadi et al., 2019; Han, Lee, et al., 2014; Warren-Findlow & Seymour, 2011). The existing instruments revealed some concern regarding the quality of the assessment instruments and regarding their comparability due to the conceptual doubt of the underlying concept of self-care of patients with HTN(Riegel et al., 2012).Therefore, applying quality criteria on assessment instruments as suggested by the Jeff Sauro guideline provides a critical quality appraisal of their psychometric properties (Sauro, 2019).

In methodological studies, a good quality research study should provide evidence of how to address the validity and reliability of the instruments used in the study. This will help researchers to assess the validity and reliability of the research and to determine whether they can apply the findings to the field of clinical practice or not (Heale & Twycross, 2015). The minimum acceptable value for Cronbach's alpha is 0.70; less than this value indicated that the internal consistency is low. While, the maximum expected value is 0.90; more than this value is perceived as redundancy or duplication (Shuttleworth, 2020; Taber, 2018). Alpha values between 0.80 and 0.90 are usually favored.

However, the existing instruments have limited evidence of their reliability; Overall, internal consistency was well reported with Cronbach  $\alpha$  ranging from 0.59 to 0.95. Furthermore, two studies strongest their scales' reliability by using the item-total correlation (Eghbali-Babadi et al., 2019; Han, Lee, et al., 2014) and inter-class correlation (Eghbali-Babadi et al., 2019). HTN Self-Care Profile combines between the favorable value of Cronbach  $\alpha$  (0.83 – 0.93) and well reliability test methods, which given high quality of existing identified measures.

Validity can be measured using three major types; content validity, Construct validity, and criterion validity (Heale & Twycross, 2015). The existing scales were limited to have strong validation evidence; that studies fulfilled with either convergent the scale with other instrument (Dickson et al., 2017; Han, Lee, et al., 2014; Warren-Findlow et al., 2013) or face validated (Akhter, 2010; Eghbali-Babadi et al., 2019). Just one study was well reported the scale validity using different criteria; face validated, content validity ratio, analyzed for Kappa test ( $\geq 0.71$ ) and I-CVI (0.69), and tested for Factor Analysis (KMO= 0.829, Bartlett's test  $p < 0.001$ ) (Eghbali-Babadi et al., 2019). However, all identified existing scales were reflect a good validity, except the HSMBQ (just used the content validity by experts), these findings point to the need to improve validity process of existing scales in such methodological studies.

The theoretical frame work reflects a clear shape of theories and concepts that are relevant to the research topic and relay it to the wider fields of knowledge (Tappen, 2016). Through the application nature of the theory that helps satisfies explain the meaning, nature, and challenges of a phenomenon, researchers can use that

knowledge to act in more knowledgeable and effective ways (Tappen, 2016). Most of existing scales lack to theoretical based theory, that it was used in two studies (Dickson et al., 2017; Han, Lee, et al., 2014). Although using an alternative instruments facilities developing a new one with different approaches, but not all concepts can be measured parallel to another concept. Developing a measurement based on theory or model would be more logical.

Self-care of chronic illness required maintaining healthy behaviours with health promoting practices within the context of the management (Riegel et al., 2012). HTN Self-care is a wide concept, not just adherence to anti-hypertensive medication or healthy lifestyle (Ademe et al., 2019a; Han, Song, et al., 2014; Khosravizade et al., 2015; Larki et al., 2018; Zabler et al., 2018). In order to improve the HTN self-care, it's important of addressing HTN self-efficacy, motivation, and patient interaction (Creber et al., 2016; Ea et al., 2018; Riegel et al., 2012).

However, all identified scales were comprehensively measuring the HTN self-care and assesse all dimensions, three of them were aware to the processes underlying self-care of hypertensive patients such as; self-efficacy, motivation, and confidence (Akhter, 2010; Dickson et al., 2017; Han, Lee, et al., 2014). Self-care in context of HTN which is a chronic illness that people living with the disease, this makes assessing the whole process of self-care is required to detect where the patient lack of care. HTN-SCP, SC-HI and HSMBQ were well addressed the critical dimension of HTN self-care besides assessing the self-care process.

In order to know that the instrument has similar patterns of responses, factor analysis is the method to identify if the instrument's items "hang together" to create a construct (Taherdoost et al., 2014). In identified existing scales, factor analysis was applied in three of them (Dickson et al., 2017; Eghbali-Babadi et al., 2019; Han, Lee, et al., 2014), scales were either multidimensional or unidimensional and all of them were statistically significant ( $p < 0.05$ ). Efficiency reflected by the factor analysis is particularly common in methodological studies, in which the responses to each items of the instrument represent an outcome. Because multiple items often are related, underlying factors may influence the responses.

In order to obtaining a summary score which is an integral part of the validity of a measurement tool, the clinical researchers should be familiar with the reflective and formative measurement models, including the different approaches (Avila et al., 2015). Whereas summation is one of the most commonly used techniques in the science researches and it is considered a practical method of assessment (Avila et al., 2015).

However, a comprehensive scores reference was used by three of existing scales; as better self-care (Dickson et al., 2017; Han, Lee, et al., 2014) or low, moderate, and high self-management (Akhter, 2010). Moreover, most researchers consider the Likert scale that can be assigned with using simple summation to obtain a total or subscales scores (Akhter, 2010; Dickson et al., 2017; Eghbali-Babadi et al., 2019; Han, Lee, et al., 2014). The simple summation or finding an average score dividing the total score by the number of items has been offered in order to facilitate the use of these instruments in applied research.

Diversity sensitivity, cultural diversity, and language barriers are considered a big challenge that have been limited the generalizability for the development of any measure deliberated for use across broad geographic and ethnic spaces (Lindert et al., 2015). Thus, translation and cross-cultural are the only option to disseminate the same assessment instrument for patients were alike in illness(Lindert et al., 2015). The existing instruments were developed in different countries using English language and three of them (Dickson et al., 2017; Han, Lee, et al., 2014; Warren-Findlow & Seymour, 2011) were revalidated by different cultures (e.g; Ethiopia, Iran, Arabic, Chinese, and Brazilian) and among different age and ethnic groups with high re-administration for the HTN-SCP (11 times).

However, five studies (Akhter, 2010; Eghbali-Babadi et al., 2019; Labata et al., 2019; Najafi Ghezeljeh et al., 2018; Niriayo et al., 2019) were not clearly mentioned if they developed or re-administering the scale in English language or translated it to their language, knowing that they were conducted in different cultures and languages. However, the wide re-conduction of any instrument enhanced its generalizability and increasing its reliability and validity and so far strongest its psychometric properties.

Accordingly, HTN-SCP and SC-HI seems to be the highest psychometric and practical considerations quality of existing HTN self-care measures. They achieve almost all the evaluate criteria of assessing the quality of a measures. Therefore, the researchers firstly transculturally translated the SC-HI to be used in Arabic version after be tested for its reliability and validity.

#### **4.2.1. Factors Influencing Self-Care**

According to *the middle range theory for chronic diseases*, there is eight factors influencing the self-care; motivation, experience and skill, culture beliefs and values, habits, confidence, functional and cognitive abilities , support, and access to health services (Riegel et al., 2012).

##### **1. Motivation**

Motivation is the force that drives persons to achieve their aims. Intrinsic and extrinsic are the two types of motivation. Intrinsic motivation refers to integrate in behaviours that include an aspect of pleasure and benefit. Extrinsic motivation refers to change some behaviour because it indications to a self-determined outcome that is required for a reason like to improve health (Hennessey et al., 2015).

##### **2. Experience and skill**

Level of experience is an influential contributor to determine the skills of self-care maintenance and management. Persons who have the experience, propose to expected an improvement in health outcomes that connected with specific reactions, and point to reasonable goals and activities in specific types of situations (Cameron et al., 2010).

##### **3. Cultural beliefs and values**

Importance of Self-care is various in countries and cultures. In this situation, understanding the patients' beliefs and values should be highlighted in researches as a major phase to develop nursing interventions corresponding to patients' respect about chronic diseases (e.g. hypertension) (Yeom, 2021).

#### 4. Habits

Habits, daily routines or lifestyle are essential factors touching the self-care process. Some patients acquire used to performing some healthy behaviours and this becomes as their daily routine as unearned self-care. However, self-care can earn if the person willing to adopt learned behaviours until they evolve into daily habits with time. Healthy behaviours have been consistently associated with improve wellbeing and reduced mortality. While unhealthy behaviours (e.g. inadequate diet, absence of exercise, and smoking) are major contributors to health deterioration (Balanzá–Martínez et al., 2020).

#### 5. Confidence

Confidence is the self-efficacy that the one has and his attitudes and beliefs that he has the ability to perform some action despite barriers. Self-care is influenced by confidence and it consider as one of main components of self-care (Lee & Park, 2017). Confidence of individual in the ability to perform the desired HTN self-care outcomes is important in self-care process (Dickson et al., 2017; Han, Lee, et al., 2014).

#### 6. Functional and cognitive abilities

Self-care requires well functional ability to Perform the daily required behaviours (e.g. exercise, eating, bathing...etc). Self-care could be difficult in case of having hearing problem or vision problem. Cognitive ability is growing the knowledge of individual to better self-care for the chronic illnesses such uncontrolled HTN (Lee & Park, 2017; Mohammadnia Motlagh et al., 2019). Challenges of self-care are commonly associated with health illiteracy (Oh & Park, 2017).

#### 7. Support from others

Self-care is performed by the individual himself, that naive to recommend that self-care is done without help. While, individuals with chronic disease would recognise the important contributions of family and health providers in their self-care process

(knowledge, decision making, and practice) better than if they completely dependent on themselves (Bahari et al., 2019; Lee & Park, 2017).

#### 8. Access to care

Self-care in chronic illness is typically associated with access to providers and health services. Poor outcomes of chronic illness are often influenced to lack health access to obtain care for many reasons (e.g. economic, location) (Macinko et al., 2018; Musinguzi et al., 2018).

### **4.3. Public Health Nursing**

For Public health nurse (PHN), the vital goal is to promote public health, preventing diseases, and minimizing health risks within the communities. They responsible for identifying the health risk factors specific to population, provide the most significant advantage support in improving access to health services, assigning priorities for the interventions to plan and apply health education activities to prevent disease, Provide enough information about the available health programs and services in the community to improve access to treatment and care, Providing nursing care directly to those people at-risk, Developed a well professional relationships with patients and followed them with appropriate care, and Referring people to required related services (Management, 2021).

Literature precisely defining the role of PHN present an interventions that aimed to prevent and improve BP and associated behaviours is limited and the evidence that nurses-led in the community can control the BP level and improve the individual lifestyles. A quasi-experimental study conducted in Sweden over one year among 100 participants resulted in a statistically significant reduction in diastolic and systolic blood pressure in half of patients by monitoring and coaching them by a public health nurse (Drevenhorn et al., 2007).

### **4.4. m-Health**

Today, the world witnesses new phenomena, which have an ever-greater impact on the health system. The big electronic revolution in home-based devices provides a good opportunity to involve patients in the health care process and self-care

engagement for those suffering from chronic diseases that need constant care (Milani et al., 2016). In addition, Chances to incorporate technology to support healthy behaviour and self-management are warranted. Relevant interventions are required to address digital gaps that exist among patients with HTN to manage their BP and quality of life (Still et al., 2018).

m-Health falls under the concept of e-Health. WHO defined the m-Health as a method to upkeep medical treatment and public health practices through the wireless device as; patients monitoring devices, mobile phone, and personal digital assistants (PDAs) (WHO, 2011). The health practice can presented to the patient via short messaging service, voice/ video call, or mobile applications (Xiong et al., 2018). Smartphones now are widely used, in U.S. 81% of people have a smartphones, 79% and 53% who are age is 50 -64 years and 65 years and above use smartphone, respectively (Pewresearch, 2019). Moreover, downloading for health application was increased obviously during the last period, according to WHO, about half of Smartphone users may download at least one health apps, and 93% of physicians accept mobile applications (m.apps) to probability of improve patient's health (Edwards, 2019).

Clinical trial studies can determine the actual health benefits outcomes from population engagement with self-management. However, most of the studies that addressed the m-health as a method of BP control reported that apps might be effective in positive outcome of BP level, implementing positive patient involvement with better medication adherence, and shown to be accepted by users (Albini et al., 2016; Alessa et al., 2018). Thus, well-designed studies to evaluate the actual effect of using such health Apps to control BP and to recognize the most effective combinations to lowering BP are required.

#### **4.4.1. m-Health Applications for Hypertension**

Recently, m-Health apps in context of HTN have been gradually used. Technology can positively convert HTN self-care from the perspective of users (Alessa et al., 2018). Mobile apps in the context of HTN can be demonstrated by patients to achieve three importance objectives: (1) to improve self-assessment; (2) to improve treatment; and (3) to improve control (Santo & Redfern, 2019).



### 1. Improving self-assessment:

Hypertensive patients can use apps to facilitate their BP measurements and record. Direct measure of BP levels could be withering with or without cuffs and detection the wave signals of patient's index pulse using sensor in the smartphone without needing for cuffs. However, the wireless App-based BP monitors was found to overvalue for both SBP and DBP paralleled to a gold standard aneroid sphygmomanometer. Recording of BP level is available in different apps that give patients the ability to save their reading by date and time when their BP measured by themselves or by health provider. Full history with chart diagram can provide better assessment for the patients' health status. These app-based to assess BP level might enable and encourage hypertensive patients to regular self-assessment of their BP.

### 2. Improving treatment:

Smartphone devices provide the possibility of monitoring and consultation for HTN treatment using a system that is integrated with a medical sensor device (Albini et al., 2016). Using of app-based interventions is viable and simply incorporated into the healthcare professional's care plan, thus, particularly beneficial in settings who have no resource, staff shortage, and emergency lockdown situation.

### 3. Improving control:

Many apps in both Google Play and Apple stores were HTN-related apps. Apps included options for the most frequent feature of HTN control, such as: regular monitoring of BP, patient educational component, BP tracking, and connection the patients to other health professionals. In addition to reinforcing behaviors through reminders (e.g. bill reminder) (Alessa et al., 2018; Alessa et al., 2019).

## **4.5. Older Adults**

Aging is a global issue, affecting almost all areas of life. Elderly are more experienced to have a chronic illness (Chiaranai et al., 2018). HTN, the most common chronic disease, is common for older people's (60–79 years) and more common for elderly (80 years and above) (Logan, 2011).

#### **4.5.1. Self-care in context of Elderly**

Although, in case of elderly people with HTN, the self-care has many barriers; Lack of knowledge, lack of support, lack of money, lack of motivation, fear of injury from exercising (Chang & Lee, 2015; Gholamnejad et al., 2018; Rimando, 2015). Most of studies suggested that the importance of health literacy and patient-provider communication are possible factors may influence HTN management. In addition to patients' educational, family support, and self-efficacy levels strategies should consider in order to improve older adult's self-regulation (Lee & Park, 2017; Rimando, 2015).

#### **4.5.2. e-Health in context of Elderly**

Elderly people have been studied in literature to their readiness to exhibit better health outcomes using different m-Health services (Gordon & Hornbrook, 2018; Hirvonen et al., 2020). Some of them use the m-health for communication and share information, receiving feedback, and determining schedule for next visit with health professionals (Lu et al., 2014; Woods et al., 2013). Other m-health services give chance for users to health management by allowing the older adults to achieve set targets, track changes in their behaviour, plan and prepare own activities, and regularly reminded about them (Price et al., 2013; Woods et al., 2013). In addition, the e-Health services have options to save personal information and managing data functions. They provide some information about an interested topic, give some suggestions, support the decision-making, and passing the information for others (Price et al., 2013; Woods et al., 2013).

In other hand, older adults might face some barriers when they use those services, for example: irrelevant functionality or content, lack of extra benefits when using them, usability problems, unperceived benefits, and unfamiliarity with their options and functions (Grindrod et al., 2014). In addition to infrastructure and technical problems, costs issues, time and effort consuming, lack of experience, afraid of getting wrong, possibility of data loss or losing the device itself, count on professionals, lack of help, and privacy issues (Grindrod et al., 2014; Lu et al., 2014; Price et al., 2013).

outcomes of using such e-Health services could be Positive or negative; positively it may increase patients' knowledge, increase awareness, influence skills, impact managing health, support decision-making, facilitate communication with professionals staff, influence emotional support positively, provide health reassurance, impact confidence, improve constancy of care, support control and empowerment, increased intentions to change in some desired behaviours, and overall positively impact in quality of life (Dillard & Main, 2013; Lu et al., 2014; Woods et al., 2013; Zettel-Watson & Tsukerman, 2016).

Negative outcomes of using e-Health services such as: anxiety and stress, feeling lonely, decrease interaction, risk of privacy invasion, doubt on data or information, subjective understanding of contents, risk of data mistakes or fabrication, inconsistencies or loss in data (Dillard & Main, 2013; Grindrod et al., 2014; Lu et al., 2014; Woods et al., 2013; Zettel-Watson & Tsukerman, 2016).

