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Exploring Hypertension and Its Risk Factors Across Different Age Groups: Evidence from a Community-Based Study in Rampur Bushahr, Himachal Pradesh

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Abstract

Hypertension is an escalating global public health issue, contributing significantly to morbidity and mortality. Identifying associated risk factors is essential for effective prevention and control. This study aimed to assess the prevalence of hypertension and examine its association with socio demographic characteristics, lifestyle factors, and body mass index (BMI) across young, middle-aged, and older adults. A cross-sectional study was conducted among 315 participants. Blood pressure was measured, and data on age, gender, BMI, physical activity, family history, and other lifestyle habits were collected through structured questionnaires. The overall prevalence of hypertension was 45.71%. Multivariate analysis revealed that age, male gender, higher BMI, physical inactivity, and family history of hypertension were significantly associated with elevated blood pressure levels. The study underscores the importance of addressing modifiable lifestyle factors to curb the rising burden of hypertension. Targeted interventions, especially for high-risk groups, are essential for effective hypertension prevention and management.

Keywords: Hypertension, Lifestyle, Socioeconomic status, BMI, Rampur Bushahr

Introduction

Hypertension, or high blood pressure, is a major global health issue affecting over 1.13 billion people, particularly in low and middle-income countries. It is defined by a persistent elevation in arterial pressure, with systolic pressure (when the heart contracts) and diastolic pressure (when the heart rests) used for diagnosis. Often termed a "silent killer," hypertension typically shows no symptoms until serious complications like stroke, heart failure, or kidney disease occur.

Classification varies by organization. The American Heart Association (AHA) defines stage 1 hypertension as 130–139/80–89 mmHg, while the WHO defines it as ≥140/90 mmHg. The European system includes isolated systolic hypertension and further grades. Accurate diagnosis requires regular monitoring by healthcare professionals.

Body Mass Index (BMI), a widely used tool to assess body weight, is strongly associated with hypertension risk. Although useful, BMI does not account for fat distribution or muscle mass. The WHO has proposed lower BMI thresholds for Asian populations due to increased risk at lower values.

Socioeconomic factors such as income, education, and occupation also influence hypertension prevalence. Lower SES is often linked to poor healthcare access, unhealthy diets, and higher stress. NFHS-5 data revealed rising hypertension in India, with men showing a higher prevalence than women. In Himachal Pradesh, both rural and urban areas showed significant cases, especially among men.

This study aims to assess hypertension prevalence among individuals aged 18 and above in Rampur Bushahr, Shimla (especially in G.B. Pant Memorial College), exploring its associations with BMI and sociodemographic factors. By understanding these local trends and risk factors, the research seeks to contribute to improved hypertension control and prevention strategies in the region.

Literature Review

Globally, about 31.1% of adults aged ≥20 had hypertension in 2010, with higher rates in low- and middle-income countries (Mills et al., 2016). In the U.S., hypertension prevalence rises with age—from 22.4% in adults aged 18–39 to 74.5% in those ≥60 (Ostchega et al., 2020). In children and adolescents, the global prevalence is 4%, but higher (up to 15%) in overweight and obese youth (Song et al., 2019).

In India, hypertension prevalence varies by criteria: 40.6% using ACC/AHA (130/80 mmHg) and 13.0% with JNC7 (140/90 mmHg) (Abariga et al., 2020). NFHS-5 (2019–21) reported 21% of women and 24% of men aged ≥15 had hypertension. Prevalence rises with age and is higher in men. Among young adults, 11.2% had hypertension, and 33.3% had prehypertension (Geevar et al., 2022). Himachal Pradesh reports adult hypertension prevalence from 31.1% to 38%, higher in males (Katoch et al., 2020; Bhardwaj et al., 2010).

BMI is a major risk factor. Globally, higher BMI increases hypertension risk, even in the normal to mildly overweight range (Gelber et al., 2007). In India, obesity increases hypertension risk by 2.8–3.3 times (Gupta et al., 2025). Lower BMI thresholds (≥24.5 kg/m² for men) predict hypertension in North India (Midha et al., 2014).

