IS THERE ANY DIFFERENCE BETWEEN DIETARY HABITS IN HYPERTENSIVES, HYPERLIPIDEMICS, OBESE, SMOKER INDIVIDUALS AND THE NORMAL POPULATION?

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Abstract

BACKGROUND: Cardiovascular disease has been remained the leading cause of death worldwide. This study has been designed to comprise dietary habits of persons with cardiovascular disease (CVD) risk factors and those without them.

METHOD AND MATERIALS: This cross-sectional study was performed on samples of a national community- based program for CVD prevention and control entitled Isfahan Healthy Heart Program (IHHP) including 12514 adults, aged≥ 19 years, 6391(51.1%) females and 6123(48.9%) males. All participants were interviewed by trained personnel who used a validated qualitative 48 item food frequency questionnaire (FFQ) to determine nutritional status. Blood pressure, serum lipids including triglycerides, total cholesterol, LDL-Cholesterol and HDL-Cholesterol, weight and height were measured and smoking habit was determined by a questionnaire. The frequency of food consumption of persons with and without the risk factors was compared by student t- test. The analysis was performed by SPSS version 11.5.

RESULTS: Our results show that the prevalence of dyslipidemia, hypertension, smoking and obesity are 54%, 16.8%, 15.1% and 16.8%, respectively. Hypertensive and dyslipidemic subjects have significantly more frequent consumption of healthy foods ($P < 0.05$), in comparison to normotensive and normolipidemic whereas smokers and obese participants have a significantly higher consumption of unhealthy foods ($P < 0.01$) in comparison to non-smokes and the non-obese subjects.

CONCLUSION: Our results showed that dyslipidemic and hypertensive individuals have more attention on their dietary habits. In contrast, obese and smoker persons have less attention to a healthy diet.

Introduction

Despite numerous progress in diagnosis and treatment, cardiovascular disease (CVD) has been remained the leading cause of death worldwide affecting millions of people in both developed and developing countries.[1] Accumulating evidence coming up from numerous studies,[2-6] has identified hyperlipidemia and hypertension (HTN),[7] as two major risk factors for stroke, congestive heart failure, renal disease and myocardial infarction.[8,9] According to the World Health Organization (WHO), it is estimated that high cholesterol causes approximately one third of all CVD worldwide.[10] Also the number of people with high blood pressure levels, worldwide, is estimated to be about 600 million and the annual mortality attributable to hypertension is estimated to be about 7.14 million deaths .It is estimated that hypertension is responsible for about 17% of total annual mortality or in other words, for approximately 680 thousands deaths annually.[11]

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It should be noted that the relationship between hyperlipidemia and atherosclerosis might be influenced by individual's lifestyle related factors, such as smoking, physical activity and psychosocial conditions.[2] It is also known that well balanced dietary patterns, like the Mediterranean diet, are strongly related with blood lipids levels, as well as with the prevalence and the management of dyslipidemia.[12-16] Furthermore, it is encouraging that, primary and secondary prevention trials,[17] have provided strong evidence that lowering serum cholesterol levels can be translated into a reduction in mortality rates from CVD.

The prevalence of obesity is increasingly recognized as a global health problem, and the WHO MONICA project has associated the increasing dietary energy supply with the increase in personal weight in Western countries.[18] The consequence from excessive weight gain and obesity, defined by body mass index (BMI) equal to or over 30, is the increased risk of various diseases, including CVD and diabetes. Obesity lowers quality of life, decreases productivity, and results in billions of dollars in associated health care costs. Other reports have provided a more direct analysis on causality of food intakes and body weight status by examining data or data bases which contain individual records of food consumption and anthropometrics.[19-23]

Generally, non-smokers possess a healthier lifestyle than smokers. Concerning food habits, smokers consume more coffee and alcohol, [24-26] but include less fruits, vegetables,[24,27,28] brown bread and skimmed milk in daily intake than non-smokers.[26] It has also been shown that smoking is correlated to a higher percentage of energy from fat,[29,30] and lower intakes of selected antioxidants than non-smoking.[31] The prevalence of hypertension,[29] and elevated cholesterol,[29,32] and triglycerides[27,29,32] are higher in smokers than in non-smokers, and so is the prevalence of inactivity.[33]

The food supplies and, therefore, the diets in developing countries are in a state of rapid transition. Iran is not an exception to this nutritional transition. Growing incidence and mortality of CVD and its probable relation to life style and dietary regimen suggest cost effective, feasible and appropriate methods for prevention and control of these diseases.

