Tele-nursing versus Routine Outpatient Teaching for Improving Arterial Blood Pressure and Body Mass Index for Hypertensive Patients

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Abstract **Background**: Tele-nursing refers to the use of phone conversation and information technology to provide nursing care at a distance to help solve increasing shortages of nurses and to always keep patient in touch when they are out of hospital with best possible positive outcome. It is especially useful for hypertensive patients who have problems of far distance from health care clinics or have to wait a long time for visiting a doctor. **Aim of the study**: to examine the effect of telenursing versus routine outpatient teaching on improving the levels of arterial blood pressure and body mass index of hypertensive patients. **Design**: A quasi experimental design (study/control) was utilized. **Setting:** This study was conducted on the medical out-patients department-Menoufia University Hospital, Egypt. **Sample:** A convenient sample of 100 subjects, who attend the outpatient clinics of the aforementioned setting. The subjects were divided equally into study and control groups, 50 subjects each. The study group (telenursing intervention) was followed by follow-up phone calls throughout the period of the study. **Instruments:-** 1. Structured interviewing questionnaire and 2. Bio-physiological measurements including anthropometrics; height, weight, body mass index and blood pressure. Results: There were statically significant differences between both groups regarding mean arterial blood pressure scores after telenursing intervention. The mean level of arterial blood pressure & BMI was significantly lower in the study group than the control after intervention ($p < 0.05$ & $P < 0.05$) respectively. **Conclusions:** telenursing is an effective strategy for improving arterial blood pressure, body mass index and decreasing the risk of its complications. Tele-nursing could be a promising solution for management of hypertension as a chronic disease. **Implication:** apply tele-nursing via follow up phone services to improve patient's adherence to a healthy regimen.

Keywords: tele-nursing, arterial blood pressure, body mass index, hypertensive patient

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1. Introduction

Cardiovascular diseases are the most common causes of mortality worldwide. About 17.3 million deaths would occur by cardiovascular diseases in the world annually and its prevalence is increasing in a way that this number is predicted to rise to 23.6 million deaths by 2030 [1]. Arterial hypertension is one of the most crucial health problems and the most common vascular disease in developed and underdeveloped countries. It is called the silent killer as it is usually diagnosed incidentally. This disease is the main cause of disability and is considered the most vital risk factor for mortality in the world. More than half of the people who are older than 55 years old have hypertension [2].

International Society of Hypertension and National Blood Pressure Association has declared that more than 50% of people with high blood pressure are not aware of their condition. Also the success rate for controlling high blood pressure in the USA in just 27% and this rate in England, France and Germany is even lower [3]. An Egyptian national survey conducted in 2012 showed a higher prevalence of various cardiovascular risk factors than did the global and regional figures, especially factors like increased body weight, physical inactivity, and low fruit and vegetable consumption. The prevalence of hypertension and tobacco use was also high, 39.7% and 24.4% respectively. Although hypertension is a

preventable and treatable condition but without treatment it leads to serious and life threatening complications such as heart, kidney and brain disorders which in most cases result in patient's disability [4,5].

Achieving and sustaining blood pressure (BP) control is a global challenge. Controlling and monitoring high blood pressure is one of the common goals of national and international associations of high blood pressure, and also the World Health Organization. Regular measurement of blood pressure at home is necessary for improving the management and diagnosis of high blood pressure. For all the patients who need monitoring, telenursing is an appropriate tool for evaluation, monitoring and management of chronic diseases including hypertension [6].

Continuous monitoring and evaluation of blood pressure could be an important step in successful control of hypertension. The goal of hypertension treatment is to prevent death and complications by achieving and maintaining the blood pressure at 140\90 mm hg or lower. Lifestyle modification is the first line of intervention for all patients with hypertension, but pharmacological treatment remains the cornerstone for disease management, reduction of blood pressure and prevention of complications such as cardiovascular and renal morbidity and mortality [7,8]. Health care professionals must not only identify and treat patients with hypertension but also promote a healthy lifestyle and preventive strategies to decrease the prevalence of hypertension in the general population [9]. Current recommendations for the prevention and treatment of high blood pressure emphasize lifestyle modification. Lifestyle modifications that effectively lower blood pressure (BP) include weight loss, reduced sodium intake and increased physical activity [10,11].