Socioeconomic status, education, and occupation influence hypertension. In India, higher wealth and male education levels are linked to increased prevalence (Sun et al., 2022). Risk factors like high salt intake, smoking, alcohol, sedentary lifestyle, and stress significantly affect young populations (Singh et al., 2017; Meher et al., 2023). Regional differences and urban-rural gaps persist, with rising trends across age groups.

Aim: To assess the prevalence of hypertension across age groups and its association with BMI and socio-demographic factors.

Objectives:

- To estimate hypertension prevalence across defined age groups (18–25, 26–33, 34–41, >41 years).
- To analyze systolic and diastolic BP distribution within each age group.
- To examine the association between BMI and hypertension.
- To evaluate the relationship between socio-demographic factors and hypertension.
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Methodology

StudyArea

This study was conducted in Rampur Bushahr, a municipal town in Shimla district of Himachal Pradesh,

located on the left bank of the Satluj River, approximately 130 km from Shimla. G.B. Pant Memorial Government College, Rampur Bushahr, served as the primary location for participant recruitment and data collection.

StudyDesign

A **cross-sectional survey** was conducted to estimate the prevalence of hypertension and its association with Body Mass Index (BMI) and socio-demographic factors in the study population.

Tools Used

- **Instruments**: Omron Digital Blood Pressure Monitor, Libra weighing machine, measuring tape.
- **Data Collection**: Structured questionnaire and interview schedule.

Questionnaire

A structured, comprehensive questionnaire was designed to gather information across the following domains:

- **Demographics**: Age, gender, education, occupation, academic background, and household income.
- **Awareness**: Understanding of blood pressure, symptoms, health implications, and prevention.
- **Risk Factors**: Family history, dietary habits, physical activity, smoking/alcohol use, and stress.
- **Diagnosis & Treatment**: History of hypertension diagnosis, medication usage, and frequency of BP monitoring.
- **Lifestyle & Management**: Lifestyle modifications, challenges faced, and health information-seeking behavior.

The questionnaire was administered online via Google Forms, ensuring voluntary participation and confidentiality. On average, the survey took 10–15 minutes to complete.

Inclusion Criteria

- Individuals aged 18 years and above.
- Willing participants providing informed consent.
- Residents or students of Rampur Bushahr.

Exclusion Criteria

- Individuals with known serious illnesses or psychiatric conditions.
- Pregnant women.

Ethical consideration: Participant's privacy and confidentiality were maintained throughout the study and participation was voluntary and no personal identifies were collected.

Results and Discussion

Figure 1 shows that out of a total of 315 participants, 141 (44.76%) were found to have hypertension, while 174 (55.24%) did not have hypertension.

