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Prevalence and Associated Factors of High Blood Pressure in Urban Setting of Kandahar City in Afghanistan in 2015

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Abstract

Background: Hypertension is an important public health problem, which is prevalent and asymptomatic, with modifiable and preventable risk factors. Afghanistan is suffering from double burden of diseases including communicable and noncommunicable diseases (NCDs). The present study aimed at identifying hypertension and determining its factors among the adult population in city of Kandahar in Afghanistan.

Methods: This cross- sectional study was conducted using WHO STEPwise tool, a WHO standardized tool for risk factors of (NCDs) in urban locality, in city of Kandahar during October and November 2015. The study used a random sample of 1165 adults aged 25 to 70 years. Data were collected using a structured questionnaire for assessing noncommunicable diseases and their risk factors. Fasting venous blood samples were collected to assess the lipid profile and fasting blood sugar. Anthropometric measurements of the participants were also taken. Data were analyzed using SPSS Version 20.

Results: Out of all respondents, 597 (51.2%) were females and 568 (48.8%) were males, with a mean age of 38.3 $\pm$ 11.2 years. Around two thirds of the participants (73.2%) were illiterate, 9.7% smokers, and 16.3% mouth snuff users. Of the respondents, 60% consumed fruits 3 days or less than a week and 60% consumed vegetables more than 3 days per week. Moreover, almost 6% of the respondents practiced vigorous physical activity and 21.3% reported doing moderate physical activity, and one third (32.2%) of the respondents had high blood pressure. The results of multivariate analysis revealed that the independent risk factors associated with hypertension were age, gender, education status, high body mass index, central obesity, and physical inactivity with respect to reclining hours per day.

Conclusions: One third of the adult population in the urban setting of Kandahar is suffering from hypertension. Thus, it is highly recommended to focus on interventions to prevent and control noncommunicable diseases.

Keywords: Hypertension, Risk Factors, Blood Pressure, Prevalence, Afghanistan

1. Background

Noncommunicable diseases (NCDs) have emerged as a pandemic and have risen to a great public challenge contributing to high morbidity and mortality worldwide. Of the 56 million global deaths in 2012, 38 million (68%) were attributed to NCDs, with almost three quarters (74%) of these deaths occurring in low and middle income countries (1). Hypertension (HT), substantial component of NCDs, is the largest contributor to global burden of disease and is widespread in both economically developed and developing nations (2, 3). World health organization estimated that 40% of people older than 25 years had hypertension in 2008 (4), while 7.6 million premature global deaths were attributed to high blood pressure in 2001 (5). Generally, afflicted people are not diagnosed unless it leads to medical conditions such as heart attacks or brain strokes. Therefore, high blood pressure is called a silent killer (6). Literature shows a group of factors associated with hypertension. The main factors associated with hypertension are family history, age, race, obesity, physical inactivity, cigarette smoking, excessive salt intake, and excessive alcohol intake (7-9). Moreover, around 10% of healthcare expenditure is directly related to hypertension and its complications (10). The prevalence of hypertension is highest in Africa (29.6%), followed by the Eastern Mediterranean region (26.9%), South East Asia (24.7%), Europe (23.3%), the Western Pacific (18.7%), and America (18.2%) (11). Among South Asian countries, Nepal reported the second highest proportion of hypertensive people (27.3%) after Afghanistan (29%). Furthermore, hypertension has been the main cause of morbidity and mortality in numerous Eastern Mediterranean countries, with an adult prevalence varying between 20% and 30% (12). In Afghanistan, there is lack of information on NCDs including hypertension due to priority given to communicable diseases. Prevalence of hypertension in Kabul and Jalalabad in adult population is found to be 46.2% and 28.4%, respectively (13, 14). Two neighboring countries of Afghanistan, Iran and

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Pakistan, have estimated the prevalence of hypertension to be 22.1% and 25.3%, respectively (15, 16). Certainly the national facts are not far from these countries and consistent information about the prevalence of hypertension is essential for the development of national and local level health policies to prevent and control hypertension. Accordingly, this study was conducted to identify the prevalence of hypertension and assess its predictors in urban adults in city of Kandahar in Afghanistan.

