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Physical Activity, Nutritional Status and Their Relationship with Hypertension in Adult Men in District Peshawar

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Abstract

Hypertension or high blood pressure is the condition in which systolic blood pressure is ≥ 140 mmHg and diastolic blood pressure is ≥ 90 mmHg regardless of the age. Hypertension means that no medical cause can be found to explain the raise of blood pressure. It is an important public health problem globally which is highly prevalent and is a major contributor to morbidity and mortality in both developed and developing countries. In this study related to physical activity, nutritional status and their relationship with hypertension in adult men in district Peshawar was evaluated. A total of 600 individuals (300 hypertensive and 300 non-hypertensive) as case control were randomly selected. The anthropometric measurements, physical activity, dietary intake, socioeconomic and demographic data were recorded to evaluate the relationship and risk factors associated with hypertension. The mean (± S.D.) values of body mass index (BMI) of hypertensive and non-hypertensive individuals were 26.7 ± 2.81 and 25.2 ± 2.86 kg/m^2, respectively. The results showed a significant difference in the mean weight and body mass index (BMI) of hypertensive and non-hypertensive individuals. The results from medical history and clinical examination of hypertensive individuals (98.3%) showed positive family and smoking history. The mean values of physical activity status of hypertensive and non-hypertensive individuals as sedentary, light, moderate and heavy 74.67%, 13.0%, 12.3%, 0% and 25.08%, 26.09%, 35.79% and 13.04% respectively which showed that the higher percentage of hypertensive were involved in sedentary to light physical activities comparatively non-hypertensive individuals which were involved in moderate to strenuous physical activities. The mean (± S.D) values of caloric, carbohydrates, protein and fats intakes of both hypertensive and non-hypertensive were (2197.4 ± 327.9 and 2104.0 ± 350.9 kcal) 312.0 ± 68.7 and 310.3 ± 70.1 g) (66.3 ± 22.4 and 73.7 ± 21.2 g) (76.3 ± 21.8 and 63.09 ± 25.8 g) respectively. The results of the study showed the relationship of hypertension with higher body mass index (BMI), family, medical and smoking history, low physical activity and unhealthy dietary pattern are the main contributing factors in the development of hypertension.

Keywords

Dietary Intake, Hypertension, Nutritional Status, Physical Activity

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1. Introduction

Hypertension or high blood pressure is the condition in which systolic blood pressure is ≥ 140 mmHg and diastolic blood pressure is ≥ 90 mmHg regardless of the age (Shwe *et al*., 2004). Hypertension means that no medical cause can be found to explain the raise of blood pressure and represents about 90-95% of hypertension cases. It is an important public health problem of global dimensions, both in the developed and developing world and is the most common cardiovascular disorder affecting 20% of adult population worldwide (Shwe *et al*., 2004). The World Health Organization attributes hypertension or high blood pressure as the leading cause of cardiovascular mortality and an

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estimated 600 million people are suffering from hypertension worldwide and causes 7.1 million deaths annually i.e. 13% of global fatalities (WHO, 2010).

About one third of the hypertensive population is not aware of the disease because it is essentially painless especially in the early stages. Many people don't even know they have it, hence the term "silent killer" is used. Hypertension is highly prevalent and is a major contributor to morbidity and mortality in both developed and developing countries. In other words, the disease can progress without symptoms to finally develop to any one or more of the several potentially fatal complications of hypertension such as heart attacks or strokes. It can occur in children or adults but is more common among people over age 25 years and above with estimated prevalence of over 35% in South East Asian countries (Krishnan *et al*., 2013).

Family history of blood pressure and heart disease is considered to be an important risk for hypertension. All these risk factors associated with hypertension are involved in determining the levels of blood pressure and the prevalence of hypertension. However the prevalence of hypertension and the risk factors for hypertension varies among the various races and regions. Cardiovascular disease (CVD) is not only the problem of the West. Rather, it is also very prevalent in the developing world. It has been estimated that CVD including hypertension affects 28.6% of the population in the developed countries like U.S (Hajjar *et al*., 2006). In the developing countries, CVD accounted for 86% of the global burden of the world and 80% of the deaths due to CVD (WHO, 2010). Despite the high death rates due to non-communicable diseases, the leading cause of death in the developing countries including Pakistan is CVD. In Pakistan, it has been estimated that over 50 percent of the population over the age of 50 has hypertension (WHO, 2010).

Non communicable diseases (NCDs) and injuries are considered as one of the top ten causes of mortality and morbidity in Pakistan; estimates indicate that they account for approximately 25% of the total deaths within the country (WHO, 2010). Also, NCDs contribute significantly to adult mortality and morbidity and impose a heavy economic burden on individuals, societies and health systems. In most cases, it is the economically productive workforce, which bears the brunt of these diseases. Existing population-based morbidity data on NCDs in Pakistan show that one in three adults over the age of 45 years suffers from high blood pressure (WHO, 2010).

