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Original Research Article

Nutritional Status and Diet Intake among Hypertensive Palestinians in Gaza Strip

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Abstract

The main objective of our study is to examine the associations between hypertension and both nutritional status and dietary intake. A case control study was conducted at Primary Health Care centers in Gaza Strip. A proportional systematic random sample of 120 cases matched with sex, and locality to 120 healthy controls attended adult screening clinics. Participants completed self-administered questionnaires included socio-demographic characteristics and food frequency intakes. Anthropometric measurements and physical examination were abstracted from the clinic files. Collected data was entered and analyzed using SPSS V20. Patients with Hypertension are older, more in lower socioeconomic and more obese. Cases and controls were similar in following diet regimen; even control reported more frequent food regimens than cases (65.1% vs. 44%). Patients with hypertension were similar to controls in percentage of intake for milk products, white meat, eggs, fish, vegetables, grains, sweets and tea – coffee drinks. Cases presented higher frequent consumption of fruits (50.8% vs. 22.5%), and soft drinks (36.7% vs. 16.7 %). These associations reached a statistical significant level (P <0.001). Cases were less frequently consumed lean red meat trimmed from visible fat (80.8% for cases vs. 97.5% for controls) and the differences were statistically significant (P < 0.001). When adjusting for socio-demographic variables low intake of fruit, legumes, lean red meat trimmed from visible fat, and high intake of fried food and soft drink were positively associated with hypertension. We recommend raising the public awareness towards following food based dietary guidelines to ensure hypertension control.

Keywords: Diet Intake, Gaza – Palestine, Hypertension, Nutritional Status

INTRODUCTION

The risk of developing hypertension can be affected by a number of factors, including adopting a healthy lifestyle that includes practicing regular exercise, maintaining a healthy body weight, managing stress, limiting alcohol consumption, quitting smoking and eating a healthy diet low in sodium, with adequate fresh fruits , vegetables limited fat and simple sugars (Khatib *et al*., 2005). It is well known that food is important for health but it can also be the cause of ill health. The foods we eat contain protein, fats, carbohydrates, salts, minerals and vitamins. Each of these has a role to play in sickness and in health. Although genetic factors play a significant role in determining who will become hypertensive, lifestyle factors contribute strongly to the high prevalence of hypertension. Food-related behavior was determined by the interplay of many factors, including physiological factors, socio-demographic factors, behavioral and lifestyle factors such as physical

activity, smoking, knowledge, attitudes related to diet and health (Konzalez *et al*., 1998).Unhealthy diet; affects the development of atherosclerosis, cause of (CVDs). Diet affects serum cholesterol levels, body weight, BP, and blood glucose level. Changing these lifestyle habits including the way people eat has been known to be an effective key in managing these risk factors. Programs to control hazards associated with disease were developed; DASH (Dietary Approaches to Stop Hypertension) is an eating plan low in saturated fat, total fat and cholesterol, high in fruits and vegetables, and low fat dairy foods (Edwards, 2001). Several indicators are used to assess the nutritional status of adults including: Body Mass Index (BMI) and fat distribution (mainly waist/hip ratio) as anthropometric, biochemical analysis (mainly serum lipids and glucose levels), clinical picture and usual dietary habits (Terry *et al*., 2002). In Palestine, hypertension is a major cause of illness, disability and death (MOH, 2005). In Gaza there is rarely reported information on the nutritional status of patients with hypertension disease. In the present study, we investigate food habits, nutritional status and their relation to hypertensive patients, and we provide recommendation and suggestions to prevent and control hypertension.

METHODOLOGY

Study Design and Setting

This is a case-control primary health care (PHC) based study covering the main PHC centers in the non-communicable diseases (NCDs) services, in the five Gaza Governorates. One clinic was selected from each different level in each Governorate to reflect representative sample.

Sample Population

The sample population consisted of 240 persons, divided into 120 cases and matched for 120 controls adult over 30 years old. The cases were complaining from hypertension (BP ≥ 140/90) and attending the NCDs services in the clinic. Patients are selected randomly from the clinic attendances. Controls were chosen from the same medical centers that were seeking other services and proved to be free from hypertension. Controls were matched with cases for gender and place of residency. Official approval letter from Helsinki committee for ethical issues in Gaza was obtained to carry our study.

