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PREVALENCE OF HYPERTENSION AND ITS ASSOCIATED RISK FACTORS AMONG THE ADULTS IN SELECTED RURAL AREAS OF ANAND DISTRICT: A COMMUNITY BASED CROSS SECTIONAL STUDY

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ABSTRACT

Background: High blood pressure is a significant health challenge across the world, contributing considerably to cardiovascular and other chronic ailments. Identifying hypertension's prevalence and risk factors is crucial for improved management and control. As a result, the current study aimed to assess the current incidence and risk variables associated with hypertension among people residing in selected rural areas of Anand district, Gujarat state.

Methods: Residents of selected rural regions of Gujarat's Anand district participated in a cross-sectional community survey. A structured assessment tool was utilized to gather information about socio-demographic traits, clinical history, behavioural factors, and anthropometric data during face-to-face interviews. Additionally, standardize protocols were also to acquire blood pressure and anthropometric measures. SPSS statistical software version 20 was used to analyse the data, and logistic regression was employed to identify factors that were independently associated with hypertension. Statistical significance was defined as a p-value of less than 0.05.

Results: In order to ascertain the prevalence of hypertension using the ACC/AHA 2017 hypertension guidelines, the current study involved 315 individuals. The research showed that less than half of the study subjects (44.4%) had normal blood pressure, while more than half (56.6%) showed abnormal blood pressure levels ranging from elevated blood pressure to hypertension crisis. Around 13.0% had high blood pressure, 19.0% had stage I hypertension, 22.2% had stage II hypertension, and 1.3% were in hypertension crisis. Age, employment, family type, socioeconomic position, family history of hypertension, diabetes mellitus, renal illness, thyroid diseases, and a lack of health insurance were all found to be significant predictors of hypertension using logistic regression. Alcohol consumption, physical inactivity, an unhealthy diet, insufficient sleep, low water intake, excessive screen time, and poor stress management were all substantially linked to hypertension. Furthermore, the waist-hip ratio emerged as a significant anthropometric predictor, emphasizing the importance of central obesity in elevated blood pressure.

Conclusion: The study discovered that people residing in particular rural areas of Gujarat's Anand district had a high prevalence of hypertension. Several sociodemographic, clinical, behavioural and anthropometric characteristics were shown to be substantially linked with hypertension. The findings emphasize the need of routine screening, early identification of susceptible people, and promotion of healthy lifestyle choices in the rural community in order to prevent hypertension and accompanying cardiovascular problems.

KEYWORDS: Hypertension, Prevalence, Risk factors, Adults, and Rural population.

INTRODUCTION

Blood pressure that is continuously higher than normal, with a systolic blood pressure of 130 mm Hg or higher and a diastolic blood pressure of 80 mm or Hg or higher, is known as hypertension. (1). Hypertension is expected to remain a significant public health challenge worldwide by 2040, especially in low income countries and south-East Asia (2). Hypertension is recognized as a leading cause of heart disease, stroke, kidney disease and early death. In 2024, nearly 1.4 billion adults were affected by hypertension, but only a few were able to keep their blood pressure under proper control (3).

The WHO Global Report on Hypertension reports that the rates of diagnosis and control remain suboptimal, with only about 50% of hypertensive individuals being diagnosed and a considerably smaller proportion attaining adequate blood pressure control (4). Although there are effective treatments for high blood pressure, knowledge, prevention, and control of the condition are still lacking in many regions of the world (5).

In India hypertension remains a prevalent non-communicable disease with the studies reported its steadily increasing prevalence Among adults. A study reported overall hypertension prevalence of 34.35 with higher

prevalence among females (36.29%) then males (31.97%) and the burden increasing significantly with advancing age in tribal areas (6). A national study in India found that among both sexes, obesity and central adiposity showed a significant relationship with hypertension (7). In India exposure to household air pollution from fuel use poor living condition and advancing age are important factors associate with hypertension. The burden of hypertension is also higher among rural population and socioeconomically disadvantaged groups (8).