#### **4.6. COVID-19 Pandemic**

COVID-19, novel coronavirus 2019, or Wuhan CoV-2019, all of them are terms for the virus occurred for the first time in Wuhan city in China at the end of 2019 for unknown reason (Wang et al., 2020). However, there has been over one scenario so far. First one, result of participants with pneumonia to unknown reason connected to a seafood public market in Wuhan City (Zhu et al., 2020). Second one was proposing a bat origin of 2019-nCoV that using full genomes and viral gene sequences, there was a high phylogenetic relationship between COVID-19 and the bat (York, 2020).

However, COVID-19 stills a longest pandemic from the time of Spanish Flu, and has worldwide economic, social, and health, deterioration (Mann et al., 2020). Up to the study time, COVID-19 reach 61 million of cases and about one and half million of deaths worldwide (WHO, 2020). Moreover, the health problems are the worst impact for peoples (Salari et al., 2020). Older people and those with primary chronic diseases such as HTN, cardiovascular disease (CVD), diabetes, kidney disease, and lung disorders are impacted higher rate of complications and deaths by COVID-19 compared with the general population (Pal & Bhadada, 2020; Zhou et al., 2020).

People with comorbidities are immune-deficient, thus they are more susceptible to complications of COVID-19 compared to others. A recent meta-analysis of COVID-19 patients has revealed that the highest percentage of underlying comorbidities was among the HTN (18.6%) (Rodriguez-Morales et al., 2020). According to the scientific literature, they suggest that hypertensive people especially older individuals may be associated with higher risk of severe and fatal COVID-19 (Lippi et al., 2020).

COVID-19 postures an additional weight for self-care to people with chronic illness (like HTN, cardiovascular disease, or diabetes). The essential features of self-care include healthy diet, medication adherence, exercises, self-monitoring of BP, low salt intake, and stress management. Primary care providers and other health worker hard work to ensure patients keep to self-care during of COVID -19 conditions. In order to deal with challenges and barriers of self-care managements during the pandemic consequences, primary care provider-based approach through continuous education and support is required. For example, tele-consultation would be helpful for this time and for future for close communication and better understanding with patient in safe distance (Gupta et al., 2020).

#### **4.6.1. Lockdown period**

Unfortunately, COVID-19 has imposed rigorous protective methods to reduce the spread of the virus and maintain the health of people, including forcible lockdown in many countries including Jordan to break the chain of virus transmission. Since 15<sup>th</sup> March, 2020 the government has instructed nationwide lockdown in Jordan, which has generated major challenges for people, especially those living with HTN.

Regular follow-up with self-care is the core of the management of any chronic disease (Chen et al., 2019). In case of HTN, self-care has big role to properly control BP and prevent complications due to HPB (Farahmand et al., 2019). This has posed major restrictions to routine clinic visits for regular patient's follow-up consequently affecting the management of chronic disease including HTN (Blecker et al., 2020).

Lockdown has affected all aspects of HTN self-care, daily activities, and behaviors of people during the pandemic period in many ways.

1. Isolation has led to change in eating behaviour as eating unhealthy food and snacking heavily. Limited resources during lockdown make maintaining the formal healthy dietary schedule difficult for the patients on diet as they would possibly be compelled to eat the accessible or served food.
2. During the lockdown, it may be difficult for some patients to adhere to their prescribed medications due to limitations in pharmacy supply and medication unavailability or difficulty to access.
3. The limited outdoor physical activities are leading to inactivity.
4. During the COVID-19 pandemic, stress and anxiety related to isolation has created panic for patients which makes daily routine difficult to follow, causing sleeping disturbances. Thus, it might lead to poor management of blood pressure which may be a further reason for undesired complications.

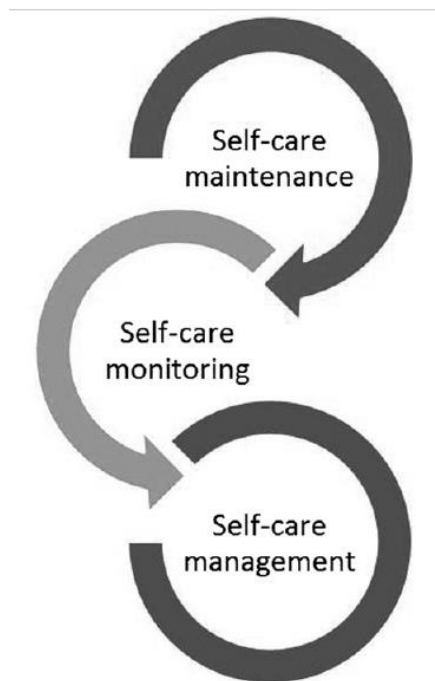
## CHAPTER II

### Literature Review

#### 1. Theoretical Framework

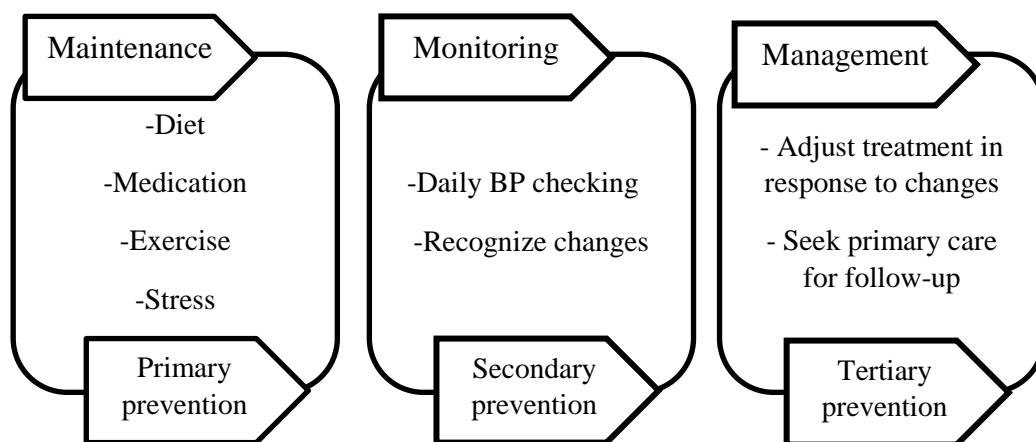
The theoretical framework guiding this study was derived from the ‘*Middle-Range Theory of Self-Care of Chronic Illness*’ (Riegel et al., 2012).

According to this theory, the self-care of chronic diseases is a process of self-care monitoring, self-care management, and self-maintenance. Self- maintenance reflects patients sustaining the healthy behaviours; Self-care monitoring reflects the routine process enabling the patient to detect health changes; Self-care management is evaluation to patient’s actions. For this study the theory use to assess the structure of the patient with HTN of in the self-care process each patient is hostile and need for specific intervention. For example, the patient who is unable to recognize high BP symptoms that time he/she needs a different intervention than other patient who is poor in self-care maintenance (Riegel et al., 2012). **(Figure 2)**



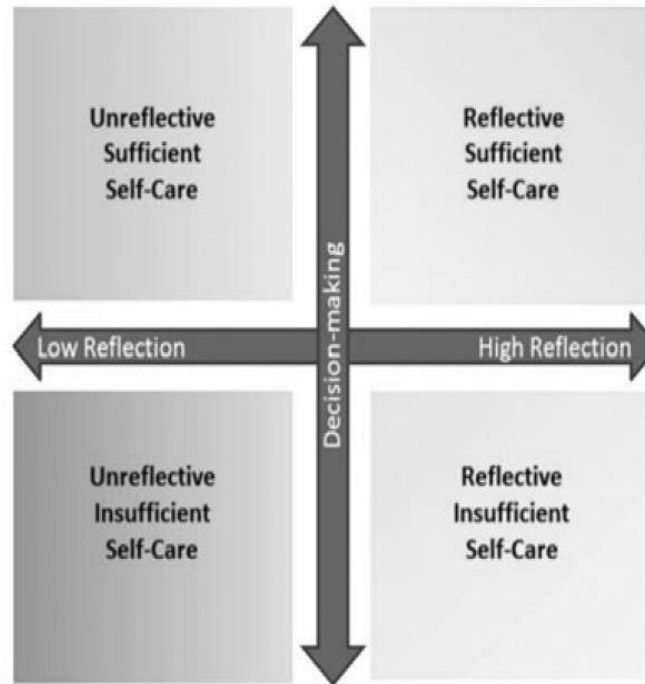
**Figure 2:** ‘*Middle-Range Theory of Self-Care of Chronic Illness*’

In this study, we assume that the PHN role in the three levels of prevention plus apps address the three self-care process in chronic illness and especially for HTN. The primary level (e.g Education) through teaching the patients all HTN self-care aspects (low fat-salt diet, exercise, medication, and stress management...etc.) can represent the maintenance step. Secondary level (e.g Screening) through using the mobile Apps for daily recording of BP level and thus early detection for changes can represent the monitoring step. Tertiary level (e.g Referral) through the PHN follows to the patient's health status and evaluates his responses/ actions to changes can represent the management step (**figure 3**).



**Figure 3:** Conceptual Framework of Self-care of HTN A Middle Range Theory.

We take into account the factors that influencing the self-care like: experience, motivation, skill, culture, habits, confidence, support from others, cognition, function, and access to care. In this study mHealth-based interventions (e.g., mobile apps) would be improve the patient's skill, confidence, function, habits, and access to care (maintenance). Nursing led would be improved patient's motivation, and support (monitoring), then improving in patients functional and cognitive abilities (management). Thus, the patients may reflect sufficient self-care (**figure 4**).



**Figure 4:** Decision making and reflection relationship on sufficiency of self-care

## 2. Related Research

In literature, different e-health and m-health tools were used to enhance self-care strategies and to be a solution for patient-provider communication, motivation, and self-efficacy (Li et al., 2020; Xiong et al., 2018; Zha et al., 2020). 40% of those publications reported use of the telehealth in general (Kampmeijer et al., 2016), 2016). However, the vulnerable groups and especially seniors have less access to digital tools, less familiarity with a variety of online tasks, and they believe that they wouldn't be capable to engage with e-health or m-Health (Nancy P. Gordon, 2018). The need to develop and test such m-health interventions that improve self-care with HTN have become a priority of the health researcher.

Personalised interventions are essential for hypertensive people without social support and independent. In addition to more focus on patients with a lower education level, poor well-being, poor family function, and those with low self-management levels (Zhang, Xiao-Nan BD, 2020). Some of the e-health tools are already handled by older adults, but are not yet studied in self-care of HTN zone.



While many studies has tended to focus on self-care of chronic disease of elderly people that carried by mobile applications (Gordon & Hornbrook, 2018; Goyal & Cafazzo, 2013; Portz et al., 2018).

Mobile apps are widely used in recent years as a new strategy to improve patient's self-management (Alessa et al., 2018; Alessa et al., 2019; Jamshidnezhad et al., 2019; Li et al., 2020). The results of one systematic review for self-care of hypertensive patients using the mobile apps showed potential improving the self-care behaviour on the patients with HTN using the mobile apps, but the evidences presenting their impact are various (Jamshidnezhad, 2019).

Researchers pay attention to evaluate and develop the high functionality and quality of self-care applications for hypertensive patients (Jamshidnezhad et al., 2019; Li et al., 2020). Applications were varied from one to three or more functionality to cover most of HTN self-care features; blood pressure record and bill reminders were more popular among the applications and low attention was given to stress management service (Alessa et al., 2018; Athilingam et al., 2017; Lee et al., 2018). Most of studies addressed the self-care of HTN using mobile applications were those conducted by technological health department and few of them conducted by nursing or giving a darn about the patient's needs and diversity (Moore et al., 2014; Morawski et al., 2018; Persell et al., 2020).

Two systematics review conducted by technological health authors, were focused in mobile apps themselves and ignored its impact on users (Athilingam et al., 2017; Lee et al., 2018). They reviewed the apps name, type, availability, functionality, privacy, services combination, and usability. The primary outcome used to evaluate the effectiveness of using mobile apps in most of those articles that studied the self-care of patient with HTN was the changing in blood pressure; systolic and diastolic (Kim et al., 2016; Morawski et al., 2018; Persell et al., 2020; Zha et al., 2020).

The majority of studies were compared for combination function, quality, usability, satisfaction of users, and their attitude in most systematic reviews, and they ignored the health outcomes (Alessa et al., 2018). While two systematic reviews were conducted by nurses, one of them was addressed the self-care using mobile apps for

patients with heart failure (Athilingam et al., 2017). Authors in their review were evaluating the articles according to functionality of app, usability, and efficacy. While in the other systematic review, the author was focusing on articles that deal with self-care using mobile apps for chronic diseases patients (Liang et al., 2018). He evaluated the articles according to patient's satisfaction, adherence to medication, and patient's engagement.

In 2016, Bengtsson and his colleagues who are nurses evaluated the effect of daily use of 8 week the mobile phone-based self-management support system in reducing the BP (Bengtsson et al., 2016). The self-management system functions were recording for the BP level, pulse, lifestyle, symptoms, and wellbeing; carriage of reminders and encouragements; and feedback of responses. Their results found that the self-management system may be useful to self-manage of patients with HTN.

Another study aimed to control the blood pressure in hypertensive patients with same idea but different functions and outcomes (Kim et al., 2016). In their study, a wireless self-monitoring program were used which have a blood pressure monitoring device linked to a mobile phone, reminders, a Web-based program, and a mobile app for education. The outcomes were patient's activation, healthy behaviours (e.g. smoking, drinking, and exercise), blood pressure levels, and medication adherence. The study provides that patients using the mobile health self-monitoring have the motivation to lifestyle modification. Also, changing health behaviour and self-monitoring of blood pressure were launched in study of Lee and his colleagues to provide a telehealth counselling service using a mobile self-monitoring application for patients with HBP (Lee et al., 2019).

Pharmaceutical department focused on medication adherence as a blood pressure control method. In Morawski study, mobile apps were used to improve medication adherence and blood pressure control (Morawski et al., 2018). The applications contained a reminder, self-report, and peer support as an optional services. Self-report adherence was measured by the Morisky medication adherence scale (MMAS). Their study show small improvement in the adherence self-report and no effect on BP. While in a another study that handled by nursing department, the

Smartphone medication adherence application was used and resulted in a significant improvement in BP among Patients with uncontrolled HTN (Chandler et al., 2019).

Just one study in nursing department recently carried out the self-care of hypertensive patient as a primary outcome for the mobile apps (Zha et al., 2020). They measured four health outcomes included changes in blood pressure (BP) level, adherence to BP monitoring, health-related quality of life, and perceived medication adherence self-efficacy. Their results had been statistically significant improvement in systolic BP, better adherence to BP monitoring, and improvement in perceived medication adherence self-efficacy. Accordingly, nursing area needs for more studies launching the mobile application in the context of self-care. Quality of life and health literacy were limited measures as health related outcomes for mobile application strategy of self-care in hypertensive patient especially among older adults.

Technological designers are running to develop new apps with high functionality to achieve positive self-care outcome and customers' acceptance (Alessa et al., 2019). All of study evaluated the mobile apps among general population and in different age group. Thus, increase the possibility of inappropriate contents for a specific age group like elderly patient. Furthermore, most studies ignored the role of nursing to complete the picture of management. Hence, the nursing role as a guide in such self-care methods was shown a significant effect in many empirical studies (Chow & Wong, 2014; Clark et al., 2010; Ovbiagele, 2015). In phone-based intervention studies which guided by nurses, the researchers found the groups guided by nurses was more effective outcomes especially older adults group (Chow & Wong, 2014).

In this study, authors aim to fill three gaps point in literature; (1) handling the older adult as a target group, (2) using comprehensive mobile apps to cover all features of self-care of HTNs with nursing interventions, and (3) based on a theoretical framework using the 'middle-range theory of chronic illnesses' (Riegel et al., 2012). (4) Combining of using the m.Apps with interventions of PHN.

## CHAPTER III

### METHODOLOGY

#### 1. Research Design

This longitudinal study going in three-arm groups, two-blind, Pretest–posttest (before–after), a randomized controlled trial (RCT) design had been carried out in Dec 2019 and continue at present date. The study had been applied in King Abdullah University hospital (KAUH) in Jordan. The study outcomes were collected between Jun 2020 and Sep 2020 as baseline and after the intervention data.

##### 1.1. Study setting

KAUH is the largest medical structure in the north of Jordan, serving about one million residents (dxc.technology, 2020). It is a teaching hospital affiliated with Jordan University of Science and Technology (JUST). KAUH have an operating capacity of 678 beds, and it can be expanded to 819 beds in an emergency situations (KAUH, 2020). In addition, KAUH had received covid-19 cases in its intensive care unit during the period of the study was conducted.

Princess Mona Al Hussein centre for heart diseases is a separated department in KAUH. The center contains five departments, which are the Cardiac Intensive Care Unit, the Cardiac Intensive Care Unit, the Cardiac Operations Unit, the Catheterization Unit and the Cardiac Intermediate Care Unit, with a total capacity of forty-two beds. The Coronary Care Department consists of twelve single beds, where the department receives critical heart cases from various hospitals in the region, such as acute stroke cases and patients who need a respirator, with an occupancy rate of 94%. The cardiac catheterization department, which operates 24/7, receives cases that need urgent catheterization. It contains two laboratories and catheterization operations are performed daily at a rate of 3,800 cases annually, in addition to conducting therapeutic catheterization operations for children and installing a heart battery and electric shock device.

