

# Epidemiology and management of hypertension among Bedouins in Northern Jordan

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## ABSTRACT

**Objectives:** To estimate the magnitude of hypertension, and its levels of awareness and control of hypertension among a community of Jordanian aborigines in Northern Jordan; and to compare the study findings with findings from other Jordanian communities.

**Methods:** A systematic sample of 50% of all households of Qafqafa, Northern Jordan was selected and all members of the selected households were included in the study at Qafqafa Health Center, Qafqafa, Jordan. A structured questionnaire was administered to all study participants and measurement of blood pressure was performed according to a preset criteria. Data on 366 subjects included in the sample were collected during the months of April and May 2002.

**Results:** A total of 40 subjects or 10.9% were suffering from hypertension. Prevalence rate of hypertension was significantly lower than the 16.1% and 16.3% prevalence rates reported from other more modernized Jordanian communities.

Logistic regression analysis indicated that hypertension was positively associated with masculinity, age, illiteracy, obesity, and with positive family history of hypertension. No association was detected between hypertension and each of smoking, Diabetes mellitus, and total serum cholesterol. This study showed that one-half (47.5%) of hypertensives were unaware of their diagnosis and more than one-half (57.1%) of those aware of their diagnosis did not achieve control of their hypertension.

**Conclusion:** Population of the study community has significantly lower levels of hypertension than both semi-urban and recently urbanized Jordanian communities, and much of the rise in blood pressure levels is attributed to environmental factors. Moreover, hypertension management programs in Jordan are far below the optimal standards.

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Systemic hypertension is a major public health problem worldwide. It is a leading factor for coronary artery disease, congestive heart failure, stroke, renal disease, and retinopathy.<sup>1</sup> Development of high blood pressure (HBP) may be an outcome of interaction of a multitude of physical and sociocultural factors, and lifestyle behaviors. Comparative studies<sup>2-4</sup> indicate that differences in blood pressure levels between communities may also be attributed to the degree of involvement of those communities in the process of

cultural transition towards a more modernized way of life. Moreover, there is a wealth in research attributing the rise in prevalence rates of hypertension to such factors as urbanization,<sup>2-6</sup> sedentary lifestyle,<sup>3,4</sup> and "detrribalization"<sup>3</sup> that are created by the acculturation process.

In Jordan, reliable data on hypertension and its associated risk factors are scarce. The findings from 3 semi-urban communities<sup>7</sup> in Jordan, indicate that prevalence rate of hypertension (systolic blood pressure

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$\geq 160$  mm Hg or diastolic blood pressure  $\geq 95$  mm Hg, or on antihypertensive medication) is 16.1%. A more recent data on the magnitude of hypertension among a recently urbanized community of Jordanian aborigines<sup>8</sup> were comparable (16.3%) to those reported from other semi-urban Jordanian communities.<sup>7</sup> This high degree of comparability in prevalence rates of hypertension in the above 2 studies has raised the question of whether Jordanians by nature have high BP values or it is the acculturation towards a Western lifestyle that contributed to this calamity. For this reason, this study was conducted to: 1. Estimate the magnitude of hypertension among a parochial community of a tribe of Jordanian aborigines, and to compare the findings with those reported from other urbanized Jordanian communities; 2. Examine the association of hypertension with certain purported risk factors; and 3. Examine the level of awareness and control of hypertension among the study population.