In India, urban populations experience a higher prevalence of hypertension (34%) than the rural populations (28%). However only 25% of rural and 38% of urban hypertensive individuals receive treatment, while blood pressure control remains very poor in both the population (9). In rural populations awareness about hypertension was found to be low while the number of newly identified cases was higher. Lifestyle and health related factors such as obesity, physical inactivity, excessive salt intake, stress, alcohol use, high cholesterol levels and low literacy were commonly associated with hypertension (10).

A recent research in Gujarat found that hypertension was prevalent in 41% of urban people and 27% of rural persons over the age of 30. The outcome emphasize that hypertension is a substantial public health concern in both rural and urban regions of the state (11). In Gujarat, variables such as advanced age, male gender, obesity, diabetes mellitus, dyslipidaemia, chronic renal disease, and smoking enhance the chance of getting hypertension. These demographic, clinical, and behavioural variables all lead to poor hypertension management and a higher risk of cardiovascular disease. (12).

MATERIALS AND METHODS

Study description

The research was carried out in selected rural areas of Anand district, Gujarat. Anand is a predominantly rural district where agriculture and dairy farming are the main occupation of the people. The rural population receives healthcare services through an established network of peripheral health centres.

Study area

The present study was undertaken in the rural villages of Bandhani, Piplav and Sihol in Anand district, Gujarat. In order to determine the prevalence of hypertension and related risk factors, these villages were chosen to represent the rural population of the area.

Study design and study population

A cross-sectional descriptive research was conducted among residents from Anand district's rural regions. The research enrolled adults over 18 who had lived in the region for at least six months prior to data collection.

Sampling technique

A non-probability convenience sampling strategy was used to recruit research participants from certain communities. Participants recruitment and data collection continued until the intended sample size was reached.

Sample size

The sample size was determined using the formula $n = t^2(p \times q)/d^2$, with a hypertension prevalence of 26.75% (NFHS-5), 95% confidence, and 5% precision. The computed sample size was 302.87, which was rounded up to 315 individuals to ensure that the research population was well represented.

Selection of study subjects:

Adults aged 18 and over who lived in designated rural regions of Anand district, were willing to engage in the study, and could speak in Gujarati, Hindi, or English were eligible for the study.

The study excluded those who had significant diseases such cancer, hepatitis, HIV/AIDS, TB, asthma, or COPD, as well as those who were bedridden, mentally sick, or pregnant at the time of data collection.

Tools of study

Data were collected using a structured interview schedule developed to obtain information on socio-demographic, clinical, behavioural, and anthropometric variables. A stadiometer, digital weighing scale, and measuring tape were utilized to acquire anthropometric variables. Blood pressure measurements were obtained using a digital sphygmomanometer in accordance with standardized measurement protocols. To verify the measurement's validity, precision, and reliability, all instruments and equipment used in the study were calibrated before data collection began.

Data collection

Data were obtained from 315 people living in the rural villages of Bandhani, Piplav, and Sihol in Gujarat's Anand District. Before enrolling, all participants provided written informed permission. A structured tool was employed to collect socioeconomic, clinical and behavioural data. Trained investigator used defined techniques to conduct anthropometric measurement and blood pressure checks, ensuring data quality and dependability.

Data analysis

The data set was processed utilizing IBM SPSS version 20. Descriptive statistics and logistic regression analysis were applied, and the findings were reported as odds ratios and 95% confidence intervals. Statistical significance was determined as $p < 0.05$.

Ethical consideration

The institutional Ethics committee of Charotar University of Science and Technology (CHARUSAT) granted ethical permission (permission number CHA/IEC/ADM/23/08/995.07). All subjects provided written informed permission and confidentiality, anonymity, and voluntary participation were ensured throughout the study.