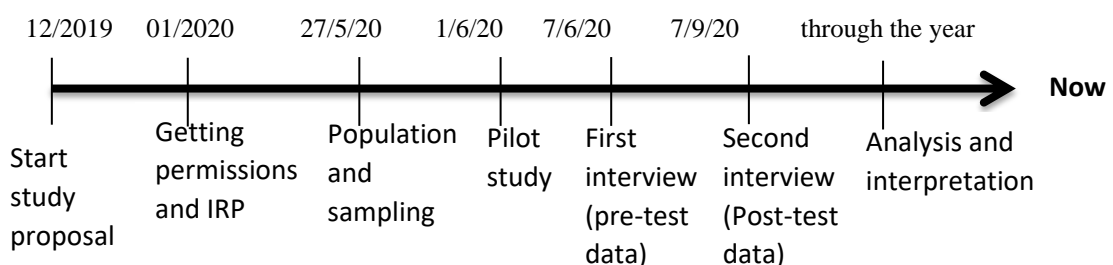
The Heart Operations Department is considered one of the sensitive departments due to its importance, as rare and delicate heart operations are performed. The doctors of

the Princess Muna Al Hussein Heart Center in the hospital performed (3,821) cardiac catheterization operations in 2017, an increase of (15%) over the previous years, and by 15 operations per day (KAUH, 2020).

However, the cardiac clinic of KAUH had limited of nursing staff with huge number of patients visiting the out-clinic daily. In cardiac clinic, there is just one nurse arranges patients to enter to doctor room and check their vital signs before entering. Accordingly, the nurse has no time to well educating of patients and applying the nursing process.

## 1.2. Study time

The study started in the end of 2019, that the planning and all permissions were prepared and continues to finalize to the present time. While the empirical study was conducted in the first of June 2020; the first week was for the pilot study then three months were used for the experimental study to three groups. The Data were collected two times over three months; baseline and post intervention. Data analysis and interpretation was done after all post-data were collected. During this period, Jordan was affected by the COVID-19 pandemic as everywhere in the world. In this period, the government instructed the people to take the required protective measurements to prevent spreading the disease (safe distance, wearing mask and gloves, hand hygiene, and social isolation). Moreover, the government imposed lockdown across the country with some exceptions for the vital sectors like hospitals. The researcher fined the chance to start the study once it was allowed to the researcher and the participants to go to the hospital.



## **2. Population and Sample**

### **2.1. Sample size**

G-Power was used to calculate the sample size, effect size convenient  $p=0.30$ , alpha error probability 0.05 and divide to three for each group, thus  $\alpha$  error=0.016 with power 80% and 95% confidence interval; resulted a sample size is 93. Accordingly, the total sample size was estimated to be  $N=120$  for attrition and withdrawal probability. **Appendix A**

### **2.2. Participants selection**

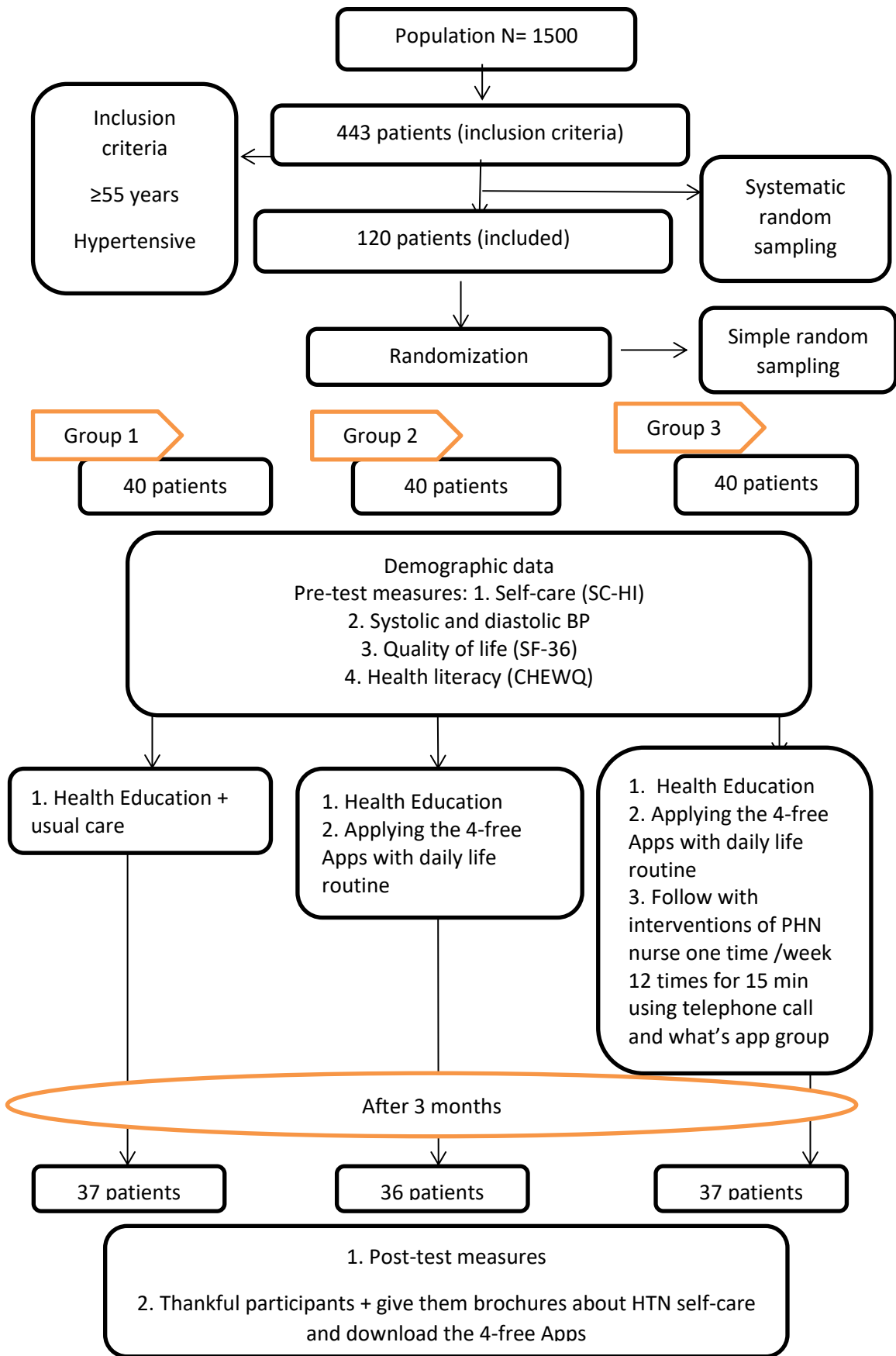
Once Jordan opened the vital services after the closing because of COVID-19 pandemic in first of June 2020, the researcher contacts the Medical records section in KAUH and gets a list for the patients who they have a reserve visit for this month (7 June to 7 July) as a follow up schedule in the cardiac clinics. The list included 1500 patients and they were checked to the initial inclusion criteria for age, HTN diagnoses, and free of mental or multiple chronic illness which they are already available in the electronic system of the hospital.

Patients were fit the study aim ( $N= 443$ ) were applied to a systematic random sampling to select  $n=120$  participants at a 4th interval ( $443/120$ ). The researcher randomly selected a starting point between 1 and the sampling interval that was 4. All recruited patients were asked if they accept the participation in the study via phone calling after ensuring that he/she have and able to deal with smartphones and met our inclusion criteria. Participants ( $n=120$  patients) were asked via the phone to answering the demographic data then the homogeneity was tested. The  $n=120$  were randomized to the three groups. **(Figure 5)**

### **2.3. Randomization**

The  $n=120$  patients who are agreed to participate were simple randomized, using Simple random sampling (ratio 1:1:1) to either intervention group; who received the study interventions ( $n=40$ ), or to the two-control groups; those receiving only portions of the study interventions ( $n=40$ ) and those receiving the usual care ( $n=40$ ). Participate patients and statistical analysers were blind to the study groups.

**Figure 5: Participants selection process and randomization**



## **2.4. Inclusion and exclusion criteria**

*Participants were enrolled* in the study if they were (a) 55 years and above, (b) have follow-up with out-clinic of KAUH, (c) had been diagnosed with HTN, (d) on anti-HTN medication— at least one drug, and (e) have and able to deal with personal smartphone (Android) – internet access is not important, (f) able to read and understand Arabic language. *Participants were excluded* if they had been diagnosed by doctor for any psychiatric or mental illness, terminal stage disease, physical deficit such if they blinded or deaf.

## **3. Data Collection Tools/ Materials**

### **3.1. Demographics data**

A self-report questionnaire was prepared literally by authors based on such studies which examined such self-care interventions for HTN patients (Kim et al., 2016; Persell et al., 2020; Wong et al., 2014; Zare et al., 2019; Zhu et al., 2018). It was 13 questions about social characteristics included: age, gender, marital status, education, economic status, health insurance, smoking, caregiver, job, family history of HTN, health applications experience, duration of diagnosed with HTN, and number of antihypertensive medication. Response was as choosing one of multiple choices, continuous numbers, and yes or no. **(Appendix B)**

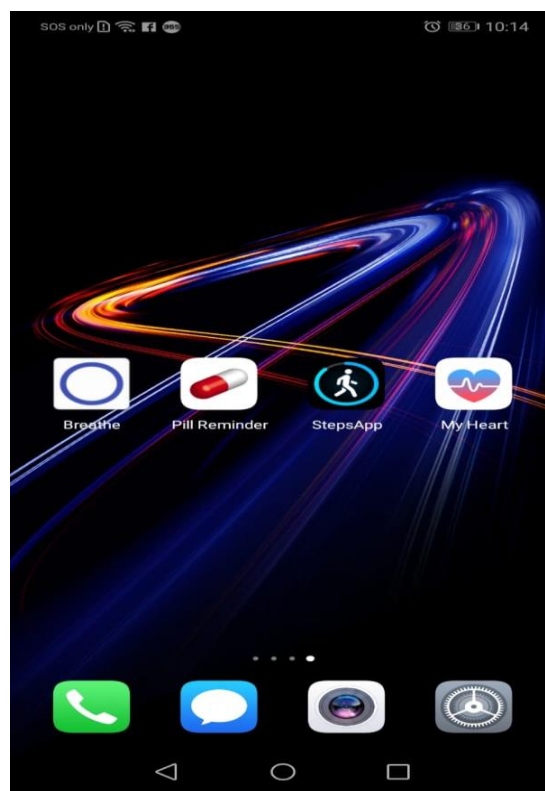
### **3.2. m-Health application**

Free smart phone Apps in android were searched through the play store using key words such: ‘self-care, blood pressure, pill reminder, breath, stress management, exercise, and steps’. The first 10 pages on the play store were checked to meet our criteria: Free download, English/Arabic language, history availability, and attractive in style and colors. Researcher vainly attempted to find an app that included the 4 main HTN self-care aspects: checking BP, exercise, medication adherence, and stress management. So rather than using one app, the researcher chose one app to help in maintaining and monitoring each one of HTN self-care critical features. While that was not available, the researchers selected one mobile Apps for each the 4 main HTN



aspects; were: 1) Blood pressure (My heart), 2) Pill reminder- medication tracker with alarm, 3) Breathe easy, 4) and StepsApp. **(Figure 6)**

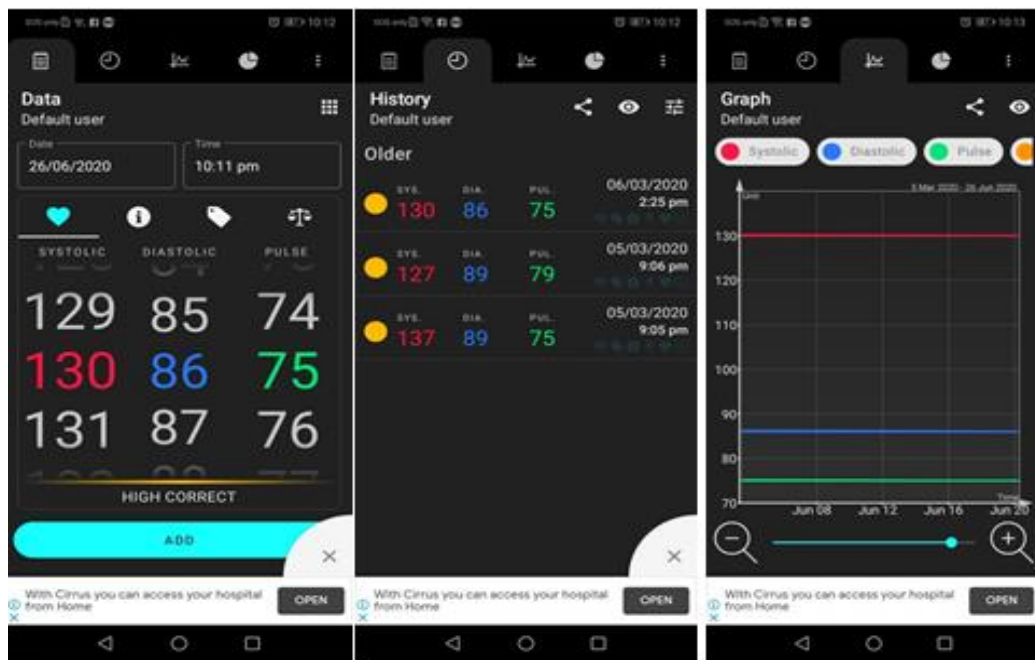
The 4-free Apps were evaluated for content validity, accessibility, usability, and feasibility by focus group interviews and a committee of experts: two nurses with PhDs, 2 computer technicians, and a cardiologist. They were asked to evaluate the four selected free Apps by rating each Apps from 1 to 4; where 1= not relevant, 2= somewhat relevant, 3= quite relevant but needs minor changes, and 4= very relevant. After calculating content validity index, the 4-free Apps were scored  $\geq 0.80$  and that was considered acceptable.



**Figure 6:** The selected 4-free mobile Apps

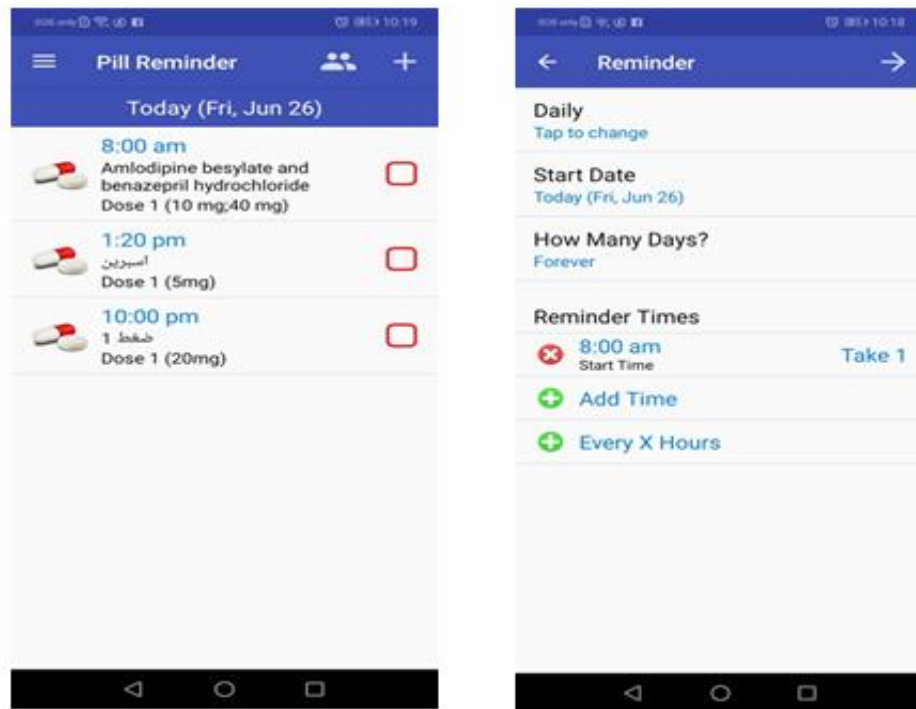
The 4-free Apps were evaluated for content validity and usability by focus group interviews and expert's committee. The committee includes two nurses with PhD, two technical, and one cardiologist doctor. They were asked to evaluate the four selected free Apps by rating each Apps from 1 to 4; where 1= not relevant, 2= somewhat relevant, 3= quite relevant but needs minor changes, and 4= very relevant. After calculation the content validity index, score  $\geq 0.80$  were considered acceptable.

