

Effect of an Educational Intervention About Dietary Approach to Stop Hypertension (DASH) on Changing Knowledge, Attitude and Blood Pressure of Hypertensive Patients Attending Zagazig University Hospitals

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Abstract: Background: Hypertension is an important risk factor for cardio vascular illness and mortality all over the world. The burdens of hypertension can be significantly controlled and reduced by lifestyle modification and treatment adherence. DASH diet is proved to reduce blood pressure either alone or combined with other life style modification. Aim of the Study is to evaluate effect of an educational intervention about Dietary Approach to Stop Hypertension (DASH) on Changing knowledge, attitude and blood pressure of hypertensive Patients Attending Zagazig University Hospitals. Methodology: this study was an interventional study carried out in cardiology outpatient clinic in Zagazig University Hospitals. The sample included 132 hypertensive patients chosen by systematic random sampling. The patients were divided into two equal groups 66 patients in the intervention group (G1) and 66 patients in the control group (G2). Data were collected through interviewing questionnaire which cover socio demographic characteristics, knowledge and attitude toward DASH diet. Results: The results showed that there was no significant difference between both groups in socio demographic characteristics, knowledge and attitude toward DASH before the intervention. There was significant improvement in all items of knowledge and attitude toward DASH in studied group 1 after application of health education sessions. There was significant reduction in blood pressure of studied group 1 after the intervention but there was no significant change in group 2. Conclusion: The health education program for hypertensive patients about DASH diet proved its success in improving their knowledge, attitude and reduction of their blood pressure level.

Keywords: Hypertension, DASH Diet, Life Style Modification, Health Education

1. Introduction

Hypertension is a persistent elevation of the systolic blood pressure at a level of 140 mm hg or higher and diastolic blood pressure at a level of 90 mm hg or higher based on the average of two or more correct blood pressure measurement taken two or more contact with health care providers (WHO, 2015).

Poorly controlled hypertension is a significant worldwide public health concern because of its morbidity, mortality, and economic burden especially among older adults (Ogedegbe et al, 2013).

About one billion individuals or 26% of the adult population worldwide had hypertension (Park et al, 2011), while the prevalence of pre hypertension and hypertension in Egypt were estimated to be 57.2% and 17.6% respectively (Arafa and Ez-Elarab., 2011).

The healthy DASH (Dietary Approaches to Stop Hypertension) diet plan was developed to lower blood pressure without medication in research sponsored by the US National Institutes of Health. The first DASH diet research showed that it could lower blood pressure as well as the first

line blood pressure medications, even with a sodium intake of 3300 mg/day. Numerous studies have shown that the DASH diet reduces the risk of many diseases, including some kinds of cancer, stroke, heart disease, heart failure, kidney stones, and diabetes. It has been proven to be an effective way to lose weight and become healthier at the same time. (Heller, 2016)

DASH is a flexible and balanced eating plan that requires no special foods and instead provides daily and weekly nutritional goals. This plan recommends:

- (1) Eating vegetables, fruits, and whole grains
- (2) Including fat-free or low-fat dairy products, fish, poultry, beans, nuts, and vegetable oils
- (3) Limiting foods that are high in saturated fat, such as fatty meats, full-fat dairy products, and tropical oils such as coconut, palm kernel, and palm oils
- (4) Limiting sugar-sweetened beverages and sweets. (National Heart, Lung, and Blood Institute, 2015)

Beside its beneficial effect on blood pressure, DASH is designed to be a well-balanced diet for the all population. DASH is recommended by the United States Department of Agriculture (USDA) as an ideal eating plan for all American (USDA, 2010).

The DASH diet reduces systolic blood pressure by 6 mm Hg and diastolic blood pressure by 3 mm Hg in patients with pre-hypertension (Systolic 120-139 mm Hg, diastolic 80-89 mm Hg). Those with hypertension (Systolic \geq 140mm Hg, diastolic \geq 90mm Hg) dropped by 11 and 6 mm Hg, respectively. These changes in blood pressure occurred with no changes in body weight (U.S. Department of Health and Human Services., 2006). It also reduces bad cholesterol (LDL) and the 10-year risk of heart attack (Chen et al, 2010).

The World Health Organization defined Health Education as any combination of learning experiences designed to help individuals and communities improve their health, by increasing their knowledge or influencing their attitudes (WHO, 2015).

2. Patients and Methods

2.1. Technical Design

2.1.1. Type of Study

An interventional study

2.1.2. Site of Study

The present study was conducted at cardiology outpatient clinic in Zagazig University Hospitals.

