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Effect of Using Scheduled Qigong Exercise on Selected Clinical Outcomes among Patients with Hypertension

Wafaa Mustafa El Kotb [1], Samah E. Masry [2] and Lamiaa Abd El Salam Mohamed [3]

[1, 3] Lecturer of Medical-Surgical Nursing, [2] Assist. Professor of Medical Surgical-Nursing, Department of Medical-Surgical Nursing, Faculty of Nursing, Menoufia University, Shebin El-Kom, Egypt

Abstract: Aim: to examine the effect of using scheduled qigong exercise on clinical outcomes among patients with hypertension. **Design**: a quasi-experimental research design (study and control group "pretest and posttest") was utilized. **Setting**: The study was conducted at the medical outpatient clinics of Menoufia University Hospital, Egypt. **Subjects**: A purposive sample of 110 adult conscious patients diagnosed with hypertension **Instruments:** Three instruments were utilized as follows: Instrument one: Structured interviewing questionnaire, Instrument two: knowledge assessment questionnaire, and Instrument three: The perceived stress scale (PSS-10). **Results**: The mean age of patients was 40.87±6.78 & 40.78 ±6.19 years for the study and control group respectively. There was an improvement in the mean score of knowledge (27.31±2.23 VS 15.15±3.22) respectively and an improvement in the mean of systolic and diastolic blood pressure (119.36±8.87, 75.63±5.09 & 132.09±9.75, 86.36±5.13) after the implementation of qigong exercise than before. 96.4% % of study participants had high stress levels pre-intervention compared to 100% had no stress after the implementation of the qigong exercise. **Conclusion:** Significant reductions in systemic blood pressure and stress are seen with the use of qigong exercise among study group subjects as compared with the control group. **Recommendations:** Using qigong exercises should be encouraged as routine care in the hospital. Periodical training and teaching programs for nurses about qigong exercises and their benefits for lowering blood pressure among those who suffer from hypertension should be withheld.

Keywords: *Selected Clinical Outcomes, Hypertension, Scheduled Qigong Exercise*

Introduction

Hypertension (HTN) is a worldwide problem and leftovers are the main avoidable cause of cardiovascular disorders (CVDs). Globally, it is one of the leading causes of mortality and the major cause of premature deaths for 12.8% (7.5 million) annually. The prevalence of hypertension among adults in Egypt is 29.5% (World Health Organization (WHO), 2021). Normally, blood pressure lets blood circulate throughout the body and

reach all organs. The risk of severe health problems increases if blood pressure remains high over time, which may affect heart, brain, kidneys, and retinal damage (Reda et al., 2021; and World Health Organization, 2021).

Now, the prevalence of high blood pressure (BP) is rising, which is alarming because hypertension can affect the brain's structures and functions, impairing cognitive abilities. Furthermore, dysfunction of endothelial, decreasing cerebral perfusion, and degenerating white matter can result from hypertension (Rêgo et al., 2019; Trigiani and Hamel, 2017; Muela, et al., 2017; and Iadecola, et al., 2016). Sedentary lives, an increasing body mass index, poor eating habits, drinking alcohol, and smoking are all factors that can raise the risk of hypertension. On the other hand, some risk factors cannot be changed, such as age, race or ethnicity, genetics, family history, and pre-existing illnesses like diabetes or kidney disease, which might raise the chance of getting high blood pressure (World Health Organization, 2021; and Mills et al., 2020).

Effective management of hypertension requires cooperation between members of the healthcare team and patients to balance pharmacologic and non-pharmacologic interventions to prevent target organ damage. Hypertension management depends on its severity and associated risks of developing other diseases. It includes pharmacological and non-pharmacological approaches such as modification of the lifestyle activities and exercises (Rivera et al., 2019).

The newest hypertension pharmacological management guidelines of WHO recommend that in the absence of cardiovascular disease or risk factors fast and reliable treatment should be starting early and initiation of antihypertensive therapy is recommended when BP is ≥140/90 mmHg. In patients who have a risk for/or have cardiovascular diseases or another comorbidity such as diabetes or kidney disease, the treatment should be initiated when systolic BP is 130-139 mmHg (WHO, 2021).

According to the results of previous research, there is still a very low probability of that patients with HTN will be able to maintain normal blood pressure levels just with antihypertensive drugs. So, many patients must take multiple antihypertensive drugs concurrently to control blood pressure. Though, this comes with a higher cost and can have unanticipated consequences (Williams, et al., 2018).