Educating hypertensive patients includes various methods. One of the most efficient and supportive methods, with proved effectiveness, is distanced follow-ups in which the caregiver provides real and correct information for the patients [12]. In recent years, several studies have been undertaken by providing care through telephone and similar results were achieved with regards to the effectiveness of tele-nursing on the decreasing arterial blood pressure and other chronic diseases. Nowadays, nurses use tele-nursing for all processes of nursing including assessment, planning, intervention, and evaluation of the results of their nursing cares [13].

Tele-nursing includes all kinds of nursing care and services that can be provided from distance and includes a wide range of communication technologies such as phone, fax, email, internet, and video clips to overcome time and distance obstacles and provide better nursing care [14] Among these devices, phone calls are frequently used in telenursing as telephone is accessible for majority of people in the society [15,16].

In calling system, patients receive calls from health care personnel on periodical basis and get advice on their treatment, receive educational information. This is especially useful for hypertensive patients who have problems of far distance from health care clinics or need a long time waiting for visiting a doctor [13,16]. Providing care by phone calls for other countries revealed that this technology has caused less hospitalization and has reduced nursing visits to patients' houses in chronic diseases such as chronic obstructive pulmonary disease (COPD), diabetes, congestive heart failure (CHF). Previous studies using tele-nursing for hypertensive patients have shown effectiveness in improving arterial blood pressure and body mass index [12,17].

Nurses who practice telenursing come from all settings and use technology like the internet and telephone lines to deliver care over a long distance. Telenursing care is effective despite being remote. Telenursing can be done anywhere. Nurses can make use of technology to conduct telenursing sessions from their homes, at doctor's office, in clinics and hospitals. Basically, any place where the proper technology is available is a suitable place for telehealth nursing. In emergencies, nurses from around the world can participate in telephone triage set-ups. Wherever nursing is done in a telehealth setting, nurses can monitor a patient's oxygen levels, heart rate, respiration, blood glucose and more (Patti & Denise, 2019) [18].

According to the American Tele-health Association (2018), tele-nursing is a tool for delivering nursing care remotely to improve efficiency and patient access to healthcare [19]. A tele-nursing call or inquiry is more than just a phone call, however, and the nurses who respond to these calls are participating in the healthcare continuum. In some settings, tele-health nurses are accessible 24 hours a day, 7 days a week by phone for inquiries regarding symptoms and evidence-based guidelines. These healthcare professionals have a broad range of responsibilities, from calming the nerves of new parents to assisting with ambulance dispatch in life-threatening situations (Patti & Denise 2019) [18].
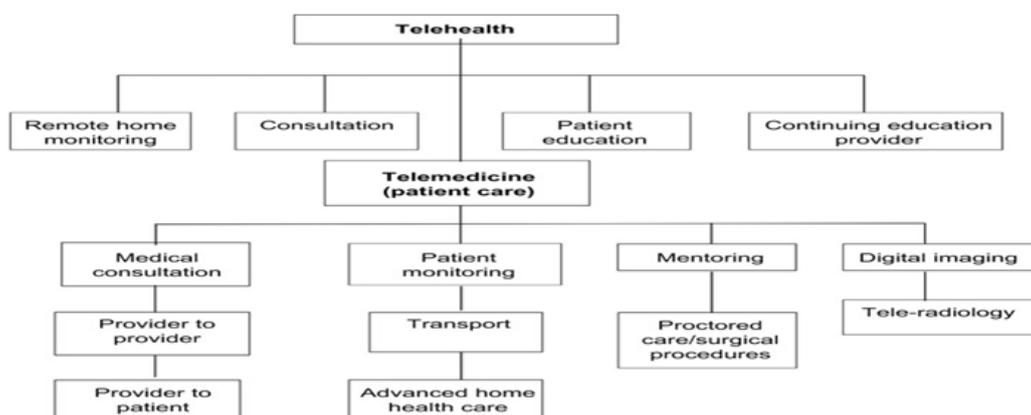
Figure 1. Diagram of telehealth and telemedicine (Rutledge C. M., Kott K., Schweickert P A., Poston R., Fowler C., Haney T S., (2017) [20]

1.1. Theoretical Definition

Telemedicine, the original term, is defined as the practice of health care delivery, diagnosis, consultation, treatment, transfer of medical data, and education using interactive audio, visual, and data communications [21].

