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Effectiveness of BASNEF model based intervention program on knowledge and self-care behaviors among hypertensive patients

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Abstract--Background: Hypertension is the major modifiable risk factor for cardiovascular diseases that recently increased in Egypt and African regions has the highest prevalence of hypertension which can be controlled by self-care. The aim of the study was to determine the effect of belief, attitude, subjective norm, and enabling factors (BASNEF) model on knowledge and self-care behaviours for hypertensive patients. Methods: A quasi-experimental design was conducted for this study (experimental /control group). Setting: The study was conducted at Damanhur University Hospital, Egypt. Sample: A purposive sample of 100 patients with hypertension was divided randomly and assigned into two groups (50 intervention groups and 50 control groups) from the beginning of September 2021 to the end of February 2022. Tools: two tools were used for data collection, tool I: A structured questionnaire designed based on the BASNEF model components. Tool II: checklist about patient's self-control behaviors concerning blood pressure control. Results: The mean total scores of all BASNEF Model components were significantly improved post-intervention in the experimental group compared to the

control group ($P < 0.001$). Conclusion: Applying the BASNEF Model is very effective for hypertensive patients as the intervention based on its controlled patients' blood pressure and changed their behaviour toward a better life in the experimental group than in the control group. Recommendations: Highlight the importance of integrating and applying the BASNEF model as a standard of care to improve the quality of life for patients with hypertension.

Keywords--BASNEF model, blood pressure, patients, hypertension.

Introduction

Non-communicable diseases are considered the foremost health problems in developed and developing countries [1], which were responsible for 42 million deaths worldwide in 2019 [2]. Hypertension is one of the important health problems within the world [3], and is the leading cause of cardiovascular disease (CVD), Hypertension is a serious medical condition that affects 1.28 billion adults aged 30-79 worldwide [4]. A diagnosis of hypertension is verified when blood pressure (BP) reaches or exceeds 140/90 mmHg after 2-3 measures over one to four weeks, or if it exceeds 180/110 mm Hg and there is evidence of CVD on a single measurement [4].

The burden of hypertension is evidenced significantly in low- and middle-income countries where approximately 75% of deaths from hypertension occur in these countries that are associated with lower disease awareness [5] and owing to rising risk factors in these populations in recent decades [6]. It increases the risk of heart, brain, kidney, and other diseases and is considered the major cause of premature death worldwide [7]. There is a tremendous increase in the incidence of hypertension in sub-Saharan Africa, an estimated 10 to 20 million individuals out of approximately 650 million people may have hypertension [8]. This high prevalence of hypertension is indorsed to population growth due to migration from rural to urban areas, changes in dietary habits that resulted in being overweight or obese, aging of the population, and social stress [9].

Large proportion of the population in sub-Saharan Africa unaware of their condition (50–60% of women and nearly 70% of men), undiagnosed, untreated, and or inadequately treated, which increase the risk for serious complications and rising burden of cardiovascular disease [10]. More than half of Egyptian adults with hypertension are unaware of their condition. People who are generally at low risk for hypertension seem to be at higher risk of ignoring hypertension. Younger, healthier, less educated men are less likely to know about their hypertension. Therefore, a targeted health education campaign and regular blood pressure screening are needed [5]. Therefore, there is a need for a targeted health education campaign and regular blood pressure screening [5].

People's attitudes toward healthy behaviours can be influenced by behaviour analysis models. Exploration of barriers to behavioural change and adapting to existing socio-cultural contexts are enhanced through educational theories and models [11]. Modified beliefs, attitude, subjective norms, enabling factors

(BASNEF) model is a simplified approach to understanding behaviours and can motivate early adoption of healthier lifestyle [12]. It's one of the useful patterns in health education, promotion, which is the combination of behavioural intention model and precede pattern [13], [14]. BASNEF model is a comprehensive and complete model used to study behaviours and plans to change them, as well as to define the factors that influence individuals' decision making. According to this model, individuals adopt a new behaviour when they realize it's helpful for them [12]. Following that, their evaluation drive to the creation of an attitude toward their actions and development of decision-making associated with achieving new behaviour or attitude [15].

As healthy lifestyle is commonly believed to be the cornerstone in lowering hypertension incidence, severity, and consequences, the BASNEF model addresses a significant gap as it considers environmental factors and social norms in changing behavior to a healthy trait behavior, as well as, the knowledge and attitude of hypertension patients [12], [16]. Thereby, this study was conducted to evaluate the effects of a lifestyle intervention program using the BASNEF model among hypertensive patients.