**Methods. Study population.** This study is a subset of a more comprehensive survey that has been conducted since January 2002 to estimate the prevalence of cardiovascular disease risk factors and other social and health parameters in selected communities in Jordan. The study site is Qafqafa, a town of 4500 inhabitants located in Northern Jordan, 55 km north of the capitol Amman. The people in this town are currently enjoying permanent residences provided with electricity and piped water, public schools, and a health center. However, reasonably maintained caves are widely distributed within the town and people in their late 20s still remember the days of their living in those caves. The people belong almost exclusively to one tribe of Jordanian Bedouins who are still relying heavily on sheep raising for their living. This job requires the people, especially men, to return back to the nomadic life by leaving the town at certain times of the year with their livestock rooming the surrounding area looking for grass to feed the animals. The community is a conservative one and adults in particular are still strictly observing their ancestors' cultural heritage away from the more western lifestyle. 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 50% of the households in the community was visited by 2 trained members of the team. After registration of names all of eligible members of the selected households, their home phone numbers and addresses, the visiting team explained the purpose of the study and its procedures, and handed them written invitations showing the date and time for them to report to the town health care center. To encourage participation a person was given the choice of reporting on the given date or any day during the study period including the weekends. The written invitation and the visiting team stressed the need for and overnight fasting before obtaining the blood samples. A structured and pilot tested interview

questionnaire was used to collect demographic data and information on specific history of hypertension, diabetes mellitus (DM), hyperlipidemia, and smoking behavior. Measurements of height, weight, BP, fasting blood sugar, total serum cholesterol (TSC), high and low density lipoproteins (HDL, LDL), triglycerides were also obtained on each subject upon his/her visit to the health care center. Blood pressure was measured using standardized sphygmomanometers with a 12-12.5 cm cuff to cover 2-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 minutes rest. The cuff was deflated at a rate of 2-3 mm Hg per second. Systolic blood pressure was taken upon hearing the first sound and DBP was taken upon complete disappearance of Korotkoff sounds (phase V). Body mass index 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  $\geq 160$  mm Hg, DBP  $\geq 95$  mm Hg, or use of antihypertensive medication. Diabetes mellitus is defined as a fasting plasma glucose levels  $\geq 126$  mg/dl or positive history of DM. High TSC is defined as a TSC level  $\geq 6.6$  mmol/l.

**Statistical analysis.** Data analysis was performed using statistical package for social sciences personal computer. Chi-square statistic was used to test for the independent distribution of both the previously diagnosed (PDH) and previously undiagnosed (PUDH) 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 366 (49.8%) eligible subjects participated in the study. A random sample of 60 non-respondents was revisited at home. The reasons for non-participation as mentioned by them were: they are physically healthy and feel no need for physical check-up; they do not like to know what is wrong with them physically; they already know that they have hypertension or diabetes mellitus, or both they are always busy in the morning or they do not have enough blood to give, or both. As indicated in **Table 1**, women and the age group 40-years and older were over represented in the study sample and accounted for 69.9% and 51.1%. The vast majority of the sample (78.7%) was either uneducated or did not attain the high school diploma. The average family is comprised of 7 members and has a monthly income of US \$200. The

current smoking rate is 13.6% (16.4% for men and 12.4% for women) and that of frank DM is 6% (7.3% for men and 5.5% for women). The rate of obesity among study sample was 31.1% (16.4% for men and 37.5% for women) and that of high TSC is 4.1% (1.5% for men and 5.1% for women). **Table 2** shows that a total of 40 subjects were suffering from hypertension with a prevalence rate of 10.9%. Bivariate analysis of study data, **Table 2**, indicates that men, the 40-years of age and older, those with positive family history of hypertension, the obese, and diabetics had significantly higher rates of hypertension than their counterparts (p-value=0.00, 0.00, 0.01, 0.02, and 0.01.); but no significant difference was detected in relation to smoking (p-value=0.44). In fact, all of the hypertensive patients in this study were of normal TSC levels and their level of education was lower than the high school diploma. Logistic regression analysis was performed to test for the independent effect of gender, age, family history of hypertension, obesity, DM, and smoking on hypertension, after adjusting for the effect of the variables included in the regression model on each other. As shown in **Table 3**, the association between hypertension and the variables of gender, age, family history of hypertension, and BMI was statistically significant, but no significant association was found with diabetes mellitus, and smoking. **Table 3** also shows that the likelihood of developing hypertension was 1.8 times among men compared to women (p-value=0.00), 4.2 times among the age group 40-years and older compared to the younger age group (p-value=0.00), 2.8 times among subjects with positive family history for hypertension compared to those with negative family history (p-value=0.01), and 2.4 times among obese compared to non-obese group (p-value=0.03). The risk of developing hypertension increased 1.8 times among diabetic compared to non-diabetic subjects. This association, however, was not significant statistically (p-value=0.33). Smoker in this study were at equal risk of developing hypertension as nonsmokers (p-value=0.99).