1. *Blood pressure (My heart)*: is a free app in android, available in English and Arabic language, rating 3.91 on android rating. Control blood pressure with multiple build-in features like measurements analysis, statistics, graphs, comprehensive reports. This app will discover by yourself what, when and how different factors influence your blood pressure. The key features include: the values of (systolic, diastolic, pulse and weight), date and time of BP measurements, blood pressure chart, save, update, and report your measurement. **(Figure 7)**



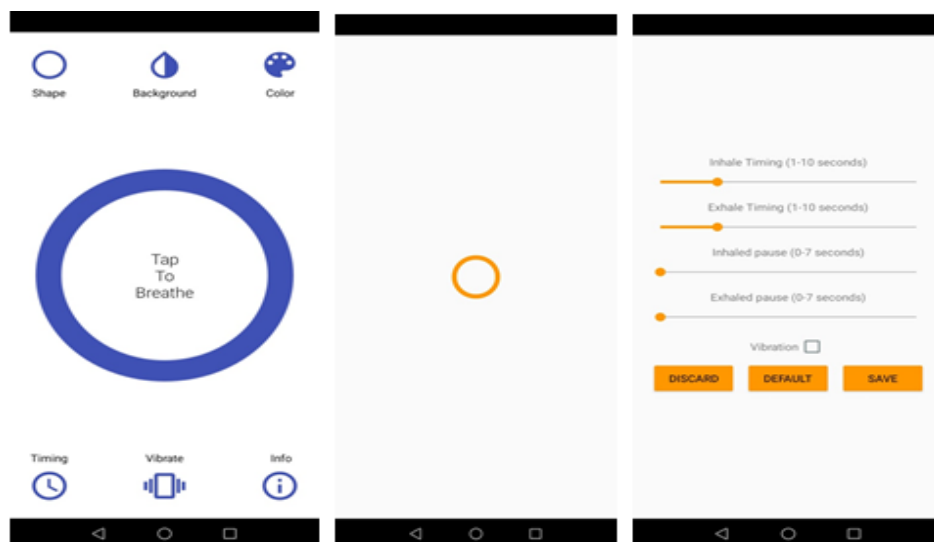
**Figure 7:** Blood pressure (My heart) App

2. *Pill reminder- medication tracker with alarm*: it is a medical app, take your medication on time, medicine reminder and refill alarms. This app rating 4.1on android rating **(Figure 8)**



**Figure 8:** Pill reminder- medication tracker with alarm App

3. *Breathe easy*: rating and reviews 4.4, simplest way to meditate and relax. Just breathe in and out as the circle continuously grows and shrinks at a regular rate. Features include: customize time spent inhaling, exhaling, and pausing between breaths. Choose between a circle, square, triangle, or heart shape in over 10 colors to be attractive for users. Select black or white background. **(Figure 9)**



**Figure 9:** Breathe easy App

4. *StepsApp* Pedometer: ratings and reviews 4.51 on android rating. It's a simple step counter. It includes an automatic step counting, count and track active calories, notification, and powerful month and year view. (Figure 10)



Figure 10: StepsApp Pedometer App

### 3.3. Changing in systolic and diastolic BP:

Systolic BP (SBP) and diastolic BP (DBP) were measured and recorded by a clinic nurse who has 9 years' experience in the cardiac clinic two times for the purpose of study's analysis; at baseline and after 3 months following the same assessment process: a) Patients in setting position with their arms at the chest line, b) relaxed for 5 minutes before the measure, c) measuring the BP of the left arm, d) using an electronic sphygmomanometer which was checked for calibrated regularly. BP readings through the 3 months were measured by patients themselves at home. BP was considered as normal if <120/80 mm Hg, elevated if 120-129 systolic and < 80 mm Hg diastolic, HTN Stage1 if 130-139 systolic or 80-89 mm Hg diastolic, HTN Stage2 if 140/90 mm Hg or higher (WHO, 2019a).

Authors calculate the deference between the BP reading pre-interventions and the reading post-intervention as: systolic BP post - systolic BP pre and diastolic BP post – diastolic BP pre. The mean differences will reflect the clinical reduction in BP.

### **3.4. Self-care (SC-HI) scale:**

Self-care of HTN was measured by self-report of the SC-HI scale, which developed recently in 2017 to measure the self-care in patients with HTN (Dickson et al., 2017). SC-HI has the ability of evaluate the effectiveness of such self-care interventions. SC-HI is 23-item in three subscales; measuring self-care maintenance, monitoring, and management, Cronbach's  $\alpha$  were 0.83, 0.75, and 0.83 for the three subscales, respectively. For the purpose of this study, authors cross-culturally translated the scale to Arabic language in previous published article, Cronbach's  $\alpha$  were 0.82, 0.61, and 0.86 for the three subscales (Alsaqer & Bebis, 2020b). (**Appendix C**)

SC-HI currently most used and well-validated in many studies (Ma et al., 2020; Silveira et al., 2020; Silveira et al., 2018; Zhao et al., 2019). Scoring the self-care for each subscale was calculated separately following the formula of the final subscale score = (real total score – minimum total) / (maximum total – minimum total) \* 100. Thus, the final scale total score = sum of three subscale score / 3 \* 100 (Zhao et al., 2019). The total scale score range from 0 to 100, patients will consider as well self-care if the final scale total score is 70 or above, and low self-care for who are get less than 70. SC-HI scale needs about 5 min to complete.

### **3.5. Quality of Life (SF-36) Scale:**

Quality of life of hypertensive patients was measured using the 36-Item Short Form Survey (SF-36). SF-36 questionnaire has been used as health indicator to screen the health status of persons and evaluate the health interventions (Care, 2020). The questionnaire has the feasibility to be administered as a self-report, personal interview or by telephone, and the participant need about 5 to 10 minutes to complete.

SF-36 questionnaire is a 36 items, included within 8 subscales (physical functioning (PF), bodily pain, role limitations due to physical health problems (RP), role limitations due to personal or emotional problems (RE), emotional well-being (EW), social functioning (SF), energy/fatigue (EF), and General health perceptions) (Care, 2020). Each function responded by 2 to 6-likert point, total mark is 100 score;

positive functions consider better as become close to 100 (e.g. physical functioning), negative functions consider better as close to 0 (e.g. pain).

SF-36 was frequently used to measure HRQOL in older adults with HTN, as well as, the Arabic version was used in many studies with Cronbach's  $\alpha \geq 0.70$  (Al-Ghamdi et al., 2002; Guermazi et al., 2012; Sheikh et al., 2015). Each scale is directly converted into a scale of 0-100, representing 0 score as worst and 100 score as best health. **(Appendix D)**

### **3.6. Health literacy (CHEWQ)**

Lisa D. Chew developed a three health literacy screening questions for detecting patients with inadequate or marginal health literacy (Chew et al., 2004). The three questions were ‘*How often do you have someone (like a family member, friend, hospital/ clinic worker or caregiver) help you read hospital materials?*’ reflects the help in reading, ‘*How often do you have problems learning about your medical condition because of difficulty understanding written information?*’ reflects the learning problems, and ‘*How confident are you filling out forms by yourself?*’ reflects the confident with filling the medical forms. **(Appendix E)**

Responses were scored on a Likert scale from 1 to 5, participants were asked to choose between; all of the time 5, most of the time 4, some of the time 3, a little of the time 2 or none of the time 1 (Chew et al., 2008). The responses were assessed as scoring each question from +5 (no problems with reading) to +1 points, with negative scores for the second question, -5 (reflecting poor reading) to -1 (reflecting no problems with learning). Then, we summed the scores to gain total scale point between a 10 (high value) or 1 (low value) point scales and used this methods to evaluate the compound screening tests in the main analyses.

Given documented association of poor health literacy and health outcomes, these questions are an important advance toward being able to practically identify patients who might have difficulty understanding and acting on health care information.

Arabic version of the three questions were used in Lebanon (Fadda et al., 2018) and they found that the CHEWQ are a valuable tool to measure health literacy and

allowing for minimal adaptations according to each country's healthcare system, in the entire Arabic speaking.

#### **4. Data Collection Procedures**

##### **4.1. Pilot Study**

In the first week of June 2020, 15 patients were enrolled to be in the pilot study, who are met the study inclusion criteria. Patients were selected convenes at the intermediate cardiac unit in KAUH, they were interviewed in their rooms during hospitalization by the researcher. All protective measures were taken in consider (safe distance, wearing mask and gloves, and hand washing before and after the interview) by both; researcher and patients. The researcher presented the education part of self-care of HTN using the laptop to present a PowerPoint included the education part (**Appendix F**) with pictures and brochures, the presentation take about 10 – 15 min.

Then, the researcher download the 4-free Apps of self-care of HTN in patient's mobile and teach him/her how to use each; how to open and close the App, how to report the reading, how to save data, how to open previous saved data and how to edit data, how to take screen shot and send it vie what's App. In case the App deleted or lost, patients were informed how to re-download each App from the App store. The researcher confirms the patients understanding by re-demonstration for each App.

All patients were evaluated for their understating to education content and their acceptance, usability, and feasibility for the 4-selected apps by discussed their recommendation and preferences for the selected 4-free Apps. Almost all patients were understandable and expressed approve for android Apps, some of them had difficulty to deal with iOS Apps. Thus, according to the pilot study and the recommendation of the expert committee, the researchers exclude the iOS Apps from the experimental study.

The study measures were filled by the participants in the pilot study and were not included in the RCT analysis data.

## **4.2. The Study practice**

### **4.2.1. Baseline data**

During the pandemic period, once Jordan opens all their vital services included hospitals after the public lockdown as precaution strategies to COVID-19 pandemic, the researcher contacted with KAUH and got a list of patients who are have reserve visit during the next month (June, 2020) and were 1500 patients. The researcher selected the sample as mentioned in the population and sample section. In the first interview, the researcher was in contact with patients on phone to be sure that they will come to the clinic visit as scheduled in the list. Every day the research was interviewed the listed patients, that was about 6- 7 patients daily.

The interviews with the patients were in the out clinic of heart department. Each patient was interviewed as the schedule date and time while he/she was waiting at the treatment room before entering to doctor room. All protection measures were applied during the interview, patients were asked to signing the written consent form and to fill the questioners (SC-HI, SF-36, and CHEWQ) as pre-test. Researcher read and explained the items that patients couldn't understand and filling the answer if they couldn't write. Patient's Blood pressure was measured by the practical nurse in the clinic using the electronic sphygmomanometer, patients were in setting position, hand in the chest level. Then, the researcher applied them either the interventions or the control groups according to the participant group.

### **4.2.2. The three study Groups**

#### **1. Intervention Group**

Intervention group was received a Health Education + The 4-free Apps + PHN interventions.

- I. Health Education: Health education contents were followed according to the World Health Organization (WHO) and American Heart Association (AHA) recommendations for HTN self-care (WHO, 2019a). Contents included: What is high blood pressure, Know your numbers, How to use a home blood pressure monitor, Choosing a home blood pressure monitor, and Changes that



patients can make to manage HBP (low salt diet, exercise, medication adherence, stress management, stop smoking... etc). Educate family members to be part of the BP control process and provide their patient daily reinforcement. Education session presented individually by the researcher in quite room using the power-point slides in a personal laptop and brochures about BP (**Appendix E**). The session takes 10 to 15 min and before patient entering to the doctor room.

- II. The 4-free Apps: Participants were instructed to download and use the 4-free Apps to facilitate the self-monitoring and detect BP and behavior changes. Nurse incorporate patents to using the 4-free Apps into their daily lifestyle: encourage patients self-monitoring of BP and daily record their readings in the Apps history through Myheart- App, encourage walking and counting steps daily through Steps-App, encourage deep breathing exercise as a stress management method using Breathe easy-App, and encourage adherent to medication using the Pill reminder-App. Training session how to use the 4-free Apps was applied as well as in pilot study.
  
- III. PHN interventions: Patients were followed via telephone (individual voice calling) for maximum 10 min, once weekly; over three months by a nurse who is a Ph.D in public health nursing and with 7 years' experience in cardiac unit. Moreover, the participants continuously can use the chat via a What's app group. The PHN nurse used the three prevention levels (primary, secondary, and tertiary) to guide patients in the self-care process (maintenance, monitoring, and management). The nurse followed the general approaches: (1) assess patient's maintenance knowledge, attitudes, beliefs, and practices; (2) check the Apps history for the previous week to detect any changes; (3) and evaluate the patient's action at that time; (4) Finally, give supportive feedback and schedule for next appointment before patient hang up. However, the patients were keeping in touch and sharing their experiences over the three months vie What's App group (e.g. send screenshot for each app history weekly).

Accordingly, the nurse provided the appropriate interventions as based on patients' needs. Nursing interventions include: (1) education (2) follow-up and screening (3) counselling, referral and collaborate with other professionals.

For example: Nurse provides feedback regarding patient's BP level; give positive feedback for good behaviours and BP improvement. The nurse indicates that she will ask about the history of BP records and steps counting at next week to counsel non-adherent patients. Nurse actively involves patients in their own care by promoting shared decision making and simplifies the self-care process. Encourage the patient to discuss of his responses and action in case of changes. Discuss modifying dosages or change medications to reduce side effects. Facilitate communication and care matching with various health care provider; patient, family, caregivers, pharmacists, and physician. Follow a particular, personalized nurse care plan based on the patient's characteristics and needs and refer him/her for more intensive evaluation.

## **2. Apps alone Group:**

Apps alone group received the initial education and the 4-free Apps.

## **3. Standard care Group:**

Standard care group received just the initial education and continue for the usual routine care.

### **4.2.3. After three months**

Patients were met after three months as pre-scheduled by date and time of their follow-up visit in the out-clinic of KAUH. Post-intervention data (blood pressure level, self-care, quality of life, and health literacy) were collected by the researcher in September, 2020. Data were collected in the treatment room; blood pressure measured by the practical nurse in the clinic using the same technique in baseline measure. Then, the patient was asked to fill the questionnaires (SC-HI, SF-36, and CHEWQ) as post-data – same method of base line data--.. The researcher informed the patients that the study was finished and they were thankful for their participation. All participants were given brochures about HTN self-care. Patients in control group

were informed about the applications and if they were interested, the researcher downloads the 4-free Apps for them and taught them how to use them in their normal life.

## **5. Data Analysis**

Statistical Package for the Social Sciences (SPSS) version 25.0 was used to perform the statistical analysis. Descriptive statistics were used as mean; standard deviation, minimum, and maximum for continue variables; frequencies with percentages for categorical variables. Homogeneity of three groups at baseline characteristics was evaluated using either Chi-Square or t-test for means differences and frequencies. At 95% CI, A p-value of  $\geq 0.05$  was considered statistically not significant and no differences in the three groups at baseline.

Comparisons between the means before and after within group for the three measures of the study were carried out using a paired-samples t- test or Wilcoxon test, a statistical significance was set as p-value  $< 0.05$ . Comparison between groups after three months was carried out using either one-way repeated measures ANOVA or the Kruskal-Wallis test followed by Tukey multiple comparisons to identify the single difference.

The relationship between socio-demographic characteristics and the patient's outcomes had been analyzed using Mann-Whitny and Kruskal Wallis tests. Chi-square used to analysis the relationship between the CHEWQ and socio-demographic characteristics,  $p < 0.05$  value was accepted as statistically significant.

## **6. Ethical considerations**

The Institutional Review Board (IRB) was obtained from the Near East University, reference number is (YDU/2020/76-997) and the IRB-approved from the KAUH, reference number is (2/132/2020). All patients' right were according to research ethics; participants provided written consent form and they were notified of confidentiality. (**Appendix G**)

**Clinical Trial ID number was taken from Clinical Trial.gov (ID NCT04992000)**

**CHAPTER IV**  
**RESULTS**

**1. Demographic Characteristics**

(Table 1) In the three groups, **age** ranged (55 – 80) years with mean age of 60.37 ±5.60, 60.37 ±5.60, and 61.45 ±7.36 years in each group. Statically was no difference between them (p = 0.757).

Participants were **diagnosed by HTN** between 1 year and 25 years with mean 9.0 ± 8.7, 8.3 ± 6.0, and 7.9 ± 6.4 years in each group. Statically was no difference between them (p = 0.80).

Participants have had one to five **anti-hypertensive medications** daily, among the three groups were no statically difference between them (p = 0.96).

**Table 1: Demographic characteristics and descriptive of continues variables of study participants in the three groups:**

Characteristics		Intervention <b>n=37</b>	<b>m.Apps</b> <b>alone</b> <b>n=36</b>	<b>Standard</b> <b>care</b> <b>n=37</b>	<b>ANOVA</b> <b>/F</b>	<b>p</b>
Age (years)	m± SD	60.37 ± 5.60	60 ± 6.89	61.45 ± 7.36	0.279	<b>.757</b>
	Minimum	55	55	55		
	Maximum	77	78	80		
HTN Duration (years)	m(SD)	9.0 ± 8.7	8.3 ± 6.0	7.9 ± 6.4	0.214	<b>.80</b>
	Minimum	1	1	1		
	Maximum	35	20	25		
HTN Pills (N/day)	m(SD)	1.8 ± 0.8	1.66 ± 0.7	1.8 ± 0.8	0.036	<b>.96</b>
	Minimum	1	1	1		
	Maximum	4	4	5		

**(Table 2)** Most of Participants were **male** (56.4%) in general and nearly among the three groups (56.8%), (63.9%), and (48.6%) respectively. Statically was no difference between them ( $p= 1.727$ ). Almost all of them were **married** in general and among the three groups (92.7%), (89.2%), (97.2%), and (91.9%). Statically was no difference between them ( $p=7.519$ ).

