



EFFECTIVENESS OF PATIENT'S EDUCATION IN SELF-MANAGEMENT OF BLOOD PRESSURE IN HYPERTENSIVE PATIENTS

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Abstract

Introduction: Deregulated blood pressure becomes the most concerned issue in Pakistan, Asia and responsible for heart stroke, failures and other cardiovascular diseases. Normal blood pressure considers by clinicians worldwide is $>120/80$ mm Hg and any value between $<130-140$ mm Hg systolic and $<80-90$ mm Hg diastolic shows hypertension. To control blood pressure, medication and sometime invasive treatments are basic requirements, but by using non-pharmacological measures and changes in lifestyle gives great relief in hypertensive patients. By educating hypertensive patients to adapt healthy lifestyle and eating habits alongwith taking medicines and regular visits to healthcare favors the reduction of blood pressure levels and contributes to the prevention of complications.

Materials and Methods: Randomized clinical trial was conducted at a tertiary care Cardiac Hospital, Lahore, Pakistan. About 150 hypertensive patients were enrolled in the study that are getting treatment and divided randomly into intervention and control groups. Pre-test post-test method was used to analyze self-knowledge and blood pressure changes. **Results:** By educating intervention group participants, the knowledge level of participants was significantly improved showing post intervention values i.e., $p=0.00$. This resulted in significant control of blood pressure in the intervention group (i.e., $p=0.00$).

Conclusion: The importance of patient's education is proved by imparting education regarding compliance of medication and adoption of non-pharmacological measures for better blood pressure control. Nurses should get engage in health education and awareness programs to meet the needs of the people for increased adherence to their medication and treatment regimens. Recommendations from this study will assist policy makers and healthcare professionals in developing relevant and context-specific policies that can improve hypertension management.

Keywords : Hypertension, Blood pressure control, Patient education, Non- pharmacological interventions, Nurse-led education

INTRODUCTION

Hypertension is a modifiable risk factor for the development of cardiovascular diseases. It is a complex clinical disorder defined by chronically high blood pressure levels by affecting 26% of the

world's adult population. It is also predicted that by 2025, this figure would have risen to 29% (Bollampally et al., 2017). According to the World Health Organization (WHO), hypertension has become a major health concern in Asia, impacting more than 35 percent of the adult population and resulting in 7.6 million deaths per year (WHO, 2013).

In developing countries like Pakistan, hypertension is a primary cause of death (Riaz et al., 2021). Due to increased trend of urbanization and citizen's diet which is excessive in sodium and saturated fats, with low fruits and vegetables consumption increases the prevalence of hypertension (Shah et al., 2018). Unfortunately, statistics on the prevalence of hypertension in the Pakistani population is currently inadequate (Elahi et al., 2023). According to Pakistan's National Health Survey, 33 percent of the adult population suffers from hypertension and only three percent who received treatment were able to keep their blood pressure under control (Aslam et al., 2018). A systematic review of the data from studies from 2010 to 2014 in 35 different countries, including Pakistan reported that 37.8% of the male and 32.1% of the female population were suffering from hypertension (Azevedo et al., 2015). These figures illustrate that hypertension is a serious health concern that, if not treated promptly, may lead to several other health problems.

A healthy diet is also important for blood pressure control (Muntner et al., 2022). The Dietary Approach to Stop Hypertension (DASH) is a dietary pattern that encourages the consumption of fruits, vegetables and low-fat dairy products; includes whole grains, chicken, fish and nuts; and aims to minimize the consumption of red meat, sweets, sugar- containing drinks, total fat, saturated fat, and cholesterol (Siervo et al., 2014). Meta- analysis done by Saneei showed that the DASH diet significantly reduced systolic blood pressure by 6.74 mmHg (95%CI: -8.25, -5.23, $I^2 = 78.1%$) and diastolic blood pressure by 3.54 mmHg (95%CI: -4.29, -2.79, $I^2 = 56.7%$) (Saneei et al., 2014).

It has long been recognized that smoking is a significant and controllable risk factor for hypertension (Herath et al., 2022). It is responsible for half of all smoker fatalities owing to high blood pressure and cardiovascular disease (Benowitz & Liakoni, 2022). Young smokers are up to five times more likely to develop hypertension than non-smokers (Afifah et al., 2023). It is the primary cause of disease onset, progression, and eventually the development of complications (Farsalinos et al., 2016).