Recent studies suggest that appropriate physical activity can successfully regulate and prevent the incidence of hypertension and its side effects. Therefore, those who engage in physical activities have lower blood pressure than those who don't. Numerous professional committees and associations including the American College of Sports Medicine, American Heart Association (AHA), Canadian Hypertension Education Program, and the European Society of Hypertension/European Society of Cardiology have recommended physical exercise as a basis for non-

pharmacological hypertension therapy (Cheah et al., 2023; and Liu et al., 2021).

It is widely acknowledged that physical activity can lower blood pressure. This includes decreasing resting times and increasing cardiorespiratory fitness. These benefits extend to cardiovascular health. Additionally, according to the guidelines published by the Eighth Joint National Committee which pointed out that regular exercise can successfully control, prevent and treat hypertension (Sosner, et al., 2017; and Costa, et al., 2018).

Based on Taoist philosophy and traditional Chinese medical theory, Qigong is a traditional Chinese aerobic exercise for mental and physical well-being. The term "qigong" refers to two theories: "qi," which is the body's vital energy, and "gong," which is the practice of cultivating or training qi. Qigong is a systematic training activity that tries to cultivate energy via body and mind coordination. It has been used for thousands of years to promote health in China and involves breathing, movement, and posture coordination. Additionally, it can reduce blood pressure, recover the circadian rhythm of blood pressure, improve quality of life, control complications, and reduce mortality (Lin et al., 2018).

The fundamental elements of practicing qigong are movement, posture, breathing control, relaxation, and meditation. The theory of traditional Chinese medicine states that the goal of qigong exercise is to produce a harmonious flow of vital energy, or qi, and to control the body's functioning processes through controlled breathing, focused mental attention, and gentle movements. Practitioners report feeling more emotionally stable and physically and mentally stronger with consistent practice and rehearsal of the organized movements combined with mindfulness and breathing exercises. Qigong is a very flexible mind-body workout that doesn't require any specific equipment to practice at any time or place. It is extensively used to enhance psychological well-being and stress management in addition to physical health (Dong et al., 2021).

Qigong exercise is effective in decreasing blood pressure through the decrease of catecholamine and levels of cortisol. Studies that examine the effects of exercise on the metabolism of lipids prove the mechanism and beneficial effectiveness of exercise on hypertension. Combining qigong practice with medication therapy decreased the risk of stroke and death among hypertensive patients, as well as the dosage of medication needed to maintain blood pressure (Dong et al., 2021).

Hence the purpose of the present study is to examine the effect of using scheduled qigong exercise on selected clinical outcomes among patients with hypertension.

Operational definition:

Selected Clinical Outcomes: are measurable changes in the patient's blood pressure and stress levels post-intervention.

Significance of the study:

Hypertension is a common health problem, globally about 26% of adults have hypertension, and by 2025, that number might potentially reach 29% (Virani, et al., 2021 and Dingcheng et al., 2020). Moreover, in Egypt, which states that 40% of deaths each year are caused by CVDs. 15% of the Middle East and North Africa region's cardiovascular disease deaths occurred in Egypt which is the most populous country in the region where 26% of adult Egyptians had hypertension (Reda et al., 2019). Five hundred and twenty (520) cases of hypertension were attending follow-up visits as reported in the most recent yearly statistical report of Menoufia University Hospital.

Managing and preventing of hypertension are becoming a top concern, nurses can assist and can effectively manage stress and help control hypertension through exercise if the patient is informed about the need to change their lifestyle and is persuaded that doing so is the most economical way to prevent cardiovascular disease (WHO, 2021). Nurses empower patients to monitor their own BP at home introduce lifestyle changes and use evidence-based guidelines that recommend using non-pharmacologic treatments, including exercise and mind-body interventions which together have been shown to lead to better BP control.

Research hypotheses:

1) Patients who practice the qigong exercises (study group) are expected to exhibit decreasing systolic and diastolic blood pressure compared to patients who do not (control group).

2) Patients who practice the qigong exercises (study group) are expected to exhibit decreasing stress scores compared to patients who do not (control group).

Methods

Design:

For achieving the current study purpose a quasi-experimental research design (study and control group "pretest and posttest") was used by the researchers.

Setting:

The study was conducted at the Medical Outpatient Clinics in Menoufia University Hospital- Egypt.

Sampling:

A purposive sample of 110 adult conscious patients diagnosed with hypertension attending for regular follow-up, receiving treatment, and ready to participate in the current research between November 2022 and May 2023 at the previously mentioned setting. The study sample were assigned and divided alternatively either into two groups study or control group (55 participants for each). The study group participants who practiced scheduled qigong exercises along with routine medical and nursing care such as dietary restrictions and pharmacological treatments while the control group participants who followed routine medical and nursing

care (dietary restrictions and pharmacological treatments only) without any additional intervention.

