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Association between Nutritional Status and Hypertension among Female Students in Damanhur University, Egypt

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ABSTRACT
Hypertension in teenagers and young adults is increasing worldwide and necessitates the implementation of scientific studies to identify the underlying aetiology. The purpose of this cross-sectional study was to estimate the association between nutritional status and dietary pattern and hypertension among university female students in one of the Egyptian Governorates.A total of 220 female students were randomly selected from four faculties of Damanhur University. Data about socio-demographic characteristics, dietary intake and habits, and life style practices were collected. Blood pressure and anthropometric measurements we reassessed for every student. Hypertension was detected among 17.3% of the studied sample. When body mass index was more than 30 kg/m^2 and waist circumference was more than 88 cm, 33.6% and 33.3% of the students were hypertensive respectively. Hypertension was prevalent among students who usually sleep immediately after consuming meals (24.1%),usually eat outside the home (21.3%),highly consuming salty foods(23.4%) and usually add table salt during consuming meals (23.1%). The high rate of hypertension was also associated with high consumption of fried (28.4%) and fast foods (27.2%) and soft (35.5%) and caffeinated drinks (27.5%).Caloric and other nutrients intakes were higher among hypertensive than normal students as well as sodium intake. Obesity and unhealthy dietary pattern of the university students play a major role in the development of hypertension among young adult females.

Key words: Hypertension, young adult females, nutritional status, obesity, dietary pattern**.**

INTRODUCTION

Hypertension is an increasingly important medical and public health issue.[1,2] Hypertension is a common health problem in developed countries (20% of adult population), and its prevalence is increasing in nations of the developing world (6.3% of Kuwaiti, 19.4% of Iranian and 16.5% of Egyptian young adults).[3-5] Hypertension may affect an individual for prolonged periods without showing any symptoms and may be diagnosed only after causing serious irreversible pathology and complications. Hypertension is strongly associated with high mortality and morbidity

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from cardiovascular (CVD),cerebrovascular and renal disease.[6] The effect of early-onset hypertension is reflected on CVD death and hypertension hospitalization rates.[7] Its control will significantly reduce the prevalence of these diseases and minimize their negative health impact.[8]

Hypertension occurring in children, adolescents and young adults is uncommon and almost always sparks off an intense search for an underlying aetiology. Though essential hypertension is still the commonest form, secondary hypertension occurs with greater frequency than in adults and is most often due to renal disease, followed by cardiovascular and then endocrine disorders.[9]

Physical inactivity, smoking, obesity, stress and family history of hypertension are well-known non-dietary predictors of hypertension.[10,11] The dietary factors associated with the increase in blood pressure are increased salt intake,[12]decreased potassium intake, decreased intake of omega-3 polyunsaturated fatty acid, caffeine,[13] high consumption of fructose and soft drinks.[14,15] An improvement in blood pressure control may be associated with increased consumption of calcium, fibres and vitamins E and C.[13]

Female gender, particularly in younger subjects, has been associated with a worse prognosis after acute myocardial infarction, including a greater recurrence of acute coronary syndrome and higher mortality.[16] Furthermore, women might have less favourable short-term outcome after myocardial revascularization procedures than do their male counterparts. The increasing prevalence of cardiovascular pathology in women has created a clear and compelling need for identification of those variables specifically relevant to cardiovascular health in women.[17]

Literature review revealed very little information on the prevalence of hypertension among young adult females

in the age group 18-25 years. A large number of studies were reported on females in the older age group above 40 years assuming that the prevalence of hypertension is very limited in young adult females. Very few studies were carried out to investigate the association between the nutritional status and the dietary pattern with the development of hypertension among Egyptian young adult females. That is why the aim of this study was to estimate the rate of hypertension among young adult females and to investigate the dietary risk factors associated with hypertension among university female students in one of the Egyptian universities.