2. Methods

In this provincial cross-sectional study, data were collected based on WHO STEPwise approach (17) to investigate the risk factors of noncommunicable diseases. This tool prescribes 3 steps: assessing demographic and behavioural risk factors, measuring physical activity, and collecting blood samples to identify plasma biochemical markers. This approach is amply flexible; therefore, it was used to match the context. The study protocol was approved by the institutional review board (IRB) of the Ministry of Public Health. The study population was adults aged 25 to 70 years including males and females in Kandahar. Kandahar province is a big province in Afghanistan, with 18 districts including city of Kandahar, which has a border with Pakistan and its total population for 2015 was estimated to be 1 226,593; of which, 629,195 were male and 597,398 female. However, we have included the urban portion of city of Kandahar, whose population is estimated to be 435,036, with differentiation of 211,100 females and 223,936 males (18). Data collection in the field took one week (October 28 to November 4, 2015). Inclusion criteria were being a permanent resident of Kandahar during the study period, providing consent to participate, being present in the households, and being part of the sampling frame. Exclusion criteria were being temporary residents (resident < 6 months), living in institutionalized settings, working in offices out of households during data collection, and being a residence of insecure areas. Due to the unavailability of previous estimates of the risk factors' prevalence in this city, the highest prevalence or sample size calculation (50%), 95% confidence interval (CI), and margin of error of 5% were assumed. We estimated the sample of 385 adults for the survey. Taking into consideration the proportion of other risk factors in similar settings, the number of participants was increased to 600. Finally, after taking into account the design effect of cluster sampling, the final sample size was increased to $(2 \times 600) = 1200$ for the city, which was reasonable for achieving the study objectives.

The expanded programme for immunization (EPI) list of the clusters was used because of its reliability in ministry of public health. We received the list of all existed EPI clusters, which included village/area name, population, and number of households per cluster. In the first stage of the cluster sampling, we randomly selected 7 clusters of EPI from this list using random number of excel sheet. In the second stage, we randomly selected 5 areas (called Area/Guzar) from the each selected cluster. Then, the whole sample of households was distributed among the selected areas according to the proportion to the size of the household in each cluster / areas.

All participants involved in the data collection attended an intensive training workshop involving interview techniques, data collection tools, practical applications, and blood sample collections. A household was defined as a group of people who share the same food pot (not the same roof). In each household the interviewer enumerated all persons who were eligible for our study based on the inclusion criteria. In households with more than one eligible person, we used a lottery system to select the respondent for the survey. In cases of refusal, which was less than 5%, the interviewer approached the next available household. This method provided an equal chance of each member of the household being selected. Various groups of targeted data including demographic, behavioural, and clinical variables were collected. Anthropometric measurements (height and weight) were used to calculate body mass index (BMI). Weight was measured using electronic scale for adults with barefoot and light dress, while the waist circumference was measured by flexible tailors' strep and height was recorded using inflexible measurement bars. A BMI of $\geq$ 30 kg/m^2 was considered as obese, 25 - 30 kg/m^2 as overweight, and 18.5 - 25 kg/m^2 as normal weight (19). A waist circumference of 94 cm for men and 80 cm for women was considered as central obesity (20). The operational definition for hypertension was based on measuring blood pressure on the spot thrice, at the start of, in the middle, and at the end of the interview. The average of these 3 measurements was considered for analysis. Hypertension was classified into 3 categories. Having systolic blood pressure (SBP) $\geq$ 140 mmHg and/or diastolic pressure (DBP) $\geq$ 90 mmHg were considered as hypertensive (21). Those who were identified by health workers as hypertensive and were already under treatment were included in the analysis as hypertensive. Furthermore, having SBP < 120 mmHg and DBP < 80 mmHg were categorized as being normal. SBP of (120 -140) mmHg and DBP of (80 - 90) mmHg were considered as prehypertensive. A fasting blood sugar of $\geq$ 126 mg/dL was considered as diabetes mellitus (22). Based on STEPs approach, physical activity was categorized as vigorous and moderate activity, in which the heart beat will be increased rapidly or moderately for 10 minutes, respectively. In addition, as a proxy for physical activity, information about

walking hours or reclining hours per day was collected from all cases and was given by the interviewer to clarify the questions.

