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Impact of Compliance to DASH Teaching Dietary Guidelines on Hypertension and Dietary Knowledge among Egyptian Sample

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Abstract
Elevated blood pressure remains an extraordinarily common and important risk factor for cardiovascular. DASH diet encourages reducing the sodium in diet and eating a variety of foods rich in nutrients that help lower blood pressure, such as potassium, calcium and magnesium. The **aim** of this study was to evaluate the impact of compliance to DASH teaching dietary guidelines on blood pressure and dietary knowledge among Egyptian sample.Quasi-experimental **design** was utilized in this study**.** Convenience sample of 90 adult male and female patients were recruited to the study. **Four tools** were formulated to collect data pertinent to the study: (1) Socio-Demographic data;(2) Nutritional Assessment (3); Nutrition knowledge questionnaire, and (4); DASH Adherence Score. **The study finding** revealed that the total dietary knowledge post- test mean score for DASH was greater than control group (25±2.8), and (13.44±2.6) respectively. The study results decumented reduction in both systolic and diastolic blood pressure among the DASH group(5-13 mmhg, 3-7mmhg)respectively. Also,there was a reduction in blood pressure among Control group(1-3mmhg in diastole,1-5 mmhg in systole) respectively. The study finding showed that there was gradual increase in the total dietary compliance mean score during the frist, second and the fourth week among DASH group(3.47±.17, 6.04±.21, and 8.22±.17) respectively in comparsion to control group(3.04±.16, 5.07±.22, and 4.8±.21) respectively. Also, there was also statistically significant differences put into evidence among the DASH and control at (F=1 311.06*, and at p=.000).**Conclusion**: we can conclude that, patients exposed to the DASH teaching dietary guidelines showed improvement in their conditions. This improvement was manifested by increased DASH Adherence Score, Nutrition knowledge score, and reduction in systolic and diastolic blood pressure within four weeks among the pre-hypertensive and stage 1 hypertension among Egyptian sample respectively. The study recommended that DASH diet eating pattern should be a central pillar in teaching pre-hypertensive adults to maintain hypertension control. Additional research is required to investigate the effect dietary fiber intake, and behavioral eating pattern among hypertensive Egyptian people.
Keywords: DASH diet, Knowledge, Compliance, Hypertension.

Introduction

Cardiovascular diseases (CVD) are associated with 13% of deaths whereas 62% of strokes and 49% of ischemic heart disease occurrences are attributed to a raise in blood pressure. Hypertension is the primary cause of CVD and imposes a great burden to the healthcare system (Mendis, Puska & Norrving, 2011; Salehi-Abargouei, Maghsoudi, Shirani, and Azadbakht, 2013). A recent study conducted in Egypt found the prevalence of hypertension (16.5%), undiagnosed hypertension (11%), and uncontrolled hypertension (30%) (Elaziz et al., 2014).

Blood pressure is classified into four categories; normal, prehypertension (mild), stage 1 (moderate), and stage 2 (severe). A sphygmomanometer is the instrument that measures blood pressure, tracking the systolic pressure (force of blood in the patient's arteries as the heart beats) (Orenstein, 2009). Systolic pressure that is greater than or equal to 140mm Hg indicates high blood pressure. Systolic less than 120mm and diastolic less than 80mm Hg is considered normal. Systolic between 120-139 HB or a diastolic between 80-89mm Hg is considered Prehypertension. Systolic between 140-159mm Hg or diastolic 90-99mm Hg is considered stage 1. Systolic 160mm Hg or higher or diastolic 100mm Hg or higher is considered stage 2 (Orenstein, 2009). It is recommended that individuals with prehypertension make lifestyle changes like exercising and eating healthy to prevent the onset of hypertension. Individuals who fall in the stage 1 or stage 2 categories are urged to make healthy lifestyle changes while also taking medication that reduces blood pressure, the risk of heart disease, and stroke (Orenstein, 2009).

Dietary and lifestyle interventions are important behavioral strategies for cardiovascular risk reduction. The DASH diet (Dietary Approaches to Stop Hypertension) is recommended by the American Heart Association for the non-pharmacological management of hypertension strategies for cardiovascular risk reduction (Eliat-Adar, Sinai, Yousefy, & Henkin, 2013; Stuart-Shor, Berr, Kamau, & Kumanyika, 2012). The DASH dietary pattern has significantly reduced blood pressure among both normotensive and hypertensive adults. This pattern promotes low intakes of fat, sodium and processed foods with high intakes of fruit and vegetables (Fung et al., 2008).In comparison with typical diets, the DASH diet provides lower amounts of total fat, saturated fat, and dietary cholesterol, while providing higher amounts of potassium, calcium, magnesium, fiber, and protein.

