

Effect of Physical Activity on Controlling Blood Pressure among Hypertensive Patients from Mishref Area of Kuwait

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ABSTRACT

Aim: To demonstrate the effect of physical activity on controlling blood pressure among hypertensive patients from Mishref area of Kuwait.

Method: A sample of 240 Kuwaiti patients diagnosed with hypertension for more than one year were randomly selected from those hypertensive patients who visited the primary care center for their regular follow up. Patients were labeled as uncontrolled hypertensives if their systolic blood pressure (SBP) was ≥ 140 mmHg and /or diastolic blood pressure (DBP) was ≥ 90 mmHg. A structured questionnaire with questions on sociodemographic characteristics, diet and physical activity was administered.

Result: The prevalence of uncontrolled hypertension among our sample was 44.4%. More than half of patients who reported not practicing physical activity had uncontrolled hypertension compared to a quarter of those who were practicing it. The multiple logistic regression analysis showed that age, Body Mass Index (BMI), diet, and physical activity were the independent significant risk factors on controlling hypertension among our study population. The risk of uncontrolled hypertension is 3.88 times among younger age group, 4.97 times among older age group, 2.50 times among patients with their BMI ≥ 30 kg/m², 7.79 times among patients who are not on diet, 8.34 times among patients who exercise less than 3 days per week, 5.71 times among less active during leisure time, and 3.52 times among less active during work.

Conclusion: The increased risk of physical inactivity in controlling hypertension in our study suggests that general practitioners must be in the habit of prescribing practice of physical exercise and patients are followed up regularly to confirm that they are adhering to the management plan and the blood pressure targets are being met.

Key words: Hypertension, risk factors, physical activity, Kuwait

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Kuveyt Mishref Bölgesindeki Hipertansif Hastalarda Fiziksel Aktivitenin Kan Basıncı Kontrol Üzerine Etkisi

Amaç: Kuveyt Mishref bölgesindeki hipertansif hastalarda kan basıncı kontrolüne fiziksel aktivitenin etkisini göstermek

Metod: 1 yıldan fazla süredir hipertansiyon tanısı ile takip edilen 240 Kuveytli hasta birinci basamak sağlık merkezine düzenli takip için gelen hipertansif hastalar içinden rastgele seçildi. Sistolik Kan Basıncı ≥ 140 mmHg ve/veya diastolic kan basıncı ≥ 90 mmHg olan hastalar kontrolsüz hipertansifler olarak adlandırıldı. Sosyodemografik özellikler, diyet ve fiziksel aktivite ile yapılandırılmış anketler uygulandı

Bulgular: Örneklemimizde kontrolsüz Hipertansiyon prevalansı %44.4 idi. $\frac{1}{4}$ fiziksel aktivite yapanlarla karşılaştırıldığında, fiziksel aktivite yapmayan yarıdan fazla hasta kontrolsüz hipertansiyona sahipti. Çalışma grubumuzda yaş, Vücut kitle indeksi, diyet ve fiziksel aktivitenin hipertansiyonu kontrol eden bağımsız risk faktörleri olduğu multiple lojistik regresyon analizinde gösterildi. Kontrolsüz hipertansiyon riski genç hastalarda 3.88 kat, yaşlı hastalarda 4.97 kat, vücut kitle indeksi ≥ 30 kg/m² olanlarda 2.5 kat, diyetle olmayanlarda 7.79 kat haftada 3 günden az egzersiz yapanlarda 8.34 kat, boş zamanlarında aktif olmayanlarda 5.71 kat ve işte daha az aktif olanlarda 3.52 kat yüksektir.

