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Exploring the prevalence, and associated factors of hypertension among adults attending a tertiary care hospital in Mogadishu, Somalia

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Abstract

Introduction: Hypertension is a growing public health issue in many developing countries, including Somalia. It is essential to determine the prevalence of hypertension and identify its associated risk factors.

Method: From November 2023 to January 2024, 350 patients were studied prospectively in the cardiology and internal medicine departments of Mogadishu Somali Turkish Training and Research Hospital in Somalia. The data was primarily collected from patients via questionnaires that examined patient demographics and risk factors.

Result: This study examines the demographic and lifestyle characteristics associated with hypertension in a sample population of 320 participants (227 males and 93 females). The analysis included smoking status, khat use, salt intake, physical activity, and body mass index (BMI). Hypertension prevalence increased with age, peaking at 48.4% in the 65-74-year-old group. Among the hypertensive group, there were higher proportions of current smokers, khat users, individuals with uncontrolled salt intake, inadequate physical activity, and obesity. Specifically, 19% of hypertensive participants were current smokers, and 13% were current khat users. Uncontrolled salt intake was reported by 73 hypertensive individuals, and 63 hypertensive participants had inadequate physical activity. Obesity was more prevalent among hypertensive individuals, with 26 participants classified as obese. These findings highlight the significant role of lifestyle factors in hypertension, emphasizing the need for lifestyle modifications, including reduced salt intake, increased physical activity, and weight management, to mitigate hypertension risk. The study underscores the importance of addressing these factors in the management and prevention of hypertension.

Conclusion: Hypertension is an iceberg disease among the top causes of cardiovascular disease and premature death globally, and specifically in the African population, where people lack basic life and health infrastructure.

Keywords: Prevalence, hypertension, risk factors, Africa, Somalia, Mogadishu

1. Introduction

Globally, Hypertension, the most common non-communicable disease, is an important risk factor for cardiovascular disease, chronic kidney disease worldwide and premature death [1, 2]. Hypertension is a significant global public health challenge, with varying prevalence rates among different populations.

Hypertension is defined by the European Society of Cardiology as >140/90 mm Hg, to achieve a level of <140/90 mm Hg for all and <130/80 mm Hg for those at high cardiovascular risk, while taking into account individual tolerability [3].

Hypertension causes morbidity and mortality worldwide, resulting in cardiovascular and kidney diseases such as myocardial infarctions, strokes, and renal failure [4].

In 2015, more than 1 billion adults worldwide suffered from hypertension, with the majority living in low- and middle-income countries [5].

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Understanding the prevalence of hypertension and its associated risk factors is crucial for public health planning and intervention strategies.

Based on estimations, 31.1% of adults (1.39 billion) worldwide suffered from hypertension in 2010. In Africa, limited access to healthcare and inadequate awareness about hypertension contributes to the escalating burden of the disease [6].

The prevalence of hypertension in Africa has steadily increased over the last few decades, owing primarily to urbanization, the adoption of Westernized lifestyles, and dietary habits. These factors, combined with limited access to healthcare and low awareness of hypertension, contribute to the disease's growing burden. As a result, Africa has become a hotspot for hypertension-related complications like cardiovascular disease, strokes, and kidney failure.

This study, the first of its kind conducted in a tertiary and referral care hospital in Somalia, provides crucial insights for public health planning and intervention strategies to mitigate hypertension risks and improve health outcomes.

2. Methods

2.1. Study Design, Setting, and Sample Size.

This prospective study was carried out in Mogadishu, Somali Turkish Training and Research Hospital, the region's largest multidisciplinary tertiary referral facility. From November 2023 to January 2024. Our hospital's research ethics committee approved this study (MSTH/8129). The Helsinki Declaration's contents carried out this study. Patients gave their informed consent to participate in the study. It adhered to the protocols of our work center.

2.2. Sample Size and Sampling

Systematic random sampling was employed to select patients from those attending the hospital during the study period. The inclusion criteria encompassed patients above 18 years of age with no known history of hypertension or cardiovascular disease.

