ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 8.4
IJAR 2023; 9(7): 240-242
www.allresearchjournal.com
Received: 11-04-2023
Accepted: 12-05-2023

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A community-based cross-sectional research looked at undiagnosed hypertension and its contributing variables among adults in Ernakulum town, Kerala

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DOI: https://doi.org/10.22271/allresearch.2023.v9.i7d.11114

Abstract
Background: Around the world, cardiovascular (CVD) disease-related fatalities are significantly influenced by hypertension. Many persons with high blood pressure in developing countries are unaware of their condition. A diagnosis of hypertension may prevent some people from receiving therapy. It leads to a high prevalence of renal failure, heart disease, stroke, early death, and disability. This study's goal is to determine the prevalence of undiagnosed hypertension among individuals in Ernakulum town, as well as to define the risk factors connected to it.
Materials and Methods: From January to March 2023, a community-based cross-sectional research was carried out. Semi-structured questionnaires that were administered by interviewers were used to gather information on the sociodemographic and behavioural traits of the participants. Using standardised measuring equipment, physical measures such as body mass index, waist circumference, and blood pressure were taken. Data for the statistical analysis were gathered using SPSS version 21. To show the findings, a single-variable logistic regression model was utilised. In a multivariable study, a p-value less than 0.05 was regarded as statistically significant at a 95% confidence level.
Results: Total 500 patients were included in this study. The mean age of the participants was 38.35 ±12.48years, the majority of them, 427 (85.4%), were under the age of 40; and most of them, 354 (70.8%), were married people. The detailed socio-demographic characteristics of the study participants are shown in Table 1. Of these, 340 (68%) were males and 160 (32%) were females. Among the research participants, undetected hypertension was present in 23.2% of cases overall.
Conclusion: This study demonstrates that untreated hypertension is a significant public health issue in the study region. The likelihood of undetected hypertension is increased by living in a home with a low wealth index, being distant from a medical facility, being underweight, using smokeless tobacco products, and knowing little about the condition. Information on the health effects of hypertension, especially for smokers, may help people identify their risk for the condition and lessen its concealed severity.

Keywords: Hypertension, prevalence, risk factors, non-communicable diseases

1. Introduction
Non-communicable diseases (NCDs) pose the greatest threats to public health, not only because of the morbidity and death they bring about but also because of the effects they have on a nation's socioeconomic progress. NCDs account for 41 million deaths annually, or 71% of all fatalities worldwide. More than 15 million people between the ages of 30 and 69 pass away each year as a result of an NCD, with low- and middle-income nations accounting for 85% of these "premature" fatalities [1]. The majority of these NCD-related premature deaths can be avoided. Raised blood pressure (BP), overweight/obesity, hyperglycemia, and hyperlipidemia are significant metabolic risk factors that lead to important metabolic changes that elevate the risk of NCDs. Of these, high blood pressure is responsible for 19% of all fatalities worldwide, followed by being overweight or obese and having high blood sugar [1]. According to WHO estimates, 1.13 billion individuals worldwide—the majority of whom reside in low- and middle-income nations—have hypertension. In India, the prevalence of hypertension is around 29.8% overall, 33.8% in urban regions, and 27.6% in rural areas [2]. According to NFHS-5 statistics, pre-hypertension affects 39% of women and 49% of men who are 15 years of age or older, whereas hypertension affects 25% of women and 24% of men in the same age group [3].

According to the WHO, fewer than 42% of individuals with hypertension are identified and treated, while over 46% of persons with raised blood pressure in developing countries are unaware of their condition [2].

Undiagnosed hypertension affects both individual and reproductive health and affects about one in five Indian women between the ages of 15 and 49 [4]. Long-term hypertension can cause chronic renal disease, coronary artery disease, ischemic and haemorrhagic stroke, congestive heart failure, and coronary artery disease [5]. The National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS), launched by the Government of India in 2010, aims to prevent and control major NCDs with a focus on infrastructure development, human resource development, health education, health promotion, early diagnosis, treatment, and referral [6].

India is a diverse nation in terms of its social, demographic, and cultural makeup. The incidence of hypertension varies throughout the nation's regions and income brackets. For long-term undetected hypertension to cause difficulties, early detection and the right treatment are essential. Evidence on the burden and drivers of undiagnosed hypertension in this current geographic region is limited, which is crucial for proper planning and implementation of health services because the burden of undiagnosed hypertension differs among geographical zones.

2. Materials and Methods

From January to March 2023, the study was carried out at Ernakulum Town, Kerala. A cross-sectional study approach based on the community and using random sampling was used. The source population consisted of all adults residing in the study region, whereas the study population consisted of those aged 18 to 70 who have lived there for at least six months and above. The study excluded those with significant illnesses, known chronic conditions, mental disorders, and pregnancy.

Using Epi Info Version 7.2.2.6, the sample size was calculated by taking into account factors that are substantially linked with the outcome variable, a two-sided confidence level of 95%, power of 80%, and the ratio of exposed to unexposed 1:1 for each factor.

The study participants were chosen using a multistage random sampling procedure after the sample size was decided. First, the number of eligible adults was counted; next, the associated houses were classified; last, health professionals tagged and documented each person's name. Second, after receiving thorough training on the STEPS study objectives, survey methodology, and materials, data were gathered by medical professionals with at least a BSC in nursing and public health officials.

Using a standardised WHO STEPS wise approach V.3.2 instrument that was created for the surveillance of non-communicable disease, participants' information on socio-demographic data, behavioural and lifestyle factors, physical measurement, and biochemical measurement (blood glucose level) was gathered. After reliability was determined, a questionnaire that was adapted from the Hypertension Knowledge-Level Scale (HK-LS) was used to assess participants' knowledge. Participants' health-seeking behaviour was examined using a questionnaire based on the health belief model.