RESULT

Table-1: Socio-demographic Characteristics of the Study Participants (N = 315)

Variable	Category	Frequency (n)	Percentage (%)
Age	Below 50 years	184	58.4
	50 years and above	131	41.6
Gender	Male	125	39.7
	Female	190	60.3
Marital Status	Single	42	13.3
	Married	218	69.2
	Separated	7	2.2
	Divorced	6	1.9
	Widowed	42	13.3
Education	Primary	119	37.8
	Secondary	71	22.5
	Higher Secondary	63	20.0
	Diploma/Graduation	45	14.3
	Post-Graduation	13	4.1
	Illiterate	4	1.3
Employment	Farmer	18	5.7
	Government job	12	3.8
	Private job	38	12.1
	Own business	30	9.5
	Unemployed	27	8.6
	Housewife	148	47.0
	Student	29	9.2
	Retired	13	4.1
Type of Family	Single	8	2.5
	Nuclear	208	66.0
	Joint	99	31.4
Socioeconomic Class	Upper class	11	3.5
	Upper middle class	62	19.7
	Lower middle class	142	45.1
	Upper lower class	63	20.0
	Lower class	37	11.7

The socio-demographic characteristics of the 315 individuals in the study reveal that a significant portion, 58.4%, were under the age of 50, and 60.3% were female. A majority, 69.2%, were married, while the rest were either single, widowed, separated, or divorced. Regarding educational attainment, 37.8% had completed primary education, followed by those with secondary and higher secondary education, and a small number were either postgraduates or had no formal education. The participants were mostly middle aged married women with rudimentary education. Almost half were housewives (47%), the majority belonged to nuclear families (66.0%), and the majority were from the lower-middle socioeconomic class (45.1%), representing a typical rural community profile.

Table-2: Prevalence of Hypertension among Study Participants According to ACC/AHA 2017 Guidelines (N = 315)

Blood Pressure Category (ACC/AHA 2017)	Frequency (n)	Percentage (%)
Normal	140	44.4
Elevated Blood Pressure	41	13.0
Hypertension Stage I	60	19.0
Hypertension Stage II	70	22.2
Hypertensive Crisis	4	1.3
Total	**315**	**100.0**

According to the ACC/AHA 2017 Hypertension Guidelines, 44.4% of participants had normal blood pressure and 55.6% had abnormal blood pressure, ranging from high to hypertension crisis. Elevated blood pressure was found in 13.0% of individuals, while 19.0% and 22.2% were categorized as stage I and stage II hypertension, respectively, with 1.3% experiencing hypertension crisis. Over, all the results show a significant incidence of high blood pressure, emphasizing the importance of early screening and appropriate management techniques.

Table-3: Bivariate and Multivariate Logistic Regression Analysis of Demographic Risk Factors Associated with Hypertension

Socio-demographic Variable	Hypertension n (%)	No Hypertension n (%)	COR (95% CI)	p-value	AOR (95% CI)	p-value
Age Group						
Below 50 years	59 (43.7)	125 (69.4)	Reference	—	0.476 (0.256–0.884)	0.019*
50 years and above	76 (56.3)	55 (30.6)	2.92 (1.84–4.65)	<0.001*	Reference	—
Gender						
Female	81 (60.0)	109 (60.6)	Reference	—	Reference	—
Male	54 (40.0)	71 (39.4)	0.97 (0.61–1.53)	0.894	0.888 (0.305–2.585)	0.828
Marital Status						
Widowed	27 (20.0)	15 (8.3)	Reference	—	Reference	—
Single	7 (5.2)	35 (19.4)	0.15 (0.049–0.452)	0.001*	0.224 (0.050–1.000)	0.050*
Married	97 (71.9)	121 (67.2)	1.02 (0.528–1.980)	0.948	1.147 (0.472–2.784)	0.762
Separated	2 (1.5)	5 (2.8)	0.83 (0.164–4.147)	0.815	0.872 (0.125–6.069)	0.890
Divorced	2 (1.5)	4 (2.2)	0.55 (0.091–3.334)	0.516	1.258 (0.161–9.829)	0.827
Education						
Illiterate	3 (2.2)	1 (0.6)	Reference	—	Reference	—
Primary	56 (41.5)	63 (35.0)	0.30 (0.03–2.93)	0.298	0.222 (0.018–2.784)	0.243
Secondary	26 (19.3)	45 (25.0)	0.19 (0.02–1.95)	0.163	0.249 (0.019–3.297)	0.292
Higher Secondary	20 (14.8)	43 (23.9)	0.16 (0.02–1.59)	0.116	0.231 (0.017–3.190)	0.274
Diploma or Graduation	23 (17.0)	22 (12.2)	0.35 (0.03–3.61)	0.377	0.442 (0.031–6.290)	0.547
Post-Graduation	7 (5.2)	6 (3.3)	0.39 (0.03–4.80)	0.461	0.355 (0.019–6.617)	0.488
Employment Status						