Sample of 320 was taken using simplified formula for sample size calculation for a single population proportion

$$n = \frac{Z^2 \cdot p \cdot (1-p)}{E^2}$$

Where

- n = required sample size
- Z = z-score corresponding to the desired confidence level (e.g., 1.96 for 95% confidence)
- p = estimated prevalence of hypertension
- E = margin of error (expressed as a proportion, e.g., 0.05 for $\pm 5\%$)

2.3. Study Instruments and Data Collection

A structured questionnaire was designed and pretested to gather data on sociodemographic factors (age, sex, and socioeconomic status), lifestyle habits (low vegetable intake, high salt intake, physical activity level, and sedentary lifestyle), BMI, and history of diabetes mellitus. The WHO STEPS approach was adapted for assessing hypertension profiles in the patient population.

Step 1: (Questionnaire): Includes questions on vegetable intake, salt consumption, physical activity levels, sedentary habits, and socioeconomic status.

Step 2: (Clinical Measurements): Record height, weight, and blood pressure using standardized protocols and equipment.

Step 3: (Lab Tests): Fasting blood sugar levels and cholesterol profiles were measured.

Blood pressure was measured three times while sitting with support for the back, feet on the floor, and right arm positioned so the elbow is at heart level. A standard mercury sphygmomanometer with the right cuff size was used. Three blood pressure measurements were recorded while the individual was seated, with each measurement taken at five-minute intervals following a five-minute rest period.

Hypertension was defined as systolic blood pressure (SBP) ≥ 140 mmHg and/or diastolic blood pressure (DBP) ≥ 90 mmHg or a known history of hypertension.

Physical activity is defined as adhering to the American Heart Association's recommendations for optimal cardiovascular health status, which refer to at least 150 minutes per week of moderate activity, 75 minutes per week of vigorous activity, or 150 minutes per week of both moderate and vigorous activity [7].

Current smoking was defined by a smoking habitus persisting during the last month, while previous smoking was defined by a smoking habitus at least before 1 month.

Body mass index (BMI) was obtained by dividing height squared by mass in kg/m². Furthermore, it was classified into low, normal, overweight, and obese.

Body mass index (BMI) was categorized as underweight, normal, overweight, or obese following WHO guidelines. Physical activity was assessed using WHO/FAO guidelines on human energy needs.

2.4. Ethical Considerations

Informed consent was obtained from all participants, and ethical approval was obtained from the hospital's ethics committee (MSTH/8129). Patient confidentiality and privacy were strictly maintained throughout the study. Patients identified with hypertension or other health concerns were referred for appropriate management.

2.5 Statistical Analysis

Data were analyzed using a commercially available statistics software package (SPSS® for Windows). Descriptive statistical methods (mean, standard deviation, frequency, ratio, minimum, maximum) were used when evaluating the study data. Multinomial logistic regression is used for evaluation of categorical data. $P < 0.05$ was considered as statistically meaningful.

Results

In this study, we examined the demographic and lifestyle characteristics associated with hypertension among a sample population. The analysis included data on smoking status, khat use, salt intake, physical activity, and body mass index (BMI). The sample consisted of 320 participants, with 227 males (56 hypertensive, 171 normotensive) and 93 females (32 hypertensive, 61 normotensive) see Table (1). The age distribution indicated that the prevalence of hypertension increased with age, peaking in the 65-74-year-old group, where 48.4% were hypertensive. Participants over 75 years old also showed a high prevalence, with 39.1% being hypertensive. Regarding smoking status, 12.7% of participants were current smokers, 14.8% were previous

smokers, and 72.6% had never smoked. Among the hypertensive group, a higher percentage were current smokers (19) compared to the normotensive group [11]. Similarly, khat use was higher among hypertensive individuals, with 13 current users and 22 previous users, compared to 6 and 12 in the normotensive group, respectively. Salt intake showed a significant disparity between hypertensive and normotensive individuals. Among hypertensive participants, 73 had uncontrolled salt intake, while only 15 had controlled intake. In contrast, among normotensive participants, 41 had controlled salt intake compared to 191 with uncontrolled intake. This indicates a strong association between high salt intake and hypertension. Assessment of physical activity levels revealed that 58.7% of participants had inadequate physical activity. This was more pronounced among hypertensive individuals, where 63 reported inadequate physical activity compared to 222 normotensive individuals. Only 15 hypertensive individuals engaged in adequate physical activity, compared to 20 normotensive individuals. The BMI analysis revealed that obesity was more common in