2.1.3. Sample Size and Sampling Technique

The sample size was calculated using (open Epi) program assuming that the level of knowledge after health education (70%) and level of knowledge before health education (50%) (Habib et al., 2016), at confidence interval 95% and at power 80%, the estimated sample was 132 hypertensive patients. Patients will be chosen by systematic random sampling technique then divided into two equal groups 66 patients in

the intervention group (G1) and 66 patients in the control group (G2). As the mean attendance of hypertensive patients is about 10 patients /day so each third patient will be chosen in the sample.

2.1.4. Patients Included in Study

132 hypertensive patients attending cardiology outpatient clinic in Zagazig University Hospitals.

Inclusion criteria:

Patients with hypertension (systolic $>$ 140 mm hg, diastolic $>$ 90 mm hg), Aged $>$ 18 years and attending cardiology outpatient clinic in Zagazig University Hospital regularly.

Exclusion criteria:

Age 18 years old or less, Patients with any physical or mental disability that hinder the intervention e.g., blindness or deafness, Patients with diagnosed secondary hypertension (renal or endocrinal), Patients with isolated systolic hypertension.

2.1.5. Data Collection Tools

The intervention group received pre test to assess their knowledge and attitude before the health education sessions then they received post test after two months of the intervention to evaluate the effect of the health education sessions, while the control group received pre test to assess their knowledge and attitude then they received post test after two months without any intervention.

These data were collected by using:

- (1) An interviewing Arabic pre-test questionnaire which was designed by (Habib et al., 2016) for hypertensive patients.

It included the following items:

- (A) Socio demographic characteristics of the patients: such as age, gender, education of husband and wife... etc.

Social class was scored as follows: education and cultural domain for both husband & wife (score = 30), family domain (score = 4), economic domain (score = 3), occupational domain (for both husband & wife) (score = 10), home domain (score = 1), health care domain (score = 5) and total score will be 53. Socioeconomic level was then classified into Very low: $<$ 13.5, Low: 13.5 - $<$ 27, Middle: 27- $<$ 40 and High: \geq 40 (El-Gilany, 2012)

- (B) Questions to test the knowledge of the patient and include the following points:

- 1) General knowledge about DASH:- hearing about DASH, Importance of having lots of fruits and vegetables, Suitable type of dairy products, Effect of excess salt and salty foods on blood pressure, The best type of bread, Does excess fats and fatty foods effect blood pressure, Suitable type of fats, The best type of oil, Effect of exercise on blood pressure and Effect of smoking on blood pressure
- 2) Knowledge about serving size in DASH:- The suitable serving size of fruits and vegetables, dairy products, meat, poultry, fish, seeds, dry beans, grains, and sweets.

(C) Questions to test the attitude towards DASH:- Following the DASH plan lower blood pressure, Limiting salt intake control blood pressure, Having fruits instead of sweets as a desert and Stop smoking and making exercise help to lower blood pressure.

Scoring of patient knowledge: in the questions about the suitable serving size, all answers are correct so:-Getting less than or equal to 50% of answers or don't know is considered wrong.

Getting more than 50% of answers is considered right. *In other questions The right answer equals 1 The wrong answer equals 0. Maximum score equal 17, Minimum score equal 0. Good knowledge > 50% while, Poor knowledge ≤ 50%.

Scoring of attitude questions:

Answers were: Agree equal 1 degree, Disagree equal 0 degree, Maximum score equal 4, Minimum score equal 0, Good score > 50% and Poor score ≤ 50%

(2) The same pre-test questionnaire was used as a post test to assess knowledge and attitude of the intervention group (G1) after health education sessions, while the control group (G2) completed this post test without any intervention.

(3) Measuring blood pressure.

Blood pressure was measured before the intervention and two month after it for both groups. The blood pressure was measured by mercury sphygmomanometer. Reading blood pressure by auscultation is considered the gold standard by the Heart, Lung and Blood Institute of the National Institute of Health (NIH). The blood pressure was measured while patients were in seated position with flexed arm, the flexed elbow should be at the level of the heart and supported and if the patient is anxious, wait a few minutes before taking the pressure. (Clark et al., 2012).

(4) Health education message.

The hypertensive patients included in the intervention group (G1) were given educational sessions to improve knowledge and attitude of the patient toward DASH: Definition of dietary approach to stop hypertension, importance of DASH diet, DASH eating plan and other life style modification needed to control hypertension. The educational message was conducted by the researcher through personal interview in health education sessions. Each session took about 20 minutes and was held three times weekly in the cardiology outpatient clinic. The message was facilitated by uses of posters and booklets which contain the most important items in the health education message.