Tele-nursing is the use of telecommunications technology in nursing to enhance patient care. It involves the use of electromagnetic channels (e.g. wire, radio, and optical) to transmit voice, data and video communications signals. It also is defined as distance communications, using electrical or optical transmissions between humans and/or computers [22]. The American Nurses Association has defined tele-nursing as a subset of telehealth in which the focus is on the specific profession's practice (i.e., nursing) [23].

1.2. Operational Definition

Tele-nursing Tele-nursing is operationally defined in this study as the use of telecommunications technology to provide nursing practice at a distance through calling [24]

Research Hypothesis:
1. Levels and scores of arterial blood pressure of the Tele-Nursing intervention (study group) will be lower than those of the routine outpatient teaching (control group) after intervention.

2. The levels and scores of body mass index will be lower in the Tele-Nursing intervention (study group) will be lower than those of the routine outpatient teaching (control group) after intervention.

1.3. Aim of the Study

To examine the effect of tele-nursing intervention versus routine outpatient teaching on improving the levels of arterial blood pressure and body mass index for hypertensive patients.

2. Methods

2.1. Design

This is a quasi-experimental study. This study is considered quasi-experimental because it was conducted on human samples and the researchers could not reach all the experimental criteria like those in a laboratory.

2.2. Setting

This study was conducted among the patients attending at medical outpatients department Menoufia University Hospital, Egypt.

2.3. Study Variables

The independent variable in the study was telenursing intervention provided for the hypertensive patients while the dependent variable was results of blood pressure level and body mass index score.

2.4. Subjects

Convenient sample of 100 men and women attending medical outpatient clinic of Menoufia University Hospital, Egypt was selected. The subject was divided equally into study and control groups, 50 subjects for each.

Calculation of Sample Size and power of the study: In order to calculate the required sample size, the researcher used the Epi statistical program from the Open Source Statistics for Public Health. The assumptions were: a two sided confidence level of 95% = (1- α); a power (1- β) or (% chance of detecting) of 80%; ratio of sample size, unexposed (control)/ exposed (study group) = 1% of unexposed with outcome (awareness) = 5%; Then the researcher entered one of four parameters which was % of exposed, s = 25%, and the other three parameters would be calculated by the Epi website program and results were presented using methods of Kelsey, Fleiss, and Fleiss (2010) [25] with a continuity correction. The final sample consisted of one hundred subjects.

The patient who agreed to participate was randomly allocated into two groups of study and control based on random numbers table, 50 patients in each. Study group, adopted the telephone support plus routine outpatient teaching and control groups received only the routine outpatient teaching.

Inclusion criteria:
Patients (1) between 35-65 years of age, (2) positive history of hypertension (recorded in patients' file) and undergoing treatment with antihypertensive medication at least 1 year prior to the study or at least 2 blood pressures over 140/90 mmHg recorded in the vital signs sheet of the patients by staff nurses, (3) Attending the medical outpatient clinic, (4) Sufficient cognitive maturity to use phones, (5) No neurological or mental problems, (6) No sight or hearing problems, (7) Oral communication ability, (8) Access to telephone Technology, (9) Not using medications which increase blood pressure.

Exclusion criteria:
Patients diagnosed with diabetes.

Instrumentations
1. **A structured interviewing questionnaire**. It was designed by the researchers to collect demographic and medical data of the studied groups. The questionnaire had two sections, first section included 11 demographic questions and the second section included 12 questions about disease's features which were completed by patients.

2. **Biophysiological measurements including: -** anthropometrics; height, weight and body mass index and blood pressure.

Body Mass Index (BMI)
Calculate body mass index value derived from the mass (weight) and height of an individual. BMI ranges are (underweight: under 18.5kg/m2, normal weight: 18.5 to 25, overweight: 25 to 30, obese: over 30). Taken measurements of height and weight of patients used kuanyi scale

(BMI = weight ÷ squared height) calculated for the participants using international classification.