The limited current data regarding the dietary habits of hyperlipidemic and hypertensive people in Iran, in combination with the considerable variability of hyperlipidemia and hypertension between countries, as well as within countries, and between different areas and population groups, motivated us to conduct a study in which we looked for the differences between dietary habits of hyperlipidimics, hypertensives, obese, smokers and the normal population.

Materials and Methods

Subjects

In 2000-2001, as the baseline cross-sectional study of a national community- based program for CVD prevention and control called Isfahan Healthy Heart Program (IHHP) was performed.[18] Examination survey design has been conducted in Isfahan, Najaf-Abad and Arak in the central part of Iran using a multistage, stratified sampling through a home interview. The methodology has been previously published in details.[19] IHHP had three phases. In the first phase, situational analysis was carried out. About 12514 adult individuals (over 19 years) in these three communities were selected. This study was carried out from data collection of first phase of this program.

Data Collection

Subjects were invited to 3 clinics in each community where the study was done; informed consent was obtained when an adult participant arrived at the clinic.

Height was measured with a portable GPM anthropometer and weight with a portable balance calibrated scale. Standard techniques were used with participants wearing light clothing.[19] Body mass index (BMI) was calculated as weight/height² (kg/m^2), and categorized into non-obese with BMI < 30 and obese with BMI ≥ 30. Blood pressure (BP) was measured three times with an interval of 10 minutes rest in sitting position using a mercury sphygmomanometer, and the mean was calculated. Hypertension (HTN) was defined as systolic BP ≥ 130 mmHg and or diastolic BP ≥ 90 mmHg or self reported use of anti-hypertensive medications during the medical history interview.[19]

Participants were asked to keep fast for 12 hours prior to the examinations and to bring all medical records and also prescription and nonprescription drugs that they used regularly to the clinic. The blood samples of three districts were transferred to Isfahan Cardiovascular Research Center (ICRC) laboratory. Serum total cholesterol (TC) and triglycerides (TG) were measured using enzymatic colo-

rimetric methods.[18] High-density lipoprotein cholesterol (HDL-C) was determined after dextran sulphate-magnesium chloride precipitation of non-HDL cholesterol.[18] Low-density lipoprotein cholesterol (LDL-C) was derived from the Friedewald equation,[20] in subjects with TG < 400. Dyslipidemia was defined as TC ≥ 240 or TG ≥ 200 or LDL ≥ 160 or HDL ≤ 40. Also current smokers were determined by asking related questions. The individuals who smoke currently are defined as smokers and others are defined as non-smokers.

For quality control, the central laboratory meets the criteria of the national reference laboratory of the Ministry of Health in Iran which is a WHO collaborating center in Tehran. Also, external standardization was done with the central laboratory of the University Hospital of Leuven in Belgium. For dietary assessment within the framework of the validated qualitative 48-item food frequency questionnaire (FFQ), subjects were asked how often in the past year they had eaten the food items by trained interviewers.[21] In this study the frequency consumption per week of 16 items including hydrogenated oil, un-hydrogenated oil, red meat, chicken, fish, bread, rice, fresh fruits, fresh vegetables, nuts, canned foods, sausage, hamburger, pizza, carbonated beverages, sweets (cakes, cookies and biscuits) of foods were determined.

Statistical analysis

All comparisons among two groups of samples, dyslipidemic-normolipidemic, hypertensive - normotensive, obese and non-obese, smoker and non-smoker in relation to normally distributed continuous variables were performed using the student t-test. Every reported p-value (P) is based on two-sided tests and compared to a significance level of 0.01. SPSS version 11.5 (Statistical Package for Social Sciences, SPSS Inc, Chicago, Illinois, U.S.A.) software was used for statistical analysis.

Results

Our sample consists of 12514 persons, 6391(51.1%) females and 6123 (48.9%) males and 9093(72.6%) urban and 3421(27.3%) rural population.