Significance of the study

Hypertension is a major health issue which responsible for major premature deaths around the world .It is one of the main causes for mortality in both high and low-to-middle-income countries. Hypertension accounted for 12% of global deaths. The prevalence of hypertension in adults (>18 years) is 22 % [10] as it affects 1 in 4 men and 1 in 5 women [17], while affirmed hypertension in children ranges from 2% and 4% [16] The burden of hypertension is felt disproportionately in low- and middle-income countries, where two thirds of cases are found, largely due to increased risk factors in those populations in recent decades [1].

In Egypt, annual mortality rate of 40% due to CVDs. Being the most populous country in the Middle East and North African region, Egypt accounted for 15% of the CVD mortality for the entire region [5], [18]. Egypt's high CVD death rate was attributed to the country's growing urbanization, which was accompanied by widening socioeconomic disparities, increasing westernization of lifestyles, and a growing imbalance between improved health care and population accessibility [19]. The majority of hypertensive patients unaware of the disease process and life style modifications [5] . Therefore, the present study was delivered with hope that the obtained findings will contribute to the health care experts, nursing practice, as well as patients' outcome.

Aim of the study

The aim of this study was to determine effect of BASNEF model based intervention program on knowledge and self-care behaviours among hypertensive patients on knowledge and self-care behaviour for hypertensive patients.

Study Hypotheses

1. Patients who will receive BASNEF model based intervention program will have higher knowledge score than patients in the control group.
2. Patients who will receive BASNEF model based intervention program will show better control in their blood pressure than those in the control group.
3. Patients who will receive BASNEF model based intervention program will show better outcomes than those in the control group

Subject and methods

Study design

A quasi-experimental control group using pre-post-test study design was utilized in the current study. This design estimated the causal impact of an intervention (BASNEF model based intervention program) on the dependent variables (patients' knowledge and self-care behaviors).

Participants & setting

The study was conducted at the Medical Outpatient Unit, University Hospital, Damanhur City, Egypt. A purposive sample of 100 hypertensive patients referred to hospital for treatment was recruited to participate in the ongoing study. Patients who willing to participate and fulfilled the inclusion criteria were eligible for this study as the following criteria: 1) age more than 16 years old, 2) confirmed diagnosed with stage 1 or stage 2 hypertension and have routine care and treatment. Patient who consumed of psychoactive drugs, have cognitive impairment, comorbid disease such as diabetes, renal diseases, and or cancer were excluded from the study. Of the initial 140 patients, 20 failed to meet the inclusion criteria, and 16 did not agree to participate and 4 patients withdraw from the study due to travel or move to another city. A total of 100 patients guarantee their consent to participate in the study. No participant was excluded owing to absence at >1 session, or hospitalization. The patients were randomly assigned equally to the two groups (50 in the intervention and 50 in the control group)

Tools for Data Collection

To assess the effectiveness BASNEF model based intervention program on the knowledge and self-care behaviors among hypertensive patients, three tools were used as following:

Tool 1: BASNEF model based structured interview questionnaire:

The questionnaire was adopted from [20] and modified by the researchers to assess patients' knowledge, Beliefs, Attitude, Subjective Norms, and Enabling Factors. It was divided into two parts.

Part I: One: Demographic identification questionnaire consisted of six items including age, sex, level of education, place of residence, family history, and history of hypertension.

Part II: BASNEF model based structured interview questionnaire which included knowledge (15 questions), beliefs (7 questions), attitude toward action (5 questions), subjective norms (5 questions), and enabling factors (6 questions).

Scoring system: The scoring system for the questionnaire was as follow:

- A. Knowledge questions: Correct answers had score "1" and incorrect scored with "0" with total scores ranged from 0 to 15. Poor knowledge (< 60%) - Fair knowledge (60-75%) - Good knowledge ($\geq 75\%$).
- B. Beliefs Questions, scoring system was designed on a 3-point Likert scale based on 3 answers with option one for disagree, 2 for I don't have an idea and 3 for agree.
- C. Subjective norms and enabling factors, Questions were designed in 3- point Likert scale ranging from zero for not done, one for inadequately done, and 2 for adequately done.