Sample size calculation:

According to the findings of a previous study (Badawy et al., 2021), the flow rate of hypertension patients in the medical outpatient clinic of Menoufia University Hospital was 520 patients per year. Considering an expected drop-out rate of 10% during the study duration, a sample of 54 patients per group researchers increased the number to 55 patients in each group (the sample equals 110 patients). The online sample size calculator was used by researchers based on the following equation. This calculation is based on **the normal distribution:**

x	=	Z(c/100)2r(100-r)
n	=	N x/((N-1)E2 + x)
E	=	Sqrt [(N - n)x/n(N-1)]

- **N:** The population size,
- **r:** The fraction of responses that the researchers are interested in, and
- **Z**(c/100): this is the critical value for the confidence level c.

Inclusion and exclusion criteria:

The following criteria were used to determine if a patient was eligible for the study:

- Adult patients of both genders aged between 30 and 60 years
- Fully conscious and oriented patients, capable of communication, able to comply with the instructions.

Patients were excluded if they had any of the following criteria:

- Cardiac diseases, such as previous ischemic heart diseases, transient ischemic attacks or stroke, and heart failure to prevent cardiac overload.
- Patients having concomitant illnesses, including diabetes mellitus, communicable disease, kidney failure, pregnancy, or planning for pregnancy to avoid exhaustion and fatigue for those patients.

Instruments:

To achieve the purpose of the current research three instruments were used:

Instrument one: Structured interviewing questionnaire:

It was developed by the researchers in order to collect sociodemographic data. It was composed of three parts including the patient's basic characteristics such as gender and educational level etc. Past medical history as surgeries, hospitalization, medication history, etc.

Instrument two: Knowledge asssessment questionnaire:

It was constructed by the researchers to assess patient's knowledge regarding hypertension such as definition, causes, complications, prevention, diet, frequency, and duration of exercise.

Scoring system:

Each item was assigned a score of one for incorrect or unclear answers, two for incomplete accurate answers, and three for complete answers. The scores

were then added together. The patients were categorized into three groups according to their scores, which varied from eleven to thirty-three.

- Scores from 0 to 15 denoted unsatisfied knowledge.
- Scores from 16 to 24 denoted partially satisfied knowledge.
- Scores from 25 to 33 denoted satisfied knowledge.

Instrument three: The Perceived Stress Scale (PSS-10):

PSS-10 is a 10-items questionnaire adopted by Cohen et al. (1988) used to evaluate the extent to which a person has felt that life has been overwhelming, unpredictable, and out of control during the last month. This scale 10 items were divided into positive and negative categories, such as "Unable to control the important things in life." and positive items (e.g., "Confident about the ability to handle personal problems).

Scoring system:

The questions focus on ideas and feelings from the previous month. Respondents are asked, on a five-point scale ranging from "never" to "very often," how often they felt a particular way in each instance. The scores for the answers are: Rarely = 1, often = 2, frequently = 3, very frequently = 4 and never = 0.

It is necessary to calculate a total PSS score, responses to the four positively stated items (items 4, 5, 7, and 8) first need to be reversed. Individual scores on the PSS can range from 0 to 40 with higher scores indicating higher perceived stress (Scores 0 to 13 denoted low stress. Scores 14 to 26 denoted moderate stress. Scores 27 to 40 denoted high perceived stress).

Reliability: The reliability of the scale was tested by Kechter et al., (2019), and found that the average inter-item correlations (coefficient alpha values) for PSS-10 were 0.79

Ethical considerations and human rights:

- A written approval was obtained from the Ethical and Research Committee of the Faculty of Nursing Menoufia University (No. 994) then an official letter from the Faculty of Nursing Menoufia University was delivered to the responsible authorities of the hospital to conduct this study after explaining the study's purpose.
- Written consent was obtained from all study participants after explaining the study's purpose, and receiving assurances that all information gathered would be kept private, stored in a locked cabinet, and used solely for that purpose. The patients' confidentiality was guaranteed by data coding, the researchers emphasized that participation in the study is completely voluntary; participants were also informed that refusal of participation would not affect their care.

Validity:

All instruments were tested for their content validity by a panel of seven experts (4 professors and 3 assistant professors) specialized in Medical-Surgical Nursing, Faculty of Nursing, Menoufia University and modifications

were done to ascertain and establish their relevance and completeness.

Reliability:

The reliability was measured using the test-retest method to ascertain the consistency of the instruments. It is the administration of the same instrument to the same participant under similar conditions on two or more occasions. The reliability of all instruments was demonstrated to be 0.74, 0.77, and 0.79 for instruments one, two, and three respectively.