Medication adherence is also an important part of hypertension management to prevent complications (Hamrahian et al., 2022); medication adherence is a factor that can contribute to the development of comorbidities. It is estimated that 65.5% of hypertensive patients worldwide do not adhere to prescribed medical treatment (Punna & Kodudula, 2022). Patients with non-adherent hypertension may have an increased risk of stroke up to 10 years earlier (Ernawati et al., 2022). A dose-response relationship was seen in this study, which indicated that lowering the adherence to antihypertensive therapy greater the risk of complications (Abegaz et al., 2017).

Despite the availability of various antihypertensive drugs, the reported rate of blood pressure control is very disappointing (Villar et al., 2023). This is believed to be due to inadequate adherence to pharmacological and non-pharmacological interventions (Kamran et al., 2014). Quality blood pressure management is time consuming and multifactorial and requires screening, medication compliance, education, self-monitoring, and patient and family involvement. These include raising awareness between patients and healthcare providers, appropriate lifestyle changes, appropriate follow-up care, and a high level of adherence to treatment (Carson, 2016).

Internationally, medical professionals and researchers have investigated several issues that affect the adherence of hypertensive patients (Lee et al., 2017). Poor adherence has many causes and can be ameliorated by sharing knowledge among patients (Baryakova et al., 2023). Patient education is the obligation of competent medical practitioners, but treatment adherence is the individual patient's

responsibility. A research conducted by (Akoko et al., 2017) suggested that just 33.3 percent of hypertension patients were adhering to their therapy, but it was 48.3 percent in a resource-poor country like Pakistan (Akoko et al., 2017).

Educational programs allow patients to better comprehend the function of therapy and enhance awareness of illness progression and ultimate consequences. Misconceptions regarding therapy can be avoided by providing patients with accurate information. This influences treatment adherence and can lead to better blood pressure management (Gleason-Comstock et al., 2015).

Nurses work with primary care providers and patients; inadequate adherence to treatment has changed their roles (Kamvura et al., 2022). By educating and motivating patients to comply with the treatment, nurses can bring positive outcomes. This approach improves the quality of hypertension management (Proia et al., 2014). The role of nurses in improving blood pressure control has been recognized in public and professional education for almost 50 years. They are involved not only in blood pressure monitoring, but also in patient education (Cicolini et al., 2014). Nurses are involved in the management of hypertension as a team member, as a trainer of non-pharmacological treatments and as a translator of physicians with a holistic and psychosocial approach. These roles focus on the advanced practice of nurses independently or in medical teams to meet the needs of patient's blood pressure management (Xu et al., 2013).

OBJECTIVE OF THE STUDY

To evaluate the effectiveness of an educational interventions given by nurses in self- management of blood pressure in hypertensive patients.

Hypothesis

There is a significant difference in blood pressure control between experimental and control groups after introducing educational intervention to patients regarding hypertension.

Methodology Study Design

A randomized control trial (RCT) with a pre-post design was conducted on patients diagnosed with HTN (intervention and control groups) over a period of two months. Randomized controlled trial (RCT) is a study in which participants are randomly assigned to one of two groups: one (the experimental group) receives the intervention under study, while the other (the comparison group or control) receives a different (conventional) treatment. The two groups are then followed up to see if any differences in the results exist. The trial's results and subsequent analysis are used to evaluate the efficacy of the intervention, therapy, treatment or services. RCTs are the most stringent way of determining a cause-and-effect relationship between the intervention and the outcome.

Sample size

Given a significance level of 0.05 and a statistical power of 90% for the pre-post- intervention score difference provided, the required sample size in each group was calculated to be 60. The sample size was expanded to 75 in each group to attain improved precision and to account for the 20% risk of attrition. The sample size was calculated by using similar studies as references (Or and Tao, 2016; Kim et al., 2016).

Sampling Technique

Published literature was reviewed for previously reported randomized controlled trials that included an intervention delivered by nurses or nurse practitioners, designed to improve blood pressure compared with usual care. The population of interest was 25-60 years old diagnosed hypertensive patients, taking the same antihypertensive drugs, seeking treatment from the outpatient department of the same hospital. 150 participants were randomly selected by using systematic random sampling where every third participant who met our criteria was selected randomly. The selected participants were randomly divided in to two groups by using simple random sampling. Lottery method was

used to divide the participants into two groups, experimental and control group.

Inclusion Criteria

- Hypertensive patients were diagnosed on the basis of their history, clinical examination and investigations.
- Both male and female.
- Age group 25-60 years.
- Hypertensive patients who have the ability to understand, speak and read Urdu language.