2.2. Operational Design

2.2.1. Pilot Study

Before starting the actual field study, a pilot study was carried on 10 hypertensive patients to estimate the level of patient's knowledge because of absence of Egyptian reference and to test the questionnaire with the most appropriate terms. It also helped to estimate time needed for

data collection, and detect the obstacles of the study. The patients included in pilot study were not included in the main sample.

2.2.2. Data Collection and Work Field

(1) Data collection and health education sessions were done between March 2016 to september 2016 with average two months lapse between pre and post test.

(2) The researcher collected the pre-test questionnaires by meeting the hypertensive patients attending cardiology outpatient clinic in Zagazig University Hospital after explaining to them the objectives of the study.

(3) The blood pressure was measured by mercury sphygmomanometer before and after the intervention.

(4) Health education sessions provided for hypertensive patients in the cardiology outpatient clinic (group 1).

(5) The post-test questionnaires were collected to assess knowledge and attitude after health education sessions for both groups.

2.2.3. Administrative Design and Ethical Aspects

The necessary official permissions were obtained: Approval obtained for performing the study from Zagazig University Hospital manager and the head of cardiology department after explaining the purpose of the study to them. Approval from the Institutional Review Board of Faculty of Medicine, Zagazig University. An informed consent was obtained from hypertensive patients involved in the study after explaining purpose to them. The study group was not exposed to any harm or risk and their data were confidential.

2.2.4. Data Management

Collected data were presented in tables and suitable graphs and analyzed by computer software (statistical package SPSS version 16) using appropriate statistical methods. Frequencies, means and standard deviation were used to summarize the data. Categorical data were compared by using chi square test. MC Nemar test was used to compare pre and post test. Student t test was used to compare two independent quantitative data. Paired t- test was used to compare paired quantitative data. Probability was considered significant if P. value is less than or equal to 0.05.

3. Results

As regard comparison between the two groups as regard socio demographic characteristics (Table 1): there is no statistically significant difference between socio demographic characteristics of both groups.

As regard Comparison between pre-tests of studied groups about general knowledge of DASH (Table 2). It shows that there is no statistical significant difference between pretests of studied groups about general knowledge of DASH.

Table 1. Comparison between the two groups as regard socio demographic characteristics.

Variables	group (1)		group (2)		X ²	P
	No (66)	%	No (66)	%		
Age						
45 - <60	35	53.0	29	43.9	1.095	0.295
60-75	31	47.0	37	56.1		
Sex						
Male	25	37.9	33	50.0	1.107	0.293
Female	41	62.1	33	50.0		
Education of husband						
Illiterate	19	28.8	26	39.4	8.093	0.088
Read and write	15	22.7	21	31.8		
Essential education	4	6.1	0	0.0		
Secondary	26	39.4	17	25.8		
High	2	3.0	2	3.0		
Education of wife						
Illiterate	21	31.8	30	45.5	8.604	0.072
Read and write	27	40.9	29	43.9		
Essential education	4	6.1	0	0.0		
Secondary	12	18.2	5	7.6		
High	2	3.0	2	3.0		
Occupation of husband						
Not working	27	40.9	21	31.8	7.655	0.105
Farmer	7	10.6	13	19.7		
Worker	16	24.2	24	36.4		
Clerk	14	21.2	8	12.1		
Business man	2	3.0	0	0		
Occupation of wife						
Not working	59	89.4	63	95.5	1.467	0.226
Clerk	7	10.6	3	4.5		
Residence						
Urban	19	28.8	27	40.9	2.182	0.139
Rural	47	71.2	39	59.1		
Social class						
Low	55	83.3	62	93.9	3.308	0.068
Moderate	11	16.7	4	6.1		
Smoking						
Smoker	43	65.2	44	66.7	0.06	0.971
Ex-smoker	11	18.2	10	15.2		
Non smoker	12	18.2	12	18.3		

Table 2. Comparison between pre-tests of studied groups about general knowledge of DASH.

Variables	Pre-test G1		Pre-test G2		X ²	P
	No (66)	%	No (66)	%		
Hearing about DASH						
• Yes	42	63.6	40	60.6	0.125	0.723
• NO	24	36.4	26	39.4		
Importance of having lots of fruits and vegetables						
• Yes	34	51.5	44	66.7	3.075	0.079
• NO	32	48.5	22	33.3		
Suitable type of dairy products						
• Full cream	40	60.6	30	45.5	3.030	0.082
• Skimmed or low cream	26	39.4	36	54.5		
Effect of excess salt and salty foods on blood pressure						
• Elevate	52	78.8	59	89.4	2.418	0.120
• Lower	14	21.2	7	10.6		
The best type of bread						
• White bread	26	39.4	17	25.8	2.948	0.086
• Whole grain bread	40	60.6	49	74.2		
Does excess fats and fatty foods effect blood pressure						
• yes	48	72.7	56	81.8	2.640	0.104
• No	18	27.3	10	18.2		
Suitable type of fats						
• Oil	44	63.6	45	68.2	0.03	0.853
• Butter or margarine	22	36.4	21	31.8		
The best type of oil						
• Olive	6	9.1	4	6.1	0.70	0.403