Therefore, some studies have proposed other useful effects of this dietary approach, suggesting it is an effective dietary pattern for the prevention of CVD(Blumenthal et al., 2010; Azadbakht et al., 2011)**.**

When patients undertake dietary therapy, they are more likely to keep blood-pressure in control when they meet regularly with clinicians or ancillary medical personnel with expertise in dietary management (Eriksson, Franks & Eliasson, 2009; Geaney et al., 2015).Nutrition education is an effective way to improve diet among many population groups (Eyles & Mhurchu, 2009) and has shown to be effective in increasing diet adherence among individuals with chronic disease. Increased knowledge should then subsequently improve nutrition behavior (Franz, Boucher, Green-Pastors, &Powers, 2008). Although ambiguity exists regarding the relationship between nutrition knowledge and diet quality, previous research has indicated that individuals with greater nutrition knowledge are more likely to consume healthier diets (Ball, Crawford & Mishra, 2006; Turrell & Kavanagh, 2006). However, the extended effect of nutrition knowledge on diet-related diseases like hypertension also remains unknown (Anderson, Winett, & Wojcik, 2009).

Nursing plays a key role in nutrition education because nutrition is a part of patient outcomes (Higgins, Daly, Lipson, & Guo, 2006). The nurse as a nutrition educator has a vital role in the overall healthcare system. Moreover, Reed (2014) emphasized that nurses are also an integral part of providing nutrition related information to patients. Therefore, nurses can provide intervention including education about low low-sodium Dietary Approaches to Stop Hypertension (DASH) (Blumenthal et al., 2010).

Purpose

The purpose of this study was to evaluate the impact of compliance to DASH teaching dietary guidelines on hypertension and dietary knowledge among an Egyptian sample. Patients' outcomes were measured in relation to its effects on blood pressure, 'dietary knowledge and compliance score. Thus, the study hypotheses were three fold; the first is; H1. Participants' blood pressure means scores who will receive DASH teaching dietary guidelines will experience lower mean scores than participant who will not receive teaching dietary guidelines. The second is; H2. Participants' DASH dietary knowledge mean scores who will receive DASH teaching diet guidelines will experience higher mean scores than participant who will not receive teaching dietary guidelines. The third is; H3. Participants' DASH compliance means scores who will receive teaching dietary guidelines will experience higher means scores than participant who will not receive Teaching Dietary Guidelines.

Methodology:

Design and Sample

A quasi- experimental design was utilized to conduct this study**.** The study was carried out at the Orthopedic and Surgical departments at El-Manial University Hospital in Egypt. A purposeful sample of 90 participants newly admitted during the preoperative phase was recruited to this study. Participants were randomized into two groups: 1) the DASH group who received the intervention, and 2) the control group who consumed hospital provided. The sample included male and female patients aged between 30–70 years; with systolic blood pressure ranged from 121 to 149 mmHg and diastolic blood pressure ranged from 81 to 98 mmHg. Participant inclusion criteria also included patients who can read and write, had no hindering factors to communicate, do not follow special diet, and do not receive any hypertensive medication. Exclusion criteria were patients presenting complications of hypertension, like stroke, cerebral vascular accidents (CVA), and patients presenting co morbidities like diabetes mellitus, renal failure, and ischemic heart disease (IHD). The exclusion criteria were considered because patients with other co morbid conditions might require special diets; therefore, the gathered data could not be generalized to hypertensive patients (Kamran, Azadbakht, Sharifirad, Mahaki, & Sharghi, 2014).