Exclusion Criteria

- Patients with the history of stroke and myocardial ischemia.
- Diabetic patients (with HbA1c levels > 5.6)
- Health professionals (Doctors, Nurses, Allied Health Scientists) were also excluded.
- Any known neurological problem.
- Patients whose BMI was greater than 25 kg/ m²

Data Collection Method:

The investigators used a structured and validated questionnaire orally to consenting subjects. The questionnaire was used to gather information on the participants' demographical status as well as their awareness about hypertension.

150 hypertensive patients between the ages of 25- 60 were chosen randomly, regardless of gender, race/ethnicity, education or financial level. Participants having a diagnosis of hypertension and using the same antihypertensive drugs, getting treatment from an outpatient department of tertiary care cardiac hospital were included. The participants having no history of diabetes, cardiovascular or renal illness, or other serious disorders were listed with the help of an attending physician. 150 participants who met our inclusion criteria were randomly selected by systematic random sampling. The participants were assigned to one of two groups by using simple random sampling: intervention and control group, having 75 participants in each group. Patients were sensitized by discussing the study's purpose and obtaining informed consent from the participants.

After 20 minutes of rest, blood pressure was taken three times on the same arm with a digital arm sphygmomanometer and the average of these values was the participant's blood pressure. Single blinding was done at the end of data collection. The nurses who recorded the blood pressure did not know whether the participant belongs to the control or experimental group. Following data collection, intervention group members were educated about hypertension and how to manage it. Lifestyle changes and the necessity of medication adherence were highlighted by the researchers in the form of a group education sessions at the auditorium. All queries about hypertension and overall health were answered. Whereas the participants in the control group received usual care as per the hospital protocol. The participants in both groups were informed about the follow-up schedule.

After six weeks, the participants were called for follow-up and post-test was done for both groups. The same questionnaire was used again to assess the post-knowledge of hypertension among all participants and their blood pressures were also recorded by using the same apparatus and the same protocol. After obtaining responses from the participants before and after the training session, the completed questionnaires and recorded BP were saved for analysis. The responses provided were not allowed to be manipulated by the researcher or any other person. The data was entered into the computer software Statistical Package for the Social Sciences (SPSS) IBM-20 version for storage and analysis.

RESULTS

The study was carried out to evaluate the effectiveness of patient's education given by nurses and

self-management of blood pressure in hypertensive patients. 150 randomly selected participants were randomly divided into two equal groups, the control group and intervention group.

Table 1: Descriptive statistics showing Characterization of the demographic profile and clinical data

| CHARACTERISTICS | CONTROL GROUP Group-1 (N=75) | INTERVENTION GROUP Group-2 (N =75) |
|----------------------|---------------------------------|---------------------------------------|
| Male Female | 44 31 | 46 29 |
| Age | 43.75 ± 12.42 | 47.0 ± 11.5 |
| Mean Systolic BP | 155.1 ± 10.2 mm Hg | 155.0 ± 10.7 mm Hg |
| Mean Diastolic BP | 102 ± 7.4 mm Hg | 102 ± 7.8 mm Hg |
| Mean knowledge score | 6 | 7 |

Table 1 shows the demographic characteristics of the studied population. It shows that the baseline data for both groups were much very similar. Mean systolic BP level was 155.1 ± 10.2 mm Hg and mean diastolic BP was 102 ± 7.4 mm Hg in the control group. Similarly, in intervention group, the mean systolic BP was 155.0 ± 10.7 mm Hg and 102 ± 7.8 mm Hg was diastolic BP. The participants' knowledge level was tested using knowledge scores ranging from 0 to 20, with 0 being the lowest and 20 being the highest. The maximum possible score for knowledge was 20, and each correct answer received one point, while incorrect or blank answers received none. Excellent (16 - 20), good (12-15), fair (9-11) and bad (16-20) were the four levels of knowledge (0-8). Before the intervention, none of the participants in any group reported having good or exceptional knowledge. In both groups, minimum age was 26 years and maximum age was 69 years, according to our inclusion criteria. Mean age of the participants in the control group was 43.75 ± 12 years, and in the intervention group the mean age was 47.0 ± 11.5 years. It was noted that the majority of participants were below 60 years, which constituted about 92.66 % of the total study population. The table 2 shows the age distribution of our population in both groups.