Blood Pressure (BP)
Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured by the researcher using a

mercury sphygmomanometer. Patients were asked to sit in a relaxed position and adult size cuff was used

Data Collection Procedure

- **Period of the study:** the study was conducted starting from February 2019 to the end of September of the same year.
- **Approval to conduct the study**: an official letter was issued to the director of Menoufia University Hospital, Egypt.
- **Protection of human rights:** each subject was informed about the purpose and the nature of the study. The subjects were informed that their participation is totally voluntary and the confidentiality and anonymity were assured.
- **Tool validity:** the tools were tested for content validity by tow expert in medical surgical nursing and community health nursing to ascertain relevance and competence.
- **Reliability of the tool:** reliability of the tools was done by test- retest for measuring internal consistency with a period of two weeks interval. The cronback's alpha for the structured interviewing questionnaire tool was 0.9 indicating good reliability. The test and retest reliability of the bio-physiological measurement was 0.88 indicating good reliability.
- **Pilot study:** Pilot study was done on a sample of ten hypertensive patients who attended the medical outpatient clinic. The aim was to test the feasibility of the study tools. According to the results obtained, some questions were restructured and rephrased to give the most accurate response.
- A list of names of eligible subjects was obtained from the registered nurse of medical outpatient clinic to obtain base line data for the study subjects then subjects were randomly assigned to the study and control group.
- The base data of the blood pressure and body mass index were measured.

• Tele-nursing Intervention group (study group)

Patients in the study group received telephone support (tele-nursing) provided by the researchers for 24 weeks (twice weekly). The total frequency of telephone teaching these contacts was 30 minutes per call. The calls and the contents of conversation, number of calls and duration was recorded in a special form.

The contents of the phone conversations were included: definition of hypertension, symptoms, risk factors, types, treatment and complications main aspects of dietary management, weight reduction, blood pressure, smoking, periodic investigations, home monitoring and importance of physical activity for hypertension patients. At each call, the patient was asked about his /her problems and was guided by the researcher. As well, the researcher asked the patient if he/she adopted the instructions that were given previous calls. The other part of the conversation was about giving information to be followed leading to healthy life style behaviour as; diet, exercise, adherence to medications, the importance of maintaining blood pressure within normal level and how to measure it, and frequent self-monitoring of blood pressure. Before the termination of any telephone call, the patient was once again invited to ask his/her questions. Over the intervention period of 3 months, and after (6) months the patients performed daily self-monitoring and the nurse provided tele-nursing intervention support according to the patients' needs and nursing care requirements. A booklet was prepared by the researchers' team based on the World Health Organization (WHO) regarding clinical guidelines for management of hypertension, and some other scientific literature, and was confirmed by experts. The booklet was distributed to the tele-nursing group during the initial contact in the outpatient medical clinic in Menoufia University hospital with the attendance of any family caregivers.

Bio-physiological Measurements: Blood pressure and anthropometric measurements were measured three times at the beginning of the study and after three then six months (at the end of the study) by the researcher.

• The control group

The control group received routine outpatient teaching.

Bio-physiological Measurements: Blood pressure and anthropometric measurements were measured three times at the beginning of the study and after three and six months by the researcher.

2.5. Statistical Analysis

The data was tabulated and analyzed by using SPSS program (statistical package for social science software) version 18.

Quantitative data was expressed as mean and standard deviation ($\times\pm$SD). A qualitative data was expressed in numbers and percentage (No. & %). Pearson correlation analysis was used for identifying the relationships among quantitative variables, and one-way ANOVA. Statistical significance was started at p-value <0.05.

3. Results

Table 1 describes the characteristics of the studied groups. Patients in both groups of the study were aged from 35 to 75 years from both sexes (male and female) and they were matched with regard to age, gender, and levels of education.