Table 1 shows the frequency of population with and without dyslipidemia, hypertension, obesity and smoking. Prevalence of dyslipidemia is 54% in the total population. Furthermore prevalence of HTN is 16.8%, 16.8% of participants were obese, and 15.1% of participants were smokers, respectively (Table 1). Table 2 shows the relation between the items of foods consumed and the presence of any type of dyslipidemia. In comparison of food habits between dyslipidemic and non-dyslipidemic participants, we found significant difference in the intake frequency of hydrogenated oil, red meat, chicken, fish, bread, rice, sweets (cake, cookies and biscuits) (P < 0.01), (Table2). In HTN and non-HTN participants, we detected significant difference (P < 0.01) in consumption of hydrogenated oil, un-hydrogenated oil, red meat, fish, bread, rice, nuts, canned foods, sausage, hamburger, pizza, carbonated beverages, and sweets (Table 3). Dietary habits in obese and non-obese participants (Table 4) revealed significant difference (P < 0.01) in frequency consumption of hydrogenated oil, un-hydrogenated oil, red meat, fish, bread, rice, fresh fruits, fresh vegetables, nuts, hamburger, carbonated beverages, sweets. In comparing smoker and non-smoker participants, there was a significant difference (P < 0.01) in frequency consumption of bread, canned food, sausage, hamburger, pizza, carbonated beverages, cake, cookies and biscuits (Table 5).

Table 1: The prevalence of dyslipidemia, hypertension, and obesity smoking in 12514 Iranian adults' population, 2000-2001

Risk factors (n = 12514)	Yes	No
Dyslipidemia mg/dl		
TC ≥ 240	18.89	81.11
TG ≥ 200	27.14	72.86
LDL ≥ 160	15.00	85.00
HDL ≤ 40	29.66	70.34
Obesity (BMI ≥ 30)	16.78	83.22
Hypertension (BP ≥ 140/90)	16.77	83.23
(mmHg)	15.01	83.99
Current smoking		

Table 2: Comparison between food frequency consumption (per week) in dyslipidemic and normolipidemic of 12514 Iranian adults' population, 2000-2001

Food items	Dyslipidemia		* P
	Yes	No	
Hydrogenated oil	8.56 ± 4.95	8.96 ± 4.80	< 0.01
Un hydrogenated oil	2.14 ± 3.51	2.01 ± 3.52	0.05
Red meat	4.06 ± 2.83	4.26 ± 2.72	< 0.01
Chicken	1.93 ± 2.74	1.80 ± 2.74	< 0.01
Fish	0.47 ± 1.82	0.42 ± 1.72	< 0.01
Bread	17.73 ± 0.90	17.52 ± 0.86	0.049
Rice	5.89 ± 5.68	6.02 ± 5.47	0.027
Fresh fruits	6.82 ± 4.22	6.90 ± 4.24	0.322
Fresh vegetables	6.24 ± 3.83	6.14 ± 3.99	0.160
Nuts	0.34 ± 1.10	0.40 ± 1.14	< 0.01
Canned foods	0.30 ± 0.73	0.32 ± 0.73	0.099
Sausage	0.62 ± 1.36	0.67 ± 1.23	0.036
Hamburger	0.14 ± 0.54	0.16 ± 0.56	0.032
Pizza	0.08 ± 0.36	0.09 ± 0.31	0.109
Carbonated beverages	1.44 ± 3.21	1.46 ± 3.10	0.507
Sweets (Cakes, Cookies and Biscuits)	2.59 ± 2.38	3.17 ± 2.50	< 0.01

P< 0.01 indicates significant difference among two groups.

Table 3: Comparison between food frequency consumption (per week) in hypertensive and normotensive of 12514 Iranian adults' population, 2000-2001

Food items	Hypertension		* P
	Yes	No	
Hydrogenated oil	7.82 ± 4.99	8.93 ± 4.84	< 0.01
Un hydrogenated oil	2.30 ± 3.70	2.04 ± 3.49	< 0.01
Red meat	3.95 ± 2.78	4.20 ± 2.74	0.025
Chicken	1.95 ± 1.93	1.85 ± 1.74	0.312
Fish	0.47 ± 1.04	0.44 ± 0.85	< 0.01
Bread	17.88 ± 5.64	17.60 ± 5.73	< 0.01
Rice	5.48 ± 3.28	6.05 ± 3.13	0.206
Fresh fruits	6.75 ± 4.27	6.88 ± 4.22	0.121
Fresh vegetables	6.08 ± 4.01	6.22 ± 3.88	< 0.01
Nuts	0.23 ± 0.87	0.39 ± 1.16	< 0.01
Canned foods	0.21 ± 0.59	0.33 ± 0.76	< 0.01
Sausage	0.42 ± 1.02	0.69 ± 1.35	< 0.01
Hamburger	0.07 ± 0.33	0.16 ± 0.58	< 0.01
Pizza	0.04 ± 0.26	0.09 ± 0.35	< 0.01
Carbonated beverages	1.12 ± 1.69	1.52 ± 2.09	< 0.01
Sweets(Cakes, Cookies and Biscuits)	1.91 ± 3.56	3.05 ± 4.66	< 0.01

P < 0.01 indicates significant difference among two groups.