SUBJECTS AND METHODS

Study design and sampling:

A cross sectional study was conducted from April to July 2011 on female students in Damanhur University aged 18-25 years. The sample size was determined assuming that the prevalence ofhypertension among young adults (15-34 years) in Egypt was 16.5 %.[5] To achieve a 95% confidence interval around the prevalence and an error of ± 5% around this estimate, the minimum required sample size was estimated as 200 subjects. The sample size was increased to 220 students for more accuracy. Four faculties of Damanhur University were selected randomly from list containing all faculties in the university. These faculties were Art, Education, Agriculture and Commerce. From each faculty about 55 female students were selected randomly from students who accept to participate in the present study. Female students with history of chronic diseases, receiving regular medical treatment or following a dietary regimen were excluded from the study.

Data collection:

Every student was interviewed using a pre-structured questionnaire to collect data about socio-demographic characteristics (age, residence, family size and the number of rooms) and medical history as family history of hypertension (family history of hypertension was considered

positive if one or more of a first degree relative had hypertension). The students were questioned about feeling exposed to family psychological stress. Data were collected about life style practices (smoking and physical activity, sleeping immediately after eating), dietary habits (eating outside the home, consumption of salty foods such as pickles and salted fish, fatty, fried and fast foods, consumption of caffeinated and soft drinks, and the habit of adding table salt during eating the meals).The consumption was considered high if it was followed between 5 to 7 times weekly and it was considered low if this habit was followed less than 3 times weekly. Physically active students were those who reported practicing exercise or any type of sport more than one hour at least 3 times per week. Crowding index was calculated using family size and the number of rooms in each female's house.

Dietary intake data was collected using a24hr dietary recall method to assess the intake of energy, macronutrients, sodium and potassium by asking each subject to recall and identify the specific quantities of all foods and drinks consumed during the last 24 hours. The data were collected for the three successive days before the interview. The researchers used simple physical models of household units (e.g. cup and spoonful) to help each student to recall the foods and drinks which she consumed. These units were converted to weight in grams for each food item before nutrients analysis. The nutritive value of the daily diet was computed using the Egyptian Food Composition Tables issued by the National Nutrition Institute.[18] Dietary data were presented in the form of mean daily intake of energy, carbohydrates, protein, fat, sodium and potassium. The results were referred to tables of dietary reference intake (DRI)[19] to calculate percent adequacy of nutrients as follows: percent adequacy of nutrient = (nutrient intake/DRI of nutrient) x 100. Nutrient density of the

consumed diet was calculated for macronutrient as follows: nutrient density = (macronutrient intake x calories of each gram/energy intake) x 100.

Anthropometric measurements were taken from each female at the time of interview. Weight, height and waist circumference were measured according to the criteria of Joliffe, et al.[20] Body mass index (BMI) was calculated by dividing the body weight in kilograms by the square of height in meters. Obese female student was defined if BMI ≥ 30 kg/m^2. Abdominal obesity was defined if waist circumference ≥ 88 cm.[21]

A mercury sphygmomanometer with a suitable cuff size was used to measure blood pressure. After 5 minutes rest, the right arm blood pressure of a seated participant was assessed twice, 5 minutes apart, and the average was reported as the final blood pressure measurement. Hypertension was defined according to the criteria of the Joint National Committee 7threport, systolic blood pressure (SBP) ≥ 140 mmHg and/or diastolic blood pressure (DBP) ≥ 90 mmHg.[1]

Statistical analysis:

Statistical analysis was done using SPSS software package, version 17 (Chicago, Illinois, US). The results were expressed and presented as numbers, percentages, mean and standard deviation (SD). Odds ratios (OR) and confidence intervals (CI) are also presented. A *P*-value <0.05 was considered statistically significant. The comparison of the frequencies of the studied parameters between two groups was done by Chi-square test, and Student's t test was used to evaluate the significance of the difference between means. Stepwise logistic regression analysis was done to estimate the independent association of the studied risk factors with hypertension.