hypertensive individuals. Only 6 normotensive individuals and 26 hypertensive participants fell into the obese category. Conversely, the majority of normotensive participants (190) had a normal BMI, compared to only 17 hypertensive participants. This study's findings highlight several key factors associated with hypertension. Individuals with hypertension were more likely to be older, male, current or previous smokers and khat users. They also had higher rates of uncontrolled salt intake, inadequate physical activity, and obesity. These results underscore the importance of lifestyle modifications in the management and prevention of hypertension. Reducing salt intake, increasing physical activity, and managing body weight are critical components in mitigating the risk of hypertension. The table demonstrates notable correlations between the prevalence of hypertension and different risk factors, specifically smoking and khat consumption among older individuals. Hypertension consistently appears as a significant predictor in various age groups, emphasizing its crucial role in determining health outcomes.

Table 1: Shows sociodemographic factors among participants

Characteristic		Hypertensive (88)	Normotensive (232)	Total (%)
Age in group	<25	1	34	35
	25 - 34	3	23	26
	35 - 44	6	20	26
	45 - 54	9	30	39
	55 - 64	21	65	86
	65-74	30	32	62
Gender	>75	18	28	46
	Male	56	171	227
	Female	32	61	93
Smoking Status	Current	19	11	30 (9.4%)
	Previous	12	17	29 (9.0)
	Never	57	204	261 (81.6%)
Khat user	Current	13	6	19 (5.9%)
	Previous	22	12	34 (10.6%)
	Never	53	214	267 (83.4%)
Salt intake	Control	15	41	56 (17.5%)
	Uncontrolled	73	191	264 (82.5%)
Physical Activity	Adequate	15	20	35 (10.9%)
	In adequate	63	222	285 (89%)
Body Mass Index(BMI) kg/M ²	Low	2	14	16 (5%)
	Normal	17	190	207 (64.6%)
	Overweight	23	25	48 (15%)
	Obese	26	6	32 (10%)

Table 2: Risk factors associated among participants by multinomial regression analyses

Age		Coefficient	Std. Error	Wald	df	p-value	Odds ratio
25 to 34 years	Sex	.201	.777	.067	1	.796	1.223
	Hypertension status	2.219	.891	6.206	1	.013	9.201
	Smoking history	.397	1.211	.108	1	.743	1.487
	Khat history	-1.214	1.475	.677	1	.411	.297
	Blood pressure control status	-16.730	701.454	.001	1	.981	5.422E-8
	Physical activity status	15.775	1014.979	.000	1	.988	7099083.703
35 to 44 years	Sex	-.251	.671	.140	1	.708	.778
	Hypertension status	.614	.577	1.132	1	.287	1.848
	Smoking history	.029	1.065	.001	1	.978	1.030
	Khat history	.048	1.233	.002	1	.969	1.050
	Blood pressure control status	.264	.000	.	1	.	1.302
	Physical activity status	16.319	.000	.	1	.	12230480.156
45 to 54 years	Sex	-.617	.643	.920	1	.337	.540
	Hypertension status	2.275	.846	7.225	1	.007	9.729
	Smoking history	-.295	1.077	.075	1	.784	.744
	Khat history	-1.871	1.245	2.258	1	.133	.154
	Blood pressure control status	-17.422	701.453	.001	1	.980	2.715E-8
	Physical activity status	15.540	852.327	.000	1	.985	5611325.689
55 to 64 years	Sex	.061	.548	.013	1	.911	1.063
	Hypertension status	.540	.444	1.480	1	.224	1.716
	Smoking history	.602	.780	.596	1	.440	1.826
	Khat history	-1.843	.926	3.964	1	.046	.158
	Blood pressure control status	-14.602	701.453	.000	1	.983	4.553E-7
	Physical activity status	16.215	609.036	.001	1	.979	11018759.429
65 to 74 years	Sex	-.310	.563	.304	1	.582	.733
	Hypertension status	.461	.475	.943	1	.331	1.586
	Smoking history	2.635	.887	8.816	1	.003	13.938
	Khat history	2.237	1.000	5.002	1	.025	9.369
	Blood pressure control status	-1.223	1084.711	.000	1	.999	.294
	Physical activity status	-.713	.453	2.478	1	.115	.490
Less than 25	Sex	-.752	.734	1.051	1	.305	.471
	Hypertension status	3.610	1.197	9.091	1	.003	36.968
	Smoking history	2.110	1.789	1.390	1	.238	8.246
	Khat history	1.458	2.718	.288	1	.592	4.297
	Blood pressure control status	-18.947	701.453	.001	1	.978	5.905E-9
	Physical activity status	14.711	811.511	.000	1	.986	2449522.833

