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ORIGINAL ARTICLE

Prevalence, awareness and management of hypertension in a recently urbanised community, eastern Jordan

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The objectives of this study were to: (1) estimate the magnitude of hypertension, and its levels of awareness and control of hypertension among a recently urbanised community of Jordanian aborigines; and (2) to compare the study findings with findings from other Jordanian communities. A sample was randomly selected from the roster of all inhabitants of the community aged 25 years or older. Data on 545 subjects included in the sample were collected during the months of January and February of 1995. A total of 89 (16.3%) subjects were suffering hypertension defined as systolic blood pressure ≥160 mm Hg and/or diastolic blood pressure ≥95 mm Hg or on antihypertensive medication. Prevalence rate of hypertension was comparable to that reported from other Jordanian communities who have experienced an urban lifestyle earlier than the reference community. Logistic regression analysis indicated that hypertension was positively associated with age, illiteracy, body mass index, family history of hypertension, and diabetes mellitus. No association was detected between hypertension and each of gender, smoking, and total serum cholesterol. This study showed that the vast majority of hypertensive patients (82.0%) were aware of their diagnosis. However, more than two-thirds (68.5%) of those aware of their diagnosis did not achieve control of their hypertension. In conclusion, hypertension is a common public health problem in this community and that the hypertension management programme is far below the optimal level.
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Introduction

Essential hypertension with definition of high blood pressure (BP) is a serious public health problem in many societies and represents one of the most common problems in clinical practice. Community surveys[1–9] indicated that prevalence rates of hypertension range from 2.6–59.0%. These variations are due mainly to the sociodemographic factors of study populations, geographical location, and study designs.

Development of hypertension may be the outcome of interaction of a multitude of physical and sociocultural factors, and lifestyle behaviours. Prevalence data indicate that BP levels are higher among older than younger age groups,[10–13] among blacks than whites.[4,11–12] among obese than non-obese individuals,[13–16] and is also higher among groups with positive family history of hypertension than their counterparts.[11,12,17–19] Several[1,5,20,21] but not all studies[2,3,6,7,15] have reported higher levels of BP among men than women. Moreover, comparative studies[22–24] indicate that differences in BP levels between communities may also be related to the degree of involvement of the populations of those communities in the process of cultural transition towards a modernised way of life. Some studies indicate that the rise in prevalence of hypertension is associated with the influence of environmental factors such as urbanisation,[20,22–25] sedentary lifestyle[23,24] and detribalisation,[23] created by the acculturation process.

In Jordan, reliable data on hypertension and its associated risk factors are scarce. The findings from a survey of three communities in Jordan,[26] indicate that prevalence rates of hypertension (systolic BP ≥160 mm Hg and/or diastolic BP ≥95 mm Hg, or on antihypertensive medication) is 16.1%; about one-half (48.6%) of all hypertensives were not aware of this problem, and more than one-third of those who were aware had failed to achieve the desired BP levels. The purposes of this study are: (1) to examine BP profile, its associated risk factors, and levels of awareness and control of high BP among, almost exclusively, one tribe of Jordanian Bedouins who live in the desert of eastern Jordan; (2) to test the hypothesis that BP levels of the study population is comparable to BP levels of modernised Jordanian population groups.

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Subjects and methods

Study population

The survey was conducted to estimate the prevalence of cardiovascular disease risk factors, such as diabetes mellitus (DM), hypertension, hyperlipidaemia, and smoking in a semi-urban community during January and February of 1995.

The town of Subha has about 8000 inhabitants, located in the eastern desert of Jordan, near the borders with Syria, and 100 km north-east of the capital of Amman. The population of the town have experienced rapid cultural transition and modernisation since the early 1970s after centuries of nomadic life. The newly adopted lifestyle of this population group is expressed in having their permanent settlement provided with all civil service institutions, electricity, piped water, nearby university, and have changed their jobs from sheep raising to either public service, trade, or mechanised agriculture.

All residents 25 years of age and older, and who are not bed-ridden, were eligible for inclusion in the study. A systematic sample of households was selected and visited by two members of the team. After registration of all of the 763 eligible members, the visiting team explained the purpose of the study and its procedures, and handed them a written invitation showing the date and time for them to report to the town health care centre. To encourage participation each person was given the choice of reporting on the given date or any day during the study period including the weekends, and was offered free transportation. The written invitation and the visiting team stressed the need for overnight fasting before obtaining the blood samples.