Tool II: A structured checklist about patients' prophylactic behaviors concerns blood pressure control: It was adopted from [21] and modified by the researchers. It included seven question about self-care behaviors including regular measurement of blood pressure, reduced salt intake, not smoking cigarettes, regular physical activity (150 minutes of physical activity per week (equivalent to 30 minutes 5 times per week), reduced fat intake, reduced anxiety, and regular medication use. The scoring system was designed to be zero for not done and 1 score for done action.

Tool III. Blood pressure monitoring: It was obtained from the patients' file by the researchers to assess blood pressure before and after application of BASNEF model.

Validity & Reliability

The validity of giving questionnaires was measured by content validity and face validity methods. It was tested for their content validity by a group of five professor experts in nursing field. The reliability coefficient of knowledge questions 0.75, beliefs 0.90, attitude 0.82, enabling factors 0.91, and subjective norms 0.84 calculated by using Cronbach's alpha test.

Administrative design

An official letter requesting permission to conduct the study was obtained before starting the study from the Dean of the Faculty of Nursing, Damanhur University to the Director of the study setting. This letter included the aim of the study in order to get permission and help for data collection.

Ethical considerations

Official permission to conduct the study was granted from hospital administrators. The purpose and relevance of the current study were discussed for each patient. Patients were also informed that they have the right to refuse participation or withdraw from the study at any time. Data encryption was used to ensure anonymity and confidentiality. Moreover, patients were informed that

their information would not be utilized in another study without their approval. Patients who volunteered to participate provided written informed consent.

Pilot Study

The pilot study was carried out on 10% of the studied sample (6 patients) from the total sample in order to ensure the clarity, applicability of the instruments, and the time needed to be completed. According to the results obtained from the pilot study, the required modifications were performed. Based on the results obtained from the pilot study, the required changes were made. The pilot study sample was excluded from the main study sample.

Data Collection Procedure

The researcher reviewed the current local and international related literature to be more acquainted with the problem, to design the study instruments, and to finalize them by using books, articles, magazines, and the internet. The actual fieldwork was carried out from the beginning of September 2021 up to the end of February 2022 of data collection. The researchers were available in the study settings three days/week, at the morning shift from 8.00 Am to 2.00 Pm. the researchers introduced themselves to the medical and nursing staff members in the previously mentioned setting. The researchers clarified the nature and the purpose of the research and asked for cooperation.

Study procedure

Assessment phase

Prior to implementing the intervention, the aim, procedures, and confidentiality of information were explained to the patients. The researchers interviewed each patient individually, while they were waiting to receive medication and care and collected their socio-demographic data. The researchers assessed the eligibility of meeting the inclusion criteria of the study. Before application of model items in the intervention and control groups, the given questionnaires were filled out by the patients. The questionnaire and the checklist were completed before the application of BASNEF model session for both experimental and control groups (before intervention). Patients were assessed blood pressure with an introduction letter (before intervention).

Planning phase

The researchers prepare intervention materials about the application of BASNEF model including definition, importance, components, and nurse role of a model component. The researchers developed education and intervention sessions covering the phases of model starting with beliefs, attitudes norms, enabling factors about hypertension and ending with scientific knowledge about hypertension. The researchers prepared videos, images and PowerPoint presentations for use in the study Colored booklets were developed to be distributed to every patient for enforcement and as a reference. The intervention was implemented on a small group basis. The participants were divided into 4

sub group. Each subgroup was encompassing 12 patients. Group from them had 14 patients. Every group attended six sessions. These sessions were scheduled as a rate of one session per week for approximately 28 weeks. The data was collected over a period of 7 months from the beginning of September 2021 to the end of February 2022.

Implementation phase, according to components of the BASNEF Model to promote normal blood pressure among patients with hypertension

Intervention was conducted for the experimental group within 6 sessions. Each session took around 30-45 minutes via lecture, question and answer, group discussion and practical presentation. Every session is conducted about one component of the BASNEF model (Belief, Attitude, Subjective Norm and Enabling Factors).