Data Collection:

Four tools were utilized to collect data pertinent to the study: **(***1)Socio-Demographic Data*, data related to age, gender, and level of education,(2*) Nutritional assessment questionnaire*, data related to diagnosis, blood pressure, BMI, age, weight, waist, and arm circumference,(3*) Nutrition knowledge questionnaire*, and(4*) DASH Adherence Score.*

(*2)Nutritional Assessment sheet:*

BMI was calculated as kg/m2. Participants were classified as underweight (BMI ≤18.49 kg/m2), normal (BMI = 18.50–24.99 kg/m2), overweight (BMI = 25.00–29.99 kg/m2) or obese (BMI ≥30.00 kg/m2) (WHO, 2000). Waist circumference (WC) was measured midway between the lowest ribs on the right side to the top of the iliac crest on standing participants with the use of a cloth tape measure. Resting Blood pressure was measured on the participants left arm with a mercury sphygmomanometer while the participant in a sitting position. Three readings were recorded. Resting blood pressure was based on the average of the 2nd and 3rd readings. A participant was identified as hypertensive if their average systolic was ≥140 mm Hg or average diastolic was ≥90 mm Hg based on the American Heart Association guidelines (Pickering et al., 2005).

Nutrient Intakes:

Nutrient intake was measured using participants' three-day dietary records (two week days and one weekend day) using a 24-hour dietary recall method. Average daily intake was calculated using nutri-Plus ver4.0 for food analysis.Nutrient intake analysis was performed for calculating total daily required nutrients, including calories, proteins, lipids, carbohydrates, calcium, potassium, and dietary fiber.

(*3)Nutrition knowledge questionnaire:*

The Nutrition knowledge questionnaire included seven domains: (1) blood pressure & hypertension, (2) health benefits for DASH and components of the DASH diet, (3)fiber diet, (4)sodium intake, (5) fat intake, (6) calcium, and phosphorus-rich food groups, (7) sodium and potassium-rich food groups. Participants were asked to complete all questions. Each correct answer scored 1. Incorrect and missing values scored 0. Subscale scores were calculated for each domain. The sum of the seven sections was calculated to give a maximum potential score of 40 grades. Content validity was determined by the specialists' opinions, who are expert in the nutrition field in particular, and other professors in the medical surgical nursing field. The internal consistency for the overall nutrition knowledge score was 0.716. Cronbach's alpha ranges from 0 to 1 and a score of≥0.7 is accepted value.

(4)DASH Adherence:

DASH adherence was assessed using a scoring scheme adopted from Folsom, Parker &Harnack**,** 2007. A composite DASH adherence score was generated using the sub scores from 10 equally weighted food and nutrient components (i.e., grains; fruits; vegetables; nut, seeds, and legumes; dairy; meat; fat; saturated fat; sweets; and sodium). The selection of the individual components and the generation of the scoring criteria were based on nutrient intake estimates and daily serving recommendations previously established for the DASH diet plan.

A score of 0 to 1 was assigned for each dietary component and summed across the 10 components to yield the total DASH diet adherence score. Individuals consuming at or above the recommended number of servings for a particular food group received a component score of 1; partial credit (0.5 points) was given for intake levels approaching the recommended level; and 0 points were awarded for intake levels below the minimum target intake recommendation. For example, 1 full point was awarded to an individual consuming four or more servings of vegetables on a typical day; 0.5 points was awarded for consuming two to three servings per day; and 0 points were awarded for anything less than two servings of vegetables per day. Individual component sub-scores were summed to yield a composite DASH adherence score ranging from 0 to 10. A score of 10 represented full adherence to the DASH diet, with a score of 0 reflecting complete non adherence (Epstein et al., 2012).

Intervention:

DASH group:

Patients meeting the inclusions criteria were identified. Structured interview and observational methods were done to assess the baseline characteristics for intervention. Recording of the patients' responses was done throughout Socio-Demographic and Nutritional Assessment, pretest-Nutrition knowledge, and DASH Adherence Score questionnaires.

The diet was explained during the first study day and started the following day for 30 days, during preoperative phase where the patients were waiting their turn in the schedule. Dietary food intake for 24 hours recalls were recorded by patients themselves for 3-days per week in food diaries and followed by discussion with the individual. Greatest emphasis was placed on consuming the fruit, vegetable, and low-fat dairy foods, as well as the salt restriction. The importance of reducing saturated fat and refined carbohydrate and increasing complex carbohydrate intakes was also stressed. Suggestions on how to increase fruit and vegetable consumption were also provided. The study diet was based on the DASH intermediate sodium diet (Lin et al., 2003).

Patients ate hospital food offered to them. In addition to they ate 4-5 servings of fruits and vegetables common during the period of the study. An instructional booklet was given to the DASH group. The theoretical content of the instructions was concerned with: 1) identification of DASH diet, 2) health benefits of DASH diet, 3) schedule elaborating food groups, 4) size and number food serving, 5) examples of common used foods, 6) health benefits of each food groups, and 7) advice to reduce dietary salt intake. Evaluation of the program outcome was measure by monitoring blood pressure three times per week for four weeks. Nutritional Knowledge post-tests were done on the fourth day, and Adherence Scores were recorded on the fourth and thirtieth day.