Measurements

A structured and pilot tested interview questionnaire was used to collect information on specific history of hypertension, DM, hyperlipidaemia, and smoking behaviour. Measurements of height, weight, BP, blood sugar levels (both fasting and 2-h post 75 g oral glucose loading), total serum cholesterol (TSC), and triglycerides were also obtained on each subject upon his/her visit to the health care centre. BP was measured using standardised sphygmomanometers with a 12–12.5 cm cuff to cover two-thirds of the upper arm. A physician or a trained nurse performed the procedure while the subject was in a sitting position with the arm at the level of the heart and after 5 min rest. The cuff was deflated at a rate of 2–3 mm Hg per second. Systolic BP (SBP) was taken upon hearing the first sound and diastolic BP (DBP) was taken upon complete disappearance of Korotkoff sounds (phase V). Body mass index (BMI) was calculated by dividing the weight in kilograms by the height in meters squared (m^2). A BMI of 30 was used as the cutoff point to differentiate obese and non-obese subjects. Hypertension is defined as an SBP $\geqslant$160 mm Hg, DBP $\geqslant$95 mm Hg, or use of antihypertensive medication. DM is defined as a fasting plasma glucose level $\geqslant$140 mg/dl, 2-h postprandial plasma glucose level $\geqslant$200 mg/dl, or positive history of DM. High TSC level is defined as $\geqslant$6.6 mmol/l.

Statistical analysis

Data analysis was performed using Statistical Package for Social Sciences Personal Computer (SPSSPC). Chi-square statistic was used to test for independency of the distribution of both the previously diagnosed (PDH) and previously undiagnosed (PUDH) hypertensives, and the distribution of both controlled (CH) and uncontrolled (UCH) hypertension among the various categories of study variables. The level of significance was set at *P*-value 0.05 or less. Multiple logistic regression analyses were performed to test for the independent effect of purported risk factors on hypertension. The odds ratio was the antilogarithm of the regression coefficient of an indicator term that corresponded to a certain level of the independent variable. The 95% confidence interval (CI) was calculated using the standard error of the regression coefficient.

Results

A total of 545 (71.4%) eligible subjects participated in the study.

As shown in Table 1, women accounted for more than 60% of the sample. The 60-year and older age group accounted for 14.9% and were over-represented in the sample compared to a distribution of 4.3% in the population.[27] The vast majority of the sample (86.2%) were either illiterate or with less than high diploma. Current smoking

Table 1 Baseline demographic and clinical characteristics of the study sample (n = 545)

Variable	*n (%)*
Sex	
Male	207 (38.0)
Female	338 (62.0)
Age (yr)	
25–29	108 (19.8)
30–39	121 (22.2)
40–49	144 (26.4)
50–59	91 (16.7)
60+	81 (14.9)
Education	
Illiterate	258 (47.3)
< High school	212 (38.0)
$\geqslant$ High school	75 (13.8)
Family history of hypertension	
Absent	342 (63.0%)
Present	201 (37.0%)
BMI (kg/m²)	
<30	315 (57.8)
$\geqslant$30	230 (42.2)
Smoking status (n = 542)	
No	434 (80.1)
Yes	108 (19.9)
Diabetes mellitus	
Absent	476 (87.3)
Present	69 (12.7)

rate was 19.9% and that of frank DM was 12.7%. More than one-third of the sample (37%) had positive family history of hypertension and 42.2% were obese.

Table 2 shows that the prevalence rate of hypertension in this study was 16.3% and was almost equally distributed between men and women (16.4% and 16.3% respectively).

As expected, prevalence rate of hypertension increased with age. Subjects 25–30 years of age had the lowest rate of hypertension (1.9%) while those in the highest age category (60+ years) had the highest rate (40.7%). This age-related trend of hypertension was statistically significant ($P = 0.00$).

The illiterate group had a higher rate of hypertension (24.0%) than those with less than high school diploma (12.2%), and those with a high school diploma or more (1.3%). The difference in distribution of hypertension by level of education was statistically significant ($P = 0.00$).

Contrary to expectation, the rate of hypertension among smokers (14.8%) was lower than that among non-smokers (16.8%). However, this difference was not statistically significant ($P = 0.62$).

Subjects with positive family history of hypertension had a higher rate of hypertension (19.9%) than their counterparts (14.3%). This difference was not statistically significant ($P = 0.09$). Obese subjects in this study had significantly higher rate of hypertension (23.1%) than non-obese subjects (11.4%) ($P = 0.00$). Similarly, diabetics in this study had significantly higher rate of hypertension (33.3%) than non-diabetics (13.9%) ($P = 0.00$).