In Pakistan, despite of high prevalence of hypertension in the adult population, a very little work has been conducted to investigate the risk factors associated with hypertension and to mitigate the modifiable risk factors. Many primary health care allied health professionals do not have current knowledge about the management of hypertension and so the general public do not know about the prophylactic and therapeutic management of hypertension. The public also is largely unaware of the prevention of CVD. There is no consensus amongst the specialists in the management of hypertension in Pakistan (WHO, 2010).

General Objective:

The main objective of the study was to determine the relationship of hypertension with physical activity and nutritional status of hypertensive adult men aged 40 years and above.

Specific Objectives:

1. To assess the dietary intake and nutritional status using anthropometric measurements of hypertensive and non-hypertensive individuals.
2. To assess the physical activity pattern of hypertensive and non-hypertensive individuals.
3. To evaluate the relationship of physical activity and nutritional status with hypertension

2. Materials and Methods

2.1. Study Location and Sample Selection

The case control study was conducted on men adult population of age ≥ 40 years in District Peshawar. A total of six hundred individuals (300 cases and 300 controls) were selected through three stage cluster sampling (random selection of clusters, households and individuals (cases and controls) procedure and enrollment of cases and control individual men.

2.2. Inclusion Criteria

All men individual aged ≥ 40 years having systolic and diastolic blood pressure ≥ 140/90 mmHg (Shwe *et al.,* 2004) but free of chronic and infectious diseases were included as a case in the study based on their consent. Similar criteria were used for the study groups who were free of chronic and infectious diseases and non-hypertensive (systolic and diastolic blood pressure ≤ 140/90 mmHg) A written consent form was obtained from both study and control groups.

2.3. Medical History and Clinical Assessment

All the individuals were screened about their medical history for any infectious or chronic disease and family history related to hypertension. Clinical assessment of all individuals

were carried out for systolic and diastolic blood pressure using a mercury column sphygmomanometer and a cuff appropriate for the subject's arm circumference and stethoscope *(America Heart Association 2012)*. Blood pressure in the sitting position was measured twice by skilled trained researcher after 5 min of rest and the average of the measurements was recorded. The individuals with systolic blood pressure ≥140mmHg and diastolic blood pressure ≥ 90mmHg were considered as hypertensive. (Shwe *et al*., 2004).

2.4. Dietary Information and Anthropometric Measurements

A 24-hr dietary recall method was used to assess the dietary intake and pattern of both cases and controls. The estimated portion sizes were then converted into nutrients intake by using Pakistani Food Composition Table (Hussain et al, 1990) and Nutritive Value of Indian Foods (Goplan *et al,* 1985).

Weight and height of the subjects were measured using WHO (1983) recommended standard procedures. Before taking weight measurements, the individual was asked to remove heavy clothing, shoes and other unnecessary things. The weight was noted up to the nearest 0.01kg. Similarly before height measurements, the individual was asked to remove shoes and to stand in the center of the platform of the scale, looking straight with his head, back, buttocks, calves and heels touching the rod. The head piece was levelled and height was recorded up to the nearest 0.1cm. Body mass index (BMI) was calculated with the help of formula, Weight (kg) / Height (m^2).

2.5. Physical Activity Level, Socio-economic and Demographic Information

Individuals were asked about socio-economic and demographic characteristics including age, smoking, family history, family type and occupation for any possible relationship among the hypertensive individuals. To compare subjects whose work involves a high level of physical activity with subjects who perform office work, were categorized subjects as sedentary, light, moderate and strenuous physical activity. Smoking was categorized as smokers and non-smokers. The physical activity levels were linked to occupation.

2.6. Statistical Analysis

The collected data were entered into computer for statistical analysis using MS Excel and Statistix 8.1 package software. Descriptive statistics was used to see the variation in mean values and associated risk factors between hypertensive and non-hypertensive individuals at 5% level of significance.

3. Results and Discussion

The case-control study related to nutritional status and physical activity related to hypertension in men adult age ≥ 40 years in district Peshawar.