The program instructed patients on the DASH diet over three 45-minute in-person group classes. Packets of all information presented in each class were distributed to all participants.The total servings of tea, coffee, and/or carbonated beverages were limited to no more than three drinks per day.

Control group:

Participants ate hospital food offered to them which was a balanced diet with intermediate sodium diet intake. They ate 2 serving of fruits and one serving of vegetables. They were not given any instruction related to sodium restriction, or number of serving of fruits, vegetables, tea, coffee, and beverages. Participants were asked also to record 24 hours food recalls during the study period. Blood pressure was recorded three times per week for four

weeks. Nutritional Knowledge post-tests were done on fourth day. In addition, Adherence Scores were documented during the fourth and thirtieth day.

Ethical Considerations

A final approval had been taken from the Ethical Committee of Scientific Research at Faculty of Nursing Cairo University to conduct the study held on 12/5/2015.Prior to getting Ethical Committee of Scientific Research approval, hospital acceptance to conduct the research was obtained from El-Manial University Hospital. Every patient was met individually and a written informed consent for participation was obtained.

Statistical Analysis

Statistical analysis was performed using SPSS for Windows, version 19. Descriptive statistics and frequencies were computed to describe sample characteristics. T-test was performed to compare the mean score for knowledge between two groups. Two way ANOVA was used to compare mean differences in continuous variables between groups for blood pressure, compliance score, and dietary intake. Nutritional data for 24 hour recalls were analyzed by Nutri–Plus Software version 4.0 registered in 2013 by Information Technology Industry Development Agency affiliated to Ministry of Communications and Information Technology in Egypt. This program utilized Food Composition Tables as a reference book affiliated to National Nutrition Institute Cairo, in Egypt, 2006. Internal consistency of the nutrition knowledge score was measured using the Cranach's alpha statistic.

Results:

Table (1):

Participant Characteristics among the DASH and control group N (45) for each:

	Control group		**DASH Group**		**Test**
	N	**%**	**N**	**%**	
Age:					
30-40	10	22.3	18	40.0	
41-50	20	44.4	15	33.3	
51-60	12	26.6	10	22.2	
60-70	3	6.7	2	4.5	
Gender:					
Male	23	51.1	24	53.3	
Female	22	48.9	21	46.7	
Level of education:					
Can read & write	6	13.3	8	17.8	
Primary education	7	15.6	9	20.0	
Secondary education	12	26.7	10	22.2	
Technical Education	17	37.8	13	28.9	
Bachelor	3	6.6	5	11.1	
Diagnosis:					
Hip& knee -replacement	27	60.0	30	66.7	
External fixation	10	22.2	9	20.0	
Hernia	5	11.1	2	4.4	
Breast cancer	3	6.7	4	8.9	
	Control group		**DASH group**		**Test**
	Mean& SD		**Mean& SD**		**t-test/p value**
Age	47.15±8.79		43.977±8.81		1.703/.92
Weight	74.91±9.65		81.64±10.19		-1.004/.318
Height	1.67±.0985		1.69±.0153		-3.217/.002*
BMI	26.61±2.04		28.28±1.96		-3.945/.000*
Arm circumference	33.90±2.62		35.87±5.66		-2.126/.036
Waist circumference	95.066±8.51		97.04±7.71		-1.154/.252

Table (1) shows that more than half of the studied sample in middle adulthood among the control and the dash group in percentage of 66.6%, 73.3% respectively. With a mean and SD equal to (47.15±8.79 and43.977±8.81).More than half were male among the control and dash group.66.7% of the DASH group performed hip and knee replacement surgical operation but 60.0% among the control group. As regards to anthropometric measures; BMI, height, weight, arm and waist circumference means and standard deviation among the DASH group were greater than control. Also, age, weight, arm &waist circumference showed no

statistical significant difference with p value (.92,.318,.036,& .252). But height and BMI recorded significant difference with p value.002* and .000*.

Table (2): Comparison of Pretest Dietary Knowledge Total Mean Score for the Control and DASH group.