Logistic regression analysis was performed to test for the independent effect of gender, age, level of education, family history of hypertension, smoking, BMI, DM, and TSC on hypertension.

As shown in Table 3, the association between hypertension and the variables of age, level of education, family history of hypertension, BMI, and DM was statistically significant, but no significant association was found with gender, smoking, and TSC. Compared to age group 25–29 years, the risk of hypertension increased by 2.6 times among the 30–39 years age group, 6.6 times among the 40–49 years age group, 8.1 times among the 50–59 years age group, and by 31.2 times in the age group 60 years and older.

The risk of hypertension among the illiterate and those with less than high school diploma was 8.7 and 6.5 times, respectively, compared to subjects with high school diploma or more. Obese persons were 1.8 times more likely to have hypertension than the non-obese, and that diabetics were 2.1 times to be hypertensives than non-diabetics.

Table 2 Prevalence of previously diagnosed hypertension (PDH) and previously undiagnosed hypertension (PUDH) by baseline demographic and clinical variables

Variable	*PDH (n = 73) n (%)*	*PUDH (n = 16) n (%)*
Sex		
Male	27 (13.0)	7 (3.4)
Female	46 (13.6)	9 (2.7)
P-value	0.85	0.63
Age (yr)		
25–29	2 (1.9)	0
30–39	8 (6.6)	0
40–49	22 (15.3)	4 (2.8)
50–59	17 (18.7)	3 (3.3)
60+	24 (29.6)	9 (11.1)
P-value	0.00	
Education		
Illiterate	49 (19.0)	13 (5.0)
< High school	23 (10.8)	3 (1.4)
⩾ High school	1 (1.3)	0
P-value	0.00	0.00
Smoking status		
No	57 (13.1)	16 (3.7)
Yes	16 (14.8)	0
P-value	0.65	
Family history of hypertension		
Absent	38 (11.1)	11 (3.2)
Present	35 (17.1)	5 (2.5)
P value	0.04	0.63
BMI (kg/m²)		
<30	28 (9.8)	8 (2.5)
⩾30	45 (19.6)	8 (3.5)
P-value	0.00	0.52
Diabetes mellitus		
Absent	56 (11.8)	10 (2.1)
Present	17 (24.6)	6 (8.7)
P-value	0.00	0.00

Table 3 Adjusted[a] odds ratio (OR) of prevalence of hypertension by selected variables

Variable	*OR*	*95% CI*	*P-value*
Sex			
Male			
Female	1.0	0.53–1.89	0.99
Age (yr)			
25–29			
30–39	2.6	0.52–12.97	0.24
40–49	6.6	1.39–31.00	0.02
50–59	8.1	1.62–14.24	0.01
60+	31.2	6.08–160.26	0.00
Education			
Illiterate	8.7	1.04–72.32	0.05
< High school	6.5	0.82–51.55	0.08
⩾ High school			
Family history of hypertension			
Absent			
Present	3.4	1.90–6.05	0.00
BMI (kg/m²)			
<30			
⩾30	1.8	1.05–3.13	0.03
Smoking status			
No			
Yes	0.7	0.35–1.37	0.30
Diabetes mellitus			
Absent			
Present	2.1	1.11–3.96	0.02
TSC			
Normal			
High	1.2	0.66–2.13	0.58

[a]Using multiple logistic regression analysis

Table 4 Distribution of controlled and uncontrolled (UCH) hypertension among previously diagnosed hypertensive subjects by selected variables

Variable	*CH (n = 23) (n (%)*	*UCH (n = 50) n (%)*	*P-value*
Sex			
Male	7 (25.9)	20 (74.1)	
Female	16 (34.8)	30 (65.2)	0.43
Age (yr)			
<40	6 (60)	4 (40)	
⩾40	17 (32.1)	46 (67.9)	0.04
Education			
Illiterate	13 (26.5)	36 (73.5)	
< High school	10 (43.5)	13 (56.5)	
⩾ High school	0	1 (100)	0.28
BMI (kg/m²)			
<30	12 (42.9)	16 (57.1)	
⩾30	11 (24.4)	34 (75.6)	0.10
Family history of hypertension			
Absent	11 (28.9)	27 (71.1)	
Present	12 (34.3)	23 (65.7)	0.62

Rates of awareness and control of hypertension

As shown in Table 4, more than two-thirds (68.5%) of patients aware of having high BP, failed to keep it under control. The rate of uncontrolled hypertension was significantly higher among the age group 40 years and older than the less than 40 years age group ($P = 0.04$). The level of controlled hypertension, however, was not associated with gender ($P = 0.43$), level of education ($P = 0.28$), obesity ($P = 0.10$), nor with family history of hypertension ($P = 0.62$).