Pilot Study:

Before data collection, a pilot study on 11 patients (10%) was carried out to assess the clarity, objectivity, feasibility, and applicability of all the instruments. Additionally, it was done to measure the time required for data collection and identify any issues related to administering the instruments. The appropriate adjustments were then made. Data included in the pilot study was excluded from the current study.

Procedure:

- A letter was submitted from the dean of the Faculty of Nursing to the director of Menoufia University hospital explaining the purpose and methods of data collection.
- Data were collected over seven months from the beginning of November 2022 to the end of May 2023.
- The researchers used study instruments one, two, and three, respectively, to collect baseline data for sociodemographic characteristics, knowledge, and stress levels from each participant who chose to take part in the study and met the inclusion criteria. These interviews took place in the waiting area of the university hospital medical clinic. It took about 20 to 30 minutes for each participant to finish their questionnaire.
- The researchers used a 1:1 assignment system to randomly allocate the participants either to the study or the control group.
- The study group participants were practising scheduled qigong exercises along with routine care while control group participants only followed routine care without any additional intervention.
- The researchers developed guided colored illustrated materials to enhance the study group participants' knowledge and practice regarding qigong exercise.
- Each study participant decided to participate in the study was interviewed individually to collect the baseline data afterwads 10-minute rest, the patient’s blood pressure was measured by the auscultator method (Aneroid Sphygmomanometer).
- The researcher conducted the educational sessions of the qigong exercises program through at least three sessions. Each session took about 30 minutes according to each participant's needs.
- For the first time, the exercises were performed in a quiet place under the supervision and instructions of the researchers and a booklet about qigong exercises was given to each

participant who was asked to perform these exercises at home more than five times a week for 12 weeks.

- **First session:** Each participant of the study group was given knowledge about hypertension and the first part of qigong exercises to master breathing and concentration. This was done through the following technique:
  - **Focus on rhythmic breathing**: Before starting the practice, get into a complete, relaxed rhythm of breathing. Breathe in and out smoothly, like calm waves, do not take rushed or gasping breaths.
  - **Stretching the breath**: Before beginning the practice, to get started, simply inhale slowly for six counts, hold it for three, then exhale for six counts, hold it for two, and repeat. Any time that the breath becomes short or tense let the pattern go until breaths become comfortable, and then return to the holds. As it gets easier, increase the breath to eight, ten, and so forth counts. After around ten minutes of breathing exercises, return to a natural rhythm of relaxation.
  - **Settle the mind**: this is among the most crucial things to do before beginning Qigong exercises. This skill helps in reducing blood pressure and stress. Focus attention on watching and stretching your breath.
  - **Relax the body**: The participants must relax their bodies after they have relaxed mentally. Releasing tension slowly through the body from head to toe, is repeated three times. Every part of the body should feel at ease and heavy don't stay rigid and tensed up. Any tension or muscle anxiety should be wiped out.
  - **Move and breathe in unison:** The participant should maintain deep, relaxed, even breaths. The breath and motions are connected, thus the movements should be slow and retain that deep-seated calm.
- **Second session:** at the beginning of this session refresh knowledge transferred in the first session and ensure that the patient has mastered body and mind regulating techniques then complete the education of the qigong sets as follows:
  - **Practice sitting posture**: Place feet flat on the floor, and sit upright in a chair with separated legs and torso at a right angle to the thighs. Close your mouth and eyes to rest them; do not attempt to smile; instead, let mouth naturally relax.
  - **Try the standing posture**: Stand upright, feet should be parallel and at shoulder width, knees should be allowed to bend slightly; arms should be raised so that hands are either level with shoulders or slightly below, elbows should be allowed to bend slightly; hands should be about a foot apart with palms facing downward; fingers should be allowed to separate and curve

slightly; finally, hold a ball in a relaxed manner. Similar to a sitting posture, the mouth, and eyes should be closed naturally.

- **Third session**: at the beginning of this session refresh knowledge and practice that transferred in previous first and second sessions and ensure that the patient has mastered the techniques and then complete the education of the qigong sets as follows:
  - **Work on the walking posture**: Practicing the walking posture is required. During sitting always raise your heels first, put your left foot forward first, let's body and hands sway to the right as move, and only put the right foot forward once your left is fully on the ground. Spend at least thirty minutes practicing or longer.
  - **Try other postures**: The supine position, which involves lying on one's back with arms by one side and legs out straight, this posture are intended to relax the body. The sideways position is as follows: lie on your side, maintain a straight upper torso, bend your knees slightly, and place your upper hand on the hip and lower hand by head. In the half-lotus position, the patient sits up with their left foot resting on their right thigh, which is beneath their left knee. Make sure to place your hands on your knees. The cross-legged posture: sit up straight, cross your legs, and place your hands in front of your stomach.