Questions background	Control group		Dash group		T-test/p value
	Mean	SD	Mean	SD	
1-4.Data related to blood pressure & hypertension(4)	1.2	.73	1.2	.73	
5-10.DASH diet(9)	1.6	.82	1.66	.82	
11-12.fiber intake(2)	.80	.62	.800	.62	
13-14.Sodium intake(2)	.77	.67	.77	.67	
15-17.fat intake(3)	.55	.58	.55	.58	
18- food rich in Ca++&Mg(10)	2.35	1.38	2.75	1.02	
19-foods rich in Na &k(10)	1.48	1.27	2.53	1.65	
Total test Score (40)	Mean 8.86	SD 2.6	Mean 10.31	SD 2.77	-2.53/.013*

Table (2) reveal that dietary knowledge background mean score for the control and study group are the same except questions number 18, 19 are greater among the study than control group. Also, there is a significant relationship between the study and control group with p value equal to (-2.53/.013*).

Table (3): Comparison of Post-test Dietary Knowledge Total Mean Score for the control and DASH group.

Questions background	Control group		Dash group		T-test/p value
	Mean	SD	Mean	SD	
1-4.Data related to blood pressure & hypertension(4)	1.6	.61	2.26	.93	
5-10.DASH diet(9)	2.5	.84	5.06	1.6	
11-12.fiber intake(2)	1.17	.64	1.55	.62	
13-14.Sodium intake(2)	.955	.67	1.5	.54	
15-17.fat intake(3)	.82	.88	1.62	.71	
18- food rich in Ca++&Mg(10)	3.35	1.22	5.57	1.28	
19-foods rich in Na &k(10)	2.95	1.16	7.42	1.23	
Total test Score (40)	Mean 13.44	SD 2.60	Mean 25.06	SD 2.86	-20.13/.000*

This table shows that dietary knowledge background means score for all questions in the Dash groups are greater than the control. The total dietary knowledge background means score for Dash is greater than control (25±2.8), 13.44±2.6) respectively. There is a significant relationship between mean score for DASH and control group with t -test /P value equal to (-20.13/.000*).

Table (4): Comparison of the Total Means Scores for DASH Diet Compliance Criteria among the Control and DASH group during the first second, and fourth week N =45: Total compliance score(10):

Compliance Criteria	Control group		Dash group		F Ratio/p value
	Mean	SD	Mean	SD	
grain	.84	.25	.91	.22	
Vegetable	.53	.37	.83	.33	
Fruits	.43	.29	.85	.29	
Diary	.41	.48	.85	.34	
Meat, poultry, and fish	.76	.40	.88	.27	
Nuts, seeds, and dry beans	.40	.42	.73	.42	
%kcal from fat	.48	.47	.75	.42	
%kcal from saturated fat	.46	.48	.78	.37	
Sweets	.20	.37	81	.37	
Sodium	.32	.37	.78	.39	
Total compliance score	Control		Dash group		

	First week	Second week	Fourth week	First week	Second week	Fourth week	F/P value
Mean& SD	3.04±.16	5.07±.22	4.8±.21	3.47±.17	6.04±.21	8.22±.17	1311.06/.000*

As shown in Table (4) it reveals that there is gradual increament in the total compliance score during the frist, second and the fourth week respectively among the DASH group. There were statistically significant in means difference for DASH and control group in compliance Criteria total score throughout the first, second and four week with p value equal to(1311.06/.000*).

Table (5) Comparison of Blood Pressure Means Score between the Control and Dash group during four weeks N=45.

Weeks / Days	Control		Study	
	Means &SD		Means &SD	
	systole	diastole	systole	diastole
First week				
1st day	144.24±7.65	91.48±	145.82±6.43	91.55±4.05
4st day	144.08±11.66	93.04±	144.24±5.90	90.55±3.98
7st day	143.80±7.75	91.22±	143.64±5.38	90.28±3.84
Second week				
8th day	143.37±7.07	89.20 ±	143.40±5.21	89.88±3.82
11th day	143.37±7.07	89.20±	142.33±4.43	88.02±3.58
14th day	143.37±7.07	89.20 ±	139.95±4.07	87.08±8.05
Third week				
15thday	141.60±6.80	87.26 ±	133.51±3.65	85.80±3.37
19thday	141.20±6.40	86.51±	133.48±3.75	84.91±3.09
21thday	139.86±5.89	87.26 ±	133.15±2.66	82.24±7.48
Fourth week				
22th day	139.84±5.85	87.2667	133.48±2.71	82.06±7.42
26th day	138.95±5.60	86.7556	133.15±2.54	81.42±7.30
30 day	139.06±5.35	86.3333	132.95±2.46	81.02±7.29
	Systolic blood pressure		**Diastolic blood pressure**	
ANOVA test F/P value	58592.91 ,.000*		40550,81 , .000*	