Sonuç: Fiziksel inaktivite tansiyon kontrolünde bir risk faktörüdür ve pratisyen hekimler fiziksel egzersizsiz bir alışkanlık olarak reçete etmelidirler ve hastalar düzenli olarak bu tedavi yönetimine uyum ve kan basıncı hedefleri açısından takip edilmelidir

Anahtar kelimeler: Hipertansiyon, risk faktörleri, fiziksel aktivite, Kuveyt

INTRODUCTION

Hypertension is an important public health challenge in both economically developing and developed countries (1). Worldwide prevalence estimates for hypertension may be as much as 1 billion individuals, and approximately 7.1 million deaths per year may be attributable to hypertension (2). It is the most widely recognized risk factor for cardiovascular disease (CVD), cerebrovascular disease and end-stage renal disease. Many studies have reported a significant relationship between hypertension and risk factors such as age, body mass index, smoking and physical inactivity. Physical inactivity may be responsible for various chronic disease conditions including hypertension (3). Hypertension therapy, and medications are available that can control blood pressure with minimal side effects. Yet inadequate blood pressure control remains too common, contributing to excess cardiovascular morbidity and mortality. Prevention of hypertension by lifestyle modification may be one of the ways to decrease the CVD population risk attributed to hypertension. A variety of lifestyle modifications have been shown in clinical trials to lower blood pressure. These include weight loss in the overweight (4), physical activity (5), a diet with increased fresh fruits and vegetables and reduced saturated fat content (6), and reduction of dietary sodium intake (6,7). A prospective study from Finland showed overweight and obese subjects were associated with an increased risk of hypertension and the protective effect of physical activity was consistent in both overweight and normal weight subjects (8).

In Kuwait, the most recent data on hypertension showed a prevalence rate of 26.3% in 1999 (9). Another study on

a sample of 800 individuals from five health regions of Kuwait reported about 7% undiagnosed hypertension (10). The awareness of hypertension and its complication has not been improving despite the available free media and medical services in Kuwait. Over the past few years the ministry of health in Kuwait has become more concerned about the complications caused by hypertension, diabetes and other cardiovascular diseases. Their increased prevalence has resulted in an increase in general expenditure on health. Since we live in an affluent society, sedentary lifestyle has become a feature of our population. In order to deal with the issue of controlling hypertension as a risk factor for CVD, one must study the factors that play a role in regulating the blood pressure. The purpose of this study was to demonstrate the effect of physical activity on regulating blood pressure.

MATERIALS AND METHODS

The health care delivery system in Kuwait is divided into six health regions; a number of primary care centers and one regional hospital serve each region. Each primary care center serves a residential area. The majority of primary care centers are walk-in clinics where patients are treated for common medical problems. Hypertensive patients often visit the primary care centers where they are followed up usually by a family physician and they are treated based on updated guidelines. Our study was carried out from July to December 2008 at Mishref primary care center in a random sample of 240 Kuwaiti patients diagnosed with hypertension for more than one year. The sample included 87 males and

Table 1. Characteristics of 240 hypertensive patients according to uncontrolled hypertension

	All n:240 n (%)	Uncontrolled hypertension (n:106) n (%)	p-value
Age in years			0.016a
<40	37 (15.4)	23 (62.2)	
40-49	77 (32.1)	26 (33.8)	
≥50	126 (52.5)	57 (45.2)	
Gender			0.891a
Male	87 (37.0)	38 (43.7)	
Female	148 (63.0)	66 (44.6)	
Marital status			0.181b
Single	16 (6.9)	9 (56.3)	
Married	210 (90.1)	90 (42.9)	
Divorced/widowed	7 (3.0)	5 (71.4)	
Working status			0.390a
Employed	117 (50.0)	47 (40.2)	
Retired	80 (34.2)	38 (47.5)	
Unemployed	37 (15.8)	19 (51.4)	
BMI (Kg/m ²)			<0.001a
<25	15 (6.5)	1 (6.7)	
25-30	68 (29.4)	17 (25.0)	
≥30	148 (64.1)	82 (55.0)	
Smoking			0.835a
No	186 (83.4)	82 (44.1)	
Yes	37 (16.6)	17 (45.9)	
On diet			<0.001a
No	140 (58.6)	79 (56.4)	
Yes	99 (41.4)	27 (27.3)	
Duration of hypertension in years			0.415a
<3	69 (30.1)	32 (46.4)	
3-6	60 (26.2)	23 (38.3)	
>6	100 (43.7)	49 (49.0)	
Medication to regulate blood pressure			0.341a
ACE inhibitor	72 (30.0)	30 (41.7)	
Beta blocker	34 (14.2)	13 (38.2)	
Calcium channel blocker	11 (4.6)	5 (45.5)	
Combinations	89 (37.1)	46 (51.7)	
Low salt diet	20 (8.3)	9 (45.0)	
Other medicines*	14 (5.8)	3 (21.4)	