Variables	Pre-test G1		Pre-test G2		X^2	P
	No (66)	%	No (66)	%		
• Corn or sun flower	60	90.9	62	93.9		
Effect of exercise on blood pressure						
• Lower	28	42.4	36	54.5	1.956	0.162
• Elevate or does not effect	38	57.6	30	45.5		
Effect of smoking on blood pressure						
• Elevate	26	39.4	34	51.5	1.985	0.159
• Lower or does not effect	40	60.6	32	48.5		

As regard Comparison between pre-tests of the studied groups about knowledge of serving size in DASH (Table 3). There is no statistical significant difference between pretests of studied groups' about serving size in DASH.

Table 3. Comparison between pre-tests of the studied groups about knowledge of serving size in DASH.

Variables	Pre-test G1		Pre-test G2		X^2	P
	No (66)	%	No (66)	%		
Suitable serving size of vegetables						
• Adequate knowledge	27	40.9	26	39.4	0.03	0.859
• Inadequate knowledge	39	59.1	40	60.6		
Suitable serving size of fruits						
• Adequate knowledge	27	40.9	29	43.9	0.129	0.719
• Inadequate knowledge	39	59.1	37	56.1		
Suitable serving size of dairy products						
• Adequate knowledge	35	53.0	45	68.2	3.075	0.079
• Inadequate knowledge	31	47.0	21	31.8		
Suitable serving size of meat, poultry and fish						
• Adequate knowledge	45	68.2	53	80.3	2.296	0.129
• Inadequate knowledge	21	31.8	13	19.7		
Suitable serving size of seeds and dry beans						
• Adequate knowledge	15	22.7	13	19.7	0.218	0.640
• Inadequate knowledge	51	77.3	53	80.3		
Suitable serving size of grains						
• Adequate knowledge	34	51.5	27	40.9	1.128	0.288
• Inadequate knowledge	32	48.5	39	59.1		
Suitable serving size of sweets						
• Adequate knowledge	19	28.8	16	24.2	0.35	0.554
• Inadequate knowledge	47	71.2	50	75.8		

As regard Comparison between pre-test of studied group (1) and pre-test of studied group (2) about attitude towards DASH (Table 4). There is no statistically significant difference between the two groups as regard attitude towards DASH.

Table 4. Comparison between pre-test of studied groups about attitude towards DASH.

Variables	Pre-test G1		Pre-test G2		X^2	P
	No (66)	%	No (66)	%		
Following the DASH plan lower blood pressure.						
• Agree	14	21.2	16	24.2	0.121	0.728
• Disagree	31	78.8	50	75.8		
Limiting salt intake control blood pressure.						
• Agree	47	71.2	53	80.3	1.33	0.249
• Disagree	19	28.8	13	19.7		
Having fruits instead of sweets as a desert.						
• Agree	39	59.1	37	56.1	0.122	0.728
• Disagree	27	40.9	29	43.9		
Stop smoking and making exercise help to lower blood pressure.						
• Agree	16	24.2	17	25.8	0.192	0.662
• Disagree	50	75.8	49	74.2		
Total satisfactory attitude						
• satisfactory	15	22.7	13	19.7	0.257	0.612
• not satisfactory	51	77.3	53	80.3		

Regarding Changes of general knowledge about DASH among the studied group (1) & group (2) (table 5). It shows statistically significant improvement in all items concerning general knowledge about DASH after health education especially the best type of oil (olive oil) which was improved from 9.1% in pre test to 54.5% in post test followed by the importance of having lots of fruits and vegetables which was improved from 51.5% in pre test to 92.4% in post test. While, there is no statistically significant change in all items concerning general knowledge about DASH among studied group (2).

Table 5. Changes of general knowledge about DASH among the studied groups after two months from intervention among group (1) and from pre test among group (2).