Ethical considerations:

There were no conflicts of interest. This research received no specific grant from any

funding agency in the public, commercial or not-for-profit sectors. This study was conducted according to the guidelines laid down for medical research involving human subjects and was approved by the ethics committee of the High Institute of Public Health, Alexandria University, Egypt. All measurements were taken in full privacy and the collected data were kept confidential. All female students were informed about the objective of the study and they had the right to accept or refuse to participate in the study, then their written consent was obtained.

RESULTS

The prevalence of hypertension among university female students is illustrated in Figure1. Results show that 17.3% of the females were hypertensive.

The socio-demographic characteristics of students from both groups are presented in Table 1. The mean age of females from both groups was comparable and was slightly more than 19 years. The rate of hypertension was 13.9% among females living in urban areas and increased to 23.7% among students living in rural areas, however, the difference was not statistically significant. The mean crowding index was slightly but insignificantly higher (2.35 persons/room) among hypertensive females as compared with a slightly lower mean of 2.19 persons/room among normotensive subjects.

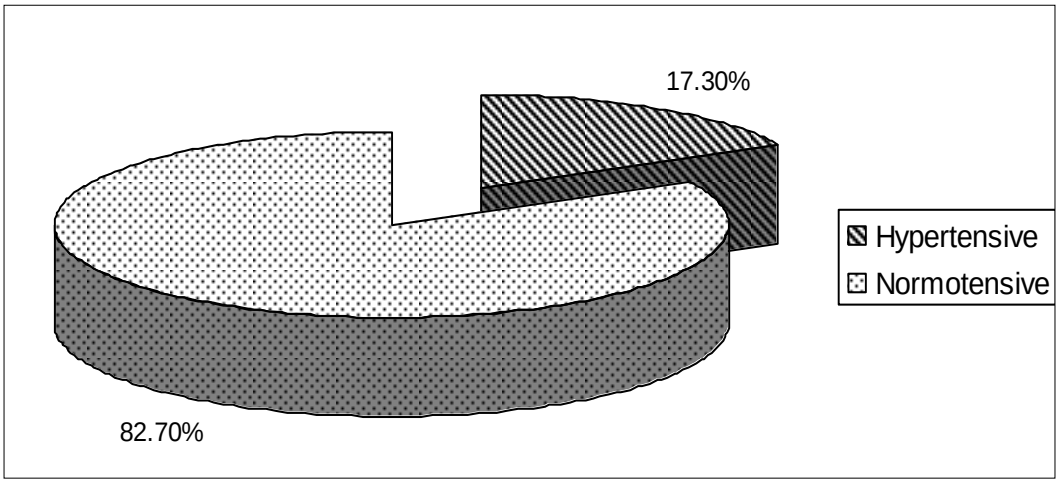

Figure (1) Hypertension among the studied sample of university female students

Table (1) Socio-demographic characteristics of the studied sample of university female students

Variable	Hypertensive (n=38)	Normotensive (n=182)	*P*-value†
Age (years)			
Mean ± SD	19.37 ± 0.29	19.18 ± 0.10	0.482
Place of residence			
Urban	20 (13.9%)	124 (86.1%)	0.068
Rural	18 (23.7%)	58 (76.3%)	
Crowding index(persons/room)			
Mean ± SD	2.35 ± 0.11	2.19 ± 0.05	0.213

SD: standard deviation; † by Chi-squared test or Student's t test

Table 2 illustrates medical history and life style practices of the studied sample. Family history of hypertension was significantly associated with the rate of hypertension among the studied sample of young adult females (OR=6.28, CI=1.89-10.56). The rate of hypertension was as high as 19.6% among females with positive family history of hypertension and decreased to 7.3% among the group with negative family history. BMI and waist circumference was significantly associated with hypertension (OR=54.74, CI=7.35-407.87) and (OR=3.41, CI=1.61-7.21), respectively. The results show that 33.6% of females with BMI more than 30 kg/m^2 and 33.3% with waist circumference more than 88 cm were hypertensive as compared with 0.9% and 12.8% among normal females respectively.Hypertension was lower (10.0%) among physically active females as compared with an insignificantly higher rate (18.6%) among inactive females. Contrary to what was expected the rate of hypertension was lower among smoking females (9.1%) and increased to a higher rate of 17.7%among non-smoker ones.This difference was not statistically significant.