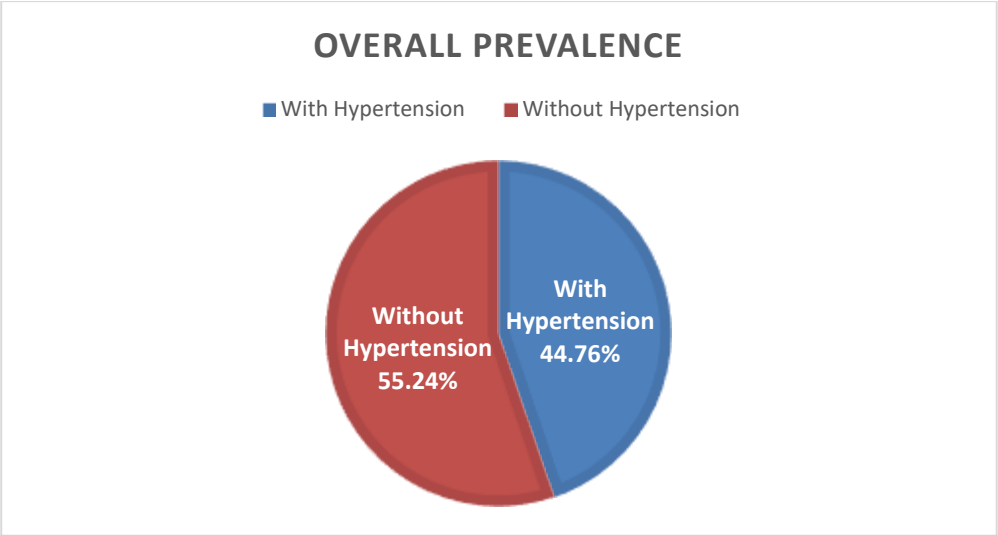

Figure 1 Overall prevalence of hypertension in the study population

Table 1: Age specific prevalence of hypertension across predefined age group

Age group	Number of participants in age group	Number with hypertension in age group	Number without hypertension in age group
18-25	179	57 (31.84%)	122 (68.15%)
26-33	34	19 (35.89%)	15 (44.11%)
34-41	33	16 (48.49%)	17 (51.51%)
Above 41	69	49 (71.01%)	20 (28.99%)
Total	315	141	174

Table 1 depicts a total of 315 responses of respondents regarding prevalence of hypertension in different age groups. These have been taken into consideration as the sample size, although the study is focused on the targeted age group of 18-25, especially the students at the college. Yet, the age groups 26-33, 34-41, and above 41 are also considered for their responses. The highest proportion belonged to the 18-25 age group, with 31.84% found hypertensive. This finding suggests that younger adults aged 18-25 are not facing an issue of hypertension and are at a lower risk for hypertension. In the 26–33 age group, hypertension slightly increased to 35.89%, likely due to the onset of lifestyle changes and stress. A more notable rise was seen in the 34–41 group, where 48.49% were hypertensive, suggesting this period as a critical threshold for hypertension development. The near-equal distribution shows that this age bracket may represent a pivotal point where lifestyle modifications could significantly alter future risk. The prevalence peaked in participants above 41 years, where 71.01% participants were found hypertensive (highest among all age groups). This progression strongly indicates that the risk of hypertension increases with age hence underlining the importance of early intervention, lifestyle modifications, and regular health monitoring to manage and prevent hypertension effectively. Comparable results were

observed in research conducted by Ostchega *et al.* (2020), Abriga *et al.* (2020), Geevar *et al.* (2022), NFHS-5 data, and Seenappa *et al.* (2024).

Figure 2 highlights data on average systolic and diastolic blood pressure, pulse and body mass index (BMI) across different age groups of participants. Individuals aged 18–25 (largest group), exhibited the lowest average systolic (116.25 mmHg) and diastolic (75.60 mmHg) pressures, the highest pulse rate (83.45 bpm), and the lowest BMI (20.28), indicating a healthier cardiovascular profile. In the 26–33 and 34–41 age groups, blood pressure and BMI progressively increased, while pulse rate slightly declined, with BMI values (23.43 and 25.45, respectively) suggesting a shift toward overweight status. Participants above 41 years showed the highest average blood pressure (131.04/84.57 mmHg) and BMI (26.62), alongside the lowest pulse rate (80.40 bpm), reflecting a higher risk of cardiovascular complications. Overall, the findings emphasize that both blood pressure and BMI tend to rise with age. Supported by similar observations of Gelber *et al.* (2007), Visaria *et al.* (2020), Talwar *et al.* (2020), Shihab *et al.* (2022), Chen *et al.* (2025) and Gupta *et al.* (2025).