1. 1st session: This session was comprised of orientation, welcoming with the patients, introduction of research topic, partitioned the participants into subgroups, schedule commitment, and assembly time. At the end of this session dispersed pretest questionnaires. It lasted almost 45 minutes.
2. 2nd session: Beliefs items about hypertension: The researchers asked hypertensive patients' about their beliefs about (hypertension, diet, treatment, the importance of exercises for hypertension). Moreover, the researchers changed patients beliefs during the session regarding eating a lot of salt = hypertension, disease incurability, and tremendous consequences.
3. 3rd session: Attitude of patients regarding hypertension: through elucidates the value of exercise, following a low salt diet, the importance of physical exercise and participating at least 3 times a week and each time 20 minutes, explaining the appropriate diet to reduce blood pressure, test blood pressure, use prescription medications regularly, go to the clinic for follow-up and measure blood pressure.
4. 4th session: Subjective norms in the BASNEF model: A meeting was held with a specialist in a medical and nutritional expert to energize patients to alter their norms about wrong habits to avoid complications of hypertension. The researchers help them to preserve ideal body weight, self-monitoring, proper use of an antihypertensive drug, compliance low salt diet, and exercise schedule.
5. 5th session: Enabling factors in the BASNEF model: An educational guide was given to all patients with hypertension to strengthen and to keep the continuity of the training. All patients were informed about the health services and how to receive the necessary care and financial support if needed.
6. 6th session: Included, definition, causes, classifications, signs, and symptoms to increase the the patient's knowledge and awareness of hypertension, reinforced by power points and images. It took us 45 minutes. By the end of this session, patients are able to define hypertension, causes, classification, and manifestation of hypertension. The researchers give patients 5 minutes to ask any question, and then give them 10 minutes to summarize all the outlines discussed. Besides, a self-care booklet for blood pressure monitoring and management was prepared for patients to enhance

their education and teaching also, to a literate member of the family to be read at home.

Evaluation phase

After completing all sessions within Six weeks of the intervention, the questionnaires, checklist, and blood pressure monitoring were checked again for experimental and control groups.

Statistical Analysis

Statistical Package of Social Science (SPSS) version 20 was used for statistical analysis of the findings. The data was obtained in the study were organized, reviewed, coded, tabulated, analyzed, and presented using descriptive statistics in the form of frequencies and percentages for qualitative variables; Means, standard deviations, for quantitative data. Test of significance was used for comparison between the study and the control groups.

Results

(1): Distribution of the studied participants according to their socio -demographic Characteristics.

Demographic Characteristic	Experimental group (n =50)		Control group (n =50)		x 2	P-value
	No.	%	No.	%		
Patients Age groups (Years)						
< 20						
20 <30	13	26	12	24	326.02	.002*
30 <40	8	16	15	30		
40 < 50	14	28	16	32		
	15	30	7	14		
Sex						
Male	40	80	39	78	44.31	.000*
Female	10	20	11	22		
Place of residence						
Rural	40	80	43	86	33.76	.000*
Urban	10	20	7	14		
Level of education						
Illiterate	2	4	1	2	75.96	.000*
Primary	4	8	3	6		
Secondary	25	50	28	56		
Bachelor degree	19	38	18	36		
Family history						
Yes	34	68	30	60	35.29	.000*
No	16	32	20	40		
History of hypertension						
Yes	35	70	37	74	41.31	.000*
No	15	30	13	26		

Table 1: showed distribution of the studied participants according to their socio-demographic characteristics. In the experimental group, the mean age of patients was 33.90 ± 12.49 years. Half of them (50%) had a secondary level of education, 68 % had positive family history for hypertension. Regarding their age, more than one-quadrant of them are aged less than 20 years old and between 30 <40 (26% and 28% respectively). While, in the control group, the mean \pm SD was 30.72 ± 10.22 years. More than half of studied group had a secondary level of education and 60% of them had positive family history. Concerning their age, approximately one quadrant of them (24%) aged < 20 and 32% were aged between 30- < 35 years old. Also, the majority of patients in experimental and control group lived in a rural area (86% and 80% respectively).