The same table also reveals that the habit of sleeping immediately after eating was significantly associated with hypertension (OR=0.36, CI=0.17-0.76). The rate of hypertension was 24.1% among female students who usually sleep after eating and10.2% among the group who did not practice this habit. Eating outside the homes was also associated with the rate of hypertension which was 21.3% among young females who usually eat outside the home as compared with 7.7% among students who eat their meals at home (OR=3.25, CI=1.21-8.74). When young adult females were exposed to psychological stress by the family, they developed hypertension at a higher rate (25.6%) compared to females who were not exposed to such stress (11.9%).The difference was statistically significant (OR=2.54, CI=1.24-5.17).

Table (2) Medical history and life style practices of normal and hypertensive university female students

Variable	Hypertensive (n=38) No (%)	Normotensive (n=182) No (%)	*P*-value†	OR (95%CI)
Family history of hypertension				
Positive	35 (19.6)	144 (80.4)	0.049*	6.28 (1.89-10.56)
Negative	3 (7.3)	38 (92.7)		
Body mass index (kg/m^2)				
≥30 (obese)	37 (33.6)	73 (66.4)	0.000*	54.74 (7.35-407.87)
<30 (non-obese)	1 (0.9)	109 (99.1)		
Waist circumference (cm)				
≥88 (abdominal obese)	16 (33.3)	32 (66.7)	0.001*	3.41 (1.61-7.21)
<88 (normal)	22 (12.8)	150 (87.2)		
Physical activity				
Active	3 (10.0)	27 (90.0)	0.113	0.32 (0.07-1.40)
Inactive	35 (18.4)	155 (81.6)		
Smoking				
Smoker	1 (9.1)	10 (90.0)	0.462	2.15 (0.27-17.32)
Non-smoker	37 (17.7)	172 (82.3)		
Sleeping immediately after eating				
Usual	27 (24.1)	85 (75.9)	0.007*	0.36 (0.17-0.76)
Never	11 (10.2)	97 (89.8)		
Eating outside the home				
Usual	33 (21.3)	122 (78.7)	0.022*	3.25 (1.21-8.74)
Never	5 (7.7)	60 (92.3)		
Family psychological stress				
Frequent	22 (25.6)	64 (74.4)	0.008*	2.54 (1.24-5.17)
Rare	16 (11.9)	118 (88.1)		

OR= odds ratios; CI= confidence intervals; † by Chi-squared test; * *P* < 0.05

Dietary habits among the studied sample of young adult females are illustrated in Table 3. The consumption of salty foods had a significant impact on the rate of hypertension (OR=0.05, CI=0.01-0.40). The rate of hypertension was 23.4% among females consuming salted food regularly as compared with a rate of 1.6% among those limiting the consumption of salty foods. Hypertension was also elevated among females who practiced the habit of adding table salt to the food while consuming their meals (22.7%) and significantly decreased to 4.5% among those who did not practice this habit. The difference was statistically significant (OR=18.65, CI=2.49-34.81).

It is appeared from Table 3 also that the rate of hypertension was insignificantly associated with high consumption of fatty foods despite of the finding that the rate was higher among those who were highly consuming fatty foods. In the mean time, the consumption of fried foods had a significant impact on the rate of hypertension which was 28.4% among higher consumers of fried foods and decreased to 4.8%among those who were consuming limited quantities of fried foods (OR=7.87, CI=2.94-21.08).Hypertension was also elevated with regular consumption of fast foods (27.2%) and significantly decreased to 11.5% when fast foods were not an essential component of the diet.

Table 3 also shows that a limited number of the young adult females were regular consumers of soft drinks, this was associated with a higher rate of hypertension (35.5%), and a high rate (27.5%) was also noted among regular consumers of caffeinated drinks such as tea and coffee. Both were significantly associated with hypertension (OR=3.30, CI=1.42-7.65 and OR=2.94, CI=1.44-6.01, respectively).