Table 2 shows that there was no significant difference between anthropometric measurements (Body Mass Index) of both groups before the intervention as well as at 3 months of intervention. At six months, it was observed that BMI of individuals in the control were higher than those of the individuals in the experimental group with mean average score of BMI 28.0 +4.81 which reveals that they were overweight. This difference was found to be statistically significant at (p<0.05); whereas the intervention group was within the normal range with a mean of average of BMI score 24.3 +4.61. In other words, the levels and scores of body mass index were lower in the study group than in the control group after receiving tele-nursing support combining with the routine health education. So, the second hypothesis was supported.

Table 3 shows the distribution of both systolic and diastolic blood pressure levels respectively at different

points of assessment (Baseline, Second and Third Assessments). There was no statistically significant difference in blood pressure levels average scores between the intervention and control groups at baseline assessment in the pre-intervention stage (p=0.43, p=0.43). While there was a statistically significant difference in the systolic blood pressure level average scores between both groups in the second assessment, whereas no significant difference in diastolic blood pressure was seen in both groups at this point of measurement (p= 0.02, P=0. 31). Regarding third assessment, a highly significant difference in average scores of systolic blood pressure of the experimental group compared to the control group was determined; and a significant difference was seen in both groups in diastolic blood pressure (p=0.003; p=0.02 respectively).

Figure 2: Numbers of Controlled Cases of Blood Pressure Levels in the two groups: Tele-nursing Intervention group and routine outpatient teaching group throughout the study period.

Figure 3: Numbers of Un-Controlled Cases of Blood Pressure Levels in the two groups: Tele-nursing Intervention group and routine outpatient teaching group throughout the study period.

Both Figure 2 & Figure 3 show that numbers of controlled cases of blood pressure was increased and un-controlled cases of blood pressure were decreased than those of the control group after receiving tele-nursing support, comparing with the routine outpatient teaching.

Table 4 shows percentage distribution of uncontrolled blood pressure levels of tele-nursing.

Intervention group compared to outpatient group throughout the study period:- at baseline assessment before any intervention revealed no statistically significant differences (p= 0.86) in both systolic and diastolic blood pressure, while there was statistically significant difference (p=0.01; p= 0.02 respectively) between both groups regarding the controlling at 3 months of intervention. According to the controlling of blood pressure level, the results revealed that there was a highly statistically significant difference (p=0.001) between both groups at 6 months respectively after the intervention. In other words, the controlling of blood pressure percentage among intervention group was 86%; whereas it was only 44% among control group.

Table 5 shows that there is a strong positive correlation among age, Body Mass Index, Systolic blood pressure and diastolic blood pressure of studied cardiac patients.

Table 1. Socio-demographic Characteristics of Intervention and Control Groups pre-Intervention

Socio-demographic Characteristics	Intervention Group N=50		Control Group N=50		P value
	No.	%	No.	%	
Age					
35-	6	12	8	16	0.12 ns
45-	11	22	17	34	
55	27	54	17	34	
65-75	6	12	8	16	
Mean ±SD	57.81±9.52		55.01±7.50		
Gender					
Female	24	48	23	46	0.91 ns
Male	26	52	27	54	
Levels of education					
Illiterate	7	14	5	10	0.32 ns
Primary	8	16	7	14	
Secondary	12	24	18	36	
University	23	46	20	40	

ns =not significant.

Table 2. Distribution of Body Mass Index for Tele-Nursing Intervention Group and outpatient Control Groups throughout Study

BMI at different points of assessment	Tele-Nursing Intervention Group N=50	Routine Outpatient Control Group N=50	P value
	Mean ±SD	Mean ±SD	
Baseline assessment (before intervention)	31.9 +6.98	29.93 +4.94	0.31
Second assessment (at 3 months of intervention)	28.73 +4.81	29.02 +4.35	0.52
Third assessment (at 6 months of intervention)	24.3 +4.61	28.0 +4.81	0.05*
F -p value	0.05*	0.91 ns	

ns =not significant
*= significant >0.05
Normal (18.5 -24.99)
Overweight (25 -29.99)
Obese (> 30)

Table 3. Blood Pressure Levels (Systolic and Diastolic pressure) at Different Points of Assessment (Baseline, Second and Third Assessments)