As shown in Table (5) it reveals that there is a gradual decreament in the diastolic and systolic blood presure measurment from frist week until fourth week among the study and Dash groups.But decreament in blood pressure in both systolic and diastolic is greater among the Dash group rather than control group.Also , there is a significant differences put into evidence among Dash and Control groups in relation to systolic and diastolic blood pressure measurement with F/P value equal to (58592.91 ,.000*&40550,81 , .000*) in the 7th day, in 14th ,and 30th day respectively.

Table (6) Comparison of Dietary Food Intake Means Scores between the Control and DASH groups during four weeks N=45.

Macronutrient	Control group			DASH group			ANOVA Test
	1st week	2nd week	4rd week	1st week	2nd week	4rd week	
	Means &SD	Means &SD	Means &SD	Means &SD	Means &SD	Means &SD	
Total calories per day	2838.9±996	2831.8±871	2619.2±778	1768.9±437.8	1868.7±472.2	1870.9±385.8	3045.7/.000*
CHO	427.5±170.9	418.4±141.7	431.2±140.2	245.1±63.3	250.2±59.5	250.9±70.8	2046.9/.000*
Sodium	6333.2±351.6	4798.3±252	3521.7±229.9	2595.4±231.3	2430.1±210.3	2326.6±180.3	1287.9/.000*
Fiber	11.0±.57	11.8±.66	11.77±.76	14.6±.63	22.3±1.2	22.6±1.8	1490.3/.000*
Total Fat	165.3±33.5	79.6±5.2	67.9±6.4	62.3±4.2	52.3±3.4	49.1±2.9	188.8/.000*
Ca++	667.1±241.7	565±305.1	712.8±.368.7	906.3±346.4	1092.1±409.8	1169.5±409.2	1764.4/.000*
K	2245.7±1083.4	2814.7±1642.9	2366.5±1406	3325.1±1029	3151.6±1092.5	3631.1±1081	2198.5/.000*

N.B daily requirement of total calories 2000 calorie, CHO=300g , Sodium= 2300mg, fiber= 25g, fat=65 g, Ca++ = 1000 mg , K=3500mg , P/ is significant at ≥.05 %

Table (6) documented that there is gradual decrease in dietary intake mean scores of sodium, fat, CHO, and total calories among the DASH group in comparison to control group during the first, second and the fourth week respectively. In contrast, there is gradual increase in dietary intake mean scores of fiber, Ca++, and K. There were also, statistically significant differences put into evidence among the DASH and control group during the first, second, and fourth week (F= 3045.7*, 2046.9*,1287.9*, 188.8, 1764.4,* 2198.5* at p=.000).

Discussion

Discussion focuses upon the findings related to the stated hypotheses of the study. The study finding that ansewr the frist hypotheis reveals that there is a decreament in systolic and diastolic blood presure measurment among DASH group by 12.9 mmHg, and 7.0 mmHg respectively. In support, Meta-analysis done on 17 studies contributing 20 comparisons indicated that the consumption of the DASH diet significantly reduced SBP by 6.74 mmHg and DBP by 3.54 mmHg (Saneei, ,et al ,2014). In the same context, (Sacks,2010) recorded that after 8 weeks, among the participants with hypertension, the diet rich in fruits and vegetables reduced systolic and

diastolic blood pressure by 7.2 and 2.8 mmHg more, respectively, than the control diet (P<0.001 and P = 0.01, respectively). A possible explanation of this finding is the DASH diet designed to reduce intake of saturated fat, total fat, sodium, and; increase intake of fruits and vegetables; and increase consumption of potassium, calcium, magnesium, fiber, and protein (Karanja, et al. 1999). As well as adherence to DASH is a key component to controlling blood pressure as recommended by the Seventh Report of the Joint National Committee (JNC7) (U.S. Department of Health and Human Services, 2004). Our results were consistent with. Couch**, et al,** 2008). Blumenthal .et al (2010) they found that the DASH eating pattern had significant favorable effects on SBP and DBP in adults. They recommended that this dietary pattern can be easily adopted by all population groups and cost-effectively serve for the primary and secondary prevention of the raised BP and its complications.