Table 2: Distribution of Participants According to Age

| Age (in years) | # of Participants in Group 1 | # of Participants in Group 2 |
|----------------|------------------------------|------------------------------|
| 20-30 | 8 | 11 |
| 30-40 | 22 | 18 |
| 40-50 | 31 | 28 |
| 50-60 | 9 | 12 |
| 60-70 | 5 | 6 |

In the control group, 58.6 % participants were male and 41.4 % were female. While in the intervention group, 61.3% were male and 37.3% were female as shown in figure 1.

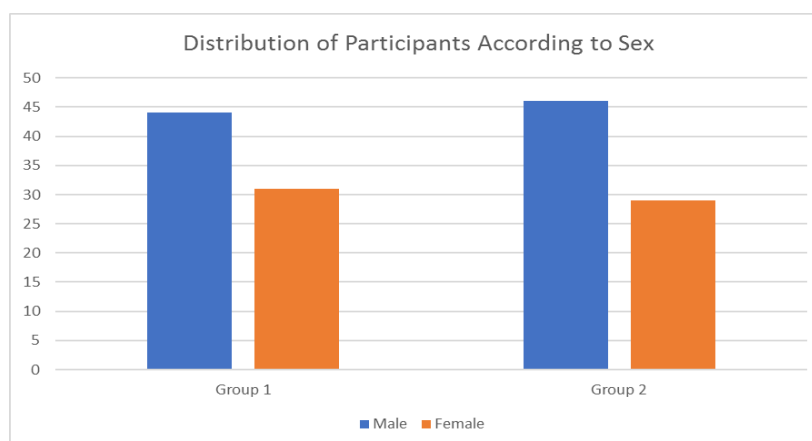


Figure 1: Distribution of participants according to sex.

After 6-weeks, both groups came for post-test. 5 patients were lost from each group, with an attrition of 6.6% with the remaining sample 70 in both groups. Among the 10 missing participants,

4 refused to join the study because of time limitations, 5 could not continue to attend the program because of worsened disease and 1 was lost to follow-up.

Table 4.3 shows the descriptive statistics of blood pressure in both groups post intervention, N=140. The above table shows the results of blood pressure in post groups, the systolic blood pressure in group 1, i.e., control group was 144.79.8 mm Hg and in group 2 which was intervention group 119.9± 11.7 mm Hg. The diastolic blood pressure in group 1 was 96.0± 6.2 mm Hg and in intervention group 78.5±7.1 mm Hg.

Table 3: Descriptive Statistics of Blood Pressure Post Intervention in terms of Mean and SD

| Descriptive Statistics of BP | | | | | | |
|------------------------------|--------------|----|---------|---------|----------|----------------|
| | | N | Minimum | Maximum | Mean | Std. Deviation |
| Group 1 (Control) | Systolic BP | 70 | 128.00 | 174.00 | 144.7714 | 9.89828 |
| | Diastolic BP | 70 | 91.00 | 116.00 | 96.0000 | 6.22757 |
| Group 2 (Intervention) | Systolic BP | 70 | 101.00 | 146.00 | 119.9571 | 11.78114 |
| | Diastolic BP | 70 | 70.00 | 99.00 | 78.5857 | 7.14547 |

In Table 4, the number and percentage of participants before and after the intervention is analyzed. Blood pressure control was assessed by using the recommendations of Joint National Committee JNC 8. Results show that all participants had poor blood pressure control before intervention. Post-intervention statistics shows 82.8% in the intervention group and 30 % of participants in the control group have good blood pressure control.

Table 4: Percentage of Participants Having Good or Poor Control of Blood Pressure

| | | Pre intervention BP Control (N=150) | | Post intervention BP Control (N=140) | |
|-------|---------|--|----------|---|-----------|
| | | Good | Poor | Good | Poor |
| Group | Group-1 | 0(0%) | 75(100%) | 21(30%) | 49 (70%) |
| | Group-2 | 0(0%) | 75(100%) | 58(82.8%) | 12(17.2%) |

DISCUSSION

Our rigorously conducted randomized controlled trial has primarily assessed the knowledge level of hypertensive patients regarding their disease and the impact of patient education on their disease. Patient's knowledge, attitudes and practice were observed to improve when training programs based on pharmacological and non-pharmacological blood pressure management strategies were used. As a result, this technique can be utilized as a framework to develop educational interventions for HTN patients.