Data collection

Face-to-face interview questionnaire included demographic, socioeconomic, lifestyle, and food frequency intakes. Food frequency questionnaire (FFQ), covered food items as: animal foods (milk/products, eggs, lean red meat, and white meat); Fish; fruit and vegetables; Grains (bread, rice); Legumes (bean, pea); Fried Food; Soft drink; Tea and coffee; Pickles and salt; Sweets. The participants were also asked about special diet regimen of low fat; low salt; low calorie diet; weight reduction diet; vegetarian; high fiber; high fruits and vegetables diet**.** For all subjects, BP was measured to the nearest 2 mmHg in the right arm after a 5-minute rest in a sitting position by a single mercury sphygmomanometer by a well-trained practical nurse. The criteria for the diagnosis of hypertension were based on WHO definition (BP ≥ 140/90 mmHg). BMI was computed as the ratio of weight (kg) per height squared (m^2), and participants with BMI 30 and more are classified obese (Molarius *et al.,* 1998).

Data Management and Statistical Analysis

The quantitative data analysis was performed using SPSS version 20.0. Descriptive statistics (Frequencies, cross tabulation and Chi-square value) were used to describe the main features of the data and to study the relationship between the variables. Logistic regression (for binary outcome) was used to model the association between independent factors and presence of hypertension as a dependent variable. The odds ratio (OR) and 95% confidence intervals (CI) were reported. A statistical significant result means that the P-value was less than 0.05.

Results

Socio-demographic characteristics of the study population

Our analysis is based on a sample of 240 persons; 120 cases from both genders matched with sex and place of residency to same number of controls. The finding based on (240) questionnaires, with response rate of 97.5% for both cases and controls. The non-respondents were replaced. (Table 1)

Two thirds of the participants were females (66.7%), and cases are older than controls where at age group 50 years and more were 56.7% of cases and 39.2 of controls (P = 0.023). Percentage of low educational level among cases (61.7%) and controls (26.6%) and the difference between low and high education reached statistically significant level with OR= 5.93 (3.0 – 11.82). In addition the study provides that, there is a strong positive association between hypertension and unemployment status (OR= 5 (2.64 – 9.35), P<0.001, unemployed was 83.3% among cases and 50% among

Table 1. Socio-demographic characteristics of the study population

Variable		Cases		Controls		OR	P.
		No.	%	No.	%	(95% CI)	Value
Sex						Matched Variable	
Male		40	33.3	40	33.3		
Female		80	66.7	80	66.7		
Age (years)							
<40		24	20	36	30	1	0.02
40-49		28	23.3	37	30.8	1.14 (0.52-2.46)	
50+		68	56.7	47	39.2	2.17 (1.10-4.32)	
Education							
Low level		74	61.7	32	26.6	5.93 (3.00-11.82)	
Medium level		23	19.2	29	24.2	2.03 (0.92-4.50)	<0.001
High level		23	19.1	59	49.2	1	
Occupation							
Employed		20	16.7	60	50	5 (2.64 – 9.35)	<0.001
Unemployed		100	83.3	60	50		
Household income							<0.001
<1700	NIS	91	75.8	41	34.2	7.15 (3.59-14.39)	
1700-2200	NIS	11	9.2	21	17.5	1.69 (0.62-4.55)	
>2200NIS		18	15	58	48.3	1	

Table 2. Distribution of BMI among the Study Population

Variable	Cases		Controls		OR (95%CI)	P. Value
	NO.	%	NO.	%		
BMI ≥ 30 kg/m²	81	67.5	35	29.2	5.04*	<0.001
BMI < 30 kg/m²	39	32.5	85	70.8	(2.81-9.08)	
Mean BMI	32.7±6.0		28.8±4.3			

Age Adjusted OR *5.08(2.92-8.85)

controls. Also the finding shows that poor economic situation among cases; 85% of cases were below poverty line (less than 2200 NIS), they were classified into two groups: 75.8% were less than 1700 NIS (extreme poverty), and 9.2% was average monthly income between 1700-2200 NIS compared with only 15% which was above poverty line (more than 2200 NIS). This classification is according to the classification of Palestinian Center Bureau of Statistics (PCBS). This indicates a negative and statistically significant association between subject's monthly income (salary) and the occurrence of high BP, OR = 7.15 (3.59–14.39), P <0.001.

Hypertension and BMI

Table 2 shows that obesity was highly prevalent, among cases (67.5%) than controls (29.2%), OR was 5.04 (95% CI) 2.81-9.08 and P < 0.001. The mean of BMI among cases was (32.7, SD 6.0) higher than among controls (28.8, SD 4.3). This reflects positive and statistical significant association between the obesity and the occurrence of high BP. Age adjustment for the OR kept the same relation between hypertension and the BMI.