Systolic and Diastolic pressure	Intervention Group N=50	Control Group N=50	P value
	Mean ±SD	Mean ±SD	
• Systolic blood pressure levels at different points of assessment			
Baseline assessment (before intervention)	152.4 ± 11.7	150.5 ±10.6	0.43
Second assessment(at 3 months of intervention)	141.5 ± 9.3	149. ±11.0	0.02*
Third assessment(at 6 months of intervention)	133.2 ± 8.6	151.3±11.9	0.003**
f-p value	< 0.001***	0.41 ns	
• Diastolic blood pressure levels at different points of assessment			
Baseline assessment (before intervention)	89.0 ± 9.9	88.0 ± 8.7	0.43
Second assessment(at 3 months of intervention)	86.7 ± 8.1	88.4 ± 8.9	0. 31
Third assessment(at 6 months of intervention)	81.3 ± 7.1	89.0 ± 9.1	0.02*
f-p value	< 0.05*	0.46 ns	

ns =not significant
*= significant at 0.05
**= significant at 0.01
***= significant at   0.001
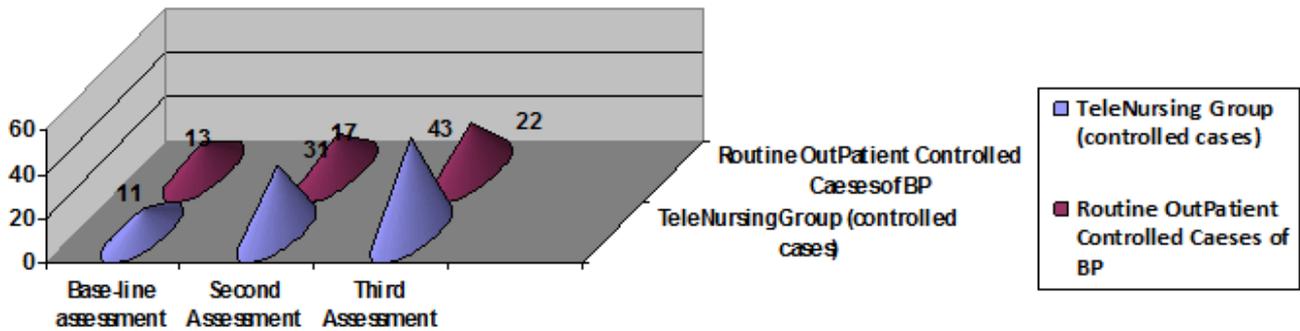
Figure 2. Numbers of Controlled Cases of Blood Pressure Levels in Tele-nursing Intervention group and routine outpatient teaching group throughout the study period
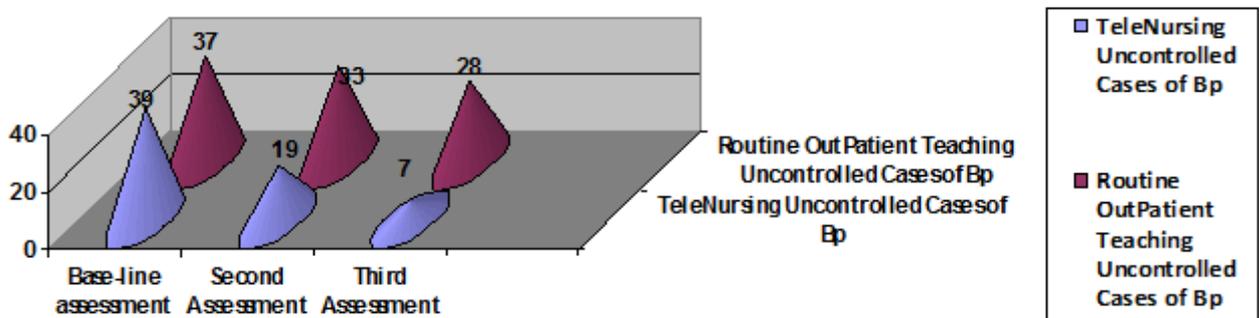
Figure 3. Numbers of Un-Controlled Cases of Blood Pressure Levels in Tele-nursing Intervention group and routine outpatient teaching group throughout the study period