Variables	group (1)					group (2)				
	Pre-test		Post- test		P*	Pre-test		Post- test		P*
	No (66)	%	No (66)	%		No (66)	%	No (66)	%	
Importance of having lots of fruits and vegetables										
• Yes	34	51.5	61	92.4	<0.001	44	66.7	46	69.7	0.708
• No	32	48.5	5	7.6		22	33.3	20	30.3	
Suitable type of dairy products										
• Full cream	40	60.6	18	27.3	<0.001	30	45.5	23	34.8	0.629
• Skimmed or low cream	26	39.4	48	62.7		36	54.5	43	65.2	
Effect of excess salt and salty foods on blood pressure										
• Elevate	52	78.8	65	98.5	0.001	59	89.4	61	92.4	0.508
• Lower	14	21.2	1	1.5		7	10.6	5	7.6	
The best type of bread										
• White bread	26	39.4	10	15.2	<0.001	17	25.8	15	22.7	0.685
• Whole grain bread	40	60.6	56	84.8		49	74.2	51	77.3	
does excess fats and fatty foods Effect blood pressure										
• yes	48	72.7	64	97.0	<0.001	56	81.8	57	86.3	0.687
• No	18	27.3	2	3.0		10	18.2	9	15.2	
Suitable type of fats										
• Oil	44	63.6	62	93.9	<0.001	45	68.2	46	69.7	0.851
• Butter or margarine	22	36.4	4	6.1		21	31.8	20	30.3	
The best type of oil										
• Olive	6	9.1	36	54.5	<0.001	4	6.1	5	7.6	0.729
• Corn or sun flower	60	90.9	30	45.5		62	93.9	61	92.4	
Effect of exercise on blood pressure										
• Lower	28	42.4	48	62.7	<0.001	36	54.5	34	51.5	0.727
• Elevate or does not effect	38	57.6	18	37.3		30	45.5	32	48.5	
Effect of smoking on blood pressure										
• Elevate	26	39.4	44	66.7	<0.001	34	51.5	33	50.0	0.862
• Lower or does not effect	40	60.6	22	33.3		32	48.5	33	50.0	

*N.B: McNemar test of significance.

As regard Changes of knowledge about serving size in DASH among group 1& group 2 (Table 6). There is statistically significant improvement in all items concerning knowledge about serving size in DASH after application of health education sessions among the studied group 1 especially adequate knowledge about suitable serving size of seeds and dry beans which was improved from 22.7% in pre test to 60.6% in post. While, there is no statistically significant change in all items concerning knowledge about serving size in DASH among the studied group (2).

Table 6. Changes of knowledge about serving size in DASH among studied groups after two months from intervention among group (1) and from pre test among group (2).

Variables	group (1)					p*	group (2)				
	Pre-test		Post- test		p*		Pre-test		Post- test		p*
	No (66)	%	No (66)	%			No (66)	%	No (66)	%	
Suitable serving size of vegetables											
• Adequate knowledge	27	40.9	44	66.7	< 0.001	26	39.4	27	40.9	0.859	
• Inadequate knowledge	39	59.1	22	33.3		40	60.6	39	59.1		
Suitable serving size of fruits											
• Adequate knowledge	27	40.9	46	69.7	< 0.001	29	43.9	30	45.5	0.861	
• Inadequate knowledge	39	59.1	20	30.3		37	56.1	36	54.5		
Suitable serving size of dairy products											
• Adequate knowledge	35	53.0	52	78.8	< 0.001	45	68.2	43	65.2	0.711	
• Inadequate knowledge	31	47.0	14	21.2		21	31.8	23	34.8		
Suitable serving size of meat, poultry and fish											
• Adequate knowledge	45	68.2	60	90.9	< 0.001	53	80.3	52	78.8	0.681	
• inadequate knowledge	21	31.8	6	9.1		13	19.7	14	21.2		
Suitable serving size of seeds and dry beans											
• Adequate knowledge	15	22.7	40	60.6	< 0.001	13	19.7	12	18.2	0.754	

Variables	group (1)					p*	group (2)			
	Pre-test		Post- test		p*		Pre-test		Post- test	
	No (66)	%	No (66)	%			No (66)	%	No (66)	%
• Inadequate knowledge	51	77.3	26	39.4	< 0.001	53	80.3	54	81.8	0.500
Suitable serving size of grains										
• Adequate knowledge	34	51.5	52	78.8		27	40.9	26	39.4	
• Inadequate knowledge	32	48.5	14	21.2		39	59.1	40	60.6	
Suitable serving size of sweets					< 0.001					0.727
• Adequate knowledge	19	28.8	38	57.6		16	24.2	18	27.3	
• Inadequate knowledge	47	71.2	28	42.4		50	75.8	48	72.7	

N.B: McNemar test of significance.

Regarding changes of attitude towards DASH plan among group 1 and group 2 of the studied sample (Table 7). There is statistically significant improvement in all items concerning attitude towards DASH in group (1) after application of health education sessions especially their positive attitude toward stop smoking and making exercise help to lower blood pressure which was improved from 22.7% in pre test to 62.1% in post test. While, there is no statistically significant change in all items concerning attitude towards DASH in group (2).