Lifestyle Characteristics of the study population

Distribution of the study population by diet regimen variables

Results of the diet regimen (Table 3) showed that no major differences between cases and controls in following diet regimen and control reported more frequent food regimen than cases (65.1% vs. 44%). No major differences reported among cases and controls regarding High fruits, vegetables and High fiber diet. The most diet regimen was followed by cases is low salt diet (67.3%) vs. 16.7% for controls. The difference is statistically significant (P < 0.001). On the other hand controls practiced low fat diet higher than cases (65.4% among cases vs. 92.9% among controls) and the same relationship for low calorie diet (3.8% vs. 26.2%) and the differences are statistically significant, Controls reported weight reduction diet more than the cases (3.8% vs. 26.2%) and the differences are statistically significant (P value <0.001).

Table 3. Distribution of the study population by diet regimen variables

Variable	Cases		Controls		P value
	NO	%	NO	%	
Diet regimen					
Yes	52	43.3	43	35.8	0.35
No	68	56.7	77	64.2	
Having one special diet regimen	28	56	15	34.9	0.06
Having more than one diet regimen	24	44	28	65.1	
Low fat					
Yes	34	65.4	39	92.9	<0.001
No	18	34.6	3	7.1	
Low salt					
Yes	35	67.3	7	16.7	<0.001
No	17	32.7	35	83.3	
Low calorie					
Yes	2	3.8	11	26.2	0.002
No	50	96.2	31	73.8	
High fruits and vegetables					
Yes	3	5.8	6	14	0.17
No	49	94.2	37	86	
Weight reduction diet					
Yes	2	3.8	11	26.2	<0.001
No	50	96.2	31	73.8	
High fiber diet					
Yes	1	1.9	2	4.8	0.44
No	51	98.1	40	95.2	

Table 4. Distribution of the study population by food and drink frequency variables

Variables	Cases		Controls		OR	P value
	No.	%	No.	%		
Milk/products (cheese, yogurt, milk drinks,)intake among cases and controls						
Less than once weekly	12	10	7	5.8	1.79 (0.6-5.0)	0.231
Once or more weekly	108	90	113	94.2		
Lean red meat trimmed from visible fat intake among cases and controls						
Less than once weekly	23	19.2	3	2.5	9.25 (2.5-39.9)	0.000
Once or more weekly	97	80.8	117	97.5		
White meat intake among cases and controls						
Less than once weekly	4	3.3	4	3.3	1 (0.2-4.1)	0.639
Once or more weekly	116	96.7	116	96.7		
Fried food intake among cases and controls						
Less than twice weekly	71	59.2	100	83.3	3.5 (1.8-6.6)	<0.001
Twice or more weekly	49	40.8	20	16.7		
Eggs intake among cases and controls						
Once weekly or less	64	53.4	67	55.8	1.1 (0.1-1.9)	0.69
More than once weekly	56	46.7	53	44.2		
Fish intake among cases and controls						
Less than once weekly	13	10.8	9	7.5	1.5(0.57-3.99)	0.37
Once or more weekly	107	89.2	111	92.5		
Grains (bread, rice, potato, pasta)intake among cases and controls						
Less than once daily	4	3.3	10	8.3	2.64(0.7-10.3)	0.09
Once or more daily	116	96.7	110	91.7		
Vegetables intake among cases and controls						
Less than once daily	24	20	23	19.2	1.1(0.5-2.1)	0.87
Once or more daily	96	80	97	80.8		
Fruits intake among cases and controls						
Less than once daily	59	49.2	93	77.5	0.28(0.15-0.51)	<0.001
Once or more daily	61	50.8	27	22.5		

Table 4. Continue

Legumes (bean, pea...) intake among cases and controls						
Less than twice weekly	61	50.8	36	30	2.4(1.4-4.3)	0.001
Twice or more weekly	59	49.2	84	70		
Sweets intake among cases and controls						
Less than twice weekly	90	75	82	68.4	0.72(0.4-1.3)	0.252
Twice or more weekly	30	25	38	31.7		
Pickles, salt intake among cases and controls						
Once weekly or Less	87	72.5	97	80.8	1.6(0.84-3.1)	0.13
More than once weekly	33	27.5	23	19.2		
Tea, coffee drink intake among cases and controls						
Less than once daily	9	7.5	7	5.8	0.8(0.3-2.3)	0.604
Once or more daily	111	92.5	113	94.2		
Soft drink intake among cases and controls						
Once or less weekly	76	63.3	100	83.3	2.9(1.5-5.6)	<0.001
More than once weekly	44	36.7	20	16.7		