The majority of participants were **educated** withier university or secondary school (77.2%) in general and nearly among the three groups (86.4%, 77.8%, and 67.5%). Statically was no difference between them ( $p=117$ ). Just 16.3% of general participants reported that they have a good or high **income** and nearly among the three groups (27%, 13.9%, and 8.1%). Statically was no difference between them ( $p=0.214$ ).

12.7% of study participants reported that they feel bad **health status** and 53.6% reported that they feel not bad but as well as not good. Among the three groups was no statically difference between them ( $p=0.417$ ). Almost all of the study participants have had a health **insurance** (97%) and nearly among the three groups 91.9%, 86.1%, and 86.5%. Statically was no difference between them ( $p=0.691$ ).

More than half of participants were **non-smokers** 66.4% in general and (67.6%, 69.4%, and 62.2%) among the three groups. Statically was no difference between them ( $p=0.791$ ). The majority of participants were have **supported** from their families 96.4% with no significant difference among the three groups ( $p=0.168$ ).

About two thirds of participants were **not-working** (71.8%) in general and among the three groups (64.9%, 77.8%, and 73%). Statically was no difference between them ( $p=0.463$ ).

The majority of participants were having a **history of HTN** in their families 80% in general and 89.2%, 83.3%, and 67.6% in each group. Statically was no difference between them ( $p=0.056$ ).

Almost all of participants have not been using any **health application** before (97.3%, 97.3%, 94.4%, and 100%) in general and each group. Statically was no difference between them ( $p=0.346$ ).

**Table 2: Demographic characteristics and frequency of categorical variables of study participants in the three groups:**

Characteristics		Intervention		m.Apps alone		Standard care		Total		Chi-Square / $\chi^2$	p-value
		n=37		n=36		n=37		n=110			
		n	%	n	%	n	%	n	%		
<b>Gender</b>	Male	21	56.8	23	63.9	18	48.6	62	56.4	1.727	<b>.422</b>
	Female	16	43.2	13	36.1	19	51.4	48	43.6		
<b>Marital status</b>	Married	33	89.2	35	97.2	34	91.9	102	92.7	7.519	<b>.275</b>
	Single	1	2.7	0	0	0	0	1	0.9		
	Divorce	2	5.4	1	2.8	0	0	3	2.7		
	Widowed	1	2.7	0	0	3	33.6	4	3.6		
<b>Education</b>	Literate	1	2.7	2	5.6	8	21.6	11	10	10.175	<b>.117</b>
	Primary school	4	10.8	6	16.7	4	10.8	14	12.7		
	Secondary school	18	48.6	14	38.9	16	43.2	48	43.6		
	University	14	37.8	14	38.9	9	24.3	37	33.6		
<b>Income</b>	low	13	35.1	11	30.6	16	43.2	40	36.4	8.349	<b>.214</b>
	moderate	14	37.8	20	55.6	18	47.3	52	47.3		
	Good	8	21.6	5	13.9	3	8.1	16	14.5		
	High	2	5.4	0	0	0	0	2	1.8		
<b>Health status</b>	Bad	5	13.5	3	8.3	6	16.2	14	12.7	3.920	<b>.417</b>
	Not bad	16	43.2	23	63.9	20	54.1	59	53.6		
	Good	16	43.2	10	27.8	11	29.7	37	33.6		
<b>Insurance</b>	Yes	34	91.9	31	86.1	32	86.5	97	88.2	0.739	<b>.691</b>
	No	3	8.1	5	13.9	5	13.5	13	11.8		
<b>Smoking</b>	Yes	12	32.4	11	29.7	14	33.6	37	33.6	0.470	<b>.791</b>
	No	25	67.6	25	69.4	23	62.2	73	66.4		
<b>Social</b>	Yes	36	97.3	36	100	34	91.9	106	96.4	3.562	<b>.168</b>

<b>support</b>	No	1	2.7	0	0	3	8.1	4	3.6		
<b>Job</b>	Yes	13	35.1	8	22.2	10	27	31	28.2	1.540	<b>.463</b>
	No	24	64.9	28	77.8	27	73	79	71.8		
<b>HTN family history</b>	Yes	33	89.2	30	83.3	25	67.6	88	80	5.777	<b>.056</b>
	No	4	10.8	6	16.7	12	32.4	22	20		
<b>Health apps</b>	Yes	1	2.7	2	5.6	0	0	3	2.7	2.123	<b>.346</b>
	No	36	97.3	34	94.4	37	100	107	97.3		

## 2. Changes of Blood Pressure

(Table 3) At baseline, Systolic blood pressure of study participants was ranged 88 – 200 mmHg with mean of 137.5, 139.5, and 143.2 in each group. Statically was no difference between them (p=0.456). Diastolic blood pressure of study participants was ranged 44 – 111 mmHg with mean of 81.54, 81.02, and 82.78 in each group (p>0.05).

**Table 3: Descriptive characteristics of blood pressure of study participants in the three groups at baseline:**

<b>BP</b>		Intervention	m.App alone	Standard	Test ANOVA F	P value
<b>Systolic BP</b>	M ±SD	137.5± 22.4	139.5 ± 20	143.2 ± 16.6	0.790	<b>0.456</b>
	min	88	90	100		
	max	200	196	190		
<b>Diastolic BP</b>	M ± SD	81.54± 12.5	81.02 ± 7.2	82.78 ± 9.5	0.745	<b>0.745</b>
	min	44	60	60		
	max	111	92	103		

After the 3 months, Interventional group and Standard group show significant decrease in Systolic BP (mean difference -14, -7.78; p= 0.001, p=0.003, respectively). While no significant decrease found in Apps alone group (mean difference -5.66; p= 0.052). However, there was significant difference found between

the three groups (**F=8.049; p= 0.001**). Using the Tukey multiple comparisons in post hoc statistical analysis, the difference was found between the interventional group with standard group and m.Apps alone. Among the three groups, there was no significant change in **diastolic BP** after the 3 months ( $p \geq 0.05$ ), as well as no significant change between the three groups ( $p=0.123$ ). (**Table 4**)

**Table 4: Changes in blood pressure of study participants in the three groups at baseline and after three months:**

<b>BP</b>		Intervention	m.App alone	Standard	Test ANOVA F	P value Between groups
		mean	mean	mean		
<b>Systolic BP</b>	Before	137.5	139.5	143.2	0.790	0.456
	After	123.5	133.8	135.4	8.049	0.001
	Mean reduce	<b>-14</b>	<b>-5.66</b>	<b>-7.78</b>		
	Within group	4.47	2.008	3.233		
	P value	<b>0.001</b>	0.052	<b>0.003</b>		
<b>Diastolic BP</b>	Before	81.54	81.02	82.78	0.745	0.745
	After	78.89	80.6	82.40	2.139	0.123
	Mean reduce	<b>-2.65</b>	<b>-0.38</b>	<b>-0.37</b>		
	Within group	1.48	0.302	0.325		
	P value	0.145	0.764	0.747		

### 3. Self-Care (SC-HI)

(**Table 5**) **At baseline, maintenance** of self-care of study participants was ranged 12 – 72.7 with mean of 37.06, 36.5, and 33.9 in each group. **Monitoring** of self-care of study participants was ranged 25 – 85 with mean of 37.06, 36.5, and 33.9 in each group. **Confidence** of self-care of study participants was ranged 22 – 66 with mean of 37.06, 36.5, and 33.9 in each group. Statically was no difference between them ( $p \geq 0.05$ ).



**Table 5: Descriptive characteristics of Self-care (SC-HI) of study participants in the three groups at baseline:**

SC-HI		Intervention	m.App alone	Standard	Test ANOVA / F	P value
<b>Maintenance</b>	M ±SD	37.06 ±37	36.5 ±10.9	33.9 ±10.3	0.86	<b>0.426</b>
	min	12	15	15		
	max	72	72.7	60		
<b>Monitoring</b>	M ±SD	55.29 ±13	54.58 ±10.2	52.7 ±11	0.50	<b>0.608</b>
	Min	25	35	35		
	max	75	85	80		
<b>Confidence</b>	M ±SD	41.79 ±9.9	41.88 ±9.9	40.1 ±10.4	0.35	<b>0.703</b>
	min	33	33	22		
	max	66	66	66		

After the 3 months (Table 6), Interventional, m.Apps alone, and Standard groups show significant increase in **maintenance self-care** score (mean difference= 30, 19.6, and 10.59, respectively;  $p \leq 0.05$ ). As well as, significant differences were found between the three groups ( $p = 0.001$ ). Using the Tukey multiple comparisons in post hoc statistical analysis, the difference was found between the interventional group with standard group and m.Apps alone, and between the m.Apps alone and standard group. Interventional, m.Apps alone, and Standard groups show significant increase in **monitoring self-care** score (mean difference= 17.75, 11.75, and 1.89, respectively;  $p \leq 0.05$ ). Using the Tukey multiple comparisons in post hoc statistical analysis, the difference was found between the interventional group with standard group and m.Apps alone, and between the m.Apps alone and standard group. Interventional, m.Apps alone, and Standard groups show significant increase in **confidence self-care** score (mean difference= 40.27, 20.96, and 0.73, respectively;  $p \leq 0.05$ ). Using the Tukey multiple comparisons in post hoc statistical analysis, the difference was found between the interventional group with standard group and m.Apps alone, and between the m.Apps alone and standard group.

**Table 6: Changes in self-care (SC-HI) of study participants in the three groups at baseline and after three months:**

SC-HI		Intervention	m.App	Standard	Test	P value
		mean	alone mean	mean	ANOVA F	Between groups
<b>Maintenance</b>	Before	37.06	36.53	33.93	0.86	0.426
	After	67.01	56.13	44.52	37.4	0.001
	Changes	<b>30</b>	<b>19.60</b>	<b>10.59</b>		
	Within group	-16.029	-12.861	-8.08		
	P value	<b>0.001</b>	<b>0.001</b>	<b>0.001</b>		
<b>Monitoring</b>	Before	55.29	54.53	52.70	0.50	0.608
	After	73.04	66.33	54.59	28.7	0.001
	Changes	<b>17.75</b>	<b>11.75</b>	<b>1.89</b>		
	Within group	-8.729	-7.197	-2.67		
	P value	<b>0.001</b>	<b>0.001</b>	<b>0.011</b>		
<b>Confidence</b>	Before	41.79	41.88	40.12	0.35	0.703
	After	82.06	62.84	40.85	96.7	0.001
	Changes	<b>40.27</b>	<b>20.96</b>	<b>0.73</b>		
	Within group	-16.862	-10.827	-2.36		
	P value	<b>0.001</b>	<b>0.001</b>	<b>0.023</b>		

#### 4. Quality of Life (SF-36)

(Table 7) At baseline, *Physical functioning* of study participants was ranged 0 – 95 with mean of 45.67, 45.4, and 48.3 in each group. *Role limitations due to physical health* of study participants was ranged 0 – 100 with mean of 38.17, 35.8, and 28.3 in each group. *Role limitations due to emotional problems* of study participants was ranged 0 – 100 with mean of 56.29, 62.9, and 56.7 in each group. *Pain* of study participants was ranged 0 – 90 with mean of 47.4, 49.7, and 53.5 in each group.

*Emotional well-being* of study participants was ranged 35 – 80 with mean of 60.2, 61.4, and 63.6 in each group. *Social functioning* of study participants was ranged 25 – 100 with mean of 51, 50.7, and 53.7 in each group. *General of Quality of life of*

study participants was ranged 35 – 85 with mean of 56.08, 55, and 55.9 in each group. Statically was no difference between all of them ( $p \geq 0.05$ ). While *Energy/fatigue* quality of life of study participants was ranged 22 – 80 with mean of 44.05, 39.7, and 46.7 in each group. Statically was significant difference between them ( $p=0.017$ ). Using the Tukey multiple comparisons in post hoc statistical analysis, the difference was found between the standard group and Apps alone group ( $p=0.13$ ).

**Table 7: Descriptive characteristics of Quality of life (SF-36) of study participants in the three groups at baseline:**

<b>QOL</b>		Intervention	m.App alone	Standard	Test ANOVA F	P value
<b>PF</b>	M $\pm$ SD	45.67 $\pm$ 26.7	45.4 $\pm$ 18.4	48.3 $\pm$ 21.7	0.194	<b>0.824</b>
	min	0	5	15		
	max	95	85	90		
<b>RP</b>	M $\pm$ SD	38.17 $\pm$ 41	35.8 $\pm$ 32.3	28.3 $\pm$ 35.9	0.720	<b>0.489</b>
	min	0	0	0		
	max	100	100	100		
<b>RE</b>	M $\pm$ SD	56.29 $\pm$ 46.3	62.9 $\pm$ 41.9	56.7 $\pm$ 46.3	0.248	<b>0.781</b>
	min	0	0	0		
	max	100	100	100		
<b>Pain</b>	M $\pm$ SD	47.4 $\pm$ 17.5	49.7 $\pm$ 13	53.5 $\pm$ 16.4	1.421	<b>0.246</b>
	min	10	0	22.5		
	max	90	67.5	90		
<b>EF</b>	M $\pm$ SD	44.05 $\pm$ 8.5	39.7 $\pm$ 9.4	46.7 $\pm$ 12.4	4.232	<b>0.017</b>
	min	25	22	30		
	max	60	65	80		
<b>EW</b>	M $\pm$ SD	60.2 $\pm$ 11.3	61.4 $\pm$ 8.7	63.6 $\pm$ 9.4	1.154	<b>0.319</b>
	min	40	35	44		
	max	80	72	84		

<b>SF</b>	M ±SD	51 ±16.2	50.7 ±10.9	53.7 ±18.8	0.400	<b>0.671</b>
	min	25	25	25		
	max	100	77	100		
<b>General</b>	M ±SD	56.08 ±9.2	55 ±7.7	55.9 ±9.6	0.159	<b>0.853</b>
	min	35	40	35		
	max	75	70	85		

**After the 3 months (Table 8)**, Interventional group and Apps alone group show significant increase in *PF Quality of life* (mean difference= 7.84, and 6.52, respectively;  $p \leq 0.05$ ). While there was no significant change within the Standard group (mean difference= 0.27;  $p=0.60$ ). However, there were no significant changes between the three groups ( $p=0.613$ ).

Interventional group and Apps alone group show significant increase in *RF Quality of life* (mean difference= 34.12, and 24.58, respectively;  $p \leq 0.05$ ). While there was no significant change within the Standard group (mean difference= 2.02;  $P=0.324$ ). However, there were significant changes between the three groups ( $p = 0.001$ ). Using the Tukey multiple comparisons in post hoc statistical analysis, the difference was found between the standard group with interventional group and Apps alone. Interventional group and Apps alone group show significant increase in *RE Quality of life* (mean difference= 29.28, 15.28, respectively;  $p \leq 0.05$ ). While there was no significant change within the Standard group (mean difference= 3.59;  $p =0.325$ ). However, there were significant changes between the three groups ( $p = 0.013$ ). Using the Tukey multiple comparisons in post hoc statistical analysis, the difference was found between the interventional group and standard group.

Interventional group and Apps alone group show significant increase in *pain Quality of life* (mean difference= 18.38, 13.19, respectively;  $p \leq 0.05$ ). While there was no significant change within the Standard group (mean difference= 1.67;  $p =0.161$ ). However, there were significant changes between the three groups ( $p = 0.015$ ). Using the Tukey multiple comparisons in post hoc statistical analysis, the difference was found between the interventional group and standard group. Interventional group and Apps alone group show significant increase in *EF Quality of life* (mean difference=

11.35, 10, respectively;  $p \leq 0.05$ ). While there was no significant change within the Standard group (mean difference= 0.40;  $p = 0.661$ ). However, there were significant changes between the three groups ( $p = 0.003$ ). Using the Tukey multiple comparisons in post hoc statistical analysis, the difference was found between the interventional group and standard group.

Interventional group and Apps alone group show significant increase in *EW Quality of life* (mean difference= 9.65, 6.94, respectively;  $p \leq 0.05$ ). While there was no significant change within the Standard group (mean difference= 0.97;  $p = 0.163$ ). However, there were significant changes between the three groups ( $p = 0.049$ ). Using the Tukey multiple comparisons in post hoc statistical analysis, the difference was found between the interventional group and standard group. Interventional group and Apps alone group show significant increase in *SF Quality of life* (mean difference= 14.81, 8.95, respectively;  $p \leq 0.05$ ). While there was no significant change within the Standard group (mean difference= 0.67;  $p = 0.644$ ). However, there were significant changes between the three groups ( $p = 0.005$ ). Using the Tukey multiple comparisons in post hoc statistical analysis, the difference was found between the interventional group and standard group.

Interventional group and Apps alone group show significant increase in *General Quality of life* (mean difference= 4.32, 4.30, respectively;  $p \leq 0.05$ ). While there was no significant change within the Standard group (mean difference= 0.00;  $p = 1.00$ ). However, there were no significant changes between the three groups ( $p = 0.054$ ).