Table (3) Dietary habits of the normal and hypertensive university female students

Variable	Hypertensive (n=38) No (%)	Normotensive (n=182) No (%)	*P*-value†	OR (95%CI)
Consumption of salty foods				
High	37 (23.4)	121 (76.6)	0.000*	0.05 (0.01-0.40)
Low	1 (1.6)	61 (98.4)		
Adding table salt				
Usual	35 (22.7)	119 (77.3)	0.000*	18.65 (2.49-34.81)
Never	3 (4.5)	63 (95.5)		
Consumption of fatty foods				
High	24 (20.5)	93 (79.5)	0.175	1.64 (0.79-3.37)
Low	14 (13.6)	89 (86.4)		
Consumption of fried foods				
High	33 (28.4)	83 (71.6)	0.000*	7.87 (2.94-21.08)
Low	5 (4.8)	99 (95.2)		
Consumption of fast foods				
High	22 (27.2)	59 (72.8)	0.003*	2.87 (1.40-5.86)
Low	16 (11.5)	123 (85.5)		
Consumption of soft drinks				
High	11 (35.5)	20 (64.5)	0.004*	3.30 (1.42-7.65)
Low	27 (14.3)	162 (85.7)		
Consumption of caffeinated drinks				
High	22 (27.5)	58 (72.5)	0.002*	2.94 (1.44-6.01)
Low	16 (11.4)	124 (88.6)		

OR= odds ratios; CI= confidence intervals; † by Chi-squared test; ****P* **< 0.05

The dietary intake of normal and hypertensive young adult females is presented in Table 4. Results show that the daily energy intake of hypertensive females (3449.54 ± 71.63 kcal) was significantly higher than that of the normal subjects (2410.48 ± 61.81 kcal). Consequently, macronutrients intakes as well as percent adequacy of energy and protein were significantly higher among the hypertensive group. Daily intake and percent adequacy of sodium was significantly higher among hypertensive students (t=2.62, *P*=0.007 and t=2.82, *P*=0.009, respectively). Daily intake and percent adequacy of potassium were insignificantly higher among the hypertensive group. Fat and carbohydrate density was comparable for both groups; however density of protein in the food of the hypertensive group (12.86%) was significantly lower than that of the normal group (15.74%).

Table (4) Dietary intake of normal and hypertensive university female students

Item	Hypertensive (n=38) Mean ± SD	Normotensive (n=182) Mean ± SD	t	*P*-value
Nutrients daily intake				
Energy (kcal)	3449.54 ± 71.63	2410.48 ± 61.81	7.45	0.000*****
Protein (gm)	109.71 ± 6.52	87.41 ± 2.75	3.32	0.000*****
CHO (gm)	398.09 ± 21.43	273.09 ± 8.39	6.01	0.000*****
Fat (gm)	124.15 ± 12.07	89.61 ± 5.79	2.49	0.012*****
Sodium (gm)	2.68 ± 0.11	2.17 ± 0.08	2.62	0.007*****
Potassium (gm)	3.72 ± 0.11	3.62 ± 0.09	0.70	0.482
Nutrients adequacy (%)				
Energy	156.79 ± 3.26	109.57 ± 2.81	7.46	0.000*****
Protein	238.49 ± 14.18	190.02 ± 5.99	3.31	0.000*****
Sodium	178.44 ± 7.60	144.49 ± 4.49	2.82	0.009*****
Potassium	80.61 ± 2.41	78.39 ± 1.99	0.71	0.478
Nutrients density (%)				
Protein	12.86 ± 0.78	15.74 ± 0.59	2.17	0.034*****
CHO	47.36 ± 3.13	46.64 ± 1.01	0.27	0.796
Fat	32.12 ± 2.94	32.94 ± 1.52	0.23	0.823

SD: standard deviation; *P < 0.05

Table 5 shows results of the stepwise logistic regression model. The significant model X^2=42.91***** shows that high consumption of salty foods was the most significant factor affecting the development of hypertension (adjusted OR=15.12), followed by high consumption of fried foods (adjusted OR=6.22) and the least was regular eating of meals outside the home which appeared to render the females 2.9 times more liable to the development of hypertension.