Table 5. Logistic regression analysis with Hypertension and socio-demographics and diet independents variables

Variable	B	S.E.	P value.	OR (95% C. I)
Fried food intake	1.55	0.400	<0.001	4.7 (2.21-10.32)
Legumes intake	-1.27	0.379	0.001	0.3 (0.13-0.53)
Red meat intake	-2.27	0.703	0.001	0.1 (0.03-0.41)
Fruit intake	1.57	0.394	<0.001	4.9 (2.22-10.44)
Soft drink intake	0.84	0.416	0.044	2.3 (1.02-5.22)
Age	-0.03	0.016	0.097	1.0 (0.94-1.01)
Education	0.62	0.229	0.007	1.9 (1.18-2.89)
Occupation	0.17	0.292	0.558	1.2 (0.67-2.10)
Income	1.01	0.294	0.001	2.7 (1.54-4.87)
Constant	-4.93	1.926	0.010	0.007

Distribution of the study population by food and drink frequency variables

Table 4 showed that patients with hypertension did not differ from their controls in frequency intake for most of diet items included in the study. That was demonstrated in percentage of intake for milk products, white meat, eggs, fish, vegetables, grains, sweets and tea – coffee drinks. Cases presented higher frequent consumption of fruits (50.8% vs. 22.5%), pickles and salt intake (27.5 vs. 19.2) and soft drinks (36.7% vs. 16.7 %). These associations reached a statistical significant level (P <0.001) except for pickles and salt salts (P = 0.13). Cases were less frequently consumed lean red meat trimmed from visible fat (80.8% for cases vs. 97.5% for controls) and the differences were statistically significant (P < 0.001).

Logistic regression for Hypertension with different variables

All the variables proved to have statistical significance association with hypertension, are included as independent variables in the logistic regression analysis demonstrated in (Table 5). BMI is not included in the model because it is intervening variable and controlling for a variable in process of causality is over control. The results in this study showed that low intake of fruits, legumes, lean red meat, high intake of fried food , soft drink, and socio-demographic variables (low educational level and low family income) were independents significant predictors of Hypertension (P value <0.001) controlling for age.

DISCUSSION

The present study reported higher frequency of hypertension among females than males. This finding coincides with majority of the studies reported women at higher risk than men of developing hypertension **(**MOH, 2005, Saeed Al-Hamdan *et al.,* 2010, Sun *et al.,* 2007). Other studies reported that, equal rate of hypertension between men and women (Wilkins *et al.,* 2010, Ostchega *et al.,* 2008). Also our study reported age as a risk factor

for the hypertension disease that was consistent with other studies reported strong relationship between age and hypertension (Idris *et al.,* 2008, Cutler *et al.,* 2000). Age reflects cumulative life experience with multiple risk factors. In our study controlling for age kept group of risk factors predicting hypertension independent from age. In addition our findings revealed an inverse statistically significant relationship between hypertension, level of education, and employment. This may be referred to the impacts of siege and political unrest situation, resulted in state where high percentage of the Palestinian lost their works (PCBS, 2010[a]), or due to lifelong unhealthy related habits like lack of physical activity due to the majority of illiterates are unemployed, unemployment rate in GS at the end of 2010 was 37.8% (PCBS, 2011), and so they sleep more hours, smoke, practice bad eating habits, and expose to stressful events affecting their lifestyle. Result of this study were in line with the results of other studies who have reported that higher hypertension percentages among subjects with lower educational level, retired, and wives engaged in domestic duties (Al-Farsi *et al.,* 2011, Ibrahim *et al.,* 1996, Saeed Al-Hamdan *et al.,* 2010). While other illustrated that, the education status affects clients' health and as much as the level of education increased, the compliance status increased (Reziq, 2006). Regarding low monthly income, the present study shows highest risk of hypertension among subjects who lived under poverty line. Debate between researchers still present regarding to illustrate the relationship between hypertension and socioeconomic status; some of them shows hypertension common on high class refer to they consume more fatty and fast foods, snake, caloric beverages, sweets and desserts. On other hand, others found hypertension common in highest poverty rates; refer that to lower energy cost foods are associated with higher energy intakes and have less access to affordable healthy foods (Saeed Al-Hamdan *et al.,* 2010, Mendez *et al.,* 2003, Forman *et al.,* 2009, Reddy *et al.,* 2007).