Discussion

The present study provides the first data on the distribution of hypertension in a Bedouin community in Jordan who have experienced a rapid cultural transition during the last three decades. Their lifestyle had changed from one that is nomadic in nature in the desert of Eastern Jordan or in the neighbouring countries hunting for grass and water for their cattle, to a more Western type of lifestyle with more reliance on trade and modern agriculture as sources of living.

Our data showed that hypertension is a common health problem in that community with a prevalence rate of 16.3%. This finding is comparable to the 16.1% prevalence rate of hypertension reported among other Jordanian communities[26] who emerged into the process of 'acculturation' during the first half of the 20th century. The present results are also comparable to the 15.4% prevalence rate among adults of Riyadh city, Saudi Arabia,[28] but higher than the 2.4% rate among rural communities of Bedouin origin in Saudi Arabia.[29] The influence of environmental factors created by such a cultural transition on the rise in prevalence rates of hypertension has been documented in research literature. In their comparative study between urban and rural Zulu, Seedat *et al*[23] reported a 25% prevalence rate of hypertension in urban Zulus compared to 10.5% in the rural Zulu population. Factors such as anxiety, physical inactivity, conditions of work, and overcrowding were reported to have negative impact on BP levels among urban Zulu but not among rural Zulu. Hollenberg *et al*[30] compared the effect of age on BP levels between Kuna Indians living on isolated islands in the Panamanian Caribbean and Kuna Indians who had migrated to Panama City. They found the effect of age on BP pattern differs between the two communities: while there is little age-related rise in BP levels among the rural group, increased BP levels were significantly age-related in the urban group with a prevalence rate of hypertension at 10.5% and as high as 45% among those over 60 years of age. James[31] in his review of literature on the relationship between psychosocial factors and BP elevation in Third-World populations undergoing 'modernisation', concluded that 'rapid sociocultural change is associated with increased prevalence of hypertension'.

In this study, hypertension appeared to be age-related and the risk of disease increased dramatically after the age of 40 years. Women were at equal risk of hypertension as men, even after adjusting for other potential cofounders. This finding is in line with those reported in several,[1,5,10] but not all studies.[2,3,6,7,15,26]

Our data indicated an inverse relationship between level of education and hypertension, after adjusting for other potential risk factors, and is consistent with previous research.[26,32] People with a high level of education tend to be more informed about health matters and subsequently are more likely to adopt healthier lifestyle behaviours such as healthy diet, exercise, cessation of smoking, and weight control, than people with no or low educational attainment.

Consistent with the findings of other studies,[17,18] our data showed a higher rate of hypertension among subjects with positive family history of this disease than their counterparts. Havlik[19] in his review concluded that about one-third to one-half of the variability in BP is explained by genetics.

In agreement with other studies,[2,13–15] the obese group appeared to have a higher risk of hypertension than the non-obese group, after adjusting for other potential cofounders. The positive association between DM and high BP reported in this study is supported by the findings of previous studies.[9,26,33]

Our data failed to show a significant relationship between smoking and hypertension. Inconsistent with the finding reported in the study of other communities in Jordan,[26] our data failed to show a significant positive association between TSC and hypertension. This finding is perhaps due to the fact that the vast majority of the study subjects had lived a less affluent and more of nomadic type of life during their childhood and early adulthood, before experiencing the acculturation process and subsequently the effect of high TSC on BP level. A follow-up study of a cohort of adults born during the cultural transition of this community is of prime importance to clarify this hypothesis. Another explanation for this finding could be related to the

ratio of high density lipoprotein (HDL) to low density lipoprotein (LDL) than to the TSC level.

Our data showed that the level of awareness of hypertension among patients inflicted with this problem was 82% which is far better than the 51.4% rate reported from other Jordanian communities.[26] However, more than two-thirds (68.5%) of those aware had failed to have their high BP under control, a rate that is higher than the 36.5% rate reported in other Jordanian communities,[26] indicating the need for establishing more effective hypertension awareness and control programmes.

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