When the interview was done, the participants' blood samples were collected the next morning after the respondent had fasted for 10 to 12 hours. On the day of the sample collection, the samples were transported in cool boxes (2 - 8°C) from the field to the Public Health Laboratory, where it was processed. Then, serum was separated and shipped to the central public health laboratory (CPHL) in Kabul. We coded the samples using cry-vials. On arrival in CPHL, all serum samples were stored at -80°C until biochemical test was conducted. Overall, 1165 samples were tested for biochemical measurement of triglyceride, cholesterol, and glucose; and more than 12 samples were poor and discarded. Data were entered in Epi-info, Version 7, and cleaned data were analysed using SPSS, Version 20. Descriptive and statistical analysis was done on 1165 records to identify the proportion of hypertension and find the association of predictors. Written informed consent was taken from each individual ahead of the interview time and participants were assured of confidentiality of data. In addition, the participants were assured that if there were any adverse findings in their blood samples, they would be notified. However, the participants were informed that they could obtain their results if they came to the surveillance office in Kandahar once the lab results were out. Thus, those with high blood sugar and blood lipids were contacted by phone and the results were submitted to them, while others came to office.

3. Results

Table 1 summarizes the frequency distribution of the main variables of the study participants. Out of the total participants enrolled (1202) in the study, 1165 (96.9%) were included in the final statistical analysis as there were major deficiencies in the remaining records. In this study, 597 (51.2%) were female and 568 (48.8%) were male, with a mean age of 38.3 $\pm$ 11.2 years. Most of the study participants were married (79.3%), illiteracy rate was 73.2%, and 88.5% of females were housewives.

Describing behavioral risk factors reflects that 9.7% of the participants were smokers and 16.3% were snuffers; 40% consumed fruits and 59.7% consumed vegetables » 3 days per week. Of the respondents, 33% reported to use liquid oil for cooking, while 37% used solid ghee, and 29.7% used both with no difference. Almost 10% (5.9%) of the respondents practiced vigorous physical activity and 21.3% reported doing moderate physical activity. Approximately half (56.3%) of the respondents reported reclining of > 3 hours per day. About 16% of the study respondents were obese and 55.5% suffered from central obesity. Approximately, one fourth (22.2%) was recorded as raised blood sugar. Only about 38.6% of the participants had low and/or normal range of blood pressure, while 29.1% were prehypertensive, and 32.3% were hypertensive. Of female and male participants, 40.5% and 23.6% had high blood pressure, respectively. Out of this group of high blood pressure, 25.2% were unaware of their status of hypertension and just 7.1% were under treatment. As a whole, the average of systolic blood pressure was 125.59 $\pm$ 14.16 and average of diastolic blood pressure was 83.19 $\pm$ 10.74 mmHg.

Statistical analysis at bivariate level is displayed in Table 2. The analysis of risk factors for high systolic blood pressure revealed a statistically significant association with age, education, marital status, frequency of taking red meat per week, sedentary lifestyle, body mass index, central obesity, and raised blood sugar. However, frequency of intake of fruits and vegetables and vigorous and moderate physical activity were not significantly associated with high blood pressure. Table 3 demonstrates the multivariate analysis of the association of risk factors and hypertension. The independent risk factors of hypertension were age, gender, education status, high body mass index, central obesity calculating from high waist circumference, physical inactivity with respect to reclining per day. Marital status, raised blood sugar, and frequency of taking red meat were not found to be significant in the multivariate analysis, however, they had a statistically significant relationship with hypertension at bivariate level.

4. Discussion

High blood pressure among adult citizens in Kandahar is a significant finding and provides a baseline and trigger point for planners and policymakers. This study revealed that the prevalence of hypertension in the urban setting of Kandahar in Afghanistan is 32.3%, indicating that almost one third of the adult population of this city is suffering from this public health problem. These findings are supported by being comparable to other findings of national (13, 14) and international studies (23, 24). It further reveals that the country has entered into an epidemic of noncommunicable diseases such as hypertension, while in the last decade the country has focused on infectious diseases, nutrition, and maternal health (25, 26). Another important finding is that most adults were unaware of their high blood pressure, proving that the disease is really a silent killer (27, 28). Similar to other studies, age was associated with high blood pressure at bivariate and multivariate level, meaning that blood pressure increases by age. Such results were found by other studies including