Retired	3 (2.2)	10 (5.6)	Reference	—	Reference	—
Farmer	15 (11.1)	3 (1.7)	16.67 (2.79–99.74)	0.002*	14.545 (2.043–103.547)	0.008*
Government Job	5 (3.7)	7 (3.9)	2.38 (0.42–13.39)	0.325	3.028 (0.431–21.286)	0.266
Private Job	13 (9.6)	25 (13.9)	1.73 (0.41–7.42)	0.458	2.950 (0.557–15.621)	0.203
Own Business	12 (8.9)	18 (10.0)	2.22 (0.51–9.79)	0.291	5.727 (1.072–30.611)	0.041*
Unemployment	13 (9.6)	14 (7.8)	3.10 (0.69–13.80)	0.138	8.527 (1.447–50.247)	0.018*
House wife	73 (54.1)	75 (41.7)	3.24 (0.86–12.27)	0.083	5.841 (0.985–34.647)	0.052
Student	1 (0.7)	28 (15.6)	0.12 (0.01–1.28)	0.079	0.477 (0.033–6.973)	0.589
Type of Family						
Joint	52 (38.5)	47 (26.1)	Reference	—	Reference	—
Single	1 (0.7)	7 (3.9)	0.13 (0.015–1.089)	0.060	0.089 (0.008–0.956)	0.046*
Nuclear	82 (60.7)	126 (70.0)	0.59 (0.363–0.953)	0.031*	0.443 (0.237–0.826)	0.010*
Socioeconomic Class						
Lower Class	19 (14.1)	18 (10.0)	Reference	—	Reference	—
Upper Class	8 (5.9)	3 (1.7)	2.53 (0.58–11.05)	0.218	1.521 (0.273–8.475)	0.632
Upper Middle Class	43 (31.9)	19 (10.6)	2.14 (0.93–4.97)	0.075	2.211 (0.785–6.227)	0.133
Lower Middle Class	52 (38.5)	90 (50.0)	0.55 (0.26–1.14)	0.105	0.495 (0.209–1.171)	0.109
Upper Lower Class	13 (9.6)	50 (27.8)	0.25 (0.10–0.60)	0.002*	0.272 (0.100–0.745)	0.011*

Abbreviations: COR = Crude Odds Ratio; AOR = Adjusted Odds Ratio; CI = Confidence Interval. * Statistically significant at $p < 0.05$.

Age, marital status, work position, family type, and socioeconomic level were found to be substantially correlated with hypertension by bivariate logistic regression analysis. The chances of hypertension were greater in individuals over 50 than in those under 50 (COR=2.92, 95% CI: 1.84-4.65, p<0.001). Compared to retired people, farmers had a higher risk of hypertension (COR=16.67, 95% CI: 2.79-99.74, p=0.002). Compared to those from joint families, those from nuclear families had a decreased risk of hypertension (COR=0.59, 95% CI: 0.36-0.95, p=0.031). In a similar vein, those in the upper lower socioeconomic class had lower risk of hypertension than people in the lower socioeconomic class (COR=0.25, 95% CI:0.10-0.60, p=0.002). Hypertension was not substantially correlated with gender or educational attainment.