Numbers may not add up to the total due to missings. p-values are generated by a: chi-square test, b: Fisher's exact test. *Other medicines include Diuretics, Divon, etc.

148 females and their mean age was 48.2±9.0 SD. The management of hypertension ranged from simple diet control to usage of advanced antihypertensive agents. Written informed consent was obtained from all patients who participated in the study.

A reading for blood pressure of each patient was taken in the clinic using a standard sphygmomanometer, was compared with 2 previous readings taken 6 months ago from the patient records and average of the 3 readings was calculated. Patients were labeled as uncontrolled hypertensives if the mean of measures of SBP was ≥140 mmHg and /or DBP was ≥90 mmHg. Data on duration and management of hypertension were also taken from

patient records. Height (cm) and weight (kg) were measured with the patient wearing light clothes and barefooted. BMI was calculated using the formula Weight (kg)/Height² (m²) and was graded as per the WHO - International Classification of BMI: Normal 18.5-24.99, Overweight 25-30, Obese ≥30.

In addition, a structured questionnaire with questions on sociodemographic characteristics (age, gender, employment status, marital status, and smoking status), dieting and physical activity was administered. Most questions on physical activity were designed to be answered by selecting one of the given choices. The included questions were on patient received advice from

Table 2. Physical activity among 240 hypertensive patients according to uncontrolled hypertension

	All n:240 n (%)	Uncontrolled hypertension (n:106) n (%)	p-value
Practicing physical activity			<0.001a
No	156 (65.5)	84 (53.8)	
Yes	82 (34.5)	21 (25.6)	
Frequency of exercise			<0.001a
Rarely	153 (65.4)	76 (49.7)	
1-2 days per week	41 (17.5)	10 (24.4)	
3-4 days per week	27 (11.5)	3 (11.1)	
≥5 days per week	13 (5.6)	2 (15.4)	
Activity during work*			0.003a
Sitting/simple activity <10 minutes	57 (48.7)	30 (52.6)	
Moderate activity >10 minutes	51 (43.6)	16 (31.4)	
Vigorous activity >10 minutes	9 (7.7)	0 (0.0)	
Activity if not employed**			<0.001b
Mostly relaxing at home/ Simple activity at home	96 (79.3)	54 (56.3)	
Moderate activity at home/outside	21 (17.4)	3 (14.3)	
Vigorous activity at home/outside	4 (3.3)	1 (25.0)	
Activity during leisure time			<0.001b
Relax or simple activity <10 minutes	140 (59.8)	89 (63.6)	
Moderate activity >10 minutes	87 (37.2)	16 (18.4)	
Vigorous activity >10 minutes	7 (3.0)	1 (14.3)	

Numbers may not add up to the total due to missings. *Applicable only for those who were employed. **Applicable only for those who were not employed. p-values are generated by a: chi-square test, and b: Fisher's exact test.

doctor to practice any kind of physical activity (yes/no); patient practice any kind of physical activity (yes/no); reason for not practicing (not convinced of the benefits/cannot spare time/cannot find proper place/unaware of proper type of activity/lack of desire/medical condition); activity during work, if employed (sitting or simple activity <10 minutes/moderate activity >10 minutes/vigorous activity >10 minutes); activity if not employed (relaxing or simple activity at home/moderate activity at home or outside/vigorous activity at home or outside); activity during leisure time (relaxing or simple activity <10 minutes/moderate activity >10 minutes/vigorous activity >10 minutes); frequency of exercise (rarely/1-2 days per week/3-4 days per week/≥5 days per week); Questionnaires were administered during face-to-face interviews conducted in Arabic by the researchers who were assisted by qualified and trained nurses. The reliability of the questionnaire was tested by using a sample of 30 patients demonstrating a high level of reliability (reliability coefficient, $\kappa = 0.85$).