Obesity was highly prevalent among the study population with significantly prevalence among hypertensive patients (67.5%) than the control group (29.2%), therefore, obesity is a blamed risk factor and well-known predictor of future hypertension and it is positively associated with increased morbidity from other chronic diseases. The high prevalence of obesity in this study is consistent with several studies in the region and worldwide. The researcher refers the higher prevalence of obesity for the living conditions of the Palestinians. Nearly one-half of all Palestinians live below the poverty line; more than 16% of the population cannot afford even necessities. Sedentary, Poor diet, mal nutrition during childhood, economic crisis increase the risk of obesity (UN, 2003, West Bank and Gaza Update, 2004). The high prevalence of obesity in this study is consistent with several studies in the region and worldwide. A study conducted in Oklahoma by Han found that most respondents with hypertension were overweight or obese (63%, 70.2% vs. 59.8%) (Han *et al.,* 2011). The positive and significant association between obesity and increased risk of developing hypertension event support a study done by Bacquer et al. in 15 European centers and revealed that overweight and obese patients had more frequently raised BP and elevated cholesterol after adjustment for age, gender, education, diabetes. In patients, using BP lowering agents, 56% of obese and 51% of overweight patients were still having raised BP compared to 42% in normal weight patients (De Bacquer *et al.,* 2004).

The study showed that no major differences between cases and controls in following diet regimen and control reported more frequent food regimen than cases (65.1% vs. 44%). Our findings come in accordance with a study conducted by Obaidin (2010), in Palestine, revealed, that elderly people (63.4%) were asked by their doctors to follow special diet, due to high prevalence of chronic diseases, 87.8% were asked to follow low fat diet, 86.3% were asked to follow low salt diet, and 86.7% were asked to follow diabetic diet, but the compliance was only 34.6% among them (Obaid S, 2010). Additionally, a study done by Khellah in 2010 revealed that adult Palestinian people aged 19-59 years are at risk of chronic diseases, and 12.1% answered that they have a diet regimen among of them 7.3% was following a low salt diet, 5% was following a low fat diet and 2.2% was following a diet special for DM (Khellah *et al.,* 2010). In our study patients with hypertension were not compliant to dilatory regimen and they kept diet as a risk factor for hypertension and subsequent complications. Non-compliance to dietary recommendations is a major public health problem especially in developing countries. In a study in Pakistan more than three quarters of the hypertensive patients were non-compliant. There is need for health professions to counsel their patients to prevent morbidities and mortalities because of non-compliance (Khan et al., 2014). Low counseling rates are reported in other study and the author suggested improvement of physicians' counseling skills so that they will be confident and effective in delivering this service to their patients. A model based on educating both physicians and patients may contribute to improve the care of hypertension (Anthony et al., 2011)

A study conducted by USDHHS and USDA mentioned that adult and children should not avoid milk/product because of concerns that these foods lead to weight gain (USDHHS and USDA, 2005). There are many fats free are available and consistent with an overall healthy diet plan which recommended 2-3 serving of milk/product daily (serving=one cup of milk or equivalent). Lean red meat is a rich source of protein and magnesium. The recommended daily intake of protein was 0.75g/kg body weight of adults (Sanders et al., 2003). A moderate protein DASH-like diet including lean beef decreased SBP in normotensive individuals. The inclusion of lean beef in a heart healthy diet also reduced peripheral

vascular constriction (Roussell et al., 2014). Studies were done had indicated a direct relationship between eggs intake and the development of CVDs, HTN, and elevations in serum cholesterol as they are rich in cholesterol (USDHHS and USDA, 2005), (Hu *et al.,* 1999, Truswell, 2003). Our findings did not reveal difference in egg consumption between cases and controls.

Carbohydrate is a major source of energy in most human diets. Diet with low simple carbohydrate is recommended to prevent type II diabetes, obesity, atherosclerosis and heart disease (Sanders *et al.,* 2003, Fung *et al.,* 2009). Additionally, USDHHS and USDA revealed that decreased intake of foods, especially beverages with caloric sweeteners is recommended to reduce calorie intake and help achieve recommended nutrient intakes and weight control (USDHHS and USDA, 2005). Studies suggested that whole grains are rich with fiber, vitamin E, vitamin B-6, minerals, antioxidants, and phytoestrogens (Jensen et al., 2004). The recommended daily intake of whole-grain foods is 3 serving/ day (USDHHS and USDA, 2005) is associated with a reduced risk of CHD, reduce risk of several chronic diseases, help in weight maintenance, and might contribute to favorable metabolic alterations. Bran component of whole grains could be a key factor in this relation (USDHHS and USDA, 2005, Jensen *et al.,* 2004, Banerjee *et al.,* 2004). As mentioned previously the majority of households were suffering from deep poverty according to income patterns in Gaza. This lead that people depend more on cheaper food items due to bad economical status and state of poverty they suffered, bread and cereals considered the cheapest food in Gaza markets comparing to other food items.