Table 4. Percentage Distribution of Controlled and Uncontrolled Blood Pressure Levels Throughout Different Points of Assessment

Blood Pressure Level	Tele-Nursing Intervention Group	Routine Out-Patient Teaching Group	P Value
Controlled Bp. levels at different points of assessment	%	%	
• Baseline assessment	22.0	26.0	0.86
• Second assessment (at 3 months of intervention)	62.0	34.0	0.01**
• Third assessment(at 6 months of intervention)	86.0	44.0	0.001***
Un-Controlled Bp. levels at different points of assessment			
• Baseline assessment	78.0	74.0	0.86
• Second assessment (at 3 months of intervention)	37.0	66.0	ns
• Third assessment (at 6 months of intervention)	14.0	56.0	0.02*

ns =not significant
*= significant at 0.05
**= significant at   0.01
***= significant at   0.001.

Table 5. Correlation matrix of age, Body Mass Index, Systolic blood pressure and Diastolic blood pressure of studied cardiac patients

Item	Age	Body Mass Index	Systolic blood pressure	Diastolic blood pressure
Age	1.oo			
Body Mass Index	.71**	1.oo		
Systolic blood pressure	.75**	.80**	1.oo	
Diastolic blood pressure	.70**	.87**	.81**	1.oo

4. Discussion

Tele-nursing is the use of technological resources and communication systems [26]. It is becoming the new approach in encouraging the development of nursing and increasingly used in managing many chronic diseases [27]. Its efficiency has been demonstrated to help countries overcome barriers to healthcare [26]. The purpose of this study was to examine the effect of telenursing versus out-patient teaching on improving the levels of arterial blood pressure and body mass index among hypertensive patients.

Regarding the descriptive characteristics of both intervention and control groups, the study results revealed that both groups were matched in terms of age, gender, levels of education and baseline assessment of their systolic and diastolic blood pressure levels as well as their anthropometric measurements (Body Mass Index). The current study results determined that there was no statistically significant difference regarding their arterial blood pressure's average scores between both groups at baseline assessment before any intervention (P>0.05), which represents that the intervention and the control groups were the same before the intervention. This was expected because of the samples and non-interference. Whereas the second and third assessment of both their arterial blood pressure average scores and their anthropometric measurements in terms of their body mass index revealed a significant difference between both groups. This result may be pertained to the impact of continuous and closed support system which was achieved through telenursing which in turn increased the patients' adherence to the suggested therapeutic regimen in order to improve their arterial blood pressure levels and their body mass index promoting a life style pattern and better quality life in near future. These results came in accordance with [27] and [28] who stated that results came in accordance with current results and also with [29] who studied and concluded that evidence based lifestyle guidelines enhance blood pressure among study group patients.

In the same line [30] and also [31] investigated "the effect a text message and telephone follow-up program on cardiac self-efficacy of patients with coronary artery disease (CAD)". They found that the text message and telephone follow-up program is effective in promoting the cardiac self-efficacy of patients with CAD. This study results came in accordance with [32] whose study finding showed that telenursing was more effective in decreasing systolic and diastolic blood pressure compared to self-monitoring method. Using this simple and low cost method would have a highly effective role in controlling this disease which is highly prevalent and considered a main health problem among a large sector of population.

In another study to examine the effectiveness of text messaging (short message service, SMS) in increasing adherence to colonoscopy follow-up after a positive Fecal occult blood tests, [33] they concluded that a SMS reminder is an effective, simple, and inexpensive method for improving adherence among patients with positive colorectal screening results. Also, a study carried out by [34] to determine if using a tele-nursing protocol with home monitoring during a 12 week implementation could also identify early signs of deterioration and factors correlated with participants' change in status, while attaining patient acceptance and satisfaction. They concluded that adherence and acceptance were high with daily monitoring, including "feelings of safety," and "understanding own condition". Tele-nursing with home monitoring indicated a trend to accurately detect early-stage changes. Participants' acceptance was acceptable.