Table 4: Comparison between food frequency consumption (per week) in obese and non-obese of 12514 Iranian adults' population, 2000-2001

Food items	BMI ≥ 30	BMI < 30	*P
Hydrogenated oil	.8.91 ± 4.85	7.95 ± 5.00	< 0.01
Un hydrogenated oil	1.99 ± 3.46	2.53 ± 3.80	< 0.01
Red meat	4.20 ± 2.75	3.98 ± 2.71	< 0.01
Chicken	1.85 ± 1.77	1.94 ± 1.81	0.051
Fish	0.44 ± 0.88	0.50 ± 0.92	< 0.01
Bread	17.74 ± 5.66	17.21 ± 5.94	< 0.01
Rice	6.02 ± 3.15	5.62 ± 3.14	< 0.01
Fresh fruits	6.81 ± 4.81	7.11 ± 4.45	< 0.01
Fresh vegetables	6.16 ± 3.90	6.41 ± 3.92	< 0.01
Nuts	0.39 ± 1.17	0.26 ± 0.83	< 0.01
Canned foods	0.32 ± 0.73	0.28 ± 0.76	0.056
Sausage	0.66 ± 1.35	0.57 ± 1.09	< 0.01
Hamburger	0.16 ± 0.58	0.10 ± 0.37	< 0.01
Pizza	0.08 ± 0.33	0.07 ± 0.38	0.240
Carbonated beverages	1.48 ± 2.08	1.29 ± 1.78	< 0.01
Sweets(Cakes, Cookies and Biscuits)	2.96 ± 4.61	2.36 ± 3.99	< 0.01

P < 0.01 indicates significant difference among two groups

Table 5: Comparison between food frequency consumption (per week) in smoker and non-smoker of 12514 Iranian adults' population, 2000-2001

Food items	Smoker	Non smoker	*P
Hydrogenated oil	8.92 ± 4.85	8.71 ± 4.89	0.079
Un hydrogenated oil	1.99 ± 3.44	2.10 ± 3.54	0.208
Red meat	4.19 ± 2.75	4.16 ± 2.74	0.589
Chicken	1.86 ± 1.77	1.87 ± 1.77	0.872
Fish	0.43 ± 1.77	0.45 ± 1.77	0.450
Bread	18.30 ± 5.56	17.54 ± 5.74	< 0.01
Rice	6.07 ± 3.27	5.93 ± 3.14	0.081
Fresh fruits	6.46 ± 3.95	6.93 ± 4.27	< 0.01
Fresh vegetables	6.05 ± 3.63	6.22 ± 3.95	0.080
Nuts	0.36 ± 1.02	0.37 ± 1.13	0.884
Canned foods	0.37 ± 0.75	0.30 ± 0.73	< 0.01
Sausage	0.81 ± 1.41	0.61 ± 1.29	< 0.01
Hamburger	0.21 ± 0.67	0.14 ± 0.52	< 0.01
Pizza	0.11 ± 0.43	0.07 ± 0.32	< 0.01
Carbonated beverages	1.29 ± 1.78	1.48 ± 2.08	< 0.01
Sweets (Cakes, Cookies and Biscuits)	3.38 ± 5.03	2.77 ± 4.41	< 0.01

P < 0.01 indicates significant difference among two groups.

Discussion

In the present study, we surveyed nutritional habits of Iranian population with major CVD risk factors (dyslipidemia, hypertension, obesity or smoking) and compared them with healthy persons.