Figure 2: Distribution of average systolic and diastolic blood pressure levels

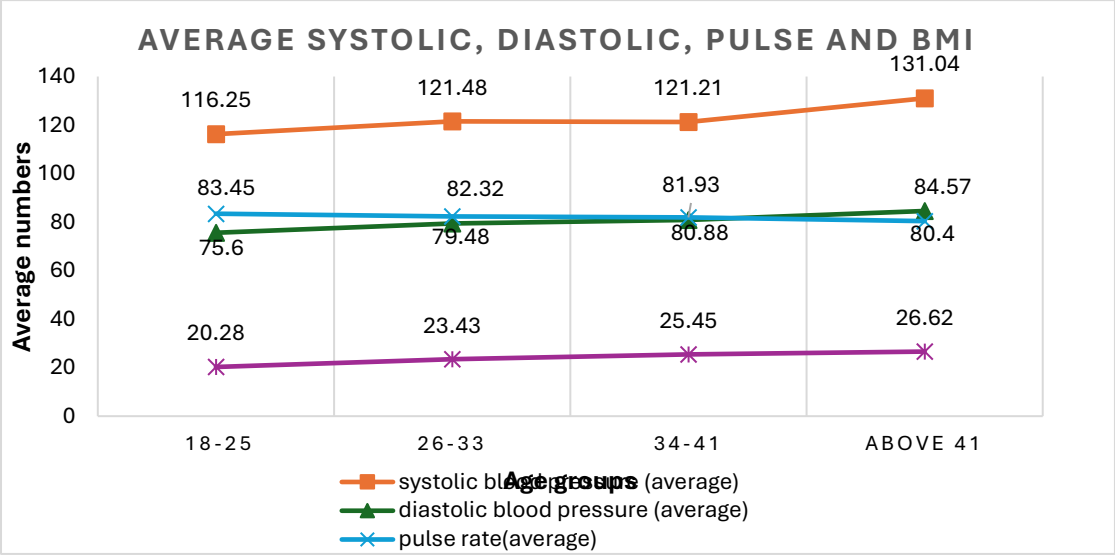

Table 2: Prevalence of different BMI category in overall study population

BMI category	Number of participants	Percentage (%)
Underweight <18.50	57	18.10%
Normal 18.50-24.99	171	54.29%
Overweight 25.00-29.99	68	21.58%
Obese ≥30	19	6.03%
Total	315	100%

Table 2 indicates the distribution of participants across four BMI categories based on total sample size of 315 individuals. Out of 315 participants, 54.29% have a normal BMI, 18.10% are underweight, 21.58% are overweight, and 6.03% are obese. While the majority maintain a healthy weight, over one-fourth fall into overweight or obese categories, indicating a potential risk for lifestyle-related health issues.

Figure 3: Association between BMI categories and the prevalence of hypertension in overall study population

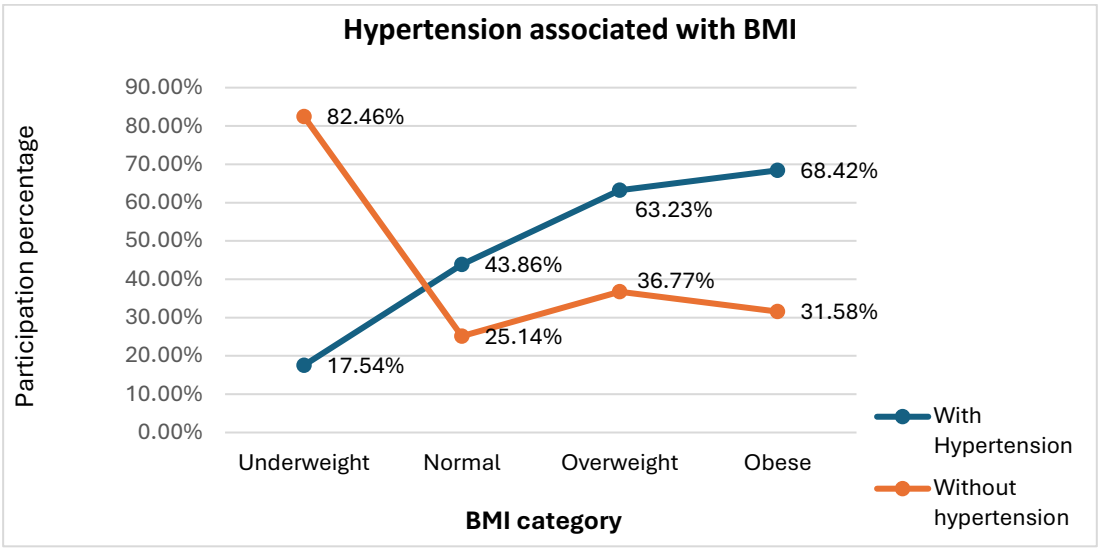

Figure 3 provides detailed analysis of the relationship between body mass index (BMI) categories and hypertension status among 315 participants. The BMI categories considered are underweight, normal, overweight, and obese, with the number of participants in each group recorded alongside their hypertension status.