Table 7. Changes of attitude towards DASH plan among studied groups after two months from intervention among group (1) and from pre test among group (2).

Variables	group (1)					p*	group (2)				
	Pre-test		Post- test		p*		Pre-test		Post- test		p*
	No (66)	%	No (66)	%			No (66)	%	No (66)	%	
Following the DASH plan lower blood pressure.											
Agree	14	21.2	55	83.3	< 0.001	16	24.2	18	27.3	0.861	
Disagree	31	78.8	11	16.7		50	75.8	48	72.7		
Limiting salt intake control blood pressure.											
Agree	47	71.2	59	89.4	0.009	53	80.3	52	78.8	0.829	
Disagree	19	28.8	7	10.6		13	19.7	14	21.2		
Having fruits instead of sweets as a desert.											
Agree	39	59.1	57	86.4	< 0.001	37	56.1	35	53.0	0.726	
Disagree	27	40.9	9	13.6		29	43.9	31	47.0		
Stop smoking and making exercise help to lower blood pressure.											
Agree	16	24.2	41	62.1	< 0.001	17	25.8	16	24.2	0.841	
Disagree	50	75.8	25	37.9		49	74.2	50	75.8		

As regard changes of total knowledge and attitude among the studied group (1) and group (2) (Figure 1). It shows statistically significant improvement in both total knowledge scores from 40.9% in pre test to 72.7% in post test and total attitude scores from 22.7% to 83.3% after application of health education sessions among the studied group (1). While, there is no statistically significant difference in both total knowledge scores and total attitude scores among group (2) between pre and post test.

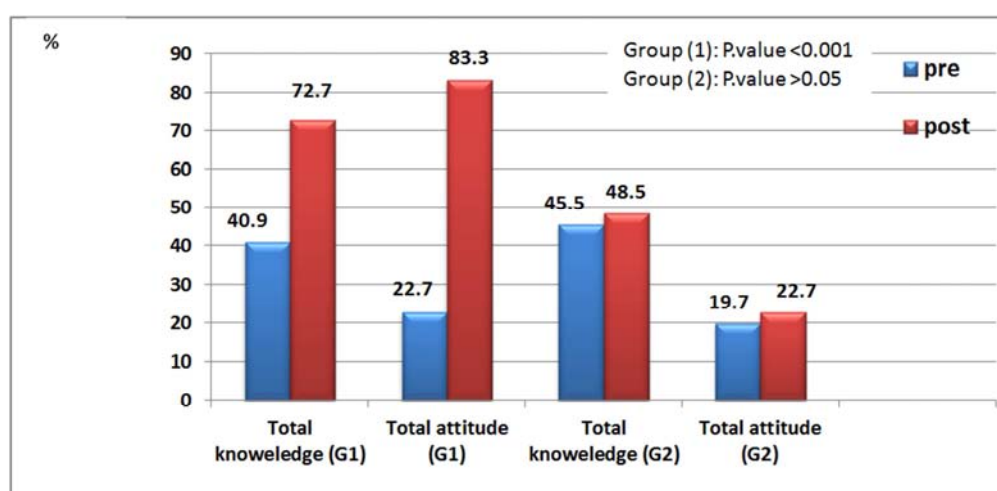


Figure 1. Changes of total knowledge and attitude among studied groups after two months from intervention among group (1) and from pre test among group (2).

Regarding Comparison between blood pressure levels of studied group (1) and studied group (2) before the intervention Table (8). There is no statistical significant difference in both systolic and diastolic blood pressure between the two groups.

Table 8. Comparison between blood pressure levels of studied groups at the beginning of the study.

Blood pressure	Group (1)	Group (2)	t test	P
Systolic mean \pm SD	144.7 \pm 12.7	145.1 \pm 12.2	0.7	0.485
Diastolic mean \pm SD	93.8 \pm 7.9	94.2 \pm 6.9	1.64	0.103