The British Society for Hematology-validated, automated Riester RI champion® N blood pressure measuring system was used to monitor blood pressure. Its cuff size was 22*43 in both width and length. Before being measured, participants were instructed to relax (rest) for 30 minutes on the chair, keep their feet flat on the ground, support their backs, make sure they had an empty bladder, refrain from smoking, and refrain from drinking coffee or tea. To prevent COVID-19, the equipment was examined for integrity and cleaned with 70% isopropyl alcohol. In order to maintain the upper arm level with the heart, participants were then positioned with their arms supported on desks. Two inches above the elbow seam, the top arm was visible. On the upper arm's brachial artery, the cuff was placed. In a seated position, three blood pressure readings were recorded three minutes apart. The respondents' BP status was finally calculated using the mean of the three values.

Standard operating procedures and tools that have been calibrated were used to take anthropometric measurements. The weight of each participant was reported to be the closest to 0.1 kg. With the aid of a portable stadiometer, the participants' heights were determined. To the closest 0.1 cm, measurements were made. Utilising the programme or service, participants' random and/or fasting blood glucose levels were assessed.

3. Statistical Analysis

With the aid of the SPSS version 21 programme, data entry and analysis were carried out. Frequency distributions are presented using descriptive statistics. To find potential variables for multivariable logistic regression analysis, a univariate logistic regression analysis was conducted. The multivariable model includes all variables with a p-value of less than 0.25 in a univariate logistic regression analysis. The independent factors of undetected hypertension were found using a multivariable logistic regression model. There were estimated adjusted odds ratios (AORs) and 95% confidence intervals (CIs). At the 95% CI level, a p-value of less than 0.05 was regarded as statistically significant.

4. Results

A total of 500 patients were included in this study. The mean age of the participants was 38.35 ±12.48years, the majority of them, 427 (85.4%), were under the age of 40, and most of them, 354 (70.8%), were married people. The detailed socio-demographic characteristics of the study participants are shown in Table 1. Of these, 340 (68%) were males and 160 (32%) were females.

Table 1: Socio-demographic characteristics of the study participants

Variable	Category	Frequency	Percentage
Gender	Male	340	68
	Female	160	32
Age (Years)	20-30	80	16
	31-40	347	69.4
	41-50	60	12
	others	13	2.6
Occupation	Employed	356	71.2
	Unemployed	144	28.8
Educational Status	Educated	213	42.6
	Uneducated	287	57.4
Marital status	Married	380	76
	Unmarried	120	24
BMI	Underweight	84	16.8
	Normal	243	48.6
	Obesity	173	34.6
Family history of Hypertension	Yes	105	21
	No	395	79

A number of behavioural characteristics were evaluated, including BMI status, tobacco usage, BP check-up trends, alcohol drinking, and cigarette smoking. Based on this, 282 (56.4%) of the individuals reported alcohol use, 302 (60.4%) were smokers, 184 (36.8%) were tobacco users, 393 (78.6%) had no regular physical activity, 173 (34.6%) were obese. Table 2 lists the subjects' specific behavioural data in detail.

Table 2: Behavioural data of subjects

Variable	Category	Frequency	Percentage
Alcohol consumption	Yes	282	56.4
	No	218	43.6
Smoking	Yes	302	60.4
	No	198	39.6
Tobacco user	Yes	184	36.8
	No	316	63.2
Physical Exercise	Regular	75	15
	Sometimes	32	6.4
	No	393	78.6
Diabetes Mellitus	Yes	28	5.6
	No	472	94.4

Table 3: Distribution of undiagnosed Hypertension

Variable	Category	Frequency	Percentage
Undiagnosed Hypertension	Yes	116	23.2
	No	384	76.8
Total		500	100

5. Discussion

According to the NPCDCS programme, opportunistic screening of people over 30 is advised at all levels of the healthcare delivery system, starting at sub enter level and above, for the early diagnosis of diabetes, hypertension, and common malignancies. Such screening includes gathering information on past behaviours, including dietary patterns, alcohol and cigarette use, and family histories of diabetes [7-9]. To detect the condition at an early stage, general physical examinations, BMI calculations, blood pressure measurements, blood sugar estimations, and other procedures were also carried out. Even then, the general public's lack of understanding and access to services precludes early screening and illness identification.

According to the World Health Organisation, fewer than 42% of individuals with hypertension are identified and treated, while 46% of persons with raised blood pressure in poor nations are unaware of their condition [10]. Determining the incidence of undetected hypertension among individuals using health centres in a South Indian area is the goal of the current study.

Because it is one of the most significant risk factors for early mortality globally, elevated BP continues to be a serious issue for public health. In recent decades, there has been a sharp rise in both the prevalence and incidence of HTN. Nearly ten years sooner than in wealthy nations, Indians die from cardiovascular events. In India, cardiovascular events account for 52% of all fatalities among those under the age of 70, compared to 23% in other developing nations.

The purpose of this study was to determine the prevalence of undiagnosed hypertension and risk variables. Among the research participants, undetected hypertension was present in 23.2% of cases overall.

6. Conclusion

The frequency of untreated hypertension among individuals in this research was astounding. Age, BMI, family history, and eating a fatty diet were all strongly linked to the development of hypertension. This discovery served as a warning to the government and the accountable shareholders to develop some sort of public health intervention, such as neighbourhood-based screening and informational programmes.

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