Fruits and vegetables are low in fat, and contain pectin and other fibers, flavonoids and other antioxidants, and they contain folate, vitamins and minerals (Truswell, 2003). Fruit (2-4 serving/day) and vegetable (3-5 servings/day) intake was inversely associated with a higher prevalence of diabetes, hypertension, and high cholesterol, and were associated with lower risk of CVD (Liu *et al.,* 2000). In addition, fruits and vegetables are recognized as a source of a number of nutrients that may interact to reduce LDL-c, BP (lower Na/K ratio), and homocysteine (folate), and to improve antioxidant status, and endothelial function (Samman *et al.,* 2003). Dietary interventions to reduce diet-dependent net acid load (e.g., increase intake of fruits and vegetables, decrease intake of meat and cheeses, and increase the ratio of potassium to protein in diets, or treatment with alkalizing supplements) could reduce the risk of hypertension (Zhang *et al.,* 2009). In our study cases consume more fruits than controls, a practice that should be encouraged.

Legumes are excellent sources of fiber. Eating a high-fiber diet can significantly lower the risk of heart attack, stroke and colon cancer Legumes are low in sodium and rich in potassium, calcium, and magnesium that decrease the risk of hypertension; the recommended daily intake is four times or more per week (Monique et al., 2001, Bazzano et al., 2001). Salt (or sodium chloride) may cause fluid retention and thereby cause pressure around the blood vessels, which can lead to hypertension. Most epidemiological studies have shown a positive association between dietary salt intakes, and the prevalence of hypertension. Reduction in salt intake significantly reduces both systolic and diastolic BP, CHD, and stroke (Khatib *et al*., 2005, USDHHS and USDA, 2005, Fung *et al.,* 2008). Restriction of food is not accepted by public, results suggested that long-term compliance with salt restriction is poor in Japanese hypertensive patients (Yuko et al., 2005).

Most intervention trials indicated that tea and coffee are beneficial when used in small amounts, but excessive amounts are detrimental to kidney action and may aggravate tendency to hypertension (Mehra et al., 1992). Among coffee drinkers, the proportion of smokers increased, intake of total and saturated fatty acids and daily total energy increased, while leisure-time physical activity decreased, serum LDL-c concentration increased dose-dependently with increasing coffee intake (Happonen et al., 2004). Happonen et al.; Kleemola et al.; Mehra and Lashkari did three studies, have reported a positive association between coffee and tea drinking and Hypertension. The maximum allowed amount of caffeine should not exceed 400 ml of coffee daily (1-3 cups daily) (Kleemola et al., 2000). Tea and coffee drink is common practice in our community among cases and controls.

Sugar-sweetened beverages, or soft drinks, include carbonated and noncarbonated beverages that contain sugar-based caloric sweeteners and are flavored with fruit juice. Our findings are similar to two studies done by Fung et al.; USDHHS and USDA revealed that, there is a positive association between soft drinks, and weight gain and obesity (USDHHS and USDA, 2005, Fung et al., 2009).

Finally this is a case controlled study designed to reveal commitment of hypertensive patients in Gaza strip to diet regimen and to demonstrate the general diet pattern of hypertensive patients compared to their controls. The findings reveal importance of conducting a larger size study to go in depth of food frequency of chronic patients in Palestine.

CONCLUSION

Risk factors of hypertension are known while interventions to control hypertension are poor. This study revealed that hypertension patients are not following dirt regimen and they are not different from controls in food frequency pattern. Compelling evidence indicates that, adults with hypertension could be lowered BP as much as by making lifestyle changes and participating in programs as DASH diet, will encourages eating more

fruits and vegetables, reducing salt intake, reducing fat intake, low simple carbohydrate reduction in salt intake significantly, reduces losing weight, getting regular exercise, quitting smoking, reducing alcohol consumption, and managing stress. These non-pharmacological measures can be sufficient to control BP or to decrease the amount of required medications, to prevent, treat or remove associated risk factors, reduce CVD risk, diabetes, and obesity.

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