Another possible explanation might be due to reduction to dietary sodium intake. Also, this might explain the reduction in blood pressure in both SBP ,and DBP among the control group, in spite of they did not eat dash diet .The Sodium intake initiates an autoregulatory sequence that leads to increased intravascular fluid volume and cardiac output, peripheral resistance, and blood pressure(Adrogué , Madias2007,. O'Shaughnessy ,Karet, 2006).Therefore, Epstein et .al. 2012, reported that daily dietary sodium should be restricted to 2300 mg. The original DASH feeding trial, in which subjects were provided with all their food, demonstrated a significant reduction of SBP and DBP in patients with stage 1 hypertension by 11.4 and 5.5 mmHg net of the control, respectively (p, 0.001 for both). Such BP lowering effect occurred within 2 weeks (Adrogué.,,& Madias,2007; Epstein et .al. 2012).

In very recent Studies, have demonstrated the importance of sodium in hypertension control repeatedly. The study that found that reducing the sodium intake in patients and healthy subjects for 4 weeks or more, results in a significant reduction in blood pressure (Li, &.Macgregor,2013).Therefore, consumers and health care providers should be aware of the lower sodium recommendation, and health care providers should inform their patients of the evidence linking greater sodium intake to increased BP. Sodium reduction is recommended for persons with hypertension and as first-line interventions for persons with pre-hypertension.

The present study reported that there was a statistical significant for a Dietary adherence criteria among the DASH, and Control group, Also there were increase in mean score for fruit and vegetables among the DASH group this could explain explain the greater reduction in blood pressure among the DASH group than Control group. In congruent with this finding, Tayela, El-Sayedb., and El-Sayeda. (2013) indicated that the consumption of fruits and vegetables was low and this low consumption was associated with the increased levels of both SBP and DBP.

The third possible explanation for blood pressure reduction might be due to increase dietary fiber intake among the DASH group. In support, a meta-analysis of these trials, restricted to the 20 trials that only increased fiber intake, showed that supplemental fiber (an average increase of 14 g/d) was associated with net systolic BP and diastolic BP reductions (Slimko, &. Mensah, 2010).

In relationship to second hypothesis the study results indicated that post nutritional knowledge score, is greater than pre nutritional knowledge score among the DASH and control group. Also, there was a statistical significant relationship between post nutritional knowledge and pre nutritional knowleage total score. This finding explained the greater reduction in blood pressure among the DASH group than control group. In support Abolfotouh, Soliman, Abolfotouh, Sameh and Raafat (2011)found that the study findings showed that higher nutrition knowledge was associated with better diet quality and lower blood pressure . In accordance with these results Geaney et. al (2015) indicated that without knowledge, patients usually discontinue their nutritional management of hypertension, making it difficult to control and manage the disease. A possible explanation of these finding might be due to nutrition educational program delivered to the DASH group. Heath education was designed to improve health by increasing people's theoretical and practical knowledge and to encourage changes in attitude regarding health behaviors (Appel,2009). In support to this explanation, many studies reported that intervention studies focusing on dietary education, which included face-to-face dietary counseling by dietitian, phone calls, also observed a significant reduction of SBP and DBP ranged 5.6–11.2 mmHg and 4.1–7.5 mmHg respectively (Nowson,Patchett ,Wattanapenpaiboon., & (2009); Blumenthal,Babyak, Hinderliter,Watkins,&, Craighead., L, et al.2010)-.in the same context a study entitled" Dietary pattern and blood pressure levels of adolescents in Sohag, Egypt"in 2013 indicated that nutritional education programs should be implemented by nutritionists and health professionals to provide the primary prevention steps for decreasing the risk of hypertension in adolescents and through adulthood(Tayela, El-Sayedb., &. El-Sayeda (2013,). Also, a very recent systematic review done by Oyebode, Oti, Chen., &. Lilford in 2016 and Wright 2010 concluded that health education strategies in nursing practice should be valued in promoting healthy eating habits of hypertensive people.

It is worth considering that the study results documented that there was gradual increament in the total compliance DASH score during the frist, second and the fourth week respectively among the DASH group in comparision to control. Possible explaining of this finding might be due to giving verbal and written dietary guidelines instruction .in addition to feeding the studied subject with available and suitable DASH foods with the

help of hospital kitchen.