Among 315 participants, 141 (44.77%) were hypertensive. The lowest prevalence was in the underweight group (17.54%), followed by the normal BMI group with 43.86% hypertensive individuals. A significant increase was noted in the overweight group (63.23%) and peaked in the obese group, where 68.42% had hypertension. This indicates a clear positive correlation between BMI and hypertension prevalence that rises progressively from underweight to obese individuals. The data strongly suggests that higher BMI is associated with increased risk of hypertension. Overweight and obese individuals are significantly more prone to hypertension, highlighting the urgent need for weight management as a preventive measure against cardiovascular risk. Related studies conducted by Gelber *et al.* 2007, Landi *et al.* 2018, Visaria *et al.* 2020, Talwar *et al.* 2020, Kaur *et al.* 2023 and Gupta *et al.* 2025 and are in alignment with the present study.

Table 3: Socio-demographic association with hypertension

Socio-demographic parameter	Category	Number of participants with hypertension	Number of participants without hypertension	Total number of participants
Age	18-25	57 (31.84%)	122 (68.16%)	179
	26-33	19 (55.89%)	15 (44.11%)	34
	34-41	16 (48.49%)	17 (51.51%)	33
	>41	49 (71.01%)	20 (28.99%)	69
Sex	Male	95 (57.92%)	69 (42.08%)	164
	Female	46 (30.47%)	105 (69.53%)	151
Education	No formal education	10 (66.67%)	5 (33.33%)	15
	Matriculate	16 (69.57%)	7 (30.43%)	23
	Higher sec. School	20 (44.44%)	25 (55.56%)	45
	Bachelor's	62 (40%)	93 (60%)	155
	Master's	24 (39.34%)	37 (60.66%)	61
	Higher education	9 (56.25%)	7 (43.75%)	16
Occupation	Employed	46 (60.52%)	30 (39.48%)	76
	Students	57 (32.58%)	118 (67.42%)	175
	Unemployed	15 (51.72%)	14 (48.28%)	29
	Homemaker	23 (65.71%)	12 (34.29%)	35
Income	<10	8 (34.79%)	15 (65.21%)	23
	10k-30k	43 (46.73%)	46 (53.27%)	92
	30k-50k	37 (38.94%)	58 (61.06%)	95
	50k-75k	22 (46.80%)	25 (53.02%)	47
	75k-1lakh	21 (52.27%)	17 (44.73%)	38
	>1 lakh	10 (50%)	10 (50%)	20

The data presented in Table 3 highlights the socio-demographic association with hypertension across various factors such as age, sex, education, occupation, and income. Hypertension prevalence shows a clear increasing trend with age. Among participants aged 18–25 years, 31.84% were hypertensive, which steadily rises to 71.01% in individuals over 41 years, indicating age as a significant risk factor.

Males (57.92%) exhibit a higher prevalence of hypertension as compared to females (30.47%). Males tend to have a higher prevalence of hypertension due to lifestyle and behavioural factors such as smoking/tobacco, alcohol consumption, and endocrinological/physiological differences, perhaps as supported by previous research of Bhardwaj *et al.* (2010), Mills *et al.* (2016); Ostchega *et al.* (2020); Sushma *et al.* (2025 and NFHS-5 data.

Education level has been shown to have a significant impact on hypertension prevalence. Participants with no formal education and matriculation exhibit highest rates of hypertension,66.67% and 69.57%, respectively. As most of the individuals in this study with lower education levels were in the age group above 41, indicates that the higher prevalence of hypertension among them may not only be influenced by educational background but also by age-related risk factors. However, a strong correlation between lower educational attainment and increased risk of hypertension are also observed. For instance,

participants with bachelor's degree show a notably lower prevalence at 40% and those with a master's degree are even slightly lower at 39.34%. Interestingly, the trend reversed slightly among individuals with the highest education level, where the prevalence of hypertension rose again to 56.25%. This creates a U-shaped trend, suggesting that while education generally lowers the risk of hypertension, extremely high educational attainment may be associated with increased stress levels or a more sedentary lifestyle, potentially contributing to elevated blood pressure. Studies by Ostchega *et al.* (2020), K. Sun *et al.* (2022) and Y. Li *et al.* (2024) indicates the similar trends.