3.1. Anthropometric Measurements and General Characteristics of the Subjects

Table 1 describes the general characteristics and anthropometric measurements of the hypertensive and non-hypertensive individuals. The mean ages of the hypertensive and non-hypertensive individuals were 47.5 ± 4.78 and 47.4 ± 4.74 years. The mean weights of hypertensive and non-hypertensive individuals were 77.4 ± 7.25 and 73.3 ± 7.39kg while the mean heights of these individuals were 1.71 ± 0.05 and 1.71 ± 0.04 meters respectively. The mean body mass indices (BMI) for hypertensive and non-hypertensive individuals were 26.7 ± 2.81 and 25.2 ± 2.86 kg/m^2. The p value in the table indicates that there was a significant difference in the mean weight and body mass index (BMI) of hypertensive and non-hypertensive individuals while there was no significant difference between the mean age and height of both groups. The findings indicate a relationship between weight and hypertension in association with significantly higher weight and body mass index (BMI).

Table 1. Anthropometric measurements and general characteristics of the Subjects.

Variables	Hypertensive (n= 300) (Mean ±SD)	Non-Hypertensive (n= 300) (Mean ±SD)	*t*-value	*p*-value
Age (years)	47.5 ± 4.78	47.4 ± 4.74	0.168	0.867
Weight (kg)	77.4 ± 7.25	73.3 ± 7.39	6.883	0.000
Height (m)	1.71 ± 0.05	1.71 ± 0.04	0.962	0.337
BMI (kg/m^2)	26.7 ± 2.81	25.2 ± 2.86	6.572	0.000

3.2. Medical History and Clinical Characteristics of the Subjects

Table 2 reveals the medical history and clinical characteristics of hypertensive and non-hypertensive individuals which show that 98.3% of the hypertensive individuals had a positive family history comparatively 13.0% in non-hypertensive individuals. Similarly 98.3% of the hypertensive individuals had a smoking history as compared to 25.7% in the non-hypertensive individuals. The p-value indicates the association between family medical and smoking history with hypertension and are contributing

factors in the development of hypertension in individuals.

Table 2. Medical history and clinical characteristics of the hypertensive and non-hypertensive individuals.

Variables	Hypertensive (n=300) N (%)	Non-hypertensive (n=300) N (%)	Chi Square Value	P-value
Family Medical History				
Positive	295 (98.33%)	39 (13.04%)	446.50	0.001
Negative	5 (1.67%)	260 (86.96%)		
Smoking				
Positive	294 (98.0%)	83 (27.76%)	336.04	0.001
Negative	6 (2.0%)	216 (72.24%)		

3.3. Physical Activity Levels of the Subjects

Table 3 describes the physical activity status of hypertensive and non-hypertensive individuals. The subject's activity levels were divided into very sedentary, light, moderate and strenuous. The results reveals that 74.67% of the subjects had sedentary, 13.0 light and 12.3% had moderate physical activity levels of the hypertensive individuals. The results on physical activity of non-hypertensive individuals indicates that 25.08% sedentary, 26.09% light activity while 35.79% and 13.04% had moderate and strenuous physical activity levels. The results on physical activity levels of hypertensive and non-hypertensive subjects indicate the higher percentage of hypertensive were involved in sedentary to light physical activities while in the control group a greater percentage of subjects were involved in moderate to strenuous physical activities level. The findings suggest that low physical activity could contribute to development of hypertension. The relationship between the physical activity level and health status was significantly reveals the less involvement in the intensive physical activity levels.

Table 3. Physical Activity Level of Hypertensive and non-hypertensive Subjects.

Activity level	Hypertensive (n=300) N (%)	Non-hypertensive (n=300) N (%)	Chi Square Value	P-value
Sedentary	224 (74.67%)	75 (25.08%)	148.04	0.001
Light	39 (13.0%)	78 (26.09%)		
Moderate	37 (12.33%)	107 (35.79%)		
Strenuous	0 (0%)	39 (13.04%)		

3.4. Demographic and Socio-economic Characteristics of the Subjects

Table 4 describes the demographic and socio-economic characteristics of hypertensive and non-hypertensive subjects. The results reveal that there is no significant association between the family type (joint versus nuclear) and health status. Similarly no significant association between the marital status and health status was found indicating that family type and marital status do not pose any risk for hypertension. The association between exercise with health status of hypertensive and non-hypertensive individuals was found significant. A greater number of hypertensive patients than non-hypertensive were involved in exercise which may have a positive impact on hypertensive in preventing further deterioration and aggravation of hypertension.

Table 4. Demographic and socio-economic characteristics of the subjects.