**Table 8: Changes in Quality of life (SF-36) of study participants in the three groups at baseline and after three months:**

QOL		Intervention	m.App alone	Standard	ANOVA F	P value
<b>PF</b>	Before	45.67	45.41	48.37	0.194	0.824
	After	53.51	51.94	48.64	0.492	0.613
	Changes	<b>7.84</b>	<b>6.52</b>	<b>0.27</b>		
	Within group	-4.400	-4.78	-0.52		
	P value	<b>0.001</b>	<b>0.001</b>	0.600		
<b>RP</b>	Before	38.17	35.83	28.37	0.720	0.489
	After	72.29	60.41	30.40	12.362	0.001
	Changes	<b>34.12</b>	<b>24.58</b>	<b>2.02</b>		
	Within group	-5.156	-4.66	-1.00		
	P value	<b>0.001</b>	<b>0.001</b>	0.324		
<b>RE</b>	Before	56.29	62.94	56.74	0.248	0.781
	After	85.57	78.23	60.34	4.554	0.013
	Changes	<b>29.28</b>	<b>15.28</b>	<b>3.59</b>		
	Within group	4.642	-3.66	-0.99		
	P value	<b>0.001</b>	<b>0.001</b>	0.325		
<b>Pain</b>	Before	47.43	49.72	53.58	1.421	0.246
	After	65.81	62.91	55.25	4.391	0.015
	Changes	<b>18.38</b>	<b>13.19</b>	<b>1.67</b>		
	Within group	-7.195	-7.50	-1.43		
	P value	<b>0.001</b>	<b>0.001</b>	0.161		
<b>EF</b>	Before	44.05	39.79	46.75	4.232	0.017
	After	55.40	49.79	47.16	3.111	0.003
	Changes	<b>11.35</b>	<b>10.00</b>	<b>0.40</b>		
	Within group	-7.999	-9.44	-0.44		
	P value	<b>0.001</b>	<b>0.001</b>	0.661		

<b>EW</b>	Before	60.21	61.44	63.67	1.154	0.319
	After	69.86	68.38	64.64	6.220	0.049
	Changes	<b>9.65</b>	<b>6.94</b>	<b>0.97</b>		
	Within group	-5.715	-6.36	-1.42		
	P value	<b>0.001</b>	<b>0.001</b>	0.163		
<b>SF</b>	Before	51.00	50.76	53.71	0.400	0.671
	After	65.81	59.72	54.39	5.570	0.005
	Changes	<b>14.81</b>	<b>8.95</b>	<b>0.67</b>		
	Within group	-7.346	-6.14	-0.46		
	P value	<b>0.001</b>	<b>0.001</b>	0.644		
<b>General</b>	Before	56.08	55.00	55.94	0.159	0.853
	After	60.40	59.30	55.94	2.997	0.054
	Changes	<b>4.32</b>	<b>4.30</b>	<b>0.00</b>		
	Within group	-4.852	-5.74	0.00		
	P value	<b>0.001</b>	<b>0.001</b>	1.000		

### 5. Health Literacy (CHEWQ)

Most of participants were answered the all times for the first CHEWQ1 (43.2%) in intervention group and most of time for the two control groups (47.2% and 35.1%, respectively). In CHEWQ 2, most of participants answered most of time (32.4%) in intervention group and the standard group C2 (37.8%) while answered the sometimes option by Apps alone group C1 (47.2%). CHEWQ 3 was answered mostly by sometimes in the three groups (43.2%, 41.7%, and 45.9%). However, there a significant difference was detected among the three groups related the first CHEWQ1 ( $p=0.017$ ), no statically differences was shown in the other CHEWQ 2 &3 ( $p > 0.05$ ). **Table 11**

**Table 9:** Frequencies of the three Health Literacy (CHEWQ) in the three groups

CHEWQ	Groups	CHEWQ 1		CHEWQ 2		CHEWQ 3	
		F	%	F	%	F	%
<b>All time</b>	I	16	43.2	8	21.6	4	10.8
	C1	9	25	8	22.2	2	5.6
	C2	5	13.5	8	21.6	8	21.6
<b>most of time</b>	I	10	27	12	32.4	9	24.3
	C1	17	47.2	7	19.4	12	33.3
	C2	13	35.1	14	37.8	11	29.7
<b>sometimes</b>	I	7	18.1	11	29.7	16	43.2
	C1	8	22.2	17	47.2	15	41.7
	C2	12	32.4	13	35.1	17	45.9
<b>little of time</b>	I	3	8.1	4	10.8	6	16.2
	C1	2	5.6	4	11.1	7	19.4
	C2	4	10.8	2	5.4	1	2.7
<b>Never</b>	I	1	2.7	2	5.4	2	5.4
	C1	0	0	0	0	0	0
	C2	3	8.1	0	0	0	0
<b>Kruskal-Wallis H</b>		8.1946		1.258		5.815	
<b>P value</b>		0.017		0.533		0.055	

SC-HI outcomes show significant relationship in Maintenance and Confidence with the first CHEWQ ( $p=0.005$  and  $0.048$ , respectively). QOL outcomes show significant relationship in PF, RE, Pain, and General ( $p<0.05$ ). No significant relationship was found in the three outcomes with the second CHEWQ. CHEWQ three was significant relationship with Maintenance and Confidence of self-care ( $p<0.05$ ) and with Pain and General QOL ( $p<0.05$ ).



**Table 10: The relationship between the three CHEWQ and three patients Outcomes; SC-HI, QOL, and BP.**

Items	Variables	Test value	P value
CHEWQ1	Maintenance	14.733	0.005
	Confidence	9.501	0.048
	PF	13.589	0.009
	RE	12.501	0.014
	Pain	14.523	0.006
	General	12.080	0.017
CHEWQ2	No significance		
CHEWQ3	Maintenance	17.698	0.001
	Confidence	12.560	0.014
	Pain	11.482	0.022
	General	17.768	0.001

**Gender** shows significant relationship with SBP, PF, RF, RE, Pain, and General QOL ( $p < 0.05$ ). **Smoking** shows significant relationship with EW ( $p = 0.006$ ). **Insurance** shows significant relationship with SBP and DBP ( $p = 0.021$  and  $0.013$ , respectively). **Job** shows significant relationship with Maintenance, PF, RF, Pain, SF, and General QOL ( $p < 0.05$ ). **Education** shows significant relationship with Maintenance, Confidence, PF, RF, RE, Pain, EF, SF, and General QOL ( $p < 0.05$ ). **Income** shows significant relationship with pain ( $p = 0.015$ ). **Health status** shows significant relationship with Maintenance, DBP, PF, RF, Pain, EF, EW, SF, and General ( $p < 0.05$ ).

**Education level** shows significant relationship with the three CHEWQ ( $p = 0.001$ ). **Health status** shows significant relationship with the first and third CHEWQ ( $p < 0.05$ ). **Income** and **Marital status** show significant relationship with the first CHEWQ ( $p = 0.016$  and  $0.001$ , respectively).

**Table 11: The relationship of the some social demographics variables and SC-HI, QOL, BP, and CHEWQ**

<b>Items</b>	<b>Variables</b>		<b>Test</b>	<b>p value</b>
<b>Gender</b>	SBP	Mann -Whitny U	1093	0.017
	PF		923.5	0.001
	RF		905	0.001
	RE		1132	0.013
	Pain		1085.5	0.014
	General		1068.5	0.010
<b>Smoking</b>	EW	Mann-Whitny U	919	0.006
<b>Insurance</b>	SBP	Mann-Whitny U	382	0.021
	DBP		363.5	0.013
<b>Job</b>	Maintenance	Kurskal	930.5	0.049
	PF		595	0.001
	RF		810.5	0.004
	Pain		602	0.001
	SF		751.5	0.001
	General		852.5	0.012
<b>Education</b>	Maintenance	Kurskal	12.551	0.006
	Confidence		9.164	0.026
	PF		9.556	0.023
	RF		10.948	0.012
	RE		9.437	0.024
	Pain		16.561	0.001
	EF		10.909	0.012
	SF		15.145	0.002
	General		12.395	0.006
<b>Income</b>	pain	Kurskal	10.510	0.015
<b>Health status</b>	Maintenance	Kurskal	7.034	0.030
	DBP		9.256	0.010
	PF		11.531	0.003

	RF		8.363	0.015
	Pain		14.572	0.001
	EF		15.195	0.001
	EW		14.037	0.001
	SF		15.763	0.001
	General		20.517	0.001
<b>CHEWQ 1</b>	Marital status	Chi-square	10.38	0.001
	Education		59.71	0.001
	Income		5.84	0.016
	Health status		6.605	0.010
<b>CHEWQ 2</b>	Education	Chi-square	19.905	0.001
<b>CHEWQ 3</b>	Education	Chi-square	33.806	0.001
	Health status		10.941	0.001

## **CHAPTER V**

### **FINDINGS and DISCUSSION**

This study take place during the imposition lockdown period in Jordan as a result of COVID-19 pandemic to provide an empirical evidence of using the mobile Apps with PHN intervention, in order to improve HTN self-care among older adults in safe distance. This RCT, theory-guided, double-blind design achieved a significant reduced in the SBP, better self-report of maintenance, monitoring, and confidence self-care, improvement in the Role limitations due to physical health, Role limitations due to emotional problems, Pain, Energy/fatigue, Emotional well-being, and Social functioning of quality of life over 3 months of 4-free Apps with PHN intervention compared to standard care and using the 4-free Apps alone.

Literature provides preliminary evidence that m-Health technology had the potential to be used among vulnerable patients with HTN to self-manage their BP and self-care behaviors and had potential to be accepted by older adults (Chow & Wong, 2014; Kolcu & Ergun, 2020). In addition, the intervention can be integrated with nurse-intervention in the community settings, particularly in underserved communities where health services may be limited or unavailable (Zare et al., 2019; Zha et al., 2020).

Unlike previous studies in context improving the self-care of HTN, the current study and during the pandemic period, we focus on the vulnerable patients especially elderly, those at high risk to affect by COVID-19 and faced difficulty with access to health services, limited, or unavailability in their communities (Blecker et al., 2020; Mobula et al., 2020). In this study, the interventional group used the 4-free Apps regularly as a part of their life style at home, beside weekly contacts with a PHN as well as they attend their weekly appointments at the primary health centre, compared to those used just the 4-free Apps without any follow and those received the standard care.

Measuring self-care of HTN is essential either in research or in clinical settings so the critical domains of HTN self-care should be adequately addressed in assessed measurements (Han, Song, et al., 2014). Self-care of HTN was measured in different

way in literature such as; knowledge of BP management, self-care behaviour, and the majority were focused in measuring the medication adherence (Athilingam et al., 2017; Han, Song, et al., 2014; Kolcu & Ergun, 2020; Zare et al., 2019; Zhu et al., 2018). This study used a comprehensive instrument to measure the self-care of HTN among older adults (Alsaqer & Bebis, 2020a; Dickson et al., 2017).

After the three months a significant improvement detected in self-care maintenance, management, and confidence among intervention group (+30, +17.7, +40.2;  $p < 0.001$ ) and better than the two-control groups ( $p < 0.001$ ). Accordingly, confidence approach was higher impacted by the study intervention (+40), while moderate impact in confidence, and management (+17 and +30).

While in a study that used the m-Health to improve the self-care of heart failure, the significance improvement was found in management, and confidence self-care (+8.7, +7.03 ;  $p < 0.001$ ) while no significant found in improvement of maintenance self-care (+5.4;  $p = 0.93$ ) (Athilingam et al., 2017). Although, different studies as well as our two-control groups (standard care and Apps alone) have a significant improvement in the self-care ( $p < 0.05$ ) (Najafi Ghezalje et al., 2018; Zare et al., 2019), the interventional group (Apps + PHN intervention) has significant better improvement than Apps alone and standard groups ( $p < 0.05$ ). Accordingly, mobile Apps plus PHN intervention seems to have better impacts on patients self-care level.

Moreover, we can say that the people who are received just health education, they can show improvement just in maintenance self-care, and who are received m-health intervention alone, they can show improvement in confident self-care, while who received follow with a PHN, they will show monitoring self-care improvement. We can explain that to if the patient feel he have to contact with the health care provider weekly or monthly, he fell commitment to do the best health behaviours. Thus, in case combining all the previous intervention together, the self-care will improved in the three approaches.

However, a nurse-led studies found a significant greater improvement in self-care behaviors and satisfaction with hypertensive care in their interventional group than control group (Zare et al., 2019; Zhu et al., 2018). In other hand some studies couldn't find any significant improvement in the self-care behaviours or adherence to

medication even when using the mobile as wireless self-monitoring (Kim et al., 2016; Persell et al., 2020). This it can be related to the period after the intervention; 6 months may have potentiality of unsustainability of self-care. While in case of combining the Apps with PHN intervention, there is high chance in maintained, monitored, and confidence self-care of patients with uncontrolled blood pressure at the community level.

Literately, the Quality of life remained consistent among groups utilizing a m-Health intervention to improve the HTN management in an underserved community (Zha et al., 2020). In this study, while there is a significant differences between the intervention group and the two-control groups in the Role limitations due to physical health, Role limitations due to emotional problems, Pain, Energy/fatigue, Emotional well-being, and Social functioning of quality of life ( $p>0.05$ ), we found no significant difference between them in the Physical functions and General of quality of life ( $p<0.05$ ).

However, the Physical component of quality of life and mental component were significantly enhanced in the interventional group of study that addressed a nurse-led HTN management program among hypertensive older adults patients (Kolcu & Ergun, 2020). other study used a nurse-led HTN management model found no statistical significant difference in the quality of life between its two groups after the intervention (Zhu et al., 2018). We can explain our results to the lockdown because of COVID-19 pandemic, which limited the physical functionality and the quality of life as general in the study participants due to curfew instructions and patients spent all their times in home. Also, may be the period of 3 months in this study and same for previous study is insufficient to detect the difference in quality of life.

In this study, it's obvious that health education alone had no significant improve in all aspects of QoL ( $p>0.05$ ; within group). While there was significant improve in almost all aspect of QoL in the education + Apps group and the study interventional group ( $p<0.001$ ). We can say that health education alone not entails any changes in the QoL but using the m.Apps beside it will make difference in the QoL improvement. People may feel enjoy using like m.Apps as a health tool and this will reflected on their physical and emotional functions. Moreover, the study intervention

group show significant improve in almost all aspect of QoL ( $p < 0.001$ ; within group) and it was significant between groups in three aspect of QoL; RP, EW, and SF ( $P < 0.05$ ). People who use the m.Apps with followed by PHN intervention had more improvement for their social function and this may related to use the what's app group over the three months which strongest their socialization. Encouragement and support from the PHN may play good part in patient's energy and well-being and that consequently improve their role function.

According to a meta-analysis, studies that used the m-Health had a better BP reduction in of intervention groups; SBP ( $-3.78$  mm Hg) and DBP ( $-1.57$  mm Hg) compared with control groups ( $p < 0.001$ ) (Li et al., 2020). In this study the baseline of SPB mean was consent with other studies (Kim et al., 2016; Kolcu & Ergun, 2020; Lee et al., 2019; Zha et al., 2020) that carried out the HTN management (137-143mmhg) and provide a significant reduction in SBP ( $-14$ ; 95% CI,  $p < 0.001$ ) after the mobile Apps plus the PHN intervention.

Moreover, the interventional group show significant better reduction than the two control group (Apps alone and standard care) ( $p = 0.001$ ). While in those studies that examined different interventions to improve the SBP reduction achieve a reduction of  $-2.7$ ,  $-8.3$ ,  $-16$ ,  $-7.8$  (Kim et al., 2016; Kolcu & Ergun, 2020; Lee et al., 2019; Zha et al., 2020) ; the  $-16$  reduction was detected for a group received a telehealth counselling which is a one role for the PHN, give a priority for the role of PHN in the potential for greater enhancing the self-care of HTN, especially in such crisis situations preclude the continuity of health services.

Highlight, the participants might have anxiety related to their worried and thinking about covid-19 risky, this may raise the suspicion if the participants were more commitment and adherence as they engage seriously and substantively because of the COVID-19 issue and its consequences. As a result, when patients feel danger, they become more determine.

DBP in this study was (81-82.7 mmHg) coincide with other studies mean range (84 - 90) (Bengtsson et al., 2016; Chandler et al., 2019; Kim et al., 2016; Lee et al., 2018; Moore et al., 2014; Morawski et al., 2018; Persell et al., 2020). However, we found no significant reduction in the DBP either in international group or two-control

groups (-2.65, -0.38.-0.37;  $p>0.05$ ), as well as no significant difference between the groups ( $p=0.123$ ). Also, in those studies with different interventions were no significant reduction found in DBP (- 2.7, -3.5, -5.7, -2;  $p>0.05$ ) (Kim et al., 2016; Kolcu & Ergun, 2020; Lee et al., 2019; Zha et al., 2020). May the clinical effects in patients with uncontrolled BP could be noted better in SBP than DBP.

Health literacy is an important factor in improving the self-care behaviors of hypertensive patients. Better self-care is connected to the Health literacy factor in the previous studies (Barati et al., 2020). Therefore, the present study show a positive significant correlation was detected between two CHEWQ (1 and 3) of health literacy and maintenance and confidence self-care ( $p>0.05$ ).