- In the follow-up visit every two weeks, patients were asked to demonstrate the qigong exercise steps with researchers. Additionally, they were instructed to record how many qigong sessions they had completed in a qigong diary. Then blood pressures were measured in the sitting position by using an aneroid sphygmomanometer for three months.
- A comparison was carried out between the results for the study and control participants before and after implementing the scheduling qigong exercise to determine the effect of this intervention on reducing blood pressure and stress as well.

Statistical Analysis

An IBM-compatible computer, SPSS (statistical package for the social science software) version 25 was used to tabulate and analyze the collected data. Two types of statistical analyses were conducted: Descriptive statistics: were used for qualitative data. A numerical and percentage forms were used for quantitative data in the form of mean and standard deviation (X+SD). Analytic statistics: Pearson Chi-square test ($\chi 2$) is a statistical test utilized to examine the association between two qualitative variables. Student t-test (parametric test): it utilized to compare between two independent groups of quantitative variables that are normally distributed. Paired sample t-test (parametric test): is used to compare two related groups of normally distributed quantitative variables. A statistical significant difference is considered if $P \leq 0.05$, a

highly statistical significance is considered if P ≤ 0.01 and a very highly statistical significance is considered if P ≤ 0.001.

Results:

Table 1 revealed that; the mean age for the study group was 40.87±6.78 and 40.78 ±6.19 for the control group. Moreover; 69.1 % and 76.4 % of the study and control groups respectively were females. Approximately 40 % and 46.7% respectively were housewives. All studied sample were married and the majority of the study and control groups were living in a rural area (81.8 %) for both group. In addition, around one-third of the study and control groups had secondary education (29.1%, 38.1%) respectively. No statistical significant difference existed regarding bio-demographic characteristics except the number of children in the family at P values = 0.006.

Table 2 showed that at pre-intervention, the mean knowledge score for the study group was 15.15±3.22 and 14.31±1.73 for the control group with no statistical significant difference related to their knowledge. Meanwhile, there were very highly statistically significant differences between the study and control groups in relation to their mean of total knowledge at post-intervention. Moreover; there was an improvement of the mean scores of total knowledge among study group at post-intervention compared to pre-intervention scores with a very highly significant statistical difference at P values = <0.001.

Figure 1 illustrated total knowledge level about hypertension in the study and control groups at pre & post-intervention. The results revealed that at post-intervention 76.4 % of the study group had satisfying knowledge regarding hypertension compared to 16.4 % of the control group.

Table 3 showed that the systolic blood pressure mean results were 132.09±9.75 vs. 130.54±10.25 for the study and control groups pre-intervention while the diastolic blood pressure mean results were 86.36±5.13 vs. 84.83±5.33 for the study and control group participants pre-intervention. In addition to post-intervention; the systolic blood pressure mean results were 119.36±8.87 vs. 130.27±8.57 for the study and control group. Meanwhile, the diastolic blood pressure mean results were 75.63±5.09 vs. 83.54±5.66 for study and control groups. A highly statistical significant difference existed post-intervention between the study and control groups regarding systolic and diastolic blood pressure measurements at P values=<0.001. While, there was no statistically significant difference existed at pre-intervention between the study and control groups regarding systolic and diastolic blood pressure measurements. Also, there were a very highly statistically significant difference was found between both systolic and diastolic pressure pre and post-intervention in the study group at P values = <0.001.

Figure 2 illustrated the total score of the perceived stress scale (PSS) for both study and control groups pre and

post-intervention. The result revealed that the majority of the study and control groups (96.4% and 89.1%) respectively had high stress levels in pre-intervention, while post-intervention the stress level was lower between the study participants than the control group (0.0 % and 89.1%) respectively.

Table (1): Distribution of bio-demographic characteristics for both studied groups participants: (n= 110)