Diet and nutrition have been extensively investigated as risk factors for major CVD like coronary heart disease and are also linked to other CVD risk factors like HTN, dyslipidemia and obesity.[22-25] Current guidelines for the management of HTN, dyslipidemia and obesity emphasize the importance of achieving several nutritional goals simultaneously. According to "2006 Diet Approach to Stop Hypertension" (DASH) recommendation,[26] and Adult Treatment Panel Ш(АТРШ) protocol,[27] to modify hypertension and dyslipidemia, a diet rich in fruit and vegetables, more poly-unsaturated and monosaturated fatty acid contents, unsalted nuts, low fat dairy products and with a lower salt, saturated fat and sugar content foods, resulted in a 5.5 mmHg reduction in systolic blood pressure and 0.35 mmol/l reduction in total cholesterol.[28]

However, analysis of the reported food consumption patterns in our study suggests that dyslipidemic subjects might have started adopting some more healthy nutritional behavior compared to normolipidemic ones. Specially, consumption of fish, chicken and unhydrogenated oil was found to be higher among dyslipidemic subjects while the opposite was observed for food items such as hydrogenated oil, red meat; fast food such as sausages, hamburger, pizza; and sweets including cake, cookies and biscuits. As the results show, the rice consumption was less frequent in dyslipidemic subjects, but bread consumption was higher than normolipidemic ones (Table 2). This is probably due to the replacement of bread with rice that increases the fiber intake.

The same results are seen in the study of Millias and colleagues, so that in this study consumption of fish, fruits and juices, cereals and low fat milk and yogurt was found to be higher among hypercholestrolemic subjects while consumption of red meat, pork, egg, full fat products and deserts were less than normocholestrolemic ones.[29]

Although nuts consumption has an important role in the prevention of dyslipidemia but in contrast to mentioned nutritional habits, consumption of this food item in dyslipidemic individuals was less frequent than normolipidemic individuals and this is probably because of lack of the knowledge about the useful effects of nuts in the improvement of dyslipidemia.

Our study demonstrated that similar to the dyslipidemic subjects, hypertensives have started adopting more healthy nutritional behaviors than normotensives. Consumption of unhydrogenated oil and fish was found to be higher and hydrogenated oil, red meat, canned food, sausage, hamburger, pizza, carbonated beverages, and sweets lower in hypertensives (Table 3). Similar to our study it was shown in the Pitsavos and colleagues reported that hypertensive subjects have healthier diet than normotensive ones.[30] Although fresh vegetables and nuts are preventive foods for hypertension,[26] their consumption was more frequent in normotensive subjects.

In contrast to dyslipidemics and hypertensives, it is specified that non-obese persons and non-smokers have more unhealthy nutritional habits than obese and smokers. As the results show hydrogenated oil, red meat, sausages, hamburger, pizza, carbonated beverages and sweets are significantly more consumed in obese persons than in non-obese and on the contrary, consumption of fresh fruits and vegetables is significantly less. Three food items including bread, rice and nuts are relatively high caloric and obese persons consume them more than non-obese persons. Several studies show that consumption of high carbohydrate foods such as bread, rice and sweets and full fat foods such as different kinds of fats and oils, nuts, hamburger and pizza have direct relationship with obesity but in the case of fruits and vegetables this relationship is inverse.[31,32] This confirms the obtained results in the present study. Consumption of canned food, sausages, hamburger, pizza, carbonated beverages and sweets is significantly more in smokers than in non-smokers and consumption of fresh fruits is less in smokers and these results show that smokers

pay less attention to nutritional habits as well. These results are similar to the obtained results in other studies.[33-35] Similar to our study, in a study by Jessie and colleagues, smokers consumed fast food and saturated fat content food more and fruits and vegetables less than non-smokers.[36]

Limitations

Whereas this study is a part from the obtained results in IHHP study (which is a vast and comprehensive study), nutritional condition of participants is determined on the basis of a qualitative food frequency questionnaire and therefore, consumption serving of participants is not specified. Furthermore, socioeconomic condition, age and sex probably have influence on dietary habits and the consequence of our study and obtained results. It was proper to contemplate the effect of these factors in the analysis. Nonetheless, it requires more study in the future for a perfect opinion. The differences between groups, while statistically significant may be biologically unimportant but our results could be used for further research.

Conclusion

It is concluded that dyslipidemic and hypertensive population have better dietary habits which is probably due to their increasing incitement in regard to sound nutritional principles but on the contrary, obese participants have unhealthy dietary habits which is probably for the reason that still individuals do not know that obesity is a risk factor for cardiovascular diseases and also smokers do not pay attention to their nutritional habits. Although dietary habits of dyslipidemic and hypertensive individuals are better than others but can not be considered completely proper and still the frequency consumption of hydrogenated oil and red meat is high in these participants and consumption of hydrogenated oil, fruit, vegetable and fish is low.

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