Statistical analyses were carried out using Statistical Package for Social Sciences, v.17.0 (SPSS Inc., Chicago, USA). The level of statistical significance was set at

0.05. The chi-square test or Fisher's exact test were used to assess the association between two qualitative variables wherever appropriate. Quantitative variables were compared using an independent samples t-test. The multiple logistic regression analysis was used to estimate the risk of different factors on uncontrolled hypertension (0 for controlled hypertension and 1 for uncontrolled hypertension) after controlling confounding between them. The adjusted odds ratios and their 95% CI for significantly associated factors were reported.

RESULTS

Table 1 shows prevalence of uncontrolled hypertension according to characteristics of the studied sample. Out of the 240 hypertensive patients, 106 (44.4%) had their blood pressure uncontrolled. There were no statistically significant differences in the prevalence of uncontrolled hypertension according to gender, marital status, working status, smoking, duration of hypertension, and different types of medicines used to regulate blood pressure of the participants. There were significant differences ($p=0.016$) in the prevalence of uncontrolled

Table 3. Significant factors associated with uncontrolled hypertension among 240 hypertensive patients as estimated by the multiple logistic regression analysis

		Odds ratio (adjusted)	95% CI ^a	p-value
<i>Age in years</i>				
40-49	(reference group)	1.00		
≥50		4.97	1.73 - 14.33	0.003
<40		3.88	1.21 - 12.54	0.023
<i>BMI (kg/m²)</i>				
<30	(reference group)	1.00		
≥30		2.50	1.09 - 5.74	0.031
<i>On diet</i>				
Yes	(reference group)	1.00		
No		7.79	2.04 - 11.28	<0.001
<i>Activity during work if employed/spent time if unemployed</i>				
Moderate/vigorous activity (reference group)		1.00		
Sitting/simple activity		3.52	1.42 - 8.69	0.006
<i>Activity during leisure time</i>				
Moderate/vigorous activity (reference group)		1.00		
Relax/simple activity		5.71	2.27 - 14.34	<0.001
<i>Frequency of exercise</i>				
≥3 days per week (reference group)		1.00		
<3 days per week		8.34	2.43 - 32.21	<0.001

^a95% CI = 95% confidence interval for odds ratio. Adjusted for the variables gender, marital status, occupation, duration of diagnosis and medication to regulate blood pressure.

hypertension among different age groups, more in <40 years age group, followed by ≥50 years age group. The association of BMI on the prevalence of uncontrolled hypertension was very highly significant ($p < 0.001$), 25% of the overweight and 55% of the obese patients were having uncontrolled hypertension. The blood pressure of patients not on diet were more uncontrolled compared to those who were on diet, $p < 0.001$.

The association between physical activity and blood pressure of studied sample is shown in Table 2. All variables related to physical activity showed significant differences in the control of blood pressure in our sample. More than half of the 156 patients who reported not practicing physical activity had uncontrolled hypertension compared to a quarter of those who were practicing. Higher proportion of patients who were sitting or doing simple activity during their work, mostly relaxing or doing simple activity at home if not employed, and relaxing or doing simple activity during their leisure time, had their blood pressure uncontrolled. Only 14.8% and 30.8% had uncontrolled hypertension among those who exercise 3-4 days per week or ≥5 days per week respectively.