Figure 1: Distribution of the studied participants according to their gender

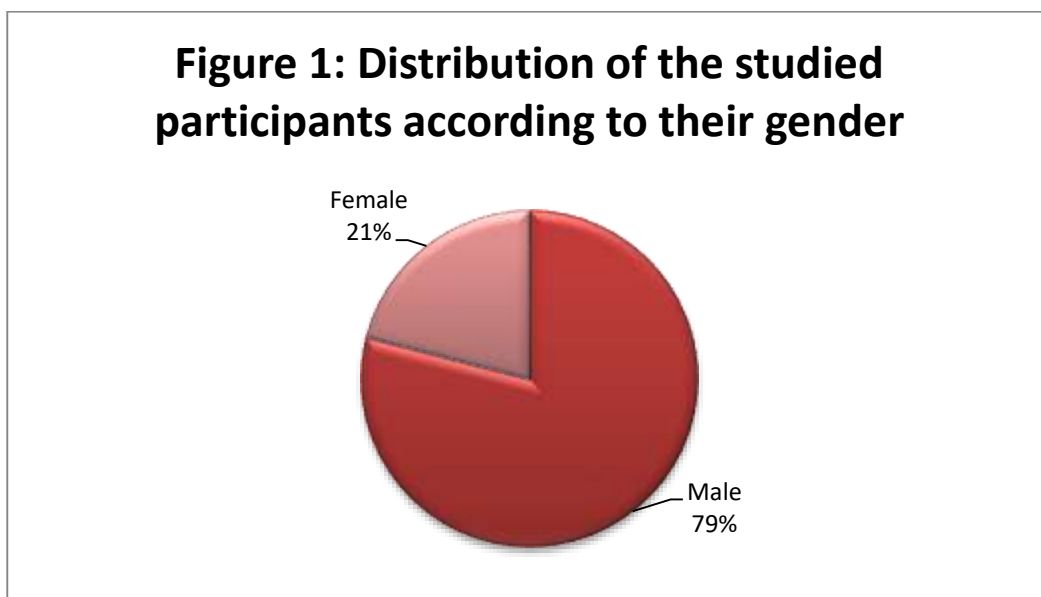


Figure 1: Distribution of the studied participants according to their gender

Figure 1 showed the distribution of the studied participants according to their gender, it was revealed that 79% of participants were male and the rest of them were female 21%.

Table (2): Knowledge levels among the studied patients before and after Intervention in both experimental and control groups

Knowledge level	Experimental group (n =50)		Control group (n =50)		χ^2	P-Value
	No.	%	No.	%		
1-Pre intervention						
Poor	40	80	48	96	3.1	0.07ns
Fair	5	10	2	4		
Good	5	10	0	0.0		
2-Post intervention						
Poor	0	0.0	49	98		

Fair	11	22	0	0.0	100	0.000**
Good	39	78	0	0.0		

Table 2: exemplified knowledge levels among the patients before and after Intervention in both experimental and control groups, as illustrated from the table, in the experimental group, the majority (80%) had poor knowledge on pre intervention, while 78% had good knowledge post intervention compared to control group (96 % had poor knowledge on pre and 98% post study). Therefore, there was a statistical significant difference between experimental and control groups regarding the knowledge level at 0.000.level of statistical significance.

Table (4): Self-measurement scores of blood pressure level among patient's pre and post intervention in both experimental and control groups

	Experimental Group (n =50)		Control group (n =50)		x ²	P- Value
	No	%	No.	%		
1-Pre intervention						
-Bad	39	78	40	80	5.48	.019
-Good	11	22	10	20		
Mean ±SD	.22 ±.41		.20 ±.40			
2-Post intervention						
-Bad	0	0.0	43	86	-	-
Good	50	100	7	14		
Mean ± SD	1.00 ±.00		.16 ±.37			

Table 4: shown the self-measurement score of blood pressure level among the patients before and after the intervention in both experimental and control groups, it was revealed that 78 % of patients in the experimental group had bad scores on pre intervention, while all of them (100%) had good scores post intervention compared to control group (14%). Also, there were statistically significant differences between pre and post intervention regarding self-measurement score of blood glucose level at the 0.000 level of statistical significance.

Table 5: Comparison of mean scores of knowledge, attitude, behavior, structures BASNEF model and blood pressure in two groups of patients with hypertension in the experimental and control groups

BASNEF components	Groups (n=50)	Before intervention (Mean ±SD)	After intervention (Mean ±SD)	P ¹	Mean Differences (Mean ±SD)	P ²
-Knowledge	Experimental	40.13±18.37	61.52±18.88	<0.001	21.38±14.48	<0.001
	Control	43.26±18.51	45.17±18.72	0.1	1.9±8.1	
-Normative beliefs	Experimental	58.47±9.74	75.41±8.92	<0.001	16.94±13.95	<0.001
	Control	61.63±11.18	63.12±10.97	0.14	1.49±6.97	
-Evaluations of behavioral outcomes	Experimental	66.38±11.58	76.94±10.55	<0.001	10.55±11.81	0.001
	Control	68.02±9.52	68.57±11.54	0.41	0.54±9.11	