After controlling for possible confounders, age, work position, family type, and socioeconomic level were still significant predictors of hypertension. Participants under 50 had a reduced risk of hypertension than those 50 and older (AOR=0.476, 95% CI: 0.256-0.884, p=0.019). Farmers (AOR=14.545, 95% CI: 2.043-103.547, p=0.008), self-employed individuals (AOR=5.727, 95% CI: 1.072-30.611, p=0.046), and jobless people (AOR=8.527, 95% CI 1.447-50.247, p=0.018) had considerably greater risks of hypertension. Participants from single (ARO=0.089, 95% CI: 0.008-0.956, p=0.046) and nuclear households (AOR=0.443, 95% CI: 0.237-0.826, p=0.010). showed decreased chances of hypertension compared to joint families. Furthermore, individuals in upper lower socioeconomic class had a reduced risk of hypertension than those in lower socioeconomic class (AOR=0.272, 95% CI: 0.100-O.745, p=0.011).

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Table-4: Bivariate and Multivariate Logistic Regression Analysis of Clinical Risk Factors Associated with Hypertension

Clinical Variables	Hypertension n (%)	No Hypertension n (%)	COR (95% CI)	p-value	AOR (95% CI)	p-value
Family History of Hypertension						
No	29 (21.5)	100 (55.6)	Reference	—	Reference	—
Yes	106 (78.5)	80 (44.4)	4.57 (2.76–7.57)	<0.001*	4.25 (2.36–7.67)	<0.001*
History of Diabetes						
No	60 (44.4)	154 (85.6)	Reference	—	Reference	—
Yes	75 (55.6)	26 (14.4)	7.40 (4.33–12.66)	<0.001*	6.48 (3.41–12.30)	<0.001*
History of Dyslipidaemia						
No	100 (74.1)	166 (92.2)	Reference	—	Reference	—
Yes	35 (25.9)	14 (7.8)	4.15 (2.12–8.12)	<0.001*	1.41 (0.62–3.19)	0.407
History of Kidney Disease						
No	111 (82.2)	172 (95.6)	Reference	—	Reference	—
Yes	24 (17.8)	8 (4.4)	4.65 (2.02–10.69)	<0.001*	2.66 (1.01–7.02)	0.047*
History of Thyroid Disorders						
No	122 (90.4)	177 (98.3)	Reference	—	Reference	—
Yes	13 (9.6)	3 (1.7)	6.29 (1.74–22.73)	0.005*	7.26 (1.74–30.36)	0.007*
Health Insurance						
No	131 (97.0)	147 (81.7)	Reference	—	Reference	—
Yes	4 (3.0)	33 (18.3)	0.14 (0.05–0.40)	<0.001*	0.14 (0.04–0.46)	0.001*

Abbreviations: COR = Crude Odds Ratio; AOR = Adjusted Odds Ratio; CI = Confidence Interval. * Statistically significant at $p < 0.05$.

Family history of hypertension, diabetes mellitus, dyslipidaemia, renal illness, thyroid problems, and health insurance status were all substantially linked with hypertension, according to bivariate logistic regression analysis. Participants with a family history of hypertension (COR=4.57, 95% CL: 2.76-7.57, p<0.001), diabetes mellitus (COR= 7.40, 95% CI: 4.33-12.66, p<0.001), dyslipidaemia (COR=4.15, 95% CI: 2.12-8.12, p<0.001), kidney disease (COR=4.65, 95% CI: 2.02-10.69, p<0.001), and thyroid disorders (COR=6.29, 95% CI: 1.74-22.73, p=0.005) had significantly higher odds of hypertension. Those having health insurance had a considerably decreased risk of hypertension (COR=0.14, 95% CI: 0.005-0.40, p<0.001).