Literatures show a statistical significant relationship between some of demographic characteristics like the economic status, education level and body mass index in self-care of hypertensive patients and health literacy (Barati et al., 2020). Therefore, our findings found health literacy was significant with marital status, education level, income, and health status ( $p<0.05$ ). In addition, the education level, home measurement of BP, and medication adherence are found to shown association relationship with health literacy. Similarly, the high health literacy patients have well management and control of their BP and better quality of life. Therefore, hypertensive patients perform a well self-care and better quality of life, if they have adequate health literacy (Shi et al., 2017). Our findings support previous studies conclusions; CHEWQ (1 and 3) show a significant relationship with most of dimensions of quality of life (PF, RE, pain, and General QOL) ( $p<0.05$ ).

Accordingly, improving health literacy is a contributing factor of better maintenance and confidence self-care as well as better quality of life and should be considered as one of the important parts of the management of HTN. On the other hand, a health literacy may similarly lower BP in patients with low and higher health literacy as presented by two years longitudinal study that use a sensitive multi-level intervention to reduce SBP in patients with HTN (Halladay et al., 2017).

The features affecting the self-care and control of HTN varied in genders. To improve the maintenance, confidence, and management self-care of HTN, the strategies for nursing interventions and management would be gender-specific from



early middle age (Ji-Soo & Chul-Gyu, 2020). A previous study found that females were low level of QoL, good physical activity, and higher prevalence of HTN comparative to males. Furthermore, socio-demographic factors, health status, and physical activity were correlated to QoL (Badr et al., 2021). In this study, the Gender shows significant correlation with SBP, PF, RF, RE, Pain, and General quality of life ( $p < 0.05$ ). Coincide with other studies, they found that Aspects associated with HTN self-care practice are education, marital status, source of self-care information, social support, place for exercise, and self-care agency (Ademe et al., 2019b). Furthermore, the effective control of BP is a multi-factorial issue, health care providers should consider the variations in insurance coverage which is a vital factor during they deliver the greatest effective references and care for BP control (Norris, 2016). Finally, it still comes down to having a thoughtful of individual patient's condition and providing the best quality of care.

## **CHAPTER VI**

### **CONCLUSION AND RECOMMENDATION**

#### **1. Conclusion**

In this study, with aggregate disease burden from HTN globally, COVID-19 offers the opportunity for the public health nurse to muster and put into action the potentially effective integrated m-Health for self-care and control of BP plus the PHN interventions, which provide an efficient approach for managing a large numbers of hypertensive patients in a community setting during a national lockdown with safe distance and, keeping older adults out of danger.

Our findings indicate that the combination between the technical and nursing intervention may be an effective solution for the promotion of quality of life and HTN self-care, resulting in statistically and clinically significant decreases in SBP among older adults with HTN compared to using the technology alone or receiving a standard care. Moreover, Health literacy is an essential part that assists patient with HTN to achieve better results of self-care and other health outcomes. Health literacy regulates the motivation level and ability of patients to access to health services, more understand and well use of information in order to maintain, confident self-care, and improve a quality of life.

At the end of this study, according to our findings that obtained from a sample of  $n=110$  and after the calculation for power analysis using the G\* power program with 0.30 effect difference; the power of the study was determined to be 80%. Thus, our sample size was sufficient.

This study give lesson to adoption of technology with nursing intervention as a method of supporting the continuity of self-management of chronic illness (e.g. diabetic patients, cancer, and chronic kidney diseases) during such pandemic, and its potential implications for future delivery of health care, not just in the Jordan, but across the world. It is strongly predicted that we will face local and global problems affects the health services in the future. We recommend repeating the study intervention in different groups and with follow-up studies.

## 2. Recommendations and Further Research

- In this RCT study, at baseline data, the participants were express low maintenance and confidence self-care (33.9- 37 and 40- 41.8, respectively) and moderate monitoring self-care (52.7- 55.2). Thus, we can say that in general patients suffered of HBP; they have the moderate ability to self-care monitoring (ranged 25 – 80) but they can't to self-maintain (ranged 12- 72.7) or self- confident (ranged 22- 66). We suggest that PHN should give more intention to increase patients self-maintenance and self-confident as well improving their ability to self-monitoring.
- Hence, patients with HTN have to provide with a tested clear evidence-based methodology to manage, treat, and control of their BP, and also any related comorbidities. An m-Health-based method is important nowadays to safe securing and comprehensive, cost-effective care.
- Intervention group was the better improve after the three months for the three self-care approaches (maintenance, monitoring, and confidence) and more affect was in confidence and maintenance approach ( $p=0.001$ ). Accordingly, the study intervention was affected the patients self-care confidence primarily then their self-care maintenance and monitoring. Thus, this intervention is good in case hypertensive patients have already moderate or good self-monitoring.
- Participants at baseline show moderate general QoL, while they have better EW than other functions (ranged 60 – 63) and they have lowest value for EF (ranged 39 – 46). Patients seems to be want to feel themself well but in real they didn't have the energy, and that supported with the moderate value in Pain (ranged 47 – 53), we suggest to PHN to improve patients physical and emotional well-being together, for example: encourage them walking in comfortable yard, encourage them working a preferred job or task in home or in workplace, and perform light exercises which are suitable to their health status and as advised by their doctors.

- The best improve was detected among participant was RP (ranged +34, +24, and 2) in the three groups, followed by RE ( ranged +29, +15, +3). Low improve was detected in General QoL (ranged +4, +4, and 0). Accordingly, the study intervention had affected the RP approach and RE approach more than other approaches and patients had the ability to improve themselves if they well directed. Using mobile Apps alone have the effect on QoL approaches but linked it to PHN interventions show better improvement. However, still there was a low improvement in PF and General QoL, thus, we suggest to apply this study with alternative solutions to improve patient's physical function. For example: using private or public sport centre with other patients so they can encourage each other to daily exercise and improve their physical functions. Integrate other professionals in diet and physiotherapy to be part of intervention as consultant and counselling.
- While most of participant exhibited moderate level in confident to filling medical forms for CHEWQ 3 (sometimes; 43.2%, 41.7%, and 45.9%), they show good level to help in reading (all times and most of time) for CHEWQ 1 (43.2%, 47.2%, and 35.1). as this study was among older adults, they have family help and support during their medical care. Participants show high level for learning problems for CHEWQ 2 (sometimes and most of time) which reflect poor health literacy in the three groups as well (32.4%, 37.8%, 47.2%) and this supported by no statically significant was detected between CHEWQ 2 and other patient outcomes. Thus, we recommend improving patient's health literacy before starting any technical or innovation method to self-care process engagement. Moreover, we recommend in case using such technical innovation tools, the researchers have to do strata for their participants according to health literacy scale to determine their level.
- Gender show significant relation with (SPB, PF, RF, RE, Pain, and General QoL) ( $P < 0.05$ ). Strata for gender could be good option for studies examined

the QoL to take consideration of differences in the role functions and physical activities.

- Using the health Apps by older adults is not common about (97%), they had never used any health Apps before, we now this days no one without a smartphone even older adults, and they show the ability to deal with many entertainment Apps like Whats app, Facebook, and others. Encouraging peoples to download and use such health education will be better for their wellbeing and decrease the continuous visiting for health centre or hospitals.
- Social support is very vital contributor factor in self-care process, Arabic area still have strong relationship among families, 97% - 100% of the study participants reported social supported by their families. Using the family members in self-care process could be useful in both side; their patient and the health care provider, especially in innovation tools they we help their patient to deal with such technical tools.
- Smoking is still the big barriers in HTN self-care process; 29% - 37% of participants are smoker. Could continue contacting with PHN, using Apps related to gradually quit smoking habits affect people with HTN or other illness. Moreover, descriptive compared study before and after to detect the effect of quit smoking Apps on smokers sample is required.
- This study was applied mostly among people who are from low and moderate income (30% - 43% and 37.8% - 55.6%). Accordingly, innovation technical tools are not limited to high income level. Researchers could apply such methods among general communities.
- BP self-management not means lifting the patient alone, its include working in corporation between the patients themselves and guided by health care professional team, using suitable tools and improve their ability to consistent with the self-care process.

- Till now there are few studies examined for its implementation and outcomes of PHN interventions with mobile Apps as a self-care tool in hypertensive older adult's patients. The top priority now go to those studies that evaluate a true primary patients outcomes; SC-HI scale with the three subscales and different scales which are comprehensive to all HTN aspects should be used to examine the real patients outcomes.

### **3. Implications for Practice**

- This study provides clinical improvement outcomes for the study intervention (PHN with m.App) among older adults hypertensive patients. Researchers based on positive results for the present trial believe that if hospitals or primary health centres applied like this study intervention, they will save their time, money, workload, and the health risk in such pandemics condition. Patient will be committed and consisted to his/her self-care behaviours as their routine lifestyle.
- Nurses could give more effort in the begging to learn patients about the m.Apps and follow them latterly, but effort will be decrease with time that patients used to manage their health over the long term.
- The 4-Apps can be applied as converted to be applicable with other chronic disease like Diabetic, kidney disease, and Heart failure. The PHN can choose an m.Apps that reflected the self-care of diabetic patients or self-care of Heart failure patients and follow them by the three level of prevention.
- Researchers have to work cooperatively with technical professionals to integrate the smart phones to self-care process, develop new m.Apps that appropriate for each chronic illness, and try to innovation technics have the ability to easily communicate between the patients in one side and health care provider in other side.

- Several Arabic countries could use the present clinical data of the study, but available statistics was not as comprehensive as desired. Thus, future studies that collect clinical data related to body mass index will add value.
- More statistical analysis could be applied in future to the present data to understand more relationships between the study variable.
- Healthcare teams that incorporate PHN care must be appraised from within the provider and patient context and perspectives. Also, applying for studies that evaluate the PHN interventions are necessary in the nations in other different languages, so cross-cultural translated self-care scales studies are required.

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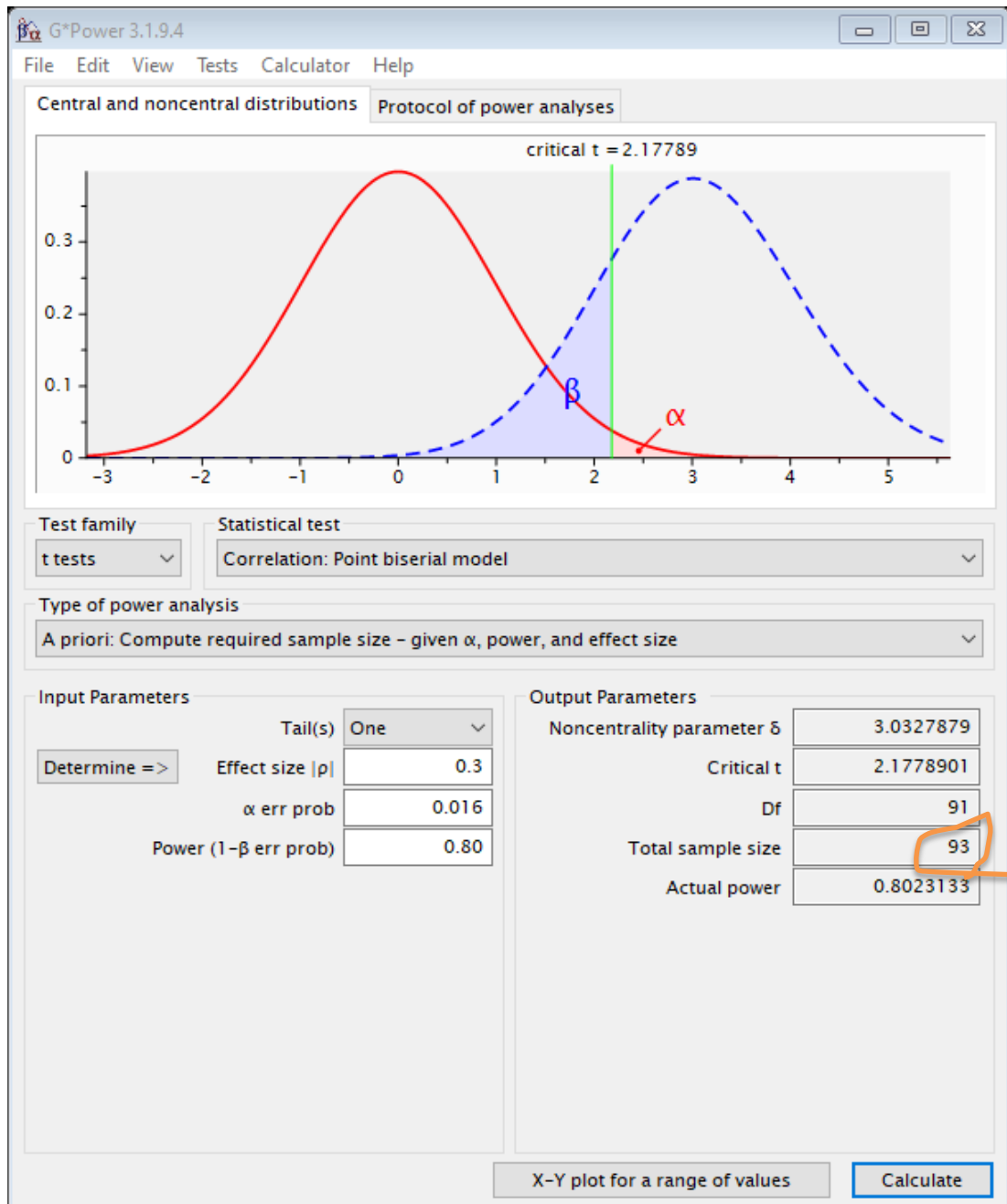
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## APPENDICES

### Appendix A: G-Power used to calculate the sample size.





2. “How often do you have problems learning about your medical condition because of difficulty understanding written information?” (Problems Reading),

Always, often, sometimes, occasionally, or never,

3. “How confident are you filling out forms by yourself?” (Confident with Forms).

Always, often, sometimes, occasionally, or never,

**Appendix C: Self-care (SC-HI) scale**

**Self-assessment of HTN**

**Part A:**

Below are most common instructions routinely given to a hypertensive patient, your task is to score that instructions according to your favorable priority

	rarely	often	always	Mostly always (daily)
Blood pressure monitoring				
High fruit and vegetable diets.				
Sport and physical activity.				
Keep visiting your doctor or nurse				
Low salt diet				
Sport training for 30 minute				
Take medication as prescribed				
Ask for low salt diet at restaurant or home of others				
Uses of reminders for time of dose of your medication to be taken like drugs box or time alarm				
Low fat diet				
Reduce weight or programs to control weight				

**Part B**

There are many hypertensive patients suffering from difficulty in controlling their blood pressure in the last month, did your blood pressure increased even little more than normal?

1. Yes
2. No

If “Yes “chose one action from below:

Very fast action      Fast action      little fast action      Not fast      un-noticed      don't do that  
 4                              3                              2                              1                              0                              x

Below are the most common actions taken by persons who have HTN to control their blood pressure; if your blood pressure increased what action you will take (chose one)

	Non	Less probably	Probably	Most probably
Reduce salt in diet				
Decrease level of anxiety				
Carefully take your prescribed medication regularly				
Contact your doctor or nurse for help				

Think about last action you have been taken when your blood pressure is increased and how you are sure that your action is helpful or not?

Strongly sure                      sure                      little sure                      not sure                      Non  
 4                              3                              2                              1                              0

**Part C:**

In general; how much you are certain that you can:

	not sure	less sure	more sure	Strong sure
Control your blood pressure				
Follow-up your treatment plan				
Know the changes that occur to your health				
Assess the variations in your blood pressure				
Decide how to control your blood pressure level				
Assess how your action was true				



## Appendix D: Quality of Life (SF-36) Scale

### SF-36 QUESTIONNAIRE

Name: \_\_\_\_\_ Ref. Dr: \_\_\_\_\_ Date: \_\_\_\_\_  
ID#: \_\_\_\_\_ Age: \_\_\_\_\_ Gender: M / F

Please answer the 36 questions of the **Health Survey** completely, honestly, and without interruptions.

#### GENERAL HEALTH:

In general, would you say your health is:

- Excellent       Very Good       Good       Fair       Poor

Compared to one year ago, how would you rate your health in general now?