Rates of awareness and control of hypertension. Study data indicated that the rate of awareness of hypertension in this study was 52.5%. As shown in **Table 2**, this rate was significantly higher among older (10.8%) than younger (0.6%) age group, and among diabetics (18.2%) than non-diabetics (4.9%). Among the 21 patients aware of having hypertension, more than one-half (57.1%) of them failed to keep their BP levels under control. Small figures, however, preclude any further analysis.

**Discussion.** The reported high prevalence rate of hypertension among a community of Jordanian bedouins who has witnessed a rapid cultural transition during the last 3 decades<sup>8</sup> has stimulated the authors to explore the magnitude and pattern of distribution of hypertension among a parochial community of Jordanian aborigines.

**Table 1** - Baseline demographic and health characteristics of the study sample (N=366).

Variables	n (%)
<b>Sex</b>	
Male	110 (30)
Female	256 (70)
<b>Age (N=365)</b>	
25-29	72 (20)
30-39	107 (29)
40-49	75 (21)
50-59	51 (14)
60+	60 (16)
<b>Education</b>	
Illiterate	119 (33)
< High school	169 (46)
≥ High school	78 (21)
<b>Family history of hypertension (N=362)</b>	
Absent	284 (78)
Present	78 (22)
<b>Body mass index (kg/m<sup>2</sup>) (N=365)</b>	
<30	251 (69)
≥30	114 (31)
<b>Diabetes mellitus</b>	
Absent	344 (94)
Present	22 (6)
<b>Current smoking status</b>	
No	312 (86)
Yes	49 (14)
<b>Hypercholesterolemia</b>	
Absent	351 (96)
Present	15 (4)
<b>Hypertension</b>	
Absent	326 (89)
Present	40 (11)

Despite the fact that the population of the study community had recently moved out from caves and tents to brick houses residences that are provided with electricity and piped water, they still preserve almost their own entire original cultural heritage, away from the effect of the rapid acculturation process that involved almost all the Jordanian people.

The study data showed that the prevalence rate of hypertension is 11%. This figure is significantly lower than the 16.3% reported among a recently acculturated community of Jordanian aborigines<sup>8</sup> and lower than the 16.1% prevalence rate reported among other semi-urban Jordanian communities.<sup>7</sup> This difference in prevalence rates of hypertension shed more light on the degree of influence of social and behavioral change on the physical health status of people involved in that change. This differential in blood pressure levels among acculturated and non-acculturated groups of Jordanian aborigines is consistent with the findings reported in research literature. In their comparative study, Seedat et al<sup>3</sup> reported a 25% prevalence rate of hypertension in