Table 1. Frequency Distribution of Demographic, Socioeconomic and Behavioral Characteristics of the Study Participants, Kandahar City (N = 1165)

Variables	Categories	Total		Female		Male	
		No.	%	No.	%	No.	%
Age							
	25 - 34	520	44.6	272	45.6	248	43.7
	35 - 44	323	27.7	161	27	162	28.5
	45 - 54	188	16.1	94	15.7	94	16.5
	55+	134	11.5	70	11.7	64	11.3
Level of education							
	Illiterate	840	73.2	533	89.4	307	55.6
	Literate	308	26.9	63	10.6	245	44.4
Marital status							
	Single	120	10.3	25	4.2	95	16.8
	Married	922	79.3	487	81.6	435	76.9
	Widow/Widower	75	6.4	66	11.1	9	1.6
Work status							
	Official Employees	125	13.8	11	2.4	114	25.7
	Private Business	110	12.1	6	1.3	104	23.4
	Worker/Farmer	130	14.3	0	0	130	29.3
	Jobless	92	10.2	19	4.1	73	16.4
	Housework	414	45.7	409	88.5	5	1.1
	Unable to work	35	3.9	17	3.7	18	4.1
Cigarette smoking status							
	No	1052	90.3	584	97.8	468	82.4
	Yes	113	9.7	13	2.2	100	17.6
Mouth snuff status							
	No	973	83.7	574	96.3	399	70.5
	Yes	189	16.3	22	3.7	167	29.5
Fruit serving (days per week)							
	≤ 3	683	59.7	344	58.3	399	61.1
	> 3	462	40.3	246	41.7	216	38.9
Vegetable's serving (days per week)							
	≤ 3	469	40.3	199	33.4	270	47.5
	> 3	695	59.7	397	66.6	298	52.5
Vigorous physical activity							
	No	1094	94.1	581	97.6	513	90.5
	Yes	68	5.9	14	2.4	54	9.5
Moderate physical Activity							
	No	914	78.7	434	72.9	480	84.8
	Yes	247	21.3	161	27.1	86	15.2
Basic mass index (in kg/m square)							
	Underweight	57	4.9	38	6.4	19	3.3
	Normal weight	522	44.8	222	37.2	300	52.8
	Overweight	400	34.3	205	34.3	195	34.3
	Obesity	186	16	132	22.1	54	9.5
Central obesity							
	No	482	44.5	86	16.7	396	70
	Yes	600	55.5	430	83.3	170	30
Blood Sugar elevated (diabetes mellitus including under treatment)							
	No	896	77.6	440	74.6	456	80.7
	Yes	259	22.4	150	25.4	109	19.3

Table 2. Bivariate Analysis of Demographic, Socio-Economic and Behavioral Factors and Hypertension Among Study Participants in Kandahar Afghanistan