Demographic characters	Studied groups				Test of sig.	P value
	Study group (n=55)		Control group (n=55)			
	NO.	%	NO.	%		
Age (years)						
• Mean±SD	40.87±6.78		40.78 ±6.19		**t**=	0.94 NS
• Range	24.0–53.0		27.0–55.0		0.73	
Sex:						
• Male	17	30.9	13	23.6	χ^2 =	0.39
• Female	38	69.1	42	76.4	0.73	NS
Marital status:						
• Married	55	100.0	55	100.0	NA	NA
Occupation:						
• Manual work	8	14.5	10	18.2		
• Commercial work	9	16.4	5	9.1	χ^2 =	0.35
• Administrative work	16	29.1	11	20.0	3.25	NS
• Housewife	22	40.0	29	52.7		
Educational level:						
• Illiterate	7	12.7	3	5.5	χ^2 =	0.52
• Read and write	8	14.5	6	11.0	3.19	NS
• Primary	6	11.0	4	7.3		
• Secondary	16	29.1	21	38.1		
• University	18	32.7	21	38.1		
Residence:						
• Rural	45	81.8	45	81.8	NA	NA
• Urban	10	18.2	10	18.2		
NO. of children in family:						
• 2 Children	12	21.8	29	52.7	χ^2 =	0.006
• 3-4 Children	26	47.3	22	40.0	15.4	S
• 5-6 Children	17	30.9	4	7.3		

t: Students` t test
NS: Not statistically significant
NA: not applicable
χ2 = Chi-square test
S: Significant

Table (2): The patient's knowledge mean score of the study and control groups regarding hypertension pre & Post-intervention (n= 110)

Knowledge scores	Studied groups		Students` t test	P value
	Study group (n=55)	Control group (n=55)		
	Mean ± SD	Mean ± SD		
Knowledge scores (pre-intervention)	15.15±3.22	14.31±1.73	1.69	0.09 NS
Knowledge scores (post-intervention)	27.31±2.23	14.31±1.73	34.10	< 0.001 HS
Paired t test	21.70	NA		
P value	< 0.001 HS	NA		

Figure (1): Knowledge levels for both study and control groups regarding hypertension at pre and post-intervention