Table (5) Stepwise logistic regression model for significant factors affecting hypertension

Risk factor	OR (95%CI)	B	S.E	Wald	*P-value*
High consumption of salty foods	15.12 (1.98 – 115.47)	2.72	1.04	6.86	0.009*****
High consumption of fried foods	6.22 (2.27 – 17.08)	1.83	0.52	12.59	0.000*****
Usual eating outside the home	2.94 (1.03 – 8.35)	1.08	0.53	4.09	0.043*****
Model X^2 = 42.91; *P* = 0.000*					

*** *P* < 0.05**

DISCUSSION

The dramatic changes in the life style and food consumption pattern that have occurred during the last four decades in developing countries have led to the emergence of non communicable diseases such as hypertension as a major public health problem.[22] Hypertension has been classified as one of the major risk factors contributing to the development of coronary artery diseases[23] and cerebrovascular diseases.[24]

In Egypt, the overall prevalence of hypertension among adults is very high (26.7%) and it is 16.5% among young adults (15-34 years).[5] There is a paucity of data on the prevalence of hypertension in the age of university (18-25 years). It has always been assumed that they are

deemed to be at a low risk of developing the disease[25] despite of the published reports describing the association between BMI and blood pressure in paediatric patients[26] and adolescents.[27]

The results of the present study showed that the prevalence of hypertension among young adult females in the age group 18 to 25 years was relatively high (17.3%), this rate is slightly lower than that reported in a recent study in Iran which showed that the prevalence of prehypertension and hypertension were 13.9% and 19.4% respectively.[4]

The prevalence of hypertension reported in this study was not associated with the age or the housing of the students whether located in urban or rural areas or even by the crowding of their homes (Table 2). This is due to the fact that the age category of the subjects of this study was very narrow and varied between 18 and 25 years and the rural nature of the Governorate where the university is located where the nature of the social and cultural environment does not vary between rural and semi urban areas.

The results presented in Table 2 showed that the practice of physical activity by young adult females had insignificant effect on the prevalence of hypertension. This is not in agreement with published studies confirming the significant positive impact of physical activity in reducing the prevalence rate of hypertension. It was shown that regularly performed aerobic exercises significantly lowered blood pressure in patients with essential hypertension.[28] Sedentary individuals have a 20 to 50% increased risk of developing hypertension.[29] However, it should be pointed out that the number of females practicing physical exercise in this study is quite limited to draw sound conclusion. This is due to the conservative nature of Damanhur Governorate where the families do not allow their daughters to practice sports in addition to the limited facilities

available for females to practice physical activity.

The results also showed that smoking was not associated with the prevalence of hypertension, this is simply due to the under reporting of smoking by female students who are very unlikely to admit the smoking habit which is rejected socially.

The positive family history of hypertension was associated with a high prevalence among females who developed hypertension at a young age (19.6%). Several reports confirmed the role of family history of hypertension in the development of the disease in children and adolescents.[30,31] Family psychological stress led to even a higher prevalence of hypertension in this young age group (25.6%). The conservative nature of the governorate were the university is located imposes many restrictions on females; female students are required to attend their classes at the university, use crowded public transportation and are forced to participate in household activities. In rural areas in Egypt, especially within extremely religious families, females are treated as an inferior creature with very limited rights and lots of social restrictions and obligations. This may be acceptable by illiterate females but is certainly rejected by university educated students who are practically powerless to resist. Such a frustrated young female is more liable to develop hypertension. It has been reported that harsh family environments increased blood pressure over time[32] and that psychosocial stress may play an important role in the development of hypertension.[33] This was hypothesized to be caused by stress induced sodium retention.[34]