In another study, [35] studied "evaluate the impact of tele-monitoring on patients with long-term conditions at high risk for re-hospitalization or an emergency department visit, in terms of target disease control (diabetes, hypertension, heart failure, and chronic obstructive pulmonary disease)". They found that The ValCrònic tele-monitoring program in patients at high risk for re-hospitalization or an emergency department visit appears to be useful to improve target disease control and to reduce the use of resources. [36] conducted a study to assess the effectiveness of telephone-based coaching services for the management of patients with chronic diseases; they mentioned that it can improve health behaviour, self-efficacy and health status. This is especially true for vulnerable populations who had difficulty accessing health services. There is less evidence for improvements in quality of life and patient satisfaction with the service. The evidence for improvements in health service use was limited. This rapid scoping review found that telephone-based coaching can enhance the management of chronic disease, especially for vulnerable groups. Further work is needed to identify what models of telephone coaching are most effective according to patients' level of risk and co-morbidity. [37] added that tele-nursing is a low-cost, highly accessible method that can lead to increased awareness on the principles of care. Also, it could build a close trusting rapport between the patient and their caregiver as mentioned by [38] and it is worthy of clinical application as mentioned by [39].

A study by [40] conducted a systematic review to identify studies on the effect of home telehealth on clinical care outcomes. The search yielded 154 potential articles and dissertations. A total of 29 articles met the inclusion criteria and were included in a meta-analysis. The weighted mean effect size for the overall meta-analysis was 0.50, and the z-statistic was 3.0, indicating that tele-health had a moderate, positive and significant effect (P ≤

0.01) on clinical outcomes. Sub-analyses also indicated positive significant effects of telehealth on some disease categories (heart disease and psychiatric conditions), but not on others (diabetes), patient populations and tele-health interventions. Overall, the meta-analysis indicated that tele-health positively affects clinical outcomes of care even in different patient populations. A logical explanation of this result is that tele-nursing permits an intimate and continuous therapeutic relationship with patients on regular basis which enhances and refreshes their information about their illness and their treatment method. Intervention group results conveyed a better adherence to diet, and prescribed drug regimen, more adaption to physical activity, increased awareness and also changing their unhealthy behaviors which in turn improve their arterial blood pressure.

In current study, patients in the intervention group received telephone support (tele-nursing) provided by the researchers for 24 weeks (twice weekly) the total frequency of telephone counseling averaged 28 calls for every patient. The contents of the phone conversations provided an overview on hypertension, symptoms, risk factors, types, treatment and complications main aspects of dietary management, weight reduction, blood pressure, smoking, periodic investigations, home monitoring and importance of physical activity) to those patients. This may be the reason for the control of their arterial blood pressure. Unlike old times where those patient would visit doctors to control their arterial blood pressure, in this study the patients were educated through phone conversation the importance of PPG and how to measure it and then according to the results, medications were prescribed. Informing and activating patients about their disease were features of this study. There was an increase in the arterial blood pressure controls, which means health care team should educate patients about the importance of proper control of arterial blood pressure to hypertension complications

5. Regarding Body Mass Index

After 6 months of intervention, it was observed that the mean of BMI decreased in the intervention group in comparison to the control group (mean of BMI in the intervention group was 24.3 +4.61 and in the control group, it was 28.0 +4.81. However, based on the f-p test, these changes were statistically significant only in the intervention group (P<0.05). In the intervention group, BMI was 31.9 +6.98 and was24.3 +4.61 where there was a statistically significant difference between before and after the intervention when compared to the control group (P<0.05). This significant decrease of their BMI may be attributed to their low diet adherence scores which reflect the impact of the telenursing on the decrease of the BMI among these patients while the reason for inadequate decreased BMI in the control group could be attributed to noncompliance with the treatment regimen or inadequacy of routine out-patient health education. The results of current study supported the hypotheses and proved that using telenursing for follow-ups has a positive impact on improving the levels of arterial blood pressure by reducing

the mean of systolic and diastolic blood pressure and body mass index among hypertensive patients in intervention group. These results supported by (Kazem et al., 2016) [32].

6. Conclusion

The use of telenursing was a largely effective resource for success in reducing arterial blood pressure and patients' anthropometric measurement.

7. Implications for Future

The health policymakers should consider telenursing in actively managing hypertensive patients in all health settings. It is considered a new intervention for those patients.

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