-Subjective Norms	Experimental	41.14±27.52	68.75±15.03	<0.001	27.6±26.91	<0.001
	Control	46.93±26.82	48.97±25.49	0.49	2.04±20.93	
Enabling Factors	Experimental	34.72±20.58	64.58±20.23	<0.001	29.86±27.49	<0.001
	Control	39.45±21.16	41.49±18.97	0.26	2.04±12.56	

Table 5 showed the Mean total score of BASNEF model components before and after the intervention in the experimental and control group. The Mean total score of the BASNEF model component displayed significant improvement in the experimental group post intervention compared to control group. Furthermore, independent-sample t test showed a significant difference between the experimental and control groups in mean score of knowledge, normative beliefs, evaluations of behavioral outcomes, subjective norms, and enabling factors ($p < 0.001$ for all).

Table (6):- Dietary Management Behavior among the patients before and after intervention in both experimental and control groups

Dietary Management Behavior	Experimental group (n=50)		Control group (n=50)		x ²	P-Value
	No.	%	No.	%		
1-before intervention						
-Normative beliefs	10	20.0	21	42	75.4	0.000**
- Attitudes	5	10	11	22		
-Subjective Norms.	35	70	18	36		
P1	0.000		0.85			
2-After intervention						
-Normative beliefs	0	0.0	18	36	92.8	0.000**
-Attitudes	35	70	16	32		
-Subjective Norms	15	30	16	32		
P2	0.000		0.81			

Table 6 revealed dietary management behavior among the studied patients before and after intervention in both experimental and control groups. It was revealed that 70% in the experimental group had Subjective Norms about changing their dietary behavior before intervention compared to 32% after the intervention. Also, 70% changed their attitude in the experimental group compared to 32% in the control group. Therefore, there was a statistically significant difference between the experimental and control groups before and after the BASNEF model application at 0.000 level of statistical significance.

Table (7): Blood pressure measurement among the patients' pre and post interventions in both experimental and control groups

Outcome	Mean ± SD		P-Value
	Pre intervention	Post intervention	
Blood pressure			0.001

Experimental	132.8 ± 13.86	125.6 ± 6.8	Control
Control	130.6 ± 14.2	131.96 ± 11.6	<0.001 0.54

SD = Standard deviation

SD = Standard deviation

Table (7): shows blood pressure measurements among the patients' pre and post interventions in both experimental and control groups. It was revealed that post intervention, the blood pressure was modified in the experimental group and there was statistical significance at ($P < 0.001$), but there were no changes in control group ($P = 0.54$).

Discussion

As presented in the study, the BASNEF model had confirmed blood pressure control among hypertensive patients and improved their aspects of lifestyle via increasing their awareness, enhancing patient beliefs and attitudes, and altering social norms. The finding showed that, in the experimental group, the mean age of patients was 33.90 ± 12.49 years while, in the control group, the mean \pm SD was 30.72 ± 10.22 years. This finding disagrees with [16] who mentioned that the mean age of participants was 58.2 ± 6.8 . This clarified that we need ongoing application of educational models for both young and old people to improve their knowledge in order to control the disease and prevent many complications, including renal problems, myocardial infarction, and cerebrovascular accidents.

Concerning the level of education, half of them had secondary education in the interventional group and 68 % had a positive family history for hypertension. While, in the control group, 56% of participants had secondary education and 60 % had a positive family history for hypertension. In relation to sex, it was revealed that 79% of participants were male and the rest of them were female 21%. This disagreed with [22] who mentioned that the majority of the studied sample was female. Also, the majority of patients in both the experimental and control group lived in a rural areas (86% and 80% respectively). Therefore, there is an intense need for health education programs targeted at rural communities to prevent and control hypertension. This was reported with [23] who mentioned that higher incidences of hypertension are common in low- and middle-income countries, and the patients are less awareness regarding the importance of hypertension control to reduce mortality and morbidity. Therefore, [24] recommended intensive health education and community surveillance programs in rural communities in order to prevent and control the diseases.

The present study revealed knowledge scores among the patients in pre and post Intervention, in the experimental group, the majority of them (80%) had poor knowledge levels on pre-intervention. While, more than two-third of them (78%) have good knowledge levels after the intervention. This was supported by [16] who revealed that the mean score of knowledge had an incremental trend in baseline and 6 months after the intervention group. In a study by [12] [25] results showed a noticeable increase in disease knowledge of patients in different issues among interventional groups while changes in the control group were unremarkable.