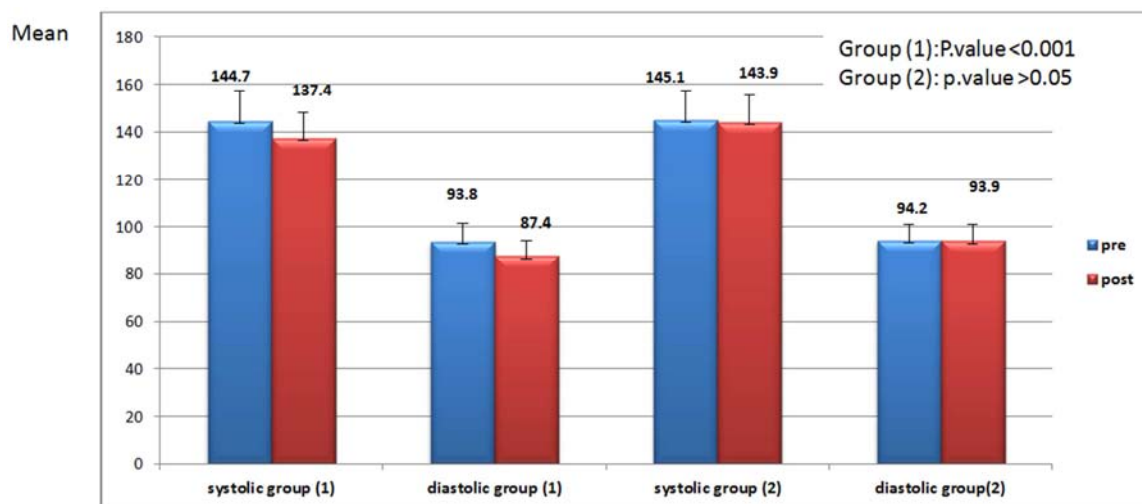


Figure 2. Changes of blood pressure among the studied groups after two months from intervention among group (1) and from pre test among group (2).

As regard Changes of blood pressure among the studied group (1) & group (2) (Figure 2). There is statistically significant reduction in both systolic and diastolic blood pressure in group (1) after application of health education intervention. The mean systolic blood pressure had decreased from 144.7 before intervention to 137.4 after intervention and mean diastolic blood pressure had decreased from 93.8 before intervention to 87.4 after intervention. While there is no statistical significant change in both systolic and diastolic blood pressure among group (2).

4. Discussion

4.1. Assessment of the Patient's Knowledge

In the present study there was no significant difference between the intervention and the control group neither in general knowledge about DASH nor in knowledge about the serving size in DASH before the intervention (table 2 and table 3). This may be due to most of patients were of relatively the same social class and there was no significant difference in their educational level.

This result was consistent with Jeng, (2011) Al-Weedy et al., (2014) and Kamran et al., (2015) who studied the effect of DASH educational intervention on knowledge, self-efficacy and dietary practice, there was no significant difference in knowledge between intervention and control group before the intervention. Also, it was consistent with the results of Habib et al., (2016) who revealed no significant difference between the intervention and the control group neither in general knowledge about DASH nor in knowledge about the serving size in DASH before the intervention.

4.2. Effect of Health Education on Patient's Knowledge

Knowledge plays an important role in the nutrition of hypertension patients. (Ford et al, 2009). It is well known that health education can result in lifestyle modifications and improve blood pressure control in hypertensive patients (Shaw and Bosworth, 2012).

In the present study the application of nutritional education in the intervention group (1) led to significant improvement in all items of general knowledge, knowledge about serving size and total knowledge about DASH diet (table 5, 6 figure 1).

These results were consistent with the results of the study by Magadza et al., (2009), Jeng, (2011) and the study by Pandey et al., (2013) which indicated a significant increase in nutritional knowledge of the patients after the intervention.

This result also agreed with Harrison, (2014) who tested the efficacy of educational intervention about DASH in classrooms versus internet education. Seung-Hye and Choi-Kwon (2014) also reported that one educational session increased dietary knowledge but dietary self-efficacy and DASH diet compliance did not increase significantly. Also, this study was consistent with result of Habib et al., 2016 who revealed significant improvement of knowledge of interventional group regarding general knowledge about DASH and knowledge about the serving size of DASH after the intervention done on hypertensive Patients Attending Dierb Negm hospital.

Assessment of knowledge of the control group (2) after two months of application of the pretest revealed that there was no significant change neither in general knowledge about

DASH nor in knowledge about serving size and total knowledge (table 5, 6 figure 1). These results may be explained by

- They were not given health education sessions about DASH by their doctors.
- Absence of mass media campaigns about DASH during the period of the study.

The studies of Jeng, (2011), Al-Wehedyet et al., (2014) and Habib et al., 2016 also reported that there was no significant change in knowledge of the control group.

4.3. Assessment of the Patient's Attitude

This study found that only (22.7%) had satisfactory attitude among group (1) and (19.7%) among group (2) (table 4). This result may be attributed to lack of awareness in hypertensive patients about healthy life style. The low level of awareness may be explained by:

- Lack of mass media campaigns about DASH eating plan and other life style modifications.
- Doctors ignore nutritional education as a part of hypertension management.
- Doctors don't educate patients how to follow the DASH eating plan.