Variable	Status	Hypertensive Mean ± SD N (%)	Non-hypertensive Mean ± SD N (%)	Chis q/ t-values	p-value
Family Type	Joint	205 (68.3)	196 (65.6)	7.039	0.073
	Nuclear	95 (31.7)	103 (34.4)		
Marital Status	Married	11 (3.67)	22 (7.36)	3.91	0.05
	Unmarried	289 (96.33)	277 (92.64)		
Exercise	Yes	251 (83.67)	202 (70.90)	59.381	0.001
	No	49 (16.33)	87 (29.09)		

3.5. Dietary Intake of Hypertensive and Non-hypertensive Subjects

Table 5 shows energy, carbohydrates, protein and fats intakes of both hypertensive and non-hypertensive groups. The mean energy intake of hypertensive and non-hypertensive individuals were 2197.4 ± 327.9 and 2104.0 ± 350.9 (kcal) respectively. The mean carbohydrate intake of these groups was 312.0 ± 68.7 and 310.3 ± 70.1 (g) respectively. The mean protein intake of these groups was 66.3 ± 22.4 and 73.7 ± 21.2 (g) respectively. The mean fat intake of these groups was 76.3 ± 21.8 and 63.09 ± 25.8 (g) respectively. The findings suggests that both groups were having similar pattern of energy and carbohydrates intake while significant difference in protein and fat intake of hypertensive and non-hypertensive individuals.

Table 5. Energy, Carbohydrates, Protein and fats intake of hypertensive and non-hypertensive subjects.

Variables	Hypertensive (n= 300) (Mean± SD)	Non-hypertensive (n= 300) (Mean± SD)	p-value
Energy (Kcal)	2197.4 ± 327.9	2104.0 ± 350.9	0.001
Carbohydrates (g)	312.0 ± 68.7	310.3 ± 70.1	0.83
Proteins (g)	66.3 ± 22.4	73.7 ± 21.2	0.001
Fats (g)	76.3 ± 21.8	63.09 ± 25.8	0.0001

4. Conclusion and Recommendations

The study related to assess the relationship of hypertension with physical activity and nutritional status in adult men was conducted in district Peshawar. A total of six hundred adult men age ≥40 years individual randomly selected from union councils of district Peshawar and 300 hypertensive individuals as a cases and 300 non-hypertensive as control. Both groups were assessed for demographic, socioeconomic characteristics, medical history, clinical examination, anthropometric indices and dietary intake.

The anthropometric results indicate a significant difference in the mean weight and body mass index (BMI) of hypertensive and non-hypertensive individuals while no significant difference between the mean age and height of both groups. The findings indicate the relationship between weight and hypertension in association with significantly higher weight and body mass index (BMI). The medical history and clinical characteristics of hypertensive and non-hypertensive individuals reveal that 98.3% of the hypertensive individuals had a positive family history comparatively 13.0% in non-hypertensive individuals. Similarly 98.3% of the hypertensive individuals had a smoking history as compared to 25.7% in the non-hypertensive individuals. The p-value indicates the association between family medical and smoking history with hypertension and are contributing factors in the development of hypertension in individuals. The results related to physical activity reveals that 74.67% of the subjects had sedentary, 13.0 light and 12.3% has moderate physical activity levels of the hypertensive individuals and non-hypertensive individuals has 25.08% sedentary, 26.09% light activity while 35.79% and 13.04% had moderate and strenuous physical activity levels. The results on physical activity levels of hypertensive and non-hypertensive subjects indicate the higher percentage of hypertensive were involved in sedentary to light physical activities while in the control group a greater percentage of subjects were involved in moderate to strenuous physical activities level. The findings suggest that low physical activity could contribute to development of hypertension. (Ben-Dov, *et al.*2000). The relationship between the physical activity level and health status was significantly reveals the less involvement in the intensive physical activity levels. The findings of demographic and socioeconomic characteristics reveals that there is no significant association between the family type (joint versus nuclear) and health status. Similarly no significant association between the marital status and health status was found indicating that family type and marital status do not pose any risk for hypertension. The association between exercise with health status of hypertensive and non-hypertensive individuals was found significant. A greater number of hypertensive patients than non-hypertensive were involved in exercise which may have a positive impact on hypertensive in preventing further deterioration and aggravation of hypertension. The results from dietary intake reveals the mean energy intake of hypertensive and non-hypertensive individuals were 2197.4 ± 327.9 and 2104.0 ± 350.9 (kcal) respectively. The mean carbohydrate intake of these groups was 312.0 ± 68.7 and 310.3 ± 70.1 (g) respectively. The mean protein intake of these groups was 66.3 ± 22.4 and 73.7 ± 21.2 (g) respectively. The mean fat intake of these groups was 76.3 ± 21.8 and 63.09 ± 25.8 (g) respectively. The findings suggests that both groups were having similar pattern of energy and carbohydrates intake while significant difference in protein and fat intake of hypertensive and non-hypertensive individuals. These results of the study shows that the risk of hypertension is associated with sedentary life style, physical activity, dietary pattern and high values of body mass index (BMI) in hypertensive individuals.

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