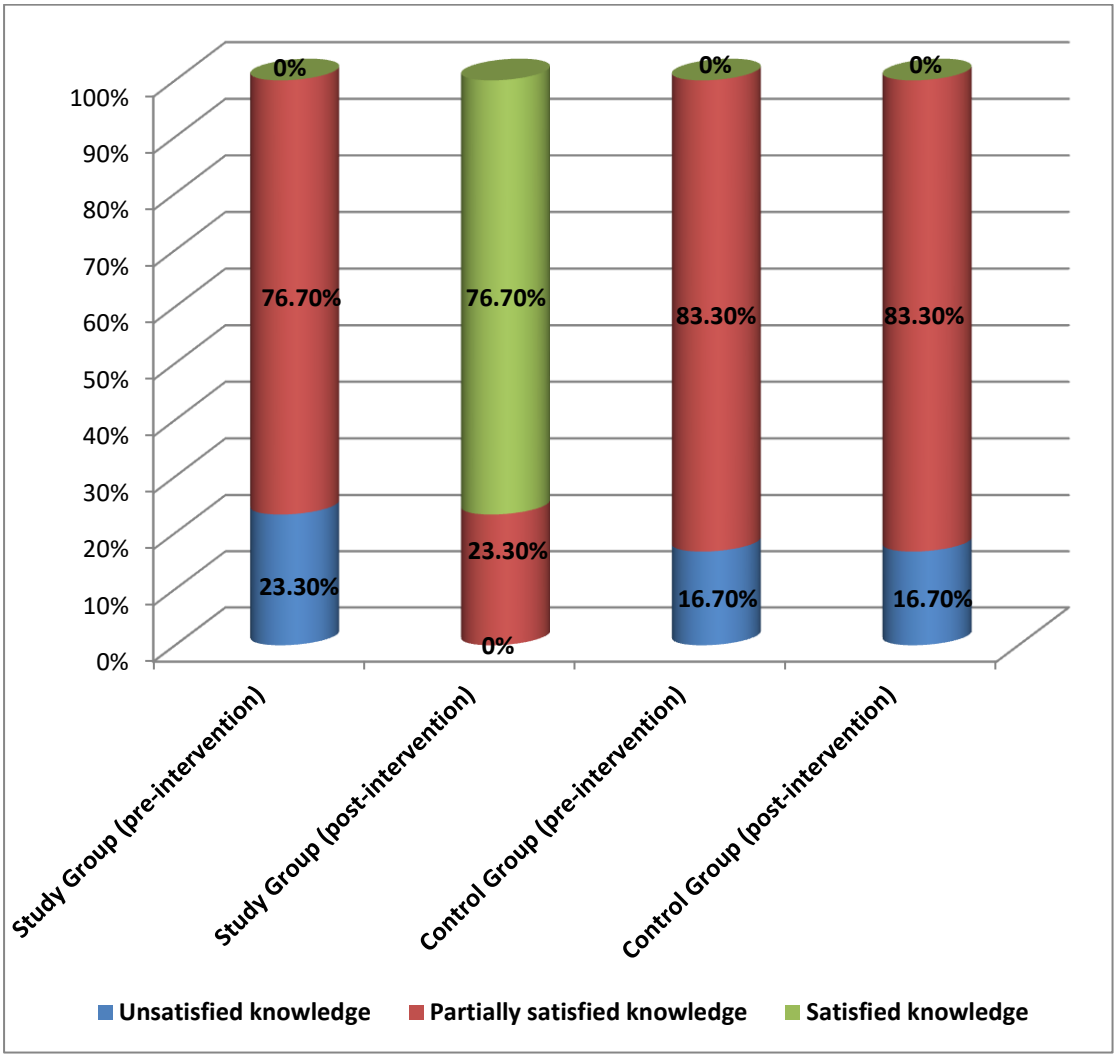
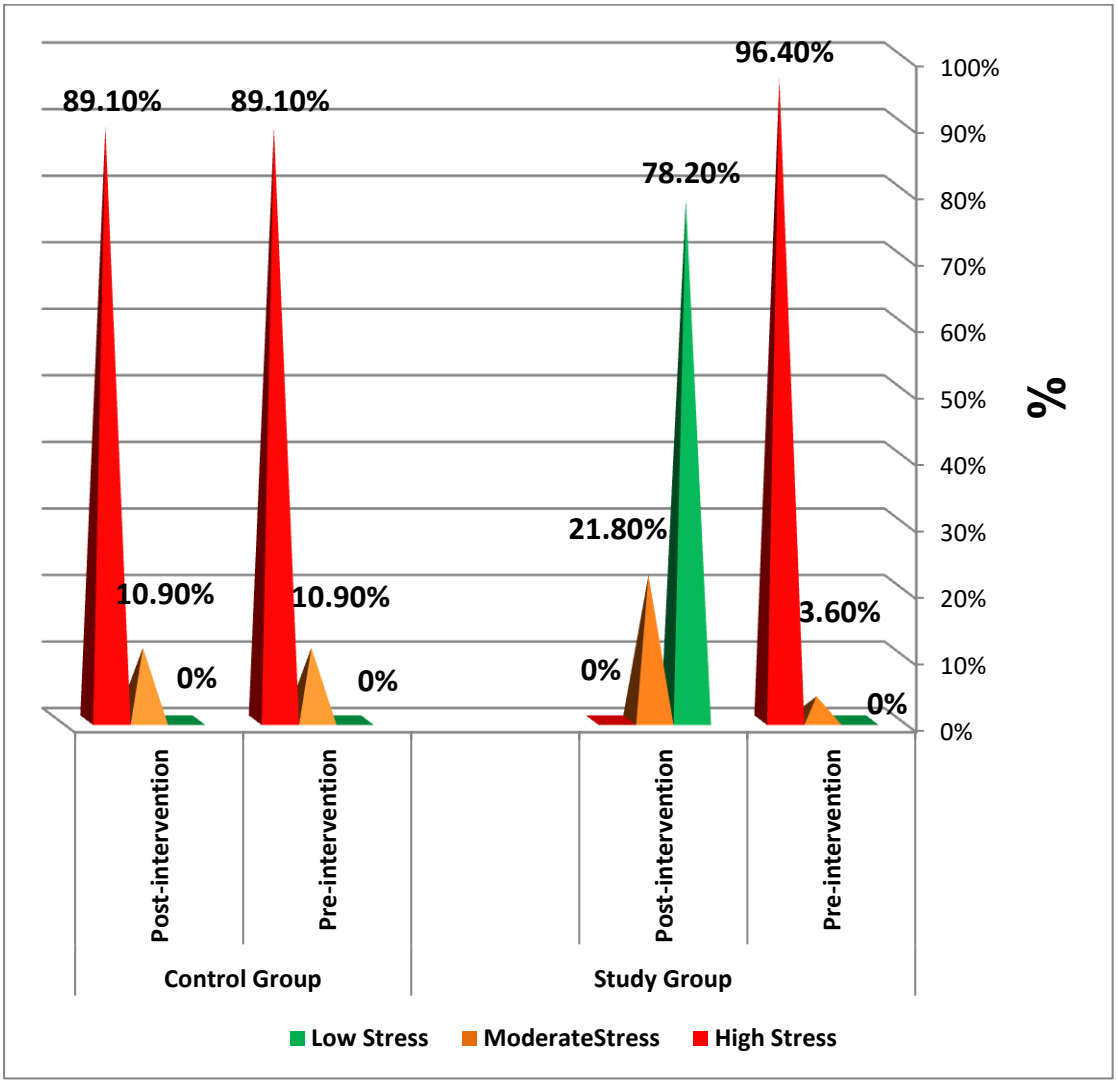