In India, Mahajan et al (2012) revealed that the majority of hypertensive patients had unsatisfactory attitude. Also, it was relatively consistent with results of Habib et al., 2016 who revealed that 13.6% of studied population had satisfactory attitude before health education intervention.

On the contrary Sabouhi et al (2011) reported that patient's attitude was good (58.2%).

The present study revealed that there was no significant difference in patient's attitude between the two groups before intervention (table 4). This may be attributed to homogeneity of the studied sample in socio demographic characters and level of knowledge.

This study showed that 21.2 % of the patients agreed that DASH diet is important in hypertension management (table 4). This result was going with Mahajan et al (2012) stated that only 5% of patients agreed that DASH diet is important in hypertension management. While, it was in contrary with Sabouhi et al (2011). Tadevosyan (2013) and Rakumakoe (2011) reported better attitude (70% and 96% respectively) and Habib et al., 2016 revealed 50 % of the patients agreed that DASH diet is important in hypertension management.

About 71.2% of the participants agreed that reducing salt is important in controlling blood pressure (table 4). This result may be attributed to good knowledge of patients about salt effect on blood pressure. This result was consistent with Mahajan et al (2012) and Habib et al., 2016 who revealed 71% of the participants agreed that reducing salt is important in controlling blood pressure. Other studies conducted by Parmar et al (2014) and Tadevosyan (2013) reported that (40% and 51% respectively) of patients agreed that reducing salt is important in controlling blood pressure.

The present study showed that 59.1% of the patients agreed that fruits are better than sweets as a desert and 24.2% of the sample agreed that exercise and stop smoking are

important in hypertension management (table 4). This result was consistent with Mahajan et al (2012) and Habib et al., 2016. Parmar et al (2014) and Rakumakoe (2011) reported better attitude (45.2%, 82% respectively). This discrepancy is due to lack of knowledge about the importance of exercise and stop smoking in controlling hypertension, old age of the patients and lack of facilities to exercise.

4.4. Effect of Health Education on Patient's Attitude

In the present study the application of nutritional education in the intervention group, lead to significant improvement in patient's positive attitude (table 7 and figure 1). This result may be attributed to improvement of patient's knowledge after health education sessions.

This result was consistent with Mahajan et al (2012), Sabouhi et al (2011) and Habib et al., 2016.

There was no significant change in attitude of patients in the control group two months after application of the pretest (table 7 and figure 1) because there was no change in patient's knowledge. This result was consistent with Habib et al., 2016.

4.5. Changes of Blood Pressure in Intervention and Control Group

In this study there was no significant difference in the mean of systolic and diastolic blood pressure between the two groups before the intervention (table 8) because of the homogeneity of the sample in socio demographic characters and the level of knowledge.

After the intervention, there was significant difference in the mean of systolic and diastolic blood pressure in the intervention group (G1) (figure 2). The mean systolic blood pressure had decreased from 144.7 before intervention to 137.4 after intervention and mean diastolic blood pressure had decreased from 93.8 before intervention to 87.4 after intervention. These results were consistent with Appel et al (1997) and Al-Wehedyet al (2014). Also, it was consistent with Habib et al., 2016 who revealed decrease of mean systolic blood pressure from 142.7 before intervention to 139.2 after intervention and mean diastolic blood pressure had decreased from 91.2 before intervention to 89.2 after intervention.

Burke et al (2007) observed the benefits of the lifestyle modification program provided to hypertensive patients and found that 89% of the studied subjects reported healthy behaviors as decrease dietary fat, increased physical activity, decrease weight, and increase fish and vegetable in diet.

The DASH diet lowered systolic blood pressure by an average of about 6 mm Hg and diastolic pressure by about 3 mm Hg. The diet that was merely higher in fruits and vegetables also lowered blood pressure, but by a lesser amount: about 3 mm Hg systolic and 2 mmHg diastolic (Appel et al., 1997).

On the contrary the study of Seung-Hye, (2014) there was no significant change in blood pressure in both experimental and control groups.

In this study there was no significant change in blood pressure in the control group (G2) (figure 2) because there was no change in knowledge nor in attitude of the patients. It was consistent with Habib et al., 2016.

5. Conclusion and Recommendations

We conclude from the results of the present study that the educational program for hypertensive patients about DASH diet proved its success in improving patient's knowledge, attitude and reduction of blood pressure level. So we recommend the following:

- Develop health education campaigns in mass media about importance of DASH diet and other life style modification in management of hypertension.
- Continuous training of physicians and providing them with recent guidelines to improve their knowledge about hypertension management.

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