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

Variable	Total n (%)	PDH n (%)	PUDH n (%)
<b>Sex</b>			
Male	22 (20)	11 (10)	11 (10)
Female	18 (7)	10 (3.9)	8 (3.1)
p-value	0.00	0.02	0.01
<b>Age (Yr)</b>			
<40	7 (3.9)	1 (1)	6 (3.4)
≥40	33 (17.7)	20 (10.8)	13 (7)
p-value	0.00	0.00	0.12
<b>Education</b>			
< high school	40 (13.9)	21 (7.3)	19 (6.6)
≥ high school	0	0	0
<b>Family history of hypertension</b>			
Absent	25 (8.8)	13 (4.6)	12 (4.2)
Present	15 (19.2)	8 (10.3)	7 (9)
p-value	0.01	0.06	0.53
<b>Body mass index (kg/m<sup>2</sup>)</b>			
<30	21 (8.3)	11 (4.4)	10 (4)
≥30	19 (16.7)	10 (8.8)	9 (7.9)
p-value	0.02	0.1	0.07
<b>Diabetes mellitus</b>			
Absent	34 (9.9)	17 (4.9)	17 (4.9)
Present	6 (16.7)	4 (18.2)	2 (9.1)
p-value	0.01	0.01	0.4
<b>Current smoking status</b>			
Absent	33 (10.6)	16 (5.1)	17 (5.4)
Present	7 (14.3)	5 (10.2)	2 (4.1)
p-value	0.44	0.15	0.69
<b>Hypercholesterolemia</b>			
Absent	40 (11.4)	21 (6)	19 (5.4)
Present	0	0	0

PDH - previously diagnosed hypertension  
PUDH - previously undiagnosed hypertension

urban Zulu compared to 10.5% in 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. In their study, Hollenberg et al<sup>9</sup> reported that the BP levels of Kuna Indians living on isolated islands in the Panamanian Caribbean is significantly lower than that of Kuna Indians migrated to Panama City, particularly among the older age groups. As expected, hypertension in this study appeared to be age-related and the risk of disease increased dramatically after the age of 40-years. Men were at higher risk of hypertension than women, after adjusting for other potential confounders. This finding is in line with those reported in several,<sup>10-12</sup> but not all studies.<sup>7,13-15</sup> Our data disclosed an inverse relationship between level of education and hypertension, after adjusting for other potential risk factors. This finding is in line with that reported in research literature.<sup>7,8,16</sup> People with a high

level of education tend to be more informative health matters and subsequently more prone to adopt healthy lifestyle behavior such as healthy diet, exercise, quit smoking, and weight control than people with no or low educational attainment. Consistent with the findings of other studies<sup>7,8,17,18</sup> our data showed a significantly higher rate of hypertension among subjects with positive family history of this disease than their counterparts. In his review of article, Havlik<sup>19</sup> concluded that one-third to one-half of the variability in BP is explained by heredity. In agreement with the existing research data,<sup>7,8,13,20-22</sup> the obese group appeared to have a higher risk of hypertension than the non-obese group, after adjusting for other potential cofounders. Our data failed to show a significant relationship between smoking and hypertension. Inconsistent with the findings reported on other communities in Jordan<sup>7,8</sup> our data showed that none of the 15 (4.1%) subjects who suffer high TSC have hypertension and that no association was reported

**Table 3** - Adjusted<sup>2</sup> odds ratio (OR) of prevalence of hypertension by selected variables.

Variables	OR	95% CI <sup>3</sup>	p-value
<b>Sex</b>			
Female	1.0		
Male	1.8	1.2, 2.5	0.00
<b>Age (years)</b>			
<40	1.0		
40+	4.2	1.7, 10.5	0.00
<b>Family history of hypertension</b>			
Absent	1.0		
Present	2.8	1.3, 6.1	0.01
<b>Body mass index (kg/m<sup>2</sup>)</b>			
<30	1.0		
≥30	2.4	1.1, 5.1	0.03
<b>Diabetes mellitus</b>			
Absent	1.0		
Present	1.8	0.6, 5.6	0.33
<b>Smoking</b>			
No	1.0		
Yes	1.0	0.4, 2.6	0.99

between hypertension and DM; possibly due to small sample size.

Our data showed that the level of awareness of hypertension among patients inflicted with this problem was 52.5% which is far below the 82% level of awareness reported among a recently modernized Jordanian community<sup>8</sup> but is comparable with the 51.4% rate reported from other Jordanian communities.<sup>7</sup> However, more than one-half (57.1%) of those aware of their hypertension had failed to have their high BP under control, a condition that requires the establishment of more effective hypertension awareness and control programs.

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