The multiple logistic regression analysis was performed, Table 3, using hypertension as the dependent variable

(Controlled: 0, Uncontrolled: 1), and the independent variables: gender, age, marital status, occupation, BMI, diet, duration of hypertension, medication, activity during work if employed/spent time if unemployed, activity during leisure time, and frequency of exercise. After adjusting confounding between variables, the significant variables were age, BMI, diet, activity during work if employed/spent time if unemployed, activity during leisure time, and frequency of exercise. Patients with uncontrolled hypertension were significantly more likely to be younger or older, obese, not on diet, not active during work if employed/at home or outside if unemployed, not active during leisure time and exercise less than 3 days per week. These variables together explained about 46.1% of the variation in the likelihood of uncontrolled hypertension.

Overall about 80% patients reported that they received advice from their doctor to practice physical activity. But the proportion of patients practicing any kind of physical activity is only 34.5%. The barriers for practicing physical activity are shown in Figure 1. More than half of the participants (51.1%) reported that 'cannot spare time' as the main barrier and the other important barriers were 'lack of desire' (19.6%) and 'not convinced of the benefits' (12%).

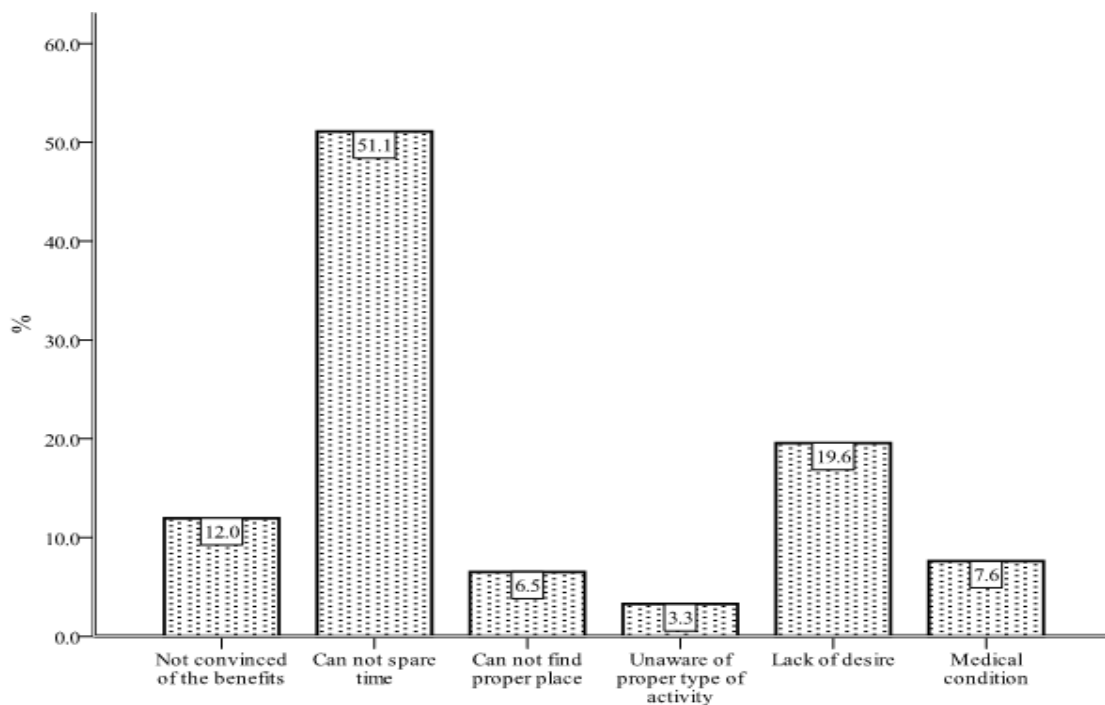


Figure 1. Barriers for practicing physical activity among 240 hypertensive patients.