- Much better now than one year ago  
 Somewhat better now than one year ago  
 About the same  
 Somewhat worse now than one year ago  
 Much worse than one year ago

#### LIMITATIONS OF ACTIVITIES:

The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

**Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports.**

- Yes, Limited a lot       Yes, Limited a Little       No, Not Limited at all

**Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf**

- Yes, Limited a Lot       Yes, Limited a Little       No, Not Limited at all

**Lifting or carrying groceries**

- Yes, Limited a Lot       Yes, Limited a Little       No, Not Limited at all

**Climbing several flights of stairs**

- Yes, Limited a Lot       Yes, Limited a Little       No, Not Limited at all

**Climbing one flight of stairs**

- Yes, Limited a Lot       Yes, Limited a Little       No, Not Limited at all

**Bending, kneeling, or stooping**

- Yes, Limited a Lot       Yes, Limited a Little       No, Not Limited at all

**Walking more than a mile**

- Yes, Limited a Lot       Yes, Limited a Little       No, Not Limited at all

**Walking several blocks**

- Yes, Limited a Lot       Yes, Limited a Little       No, Not Limited at all

**Walking one block**

- Yes, Limited a Lot       Yes, Limited a Little       No, Not Limited at all

**Bathing or dressing yourself**

Yes, Limited a Lot       Yes, Limited a Little       No, Not Limited at all

**PHYSICAL HEALTH PROBLEMS:**

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

**Cut down the amount of time you spent on work or other activities**

Yes       No

**Accomplished less than you would like**

Yes       No

**Were limited in the kind of work or other activities**

Yes       No

**Had difficulty performing the work or other activities (for example, it took extra effort)**

Yes       No

**EMOTIONAL HEALTH PROBLEMS:**

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

**Cut down the amount of time you spent on work or other activities**

Yes       No

**Accomplished less than you would like**

Yes       No

**Didn't do work or other activities as carefully as usual**

Yes       No

**SOCIAL ACTIVITIES:**

**Emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?**

Not at all       Slightly       Moderately       Severe       Very Severe

**PAIN:**

**How much bodily pain have you had during the past 4 weeks?**

None       Very Mild       Mild       Moderate       Severe       Very Severe

**During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?**

Not at all       A little bit       Moderately       Quite a bit       Extremely

**ENERGY AND EMOTIONS:**

These questions are about how you feel and how things have been with you during the last 4 weeks. For each question, please give the answer that comes closest to the way you have been feeling.

**Did you feel full of pep?**

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

**Have you been a very nervous person?**

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

**Have you felt so down in the dumps that nothing could cheer you up?**

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

**Have you felt calm and peaceful?**

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

**Did you have a lot of energy?**

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

**Have you felt downhearted and blue?**

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

**Did you feel worn out?**

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

**Have you been a happy person?**

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

**Did you feel tired?**

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

**SOCIAL ACTIVITIES:**

**During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?**

- All of the time
- Most of the time
- Some of the time
- A little bit of the time
- None of the Time

**GENERAL HEALTH:**

How true or false is each of the following statements for you?

**I seem to get sick a little easier than other people**

Definitely true     Mostly true     Don't know     Mostly false     Definitely false

**I am as healthy as anybody I know**

Definitely true     Mostly true     Don't know     Mostly false     Definitely false

**I expect my health to get worse**

Definitely true     Mostly true     Don't know     Mostly false     Definitely false

**My health is excellent**

Definitely true     Mostly true     Don't know     Mostly false     Definitely false

## **Appendix E:**

### Health Literacy Screening Questions: (CHEW QUESTIONS)

1. “How often do you have someone (like a family member, friend, hospital/clinic worker or caregiver) help you read hospital materials?” (Help Read),  
Always, often, sometimes, occasionally, or never,
2. “How often do you have problems learning about your medical condition because of difficulty understanding written information?” (Problems Reading),  
Always, often, sometimes, occasionally, or never,
3. “How confident are you filling out forms by yourself?” (Confident with Forms).  
Always, often, sometimes, occasionally, or never,

Appendix F (a):

# HYPERTENSION

also known as  
**HIGH BLOOD PRESSURE**

## What is hypertension?

Hypertension means the same thing as high blood pressure and is the leading cause of stroke in adults. High blood pressure can also cause other bad health problems if it is ignored.



## What is blood pressure?

Blood is carried from the heart to all parts of your body in vessels called arteries. Blood pressure is the force of the blood pushing against the walls of the arteries. Each time the heart beats, it pumps out blood into the arteries.



## How does a health care provider take my blood pressure?

A doctor or nurse will wrap a cuff around your upper arm, pump the cuff full of air, and then let the air out really slow while they listen to your heart through a stethoscope. The instrument that measures your blood pressure is called a sphygmomanometer.

## How do they measure my blood pressure?

Blood pressure is always measured as 2 numbers. The first or top number is the systolic pressure and the second or bottom number is the diastolic pressure. It is measure in millimeters of mercury which is written as "mmHg."

**Systolic** – This is when your blood pressure is the highest.

The heart will beat and the blood will be pumped.

Ex.  $\frac{120}{80}$

**Diastolic** – This is when your blood pressure is the lowest.

The heart is between beats and is resting.

Normal blood pressure is 120/80 mmHg. But when the numbers are 140/90 mmHg or higher, then that means high blood pressure, or hypertension.

## What can I do to keep my blood pressure at a healthy level?

- Do not eat a lot of salt
- Be active



- Eat healthy with fresh fruits, vegetables, and whole grain



July 2009

SOURCES: Teens Health, Nervous Foundation  
National Heart, Lung, and Blood Institute

## Appendix F (b):

### Tips for Losing Weight



- Cutting out drinks with calories is an easy way to lose weight. **Drinking water** instead of sweet tea or soda fills you up without adding to your calories for the day. If you don't like water, diet "zero calorie" drinks are the next best thing.
- **Looking at what you eat helps.** Try writing down what you eat and drink in a day, and how much. What on your list is healthy? What is not healthy and why? Is there something that you wish you hadn't taken in? Try this for a day or two. Is your list improving with time?
- Calories are a measure of how much energy food provides. You can read about these on food and drink labels. **Anyone that takes in fewer calories than they burn in a day loses weight.**
- By **putting half the amount of each food on your plate you normally would**, or sticking half of your sandwich in the frig for later instead of eating it, you can cut calories and still enjoy the same foods you normally eat.
- It is **not healthy to take in fewer than 1,200 calories in a day.** If you want to lose weight, you can try taking in only 1,400 calories a day. It is safe to lose up to 2 pounds per week.
- Try to eat balanced meals. Eat a **protein** - for example beans or meat, a **vegetable** - for example plain boiled squash, a **fruit** - for example a few figs, a **dairy** product - like nonfat yogurt, and a **whole grain** -like a piece of whole wheat bread, for a filling but healthy meal. Some things fit into multiple categories, like a container of fruit yogurt has fruit, dairy, and protein.
- It might be most helpful to find a **friend who is leading a healthy lifestyle.** Learn what they do to stay healthy and try some of their ideas. Sharing healthy recipes is always fun!
- **Exercise.** If you have certain health conditions like arthritis in your knees, you may not be able to jog like a 20year old, but talk to your doctor. Exercises like swimming, biking, and walking may still be OK for you. Exercise has been shown to decrease appetite!
- You can be healthy even when you're busy. **Just make the best choices that you can.**



## Appendix G:

EK-1055 - 2020





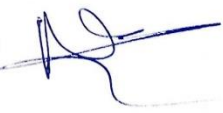
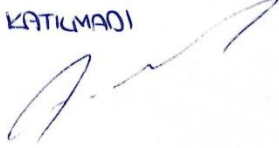


### YAKIN DOĞU ÜNİVERSİTESİ BİLİMSEL ARAŞTIRMALAR ETİK KURULU

#### ARAŞTIRMA PROJESİ DEĞERLENDİRME RAPORU

Toplantı Tarihi : 23.01.2020  
Toplantı No : 2020/76  
Proje No :997

Yakın Doğu Üniversitesi Hemşirelik Fakültesi öğretim üyelerinden Doç. Dr. Hatice Behiş'in sorumlu araştırmacısı olduğu, YDU/2020/76-997 proje numaralı ve "**Promoting Self-Care of Older Adults with Hypertension: A Randomized, Controlled Trail**" başlıklı proje önerisi kurulumuzca değerlendirilmiş olup, etik olarak uygun bulunmuştur.

1. Prof. Dr. Rüştü Onur (BAŞKAN) 
2. Prof. Dr. Nerin Bahçeciler Önder (ÜYE) KATILMADI
3. Prof. Dr. Tamer Yılmaz (ÜYE) KATILMADI
4. Prof. Dr. Şahan Saygı (ÜYE) 
5. Prof. Dr. Şanda Çalı (ÜYE) 
6. Prof. Dr. Nedim Çakır (ÜYE) 
7. Prof. Dr. Nurhan Bayraktar (ÜYE) 
8. Doç. Dr. Nilüfer Galip Çelik (ÜYE) KATILMADI
9. Doç. Dr. Emil Mammadov (ÜYE) 
10. Doç. Dr. Mehtap Tınazlı (ÜYE) KATILMADI

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Ref. 13/3/1202

Date: 8-6-2020

الرقم :

التاريخ :

الموافق :

**Doctor Hatice Bebis**

Associate Professor/ Advisor  
Public Health Nursing Department  
Near East University  
Email: hatice.bebis@neu.edu.tr

**Dear Dr.**

In reference to the letter, in which is confirmed that **Khitam Saleh Alsaqer**, who is a nursing PhD student at Near East University/ North Cyprus, and will be undertaking a project entitled:

**"Promoting Self-Care of Older Adults with Hypertension: A Randomized, Controlled Trial"**

We would like to inform you that **Khitam Alsaqer** has granted the approval to conduct her proposal at King Abdullah University Hospital for the purpose mentioned above, in coordination with the Medical Department and Nursing Department/ Outpatients clinics in the hospital, under the following conditions:

1. Commitment to the Scientific Research Policy at Jordan University of Science and Technology and King Abdullah University Hospital.
2. Maintaining data confidentiality and using it only for scientific purposes.
3. Consent form is required.
4. This approval will be canceled if the principle investigator doesn't provide IRB with the final report about the results of the research after twelve months.

Regards,

Prof. Mohammad Al-Ghazo

CEO KAUH

Tel.: (962-2) 7200600 Fax: (962-2) 7095777 P.O.Box: (630001) Irbid (22110) Jordan Email: kauh@just.edu.jo

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جامعة العلوم والتكنولوجيا الأردنية  
Jordan University of Science and Technology



King Abdullah University Hospital

لجنة أخلاقيات البحث على الإنسان  
Institutional Review Board

Ref.: 2/132/2020, date 18.05.2020

Date: 18.05.2020

### CEO of King Abdullah University Hospital

In reference to the scientific research which is presented by **Khitam Saleh Alsaqer**, who is a nursing PhD student at Near East University/ North Cyprus, and will be undertaking a project entitled:

#### " Promoting Self-Care of Older Adults with Hypertension: A Randomized, Controlled Trial"

We would like to inform you that **Khitam Alsaqer** has granted the approval to conduct her proposal at King Abdullah University Hospital for the purpose mentioned above, in coordination with the Medical Departments and Nursing Department/ Outpatients clinics in the hospital, under the following conditions:

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4. This approval will be canceled if the principle investigator doesn't provide IRB with the final report about the results of the research after twelve months.

Regards,

Prof. Yousef Al-Gaud

Chairman of the Institutional Review Board

M.R/ Committee Coordinator

Tel.: 962-2-7200600 Fax: 962-2-7095777 P.O. Box: 630001 Irbid 22110 Jordan Email: kaub@just.edu.jo

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**Re: SC-CHDI permission**

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From: Victoria Vaughan Dickson (vdickson@nyu.edu)

To: majd61\_2009@yahoo.com

Date: Monday, June 18, 2018, 5:38 PM GMT+3

---

The process is that you translate the scale into your language (Arabic) then have a blind back-translation into English. This means the person doing the back translation is blinded to the English version. Then you send the translation and blind back-translation to me for review. Let me know if you have questions.

On Mon, Jun 18, 2018 at 8:53 AM, Majd <[majd61\\_2009@yahoo.com](mailto:majd61_2009@yahoo.com)> wrote:

Dear Dr,

I contact with both turkish persons, they almost done the translation. So, if you don't mind I will use the two your scale ( CHDI and HI) and translate them just to arabic.

Regards  
Sent from my iPhone

On 15 Jun 2018, at 22:39, Victoria Vaughan Dickson <[vdickson@nyu.edu](mailto:vdickson@nyu.edu)> wrote:

Hello-

I had an email from someone in Turkey requesting to translate the SC-HI; I responded but have not heard back from him/her:

---

**INFORMED CONSENT FORM FOR ADULTS  
(FOR THE PATIENTS / PARTICIPANTS)**

You are invited to participate in a research study conducted by Khitam Alsaqer. From the NEAR EAST UNIVERSITY/ public health nursing, I have learned that this study of Promoting Self-Care of Older Adults with HTN through the health education and mobile application may be increase the self-care. You were selected as a possible participant in this study because you are hypertensive patients, 65 year and above, free of mental disease. If you decide to participate, you will enroll in one of three groups to improve self-care of blood pressure controlled, it will take about 3 month, followed in out clinic of king Abdullah University. You will be informed of their rights to withdraw from the study at any time and all information will be confidential. The study not have any cost for you. We think that the independent care using mobile Apps of personal smart phone with nursing observation to monitor and maintain blood pressure among older adults will increase the control of BP level and decrease admission to hospital. Thus, decrease the health services demand and improve patient’s self-care. So, we test the self –care of three group: routine health education, health education with mobile Apps, and health education with nursing observation for mobile Apps. And relationship of the three groups with health literacy and quality of life. However, I cannot guarantee that you personally will receive any benefits from this research. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Subject identities will be kept confidential by authors with coding for your name and blinded for others. Your participation is voluntary. Your decision whether or not to participate will not affect your relationship with king Abdullah hospital. If you decide to participate, you are free to withdraw your consent and discontinue participation at any time without penalty. If you have any questions about the study, please feel free to contact phone number, e-mail, and address. If you have questions regarding your rights as a research subject, please contact the NEAR EAST INSTITUTIONAL REVIEW BOARD. You will be offered a copy of this form to keep. Your signature indicates that you have read and understand the information provided above, that you willingly agree to participate, that you may withdraw your consent at any time and discontinue participation without penalty, that you will receive a copy of this form, and that you are not waiving any legal claims.

<b>Participant</b>	<b>Witness</b>	<b>Interviewer:</b>
Name, Surname:	Name, Surname:	Name, Surname:
Address:	Address:	Address:
Phone:	Phone:	Phone:
Signature:	Signature:	Signature:

## CURRICULUM VITAE

<b>Name</b>	KHITAM	<b>Surname</b>	ALSAQER
<b>Place of Birth</b>	IRBID- JORDAN	<b>Date of Birth</b>	4. JAN 1987
<b>Nationality</b>	JORDANIAN	<b>Tel</b>	00962798722045
<b>E-mail</b>	majd61_2009@yahoo.com		

### Educational Level

	<b>Name of the Institution where he/she was graduated</b>	<b>Graduation year</b>
<b>Postgraduate/Specialization</b>	Near East University (NEU)	2021
<b>Masters</b>	Jordan University of science and technology (JUST)	2016
<b>Undergraduate</b>	Jordan University of science and technology (JUST)	2009
<b>High school</b>	The ministry of education – Jordan	2005

### Job Experience

<b>Duty</b>	<b>Institution</b>	<b>Duration (Year - Year)</b>
Registered Nurse	King Abdulla University Hospital/ Cardiac Unit (KAUH)	2011 – 2018
Instructor	Alarabi Institute for health sciences – King Saudi Arabia	2009 – 2010

<b>Foreign Languages</b>	<b>Reading comprehension</b>	<b>Speaking*</b>	<b>Writing*</b>
English	Very good	Very good	Very good
Turkish	poor	Good	poor

Foreign Language Examination Grade								
YDS	ÜDS	IELTS	TOEFL IBT	TOEFL PBT	TOEFL CBT	FCE	CAE	CPE
		6.5						

	Math	Equally weighted	Non-math
<b>ALES Grade</b>			
<b>(Other) Grade</b>			

### Computer Knowledge

Program	Use proficiency
Microsoft Office (Word, Excel, PowerPoint)	Very good
SPSS	Very good

\*Evaluate as very good, good, moderate, poor.

### ENCLOSURE:

#### Publication:

- Alsaqer K, Bebis H. Cross-cultural adaptation, validity, and reliability of the Arabic version of the Self-care of Hypertension Inventory Scale among older adults. *J Cardiovasc Nurs.* 2021;36(5):430–436.
- Alsaqer K, Bebis H. Psychometric and Practical Quality of Assessment of HTN Self-Care instruments: A Systematic Review 2011 – 2020. *Fourrages* (2021).

#### Congress:

- “The 6th International and 17th National Nursing Congress”, organized between 19 and 21 December 2019, hosted by Gazi University Faculty of Health Sciences Nursing Department. Ankara, Turkey.
- “4. International – 22. National Congress on Public Health” organized online with theme of “for the new world, PUBLIC HEALTH AGAIN” between 13 and 19 December, 2020.

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counselling with mobile self-monitoring on blood pressure reduction among overseas Koreans with high blood pressure in Vietnam", *Journal of Telemedicine and Telecare*, 2018

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29	Michela Luciani, Lorenzo Montali, Gabriella Nicolò, Diletta Fabrizi, Stefania Di Mauro, Davide Ausili. "Self-care is Renouncement, Routine, and Control: The Experience of Adults with Type 2 Diabetes Mellitus", <i>Clinical Nursing Research</i> , 2020 Publication	<1 %
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