The previously findings were supported with those of a study done by Eriksson, Franks, &,Eliasson in (2009) which indicated that compliance with dietary therapy was better, and success rates in achieving blood-pressure control were higher, when accompanied by active guidance or counseling of the patient by clinicians or ancillary medical personnel with expertise in dietary management. In the same context Williamson et al., 2010 stated that the patient should be given written instructions on how to adopt a healthful diet such as the DASH diet, and a reduced-carbohydrate version of the DASH diet. The instructions should include ways to substantially reduce sodium intake.

It is worth mentioning that many research were done to study the effect of compliance to DASH diet on blood pressure .As a study done by Sacks , 2010 entitled "Dietary Therapy in Hypertension" .The study results revealed the profitable reducing effect of the DASH-like diet on both systolic and diastolic blood pressure in adults; although there was a variation in the extent of the fall in blood pressure in different subgroups. Similarly, a systematic review and meta-analysis on randomized controlled trials indicated that regardless of duration the DASH diet reduced BP of the interventions (below/above 12 weeks). Saneei, Salehi-Abargouei ,Esmaillzadeh , ,&Azadbakht (2014).In the same context , it was noteworthy that a study done for Pre-hypertensive and Hypertensive Group 1 among Egyptian patients found that adherence to DASH diet had rapid and statistically significant improvement in systolic and diastolic blood pressure in hypertensive grade 1 and pre-hypertensive participants. Hence, the study recommended that DASH diet was effective as a first line intervention of elevated blood pressure (Abdelhai, Khafagy ,Helmy , 2015).

In agreement with previously mentioned findings, the present study result pointed out that there was a statistically significant difference between DASH compliance score among the DASH group and control group. A possible explanation might be attributed to the implementation of dietary guidelines instruction, assessment, and monitoring delivered by the researcher. This emphasizes the significant role of professional nurse in improving patients' DASH diet compliance for pre-hypertensive patients. In support to this explanation**.** There are many publications address nursing care for patients with hypertension. In this respect,Jayasinghe, 2009 and Drevenhorn ,Bengtson , Allen , Saljo , Kjellgren**,**2007 indicated that nurses represent a formidable force in improving adherence and care outcomes by understanding the dynamics of compliance, and employing techniques in assessing and monitoring the problems of nonadherence . Because, nurses are well positioned to effectively use sustained strategies to improve adherence, thereby decreasing the global burden of hypertension. Furthermore,Guedes, 2012 explained that nurses are able to spend more time with patients, allowing more accurate assessment of patient's health perceptions. Education and ongoing support such as telephone contact are two key strategies to promote adherence. Ideally, collaborative relationships between patients and health care providers will result in improved adherence, thus teaching making anti-hypertensive therapies much more cost-effective Guedes, Moreira1, Cavalcante1, Araujo, ,Marcos, Lopes, Ximenes, &Vieira(2012).

Conclusion

Based on the results of the current study, it can be concluded that, patients exposed to the DASH teaching dietary guidelines showed improvement in their conditions. This improvement was manifested by increased dash compliance score, dietary knowledge score, and reduction in systolic and diastolic blood pressure within four weeks. Therefore, implementation of a teaching Dietary Guideline for pre- hypertension and stage 1 hypertension among Egyptian sample could prevent hypertension and improve their outcomes. In conclusion, we found that the DASH eating pattern with moderate sodium intake had significant favorable effects on SBP and DBP in adults.

Recommendation

Several recommendations emanate from the study. In terms of nursing practice, DASH diet eating pattern should be a central pillar in teaching of hypertensive adults as a non-pharmacological methods to maintain hypertension control. Additional research is required to investigate the effect dietary fiber intake, behavioral eating pattern among hypertensive Egyptian sample. This study is considered as a pilot study therefore, Additional research will need to evaluate the extent to which our study findings are generalizable on larger Egyptian sample. The dietary teaching period needs to be longer than 4 weeks; it is suggested to be 6-12 weeks. This period would be suitable to monitor the effect of DASH diet on normal blood pressure sample. As well to maximize the beneficial DASH diet effect among the pre-hypertensive and stage 1 hypertension. Screening program should be implemented on regular basis to detect hypertensive patients in community on larger scale. Disrupting a simple illustrated booklet to hypertensive patients including all therapeutic instructions could help in increasing patient's awareness, and understanding, thus patient compliance will be increased.

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