Discussion

The World Health Organization (WHO) and American Heart Association (AHA) highly recommend a daily salt consumption of less than 5 grams or no more than 8 grams, as it lowers the risk of stroke, cardiovascular disease, and coronary heart disease and is good for blood pressure. In their guidelines for managing hypertension, the European Society of Cardiology (ESC) and the European Society of Hypertension (ESH) have also stressed the significance of limiting dietary salt intake. These suggestions emphasize the importance of limiting salt consumption as a critical dietary component in improving cardiovascular health and lowering hypertension risks [8].

Physical inactivity is a significant risk factor associated with hypertension among adults. Studies have shown that a sedentary lifestyle reduces cardiac output, systemic blood flow, and insulin sensitivity, and affects vascular function by activating the sympathetic nervous system [9, 10].

Furthermore, the coexistence of hypertension with conditions like obesity can complicate management and increase the risk of adverse outcomes, especially in adolescents (a)

Hypertension is a significant public health concern in Somalia, with studies indicating both a high prevalence of the condition and poor awareness levels among the population. Research from neighboring countries in Africa,

such as Ghana and Kenya, has shown similar trends with high rates of hypertension prevalence [11, 12]. Additionally, studies have highlighted that hypertension is more prevalent in certain populations, including urban refugees from countries like Somalia [13]. Focusing on Somalia, These studies have aimed to understand the prevalence of hypertension among different groups, such as patients seeking care at hospitals in Somaliland showing high prevalence of hypertension among patients seeking care at hospitals, underscoring the need for increased awareness and management strategies [14]. Furthermore, research has explored the factors contributing to hypertensive crises among patients in Somalia, shedding light on the clinical characteristics and risk factors associated with this condition [15]. Moreover, the prevalence of hypertension among Somali populations has been a subject of interest in various contexts. Studies have examined the prevalence of hypertension among displaced individuals in Somalia, emphasizing the importance of diagnosing and managing hypertension in such vulnerable populations. Strict adherence to limiting salt intake has been emphasized as crucial for effectively managing blood pressure, especially in patients with resistant hypertension [16]. Factors such as older age, male gender, history of khat consumption, and overweight status have been associated with an increased risk of hypertension among Somali populations [17].

Similarly, in neighboring Ethiopia Risk factors such as physical inactivity, salt intake, and khat chewing have been explored in relation to hypertension in Ethiopia, providing insights into lifestyle influences on the condition ^[18].

Conclusion

Hypertension continues to pose a significant global public health challenge, its prevalence shaped by a multitude of factors such as age, lifestyle choices, geographical location, and demographic traits. Acknowledging this prevalence and understanding the associated risk factors are crucial steps towards devising tailored interventions, advocating healthy habits, and alleviating the impact of hypertension-related complications across varied populations.

Limitations and strengths

This study had several limitations. First, the result cannot be generalized because the study was conducted at a single center. Second the sample size of the population may have needed to be larger to detect statistically significant differences.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Competing interests

The authors declare that there is no conflict of interest.

Availability of data and materials

The data that support the findings of this study are available from the Mogadishu Somali Turkish Training and Research Hospital. Data are, however, available from the authors upon reasonable request and with the permission of Mogadishu Somali Turkish Training and Research Hospital.

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