DISCUSSION

Over the past decade, the prevalence of hypertension remained stable or decreased in economically developed countries and increased in economically developing countries (1). The National Health and Nutritional Health Survey 1999-2000 (NHANES IV) reports that 34% patients had blood pressure levels at the recommended goal of <140/90 mm Hg, compared with 27% in NHANES III (11). The level of awareness, treatment and control of hypertension varied considerably between countries and regions. World Health organization survey reported that blood pressure control is suboptimal in between half and two thirds of hypertensive patients in the majority of countries they surveyed in MONICA Project (12). The control of hypertension varies in different studies from different countries, 41.3% in Germany (13), 32.8% in Greece (14), 11.2% in Portuguese adults (15), and 8.1% in Turkey (16). An article published in Kuwait Medical Journal in 2003 reported the percentage of blood pressure control in Kuwait ranged from 27% - 40% in different primary care centers (17). In our study, 134 out of the 240 patients (55.6%) had their blood pressure under

control. Hypertensive patients in Kuwait have easy access to general practice clinics. This advantage helps to observe and manage hypertensive cases regularly without the long intervals between the consultations.

The main finding in this study is the independent effects of age, BMI, diet, and physical activity on controlling hypertension among our study population. The risk of uncontrolled hypertension is 8.34 times among patients who exercise less than 3 days per week, 5.71 times among less active during leisure time, 3.52 times among less active during work time, 3.88 times among younger age group, 4.97 times among older age group, 2.5 times among patients with their BMI ≥ 30 kg/m², and 7.79 times among patients who are not on diet. The effect of physical activity and diet on controlling hypertension is very high in our study.

There were many studies in the literature that reported the effect of physical activity on controlling hypertension. Fagard and Cornelissen in their article on effect of exercise on blood pressure control in hypertensive patients stated that exercise can be considered as a cornerstone therapy for the prevention, treatment, and

control of hypertension (18). Hagberg et al. on their review of 15 studies supported the recommendation that exercise training is an important initial or adjunctive step that is highly efficacious in the treatment of individuals with mild to moderate elevations in BP (5). A recent article using data from the National Health and Nutritional Examination Survey III found that patients followed the recommendations to engage in physical activity to manage hypertension had a systolic blood pressure that was on average of approximately equal to 3-4 mm Hg lower than those who did not follow recommendations (19). Another article reported that lifestyle physical activity reduces systolic blood pressure in both pre- and hypertensive adults (20). Dickinson et al. in their systematic review of randomized controlled trials observed blood pressure reductions following weight loss, dietary modification, and increased physical activity (21). Bacon et al. reported that diet and exercise, alone or combined, were effective in reducing the BP in subjects with mild hypertension, with improvements similar to drug therapy in patients with higher baseline BP level (22). A study among Japanese-Americans in Hawaii emphasized the health benefits of leisure-time physical activity, control of body weight, and reduction in salt intake in population-based control of high BP (23). The United States National High Blood Pressure Education Program Coordinating Committee has recommended six approaches with proven efficacy for the primary prevention of hypertension. These interventions include weight loss, dietary sodium reduction, increased physical activity, potassium supplementation and modification of whole diets (24).

Physical activity is considered as a natural, inexpensive, feasible, and effective means of control for hypertension and is a primary life style measure required to lower blood pressure in hypertensive patients. In our study, about 80% received advice from their physician to practice physical activity and only 34.5% practicing it. The main barriers in practicing physical activity reported by our study sample were 'cannot spare time' (51.1%), 'lack of desire' (19.6%) and 'not convinced of the benefits' (12%). The US Preventive Services Task Force (USPDTF) recommends counseling by health care providers to promote regular physical activity (25). In a cluster randomized controlled trial from eastern New Zealand reported that counseling patients in general practice on exercise is effective in increasing physical activity and improving quality of life and the interven-

tion may reduce blood pressure by an average of 1-2 mm Hg over 12 months (26).

In conclusion, the increased risk of physical inactivity in controlling hypertension in our study suggests that general practitioners must be in the habit of prescribing practice of physical exercise as resolutely as diet and hypertension drugs. This prescription must include frequency, duration, intensity and evaluation. It is important that patients are followed up regularly to confirm that they are adhering to the management plan and the blood pressure targets are being met.

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