This study has been conducted to assess the effectiveness of education and self-management of blood pressure among hypertensive patients. Among the sample population undertaken for the study in the intervention group, 44 (58.6%) of the respondents were male and 31 (41.4%) were female, while in the control group 46 (61.7%) of the respondents were male and 29 (37.3%) were female. In our study, the percentage of male participants was greater than females in both groups. This finding is similar to a study done in Bangladesh by (Rahman et al., 2018) where 63.7 % of participants were male. Another RCT done in Thailand by (Farahmand et al., 2019) also had higher number of male participants, which indicates that hypertension was found to be more common among males in these studies. However, a study done in Cape Town, South Africa had a higher number of female participants, i.e., 64.2%. (Bobrow et al., 2016) The larger proportion of men in our study suggests a link between illness and social practices such as smoking and alcohol intake among male patients.

The average age of the control group participants in our study was 43.75 ± 12 years, and in the intervention group, the mean age was 47.0 ± 11.5 years. It was noted that most of the participants

were below 60 years, which constituted about 92.66 % of the total study population. This finding was similar to one made by (Shafi and Shafi, 2017). It was further noted that the highest number of participants belongs to the age group 40 - 50 years. This finding is consistent with a previous study done in Iran (Bobrow et al., 2016). Another study done to assess the effectiveness of education in the hypertensive populations also supports this finding (Eghbali-Babadi et al., 2018). Work stress, physical inactivity, excessive alcohol consumption (more than 2 drinks per day) and high salt intake are likely causes for this higher incidence in this age group.

Patient education is critical for raising understanding, enhancing hypertension prevention, and self-care habits. The purpose of this study was to assess how successful a health education intervention was in improving hypertension awareness, prevention, and self-care habits. The pre-intervention mean knowledge score of participants in both groups was low in the current study. This conclusion is consistent with research conducted in Nepal (Dhungana et al., 2020) and Australia (Dymek et al., 2015), which could be because of many reasons like lack of symptoms in the early stages, not taking hypertension as a disease, illiteracy, poverty and unavailability of health education. Most of the patients were illiterate and from a poor to middle socioeconomic background. In the current study, the overall percentage of educated patients was found to be quite low, making it difficult for the researchers to motivate and convince them of the need for blood pressure control.

After the intervention, the participants in the intervention group had good to excellent awareness regarding illness consequences, normal B.P levels, signs and symptoms, and the need to take antihypertensive drugs. This finding was in conformity with the previous study conducted in Nepal (Ashoorkhani et al., 2016). Post intervention mean reduction of systolic/diastolic blood pressure in the study and control groups was 14.37/7.43 mmHg and 1.10/2.69 mmHg, respectively. This was supported by a research done in Australia showing a significant mean reduction of systolic/diastolic blood pressure in intervention and control groups i.e., 19.43 /9.21 mm Hg and 3.14 /5.69 mm Hg, respectively (Olsen et al., 2016).

Before the intervention, patients in our study had a very unfavorable attitude toward making lifestyle changes such as quitting smoking, exercising, losing weight and avoiding stress. Similar findings were seen in previously published studies (Hamdidouche et al., 2017). Most of the people in our country perceive that lifestyle changes have no impact on BP management. This perception was tried to be changed through educating the patients. Because of its low cost, convenience of administration, and clarity of information in regional languages, it illustrates that nursing workers may employ patient education as an intervention technique.

A favorable impact of education on lowering blood pressure was observed in post intervention. It has been observed that there was a significant association between knowledge score and blood pressure of participants before and after the intervention. This is consistent with several other intervention programs conducted in various countries with varied populations (Javadzade et al., 2018; Pirasath et al., 2017; Dymek et al., 2015). This finding supports the success of educational interventions on lifestyle modification in HTN management.

Our findings revealed that there was no statistically significant association between participant's age, gender, or knowledge scores. Previously published studies done in Korea (Kim et al., 2016) and Canada (Marra et al., 2017) have also shown no significant association between knowledge scores and these demographic variables.

Conclusion:

The importance of patient's education is proved by imparting education regarding compliance of medication and adoption of non-pharmacological measures for better blood pressure control. Nurses play an essential role in hypertension care, awareness, promotion, prevention and control and such implications reduce unnecessary hospital readmission and occurrence of disabling complications

through patient health and lifestyle behavior education. Patient health and lifestyle behavior education is a successful instrument to reduce blood pressure in hypertensive individuals. The establishment of a health education program is crucial, because it facilitates the process of maintaining effective hypertension management. In addition, this study could serve as a springboard for future researchers to perform clinical trials for community-based interventions. During our investigation, it was discovered that there are very few nursing researches on this topic in Pakistan. Most of the articles and studies were conducted by doctors or pharmacists in foreign countries. This has highlighted the need for further research in this area, which should be conducted from a nursing viewpoint.

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