After accounting for possible confounders, family history of hypertension, diabetes, renal illness, thyroid diseases, and health insurance status remained significant predictors of hypertension. Participants with a family history of hypertension (AOR=4.25, 95% CI: 2.36-7.67, p<0.001), diabetes mellitus (AOR=6.48, 95% CI:3.41-12.30, p<0.001), kidney disease (AOR=2.66, 95% CI: 1.01-7.02, p=0.047), and thyroid disorders (AOR=7.26, 95% CI: 1.74-30.36, p=0.007) had higher odds of hypertension. In contrast, persons with health insurance had substantially decreased chances of hypertension (AOR=0.14, 95% CI:0.04-0.46, p=0.001). Following correction, dyslipidaemia had no significant association with hypertension (AOR=1.41, 95% CI:0.62-3.19, p=0.407).

Table-5: Bivariate and Multivariate Logistic Regression Analysis of Behavioural Risk Factors Associated with Hypertension

Behavioral Variables	Hypertension n (%)	No Hypertension n (%)	COR (95% CI)	p-value	AOR (95% CI)	p-value

Tobacco Use						
No	65 (48.1)	161 (89.4)	Reference	—	Reference	—
Yes	70 (51.9)	19 (10.6)	9.13 (5.19–16.05)	<0.001*	1.71 (0.60–4.88)	0.319
Alcohol Consumption						
No	95 (70.4)	179 (99.4)	Reference	—	Reference	—
Yes	40 (29.6)	1 (0.6)	75.37 (10.17–558.46)	<0.001*	244.16 (22.68–2628.31)	<0.001*
Physical Activity Level						
Active	29 (21.5)	81 (45.0)	Reference	—	Reference	—
Sedentary	92 (68.1)	59 (32.8)	9.42 (5.38–16.49)	<0.001*	5.67 (2.06–15.59)	0.001*
Moderate	14 (10.4)	40 (22.2)	0.60 (0.26–1.35)	0.271	0.36 (0.08–1.57)	0.173
Eating Habits						
Mixed Diet	22 (16.3)	65 (36.1)	Reference	—	Reference	—
High salt/fat/spicy diet	90 (66.7)	28 (15.6)	5.97 (3.41–10.45)	<0.001*	4.10 (1.40–11.97)	0.010*
Balanced and low-salt diet	23 (17.0)	87 (48.3)	0.56 (0.29–1.06)	0.077	0.74 (0.24–2.24)	0.592
Stress Reducing Practices						
Never	42 (31.1)	20 (11.1)	Reference	—	Reference	—
Regularly	5 (3.7)	19 (10.6)	0.21 (0.07–0.56)	0.002*	0.44 (0.08–2.56)	0.360
Sometimes	88 (65.2)	141 (78.3)	0.23 (0.13–0.43)	<0.001*	0.16 (0.05–0.48)	0.001*
Sleep Duration						
More than 8 hours	19 (14.1)	54 (30.0)	Reference	—	Reference	—
Less than 6 hours	72 (53.3)	11 (6.1)	6.61 (3.16–13.84)	<0.001*	6.18 (1.89–20.23)	0.003*
6–8 hours	44 (32.6)	115 (63.9)	0.61 (0.34–1.12)	0.103	0.27 (0.09–0.85)	0.024*
Water Intake						
More than 2 liters	24 (17.8)	87 (48.3)	Reference	—	Reference	—
Less than 1 liter	77 (57.0)	16 (8.9)	10.47 (5.54–19.78)	<0.001*	3.39 (1.02–11.22)	0.046*
1–2 liters	34 (25.2)	77 (42.8)	1.94 (1.08–3.48)	0.028*	2.13 (0.74–6.15)	0.164
Screen Time						
Less than 3 hours/day	39 (28.9)	101 (56.1)	Reference	—	Reference	—
More than 6 hours/day	21 (15.6)	3 (1.7)	5.18 (2.05–13.08)	<0.001*	8.72 (1.58–48.08)	0.013*