Both BMI and waist circumference were significant predictors of high blood pressure in adolescents.[27] Several large epidemiological studies have shown an association between BMI and blood pressure in normal weight and overweight subjects.[26,27,29,35] It was reported that adult

weight and weight gain are the major determinants of adult blood pressure[35] and that even modest weight loss can reduce blood pressure levels even without reaching ideal weight.[36] Few studies have shown that waist circumference may be a better predictor of cardiovascular disease than BMI.[27,37] The BMI and waist circumference were the most important factors determining the rate of hypertension among young adult students. The rate was as high as 33.6% among obese females with BMI more than 30 kg/m^2 and 33.3% among females with abdominal obesity characterized by a waist circumference more than 88 cm (Table 2).

The dietary habits of the students played a significant role in the development of hypertension. Sleeping immediately after eating is a common habit in Egypt. This napping allows the body to store most of the consumed calories, and if this is accompanied by limited physical activity afterwards, students will gain weight, become obese and more liable to hypertension.

The high consumption of meals containing large quantities of sodium was significantly associated with higher prevalence of hypertension. This was very evident from data presented in Table 3 which showed that the prevalence of hypertension was high among young adult females eating meals outside their homes where the students usually consume fast foods which are very rich in sodium.

The results presented in Table 4 showed that the dietary intake of hypertensive young adult females was higher than that of the normal subjects. The data showed that hypertensive females consumed more calories, carbohydrates and fats far beyond their recommended daily requirements. Sodium consumption was higher among hypertensive students than normal subjects. However the protein density of the normal females was significantly higher than hypertensive subjects indicating a better

selection of food and a better quality meal.

These results may be due to several unhealthy dietary habits. One of the notorious food habits in Egypt is the high consumption of pickled foods as a replacement to green salad. In addition many families have the habit of adding table salt to the foods while consuming their meals, such habits increases sodium consumption several times more than the recommended level of intake rendering young adults more susceptible to the development of hypertension (Table 3). The frequent consumption of salty foods such as pickles, salted fish and chips on daily basis and the practice of adding table salt is a common practice among hypertensive patients.[38] Dietary intervention to reduce sodium intake and increase potassium intake may be effective in reducing blood pressure, this may be achieved by consuming foods rich in potassium and low in sodium particularly fruits and vegetables.[39]

The excessive caloric intake will lead to the development of overweight and obesity and when accompanied by excessive intake will ultimately lead to the elevation of blood pressure. High consumption of fried foods and soft drinks contributed to the increased caloric intake which led to increased body weight, BMI and ultimately a higher prevalence of hypertension (27.5%). Students consume several cups of tea and coffee daily and especially during the evening hours to help them to concentrate on their studies, the excessive consumption of caffeine significantly contributed to the development of hypertension. Caffeine has been used for thousands of years and is one of the most widely consumed active food ingredient throughout the world. It is found in coffee, tea, soft drinks and products containing cocoa or chocolate.[40] The consumption of caffeine resulted in an increase in blood pressure in healthy, normotensive, young, and older men and women which necessitates the consideration of caffeine in the lifestyle interventions recommended for blood pressure control.[41-43]

CONCLUSION AND RECOMMENDATIONS

Hypertension was detected among 17.3% of female students in Damanhur University. Several dietary risk factors were associated with the high rate of hypertension among university female students.Hypertension was associated with obesity and unhealthy practices such as sleeping immediately after eating meals and eating outside the homes. Faulty food habits such as the excessive intake of salt and high consumption of fried and fast foods contributed to the high rate of hypertension.

A nutritional intervention program should be designed to control hypertension among young adult females. The main objective of the program will be the correction of the improper dietary practices to reduce caloric and salt intake, maintain normal body weight, minimize the consumption of fried and fast foods and to replace caffeinated and soft drinks by natural fruit juices. The females should be encouraged to practice physical exercise and to avoid unnecessary psychosocial stress.

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