These findings in the knowledge section were compatible with our findings. [26] Indicated that BASNEF Model constructs except subjective norms had significant differences after the intervention. This would help them to control and manage the disease. This clarified how education can make a difference in creating awareness and improving knowledge. Regarding control group, the majority of them had poor knowledge level on both pre and post-intervention (96% and 98% respectively). This finding was consistent with [12] who reported that most of the patients had poor knowledge. Therefore, engaging self-care is a highly effective approach in controlling hypertension through designing and implementing educational strategies focused on enabling factors and subjective norms.

Concerning self-measurement scores of blood pressure levels among patient's on pre and post intervention in both experimental and control groups, the study revealed that 78 % of patients in the experimental group had poor scores before surgery, while all (100%) had good scores after surgery compared to the control group (14%). This variation was statistically significant, indicating the efficiency of educational programs on promoting knowledge in the experimental group which is in accordance with study conducted by [16]. This was consistent with [12] who mentioned that BASNEF model approach can be a good BP management technique. Therefore, there were statistically significant differences between the experimental and control groups regarding the knowledge level at 0.000. This emphasized that training programs based on the BASNEF model as an effective method for improving self-care behaviors in health care systems.

Regarding the total mean score of BASNEF model components before and after the intervention in the experimental and control group, it was shown that the mean total score of the BASNEF model component (Knowledge, normative belief, behavioral outcomes, subjective norms, and enable factors) showed significant improvement in the experimental group post-intervention compared to control group and significant difference between the two groups, which is in accordance with studies conducted by some researchers such as [12], [27], [28] whose all representing the effectiveness of providing the intervention based on the BASNEF model in improving self-care behaviors for the management of hypertension.

Regarding the dietary management behavior amongst the studied patients before and after the intervention in both experimental and control groups. It was revealed that two third of the experimental group had subjective norms about changing their dietary behavior before intervention compared to less than on third after the intervention. Also, two third changed their attitude in the experimental group compared to less than on third in the control group. In a study [22], [29] results showed significant association on enabling factors about nutritional education among the patients. These findings in knowledge section were well-matched with our findings. In this context, [26] signposted that BASNEF model constructs except subjective norms had significant differences after the intervention.

Therefore, there was a statistically significant difference between the experimental and control groups before and after the BASNEF model application at 0.000 level of statistical significance. The study results represented that implementation of educational intervention based on BASNEF Model caused a significant

modification in patients' role in directing self-management. This was consistent with [30] who argued that the lifestyle intervention program anchored on the BASNEF model has considerable advantages and significantly increases medication adherence and changed their behavior to control hypertension. Besides, [28], [31] also reported similar results. This could be due to the implementation of educational intervention that brought improvements in health outcomes. Therefore, it is recommended ongoing educational programs to reduce the burden and complications of hypertension.

Concerning blood pressure measurement among the patients' pre and post Interventions, it was revealed that post intervention, the blood pressure was modified in the experimental group and there was statistical significance at ($P < 0.001$), but there were no changes in control group ($P = 0.54$). This result was in agreement with [12], [32] who confirmed that healthy lifestyle plus medical treatment can reduce mortality and morbidity caused by cardiovascular disease in diabetic patients and multifactorial interventions was recommended. According to the results, the development and implementation of theoretical training programs emphasizing environmental factors can be effective in modifying the behavior of individuals. This is illustrated that by using training sessions based on the BASNEF model, there was improvement in self-care behaviors. This was supported by [27] who stated that the BASNEF model is efficient educational intervention in raising awareness and improving self-care behaviors in patients with hypertension.

Conclusion

Based on the current results, it can be concluded that the research hypothesis is accepted and applicable the BASNEF Model controlled patients with hypertension and changed their behavior on the experimental group than in the control group.

Recommendation

Based on the findings of the present study, the following recommendations can be suggested:

- 1- Using BASNEF-based training programs to control blood pressure and improve self-care behavior is an effective method.
- 2- Implementation of nutritional education program for hypertensive patients to improve self-management of behavioral intentions.
- 3- Training should be repetitive and involve actual practice to gain the required skills.
- 4- Further research on a larger scale is needed for different age groups to generalize the findings to the entire population.
- 5- Continuous nursing-led education and follow-up on blood pressure control are highly recommended for adolescents, adults, and the elderly.

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