Table (3): The total means score of blood pressure for both study and control groups (n= 110)

Blood pressure measurements	Studied groups		Students` t test	P value
	Study group (n=55)	Control group (n=55)		
	Mean ± SD	Mean ± SD		
Systolic blood pressure (pre-intervention)	132.09±9.75	130.54 ±10.25	0.81	0.42 NS
Systolic blood pressure (post-intervention)	119.36±8.87	130.27 ±8.57	6.55	<0.001 HS
Paired t test	8.75	0.59		
P value	<0.001 HS	0.55 NS		
Diastolic blood pressure (pre-intervention)	86.36±5.13	84.83±5.33	3.73	0.21 NS
Diastolic blood pressure (post-intervention)	75.63±5.09	83.54±5.66	7,69	<0.001 HS
Paired t test	10.08	0.62		
P value	<0.001 HS	0.53 NS		

Figure (2): Total perceived stress scale (PSS) of the studied groups pre & post-intervention



Discussion:

Hypertension is the most common cause of coronary heart disease and one of the most serious health issues in developed and undeveloped countries. Because it is typically diagnosed accidentally it is known as the silent killer. It is the primary cause of disability and is considered the most vital risk factor for mortality in the world. Therefore, blood pressure control and preventive measures should be given top priority because hypertension is a treatable and preventable disorder (Das et al., 2021; Chimberengwa et al., 2019; and Kjeldsen, 2018).

Regarding blood pressure measurement, the current study results showed a reduction in systolic and diastolic mean measurements among the study group rather than control group subjects after implementing the qigong exercise. The results were similar to the findings of Yang et al., (2015) who revealed that qigong practice dramatically reduced blood pressure (diastolic and systolic levels). Also, other results reported that systolic and diastolic blood pressure are lowered with qigong practice among study group participants compared to control group participants (George et al., 2022; Ching et al., 2021; and Xiong et al., 2015). Moreover; Lee et al. (2003) and Myung et al., (2004) added that practicing a half hour of qigong exercises three times per week for 8 to 10 weeks significantly lowered the blood pressure among their study group participants when compared to the control group. Additionally, a study by Chen et al., (2019) noticed that practicing qigong exercises can reduce blood pressure measurements.

In addition, this result is in the same line with Dingcheng et al., (2020) who studied "the impact of qigong activities on nitric oxide and endothelin-1 and blood pressure for patients with essential hypertension" and mentioned that practicing qigong exercises can be effective in controlling hypertension. Thus, it helps in reduction of blood pressure for hypertensive patients. These results can be explained as qigong exercises are easy to learn and if the patient follows a scheduled program in a constant manner that may get reduced blood pressure

In relation to the level of knowledge of participants, results of the study showed that mean scores of knowledge regarding disease, exercises, and duration were improved among study group participants at post-intervention when compared with pre-intervention results and the results of control group participants. These results were in the same line with the study of Mohammad et al., (2014) who reported that the mean knowledge scores improved after 3 months of an educational intervention. They reported that the mean knowledge scores improved from twelve percent to fifty-one percent following the educational intervention, illustrating how education improves the patient's awareness triad. As well, Ozoemena et al., (2019) stated that educational interventions can give patients the chance to learn more about

their illness and increase their understanding of the risks and consequences of their diseases.

Regarding the perceived stress, results of the present study showed that participants who practiced the qigong exercises showed a very highly statistically significant reduction in stress levels post intervention than before. The results were similar to the findings of Wang et al., (2014) They found that engaging in qigong practice is linked to a decrease in perceived stress and hormone levels (adrenaline, noradrenaline, and cortisol). Moreover, Skoglund and Jansson (2007) stated that qigong training affected temperature, heart rate, and noradrenaline excretion in urine. These findings suggested that practicing qigong decreased sympathetic nervous system activity, which in turn reduced stress levels.

However, the findings of this study supported those of a recently published review by Liu et al., (2021), who found that tai chi and qigong exercises can lessen symptoms of depression and anxiety. All of these results point to qigong's potential to limit the stress response. According to the experts, this exercise lowers the catecholamine effect, which in turn lowers stress levels and lowers blood pressure.

Conclusion

Using qigong exercises reduced blood pressure significantly (systolic and diastolic ranges) among study group participants compared to the control group. Also, there was a significant reduction in stress level among study group participants after practicing qigong exercises.

Recommendation

The use of qigong exercises as routine care in the hospital for patients with hypertension is important. Periodic and continuous training for nurses about qigong exercises as well as educating them about its benefits in reducing hypertension is required. This study can be applied on a larger sample at another setting to ensure the generalizability of results.

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