3–6 hours/day	75 (55.6)	76 (42.2)	2.92 (1.79–4.76)	<0.001*	2.09 (0.87–5.07)	0.102
Meal Timing						
Regular and Timely	40 (29.6)	65 (36.1)	Reference	—	Reference	—
Irregular	69 (51.1)	55 (30.6)	2.04 (1.20–3.45)	0.008*	0.40 (0.13–1.18)	0.095
Somewhat Regular	26 (19.3)	60 (33.3)	0.70 (0.38–1.29)	0.256	0.30 (0.10–0.90)	0.031*

Abbreviations: COR = Crude Odds Ratio; AOR = Adjusted Odds Ratio; CI = Confidence Interval. * Statistically significant at $p < 0.05$.

Numerous behavioural characteristics were shown to be substantially linked to hypertension using bivariate logistic regression analysis such as tobacco users (COR=9.13, 95% CL:5.19-16.05, p=0.001), drinkers (COR=75.37, 95% CI:10.17-558.46, p<0.001), sedentary people (COR=9.42, 95% CI:5.38-16.49, p<0.001), and people who slept less than six hours of sleep per day (COR=6.61, 95% CI: 3.16-13.84, p<0.001), less than 1 liter of water per day (COR=10.47, 95% CI: 5.54-19.78, p<0.001), and more than 6 hours of screen time per day (COR=5.18, 95% CI: 2.05-13.08, p<0.001).

Following adjustment, alcohol consumption (AOR=244.16, 95% CI: 22.68-2628.31, p<0.001), sedentary lifestyle (AOR=5.67, 95% CI: 2.06-15.59, p=0.001), high salt, fat, and spicy diet (AOR=4.10, 95% CI: 1.40-11.97, p=0.010), sleep duration of less than six hours (AOR=6.18, 95% CI: 1.89-20.23, p=0.003), and water intake of less than one liter per day (AOR=3.39, 95% CI: 95% CI: 1.02-11.22, p=0.0). On the other hand, individuals who slept 6-8 hours a day (AOR=0.27 95% CI: 0.09-0.85, p=0.024), occasionally engaged in stress-reduction activities (AOR=0.16, 95% CI: 0.05-0.48, p=0.001), and adhered to somewhat regular meal timings (AOR=0.30, 95% CI: 0.10-0.90, p=0.031) had significantly lower odds of developing hypertension.

Table-6: Bivariate and Multivariate Logistic Regression Analysis of Anthropometric Risk Factors Associated with Hypertension

Anthropometric Variable	Hypertension n (%)	No Hypertension n (%)	COR (95% CI)	p-value	AOR (95% CI)	p-value
BMI Category						
Obese Class III (Morbid Obesity)	1 (0.7)	1 (0.6)	Reference	—	Reference	—
Obese Class II (Severe)	9 (6.7)	6 (3.3)	1.50 (0.08–28.89)	0.788	3.20 (0.16–64.63)	0.448
Obese Class I (Moderate)	12 (8.9)	7 (3.9)	1.71 (0.09–31.92)	0.718	2.58 (0.14–49.23)	0.528
Overweight (Pre-obese)	56 (41.5)	28 (15.6)	2.00 (0.12–33.18)	0.629	4.36 (0.25–75.02)	0.310
Normal Weight	52 (38.5)	117 (65.0)	0.44 (0.03–7.24)	0.569	1.19 (0.07–20.16)	0.905
Underweight	5 (3.7)	21 (11.7)	0.24 (0.01–4.50)	0.338	0.81 (0.04–16.15)	0.889
Waist–Hip Ratio (WHR)						
High Risk	54 (40.0)	25 (13.9)	Reference	—	Reference	—
Moderate Risk	47 (34.8)	50 (27.8)	0.44 (0.23–0.81)	0.008*	0.50 (0.26–0.97)	0.040*

Low Risk	34 (25.2)	105 (58.3)	0.15 (0.08–0.28)	<0.001*	0.20 (0.10–0.39)	<0.001*

Abbreviations: COR = Crude Odds Ratio; AOR = Adjusted Odds Ratio; CI = Confidence Interval. * Statistically significant at $p < 0.05$.