Variables	Categories	Normotensive	Hypertensive	Odds Ratio	CI 95% LL	CI 95% UL
Age in years						
	25 - 34	425 (81.7)	95 (18.3)	1	Reference	
	35 - 44	210 (65)	113 (35)	2.221	1.607	3.069
	45 - 54	107 (56.9)	81 (43.1)	3.206	2.219	4.633
	55 and over	47 (35.1)	87 (64.9)	7.949	5.203	12.143
Gender						
	Female	355 (59.5)	242 (40.5)	1	Reference	
	Male	434 (76.4)	134 (23.6)	0.453	0.352	0.584
Level of education						
	Illiterate	525 (62.5)	315 (37.5)	1	Reference	
	Literate	247 (80.2)	61 (19.8)	0.412	0.301	0.563
Marital status						
	Single	99 (82.5)	21 (17.5)	1	Reference	
	Married	629 (68.2)	293 (31.8)	2.196	1.344	3.588
Smoking						
	No	705 (67)	347 (33)	1	Reference	
	Yes	84 (74.3)	29 (25.7)	0.701	0.451	1.09
Strong physical activity						
	No	736 (67.3)	358 (32.7)	1	Reference	
	Yes	51 (75)	17 (25)	0.685	0.39	1.204
Moderate physical activity						
	No	629 (68.8)	285 (31.2)	1	Reference	
	Yes	157 (63.6)	90 (36.4)	1.265	0.942	1.698
Sedentary lifestyle in hours daily						
	< 3 hours	313 (62)	192 (38)	1	Reference	
	≥ 3 hours	471 (72.4)	180 (27.6)	0.623	0.486	0.799
Fruits serving days per week						
	< 3 days	458 (67.1)	225 (32.9)	1	Reference	
	≥ 3 days	317 (68.6)	145 (31.4)	0.931	0.723	1.199
Vegetables serving days per week						
	< 3 days	327 (69.7)	142 (30.8)	1	Reference	
	≥ 3 days	462 (66.5)	233 (33.5)	1.161	0.902	1.495
Taking red meat in days per week						
	< 2 days	121 (89)	15 (11)	1	Reference	
	≥ 2 days	589 (65.7)	308 (34.3)	4.218	2.424	7.34
Body mass index						
	Underweight	42 (73.7)	15 (26.3)	1	Reference	
	Normal	390 (74.7)	132 (25.3)	1.111	0.572	2.158
	Overweight	255 (63.8)	145 (36.2)	1.765	0.906	3.438
	Obese	102 (54.8)	84 (45.2)	2.292	1.137	4.621
Central obesity						
	No	381 (79)	101 (21)	1	Reference	
	Yes	342 (57)	258 (43)	2.846	2.167	3.737
Raised blood sugar						
	No	629 (70.2)	267 (29.8)	1	Reference	
	Yes	154(59.5)	105 (40.5)	1.606	1.206	2.139

national and international research papers (29, 30). Furthermore, there was the effect of sex on hypertension in our study meaning that males are at a higher risk of hav-

Table 3. Multivariate Analysis of Risk factors and Hypertension Among Study Participants in Kandahar City Afghanistan

Variables	Categories	B	Odds Ratio	CI 95% Lower Limit	CI 95% Upper Limit	P Value
Age		0.059	1.061	1.048	1.075	< 001
Sex						
	Female		1		Reference	
	Male	0.0521	1.683	1.186	2.39	< 05
Education status						
	Illiterate		1		Reference	
	Literate	0.388	1.474	1.018	2.134	< 05
Body mass index		0.029	1.029	1.004	1.055	< 05
Central obesity						
	No		1		Reference	
	Yes	-0.483	0.617	0.435	0.875	< 05
Reclining at home in hours per day		-0.063	0.939	0.883	0.999	< 05

ing high blood pressure. Education level of has an effect on high blood pressure. Those who were literate had higher blood pressure and this could be due to their lack of physical activity and working at an office compared to illiterate people whose work may involve more physical activity. Body mass index and central obesity were statistically associated with hypertension at both statistical analysis levels. This finding is in agreement with other studies in similar settings (13, 14, 28). Physical inactivity with respect to reclining in hours per day was also associated with hypertension (31). It means that being physically inactive makes adult citizens susceptible to obesity and hypertension and probably to other health problems. Physical activity will prevent obesity and hypertension. Some other studies also supported this association (32). A community based study reported that age, education, physical activity, and diabetes were significantly associated with hypertension, which is in agreement with findings of this study (33).

High prevalence of hypertension (one third of adult population) in urban areas in Afghanistan is very much a significant finding, which requires substantial attention. As life goes on, the level of noncommunicable diseases including high blood pressure increases, therefore, interventions to prevent and control such public health challenges are crucial. According to our findings focusing on older age groups, education level, high weight, and physical inactivity are of significant importance. Awareness among the population is needed to decrease the double burden of diseases in the country. This study had some limitations such as financial constraints to list all households ahead of study commencement and the security situation, which forced the research team to exclude some areas. Perhaps checking blood pressure, taking blood samples, and promising to share the results encouraged the adults with such problems to participate in the study, and probably causing an overestimation of findings. The findings may motivate the policymakers to design and conduct studies at national level.

4.1. Conclusion

The prevalence of high blood pressure was substantially high in this urban population. Thus, designing and conducting analytical studies to identify the main causes and implement pertinent interventions is of high importance. Consequently, effective community-based preventive and control strategies is essential.

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Footnote

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