The waist-hip ratio was substantially linked to hypertension, according to bivariate logistic regression analysis. The probabilities of hypertension were considerably lower in those with moderate risk WHR (COR=0.44, 95% CI: 0.23-0.81, p=0.008) and low-risk WHR (COR=0.15, 95% CI:0.08-0.28, p<0.001) than in those with high-risk WHR. These was no significant correlation found between BMI categories and hypertension.
The waist-hip ratio continued to be a significant predictors of hypertension even after controlling for relevant variables. The probabilities of hypertension were considerably lower in those for relevant variables. The probabilities of hypertension were considerably lower in those with moderate-risk WHR (AOR=0.50, 95% CI: 0.26-0.97, p=0.040) and low-risk WHR (AOR=0.20, 95% CI: 0.10-0.39, p<0.001) than in those with high risk WHR. There was no independent correlation found between BMI and hypertension.

DISCUSSION

The current study found a significant prevalence of hypertension among the adults living in selected rural areas of Anand district, Gujarat, indicating its growing public health importance in the community. A large proportion of the study population had abnormal blood pressure readings, indicating a high prevalence of elevated and uncontrolled blood pressure. The study identified numerous determinants of hypertension, including socioeconomic status, clinical factors such as comorbid conditions, behavioural factors such as unhealthy dietary habits, physical inactivity, inadequate stress management, and related lifestyle practices, and anthropometric measures, particularly general and central obesity. Overall, the findings emphasized the multifactorial etiology of hypertension and its growing prevalence among rural adults.
The current study's findings suggest a greater prevalence of hypertension when compared to national rural estimates and NFHS-5 data. Rural Indian data show 44.9% normal blood pressure, 38%pre hypertension, and 17.1% hypertension. In comparison, the current study had a higher proportion of people with high blood pressure, indicating that the study population is becoming more hypertensive. Overall, the findings highlights hypertension as growing public health problems in rural areas, comparable with national trends (13).
The current study indicates a greater prevalence of hypertension than rural Gujarat estimates, where 57% have normal blood pressure, 33.8% are pre hypertensive, and just 3.2% are hypertensive. In contrast the current study found a higher proportion of people with high blood pressure, indicating an increasing hypertension burden in the studied group. This shows a change toward increased cardiovascular risk in the current research region, emphasizing the importance of early screening and prevention programs in rural population (14).
The current study found a higher prevalence of hypertension than the rural estimates from Anand district, Gujarat, where 16.6% of adults had midly elevated blood pressure, 6.9% had moderately or severely elevated blood pressure, and 26.9% had elevated blood pressure. In contrast, the current study found higher number of individuals with abnormal blood pressure values, indicating that hypertension is more prevalent in the study group (15).

CONCLUSION

The current study found a significant burden of hypertension among adults in selected rural regions of Anand district, Gujarat, with a high proportion having abnormal blood pressure readings. Several socio-demographic, clinical, behavioural and anthropometric characteristics were found as important predictors of hypertension. The findings underline the need of frequent community-based screening, early diagnosis of high risk individuals, and promotion of healthy lifestyle choices in primary care setting. Strengthening preventive and treatment strategies may help reduce the burden of hypertension and its associated cardiovascular effects, but additional long term studies are needed to follow changes and evaluate intervention effectiveness.

Disclosure of interest

The authors affirm that they have no conflicts of interest in this work.

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