In various occupational categories, homemakers exhibit the highest rate of hypertension (65.71%). Most female homemakers in the study fall under the age group above 41, which contributes to their higher prevalence of hypertension and because 85.71% are overweight and 77.78% are obese, as per data [Table 8.4], which implies that obesity and excess weight somewhere are important contributors. However, it is also evident that other factors beyond BMI influence age group 41, as even those with normal BMI have a higher rate of hypertension. Domestic stress and lack of physical activity are shown in the individuals above 41 years of age, 69.77% of whom lack physical activity and were found to have hypertension. Employed individuals also exhibit a high rate of hypertension (60.52%) likely influenced not only by work-related stress but also due to their weight as most of them were overweight and obese. Unemployed individuals follow with a hypertension rate of 51.72% due to psychological and financial stress. Perhaps on the other hand, students have the lowest prevalence (32.58%) likely due to young age and more active lifestyles. This suggests that stress levels and lifestyles associated with different occupations play a significant role in the risk of developing hypertension. These results are supported by the work of Landsbergis *et al.* (2015) and C. Abasilim *et al.* (2025).

The relationship between income and hypertension does not follow a simple linear pattern. The highest prevalence of hypertension is found in individuals earning between ₹ 75,000 and 1 lakh per month (52.27%), and the lowest income group (<10K) show a relatively low rate of hypertension (34.79%). Previous studies by A.G. Thrift (2014), S.A. Abariga *et al.* (2020), and R.S. Ragavan *et al.* (2020) in India have reported similar outcomes. Even the highest income group, more than 1 lakh, also has the highest prevalence, 50%. This shows that being in the higher income bracket can result in the higher prevalence ofhypertension.

Table 4: Distribution of hypertension based on age groups and family history

Age group	Family history	Number of participants with hypertension	Number of participants without hypertension	Total number of participants
18-25	Yes	21 (34.42%)	40 (65.58%)	61
	No	35 (30.43%)	80 (69.57%)	115
	Don't know	1 (33.33%)	2 (66.67%)	3

26-33	Yes No Don't know	12 (70.59%) 7 (41.18%) 0	5 (29.41%) 10 (58.82%) 0	17 17 0
34-41	Yes No Don't know	5 (50%) 11 (47.82%) 0	5 (50%) 12 (52.18%) 0	10 23 0
>41	Yes No Don't know	17 (68%) 32 (72.72%) 0	8 (32%) 12 (27.28%) 0	25 44 0

Table 4 presents the distribution of hypertension based on age groups and family history. In the 18–25 age group, 34.42% of those with a family history had hypertension, slightly higher than the 30.43% without a family history. In the 26–33 group, hypertension was substantially higher among those with a family history (70.59%) compared to those without (41.18%). In the 34–41 group, rates were comparable—50% with a family history and 47.82% without. In the >41 group, hypertension was prevalent regardless of family history—68% with and 72.72% without. In all studied age groups, the participants with a family history of hypertension had a high prevalence of hypertension as compared to the participants without a family history. Here, genetic predisposition begins to exert a stronger influence during the stage of adulthood, as hypertension prevalence among those with a family history is higher compared to those without. However, at the age of 41 and above, the related impact of family history slightly diminishes and their lifestyle choices become more dominant, which influence blood pressure regardless of genetic background as documented by Ranasinghe *et al.* (2015)

Figure 4 presents the distribution of hypertension based on age groups and dietary habits. Surprisingly in the 18–25 group, hypertension was lowest in those with unhealthy diets (22.72%) and highest in moderately healthy diets (36.37%). In the 26–33 group, hypertension was higher regardless of diet (60% in healthy and 57.14% in moderately healthy diets). In the 34–41 group, rates were similar across diet types (40% in healthy and 48.14% in moderately healthy diets). In the >41 group, hypertension was consistently high (over 70% in both healthy (72.72%) and moderately healthy (71.73%) diets). Though dietary habits influence hypertension risk, but the result of our study show that hypertension increases with age, regardless of dietary habits. While healthier diets appear to reduce the risk of hypertension, but as individuals grew older, especially beyond 41, the risk of hypertension increased markedly, even with healthy dietary habits, highlighting the need for comprehensive lifestyle and medical strategies to manage blood pressure effectively. Comparable outcomes by Wang *et al.* 2022 emphasized the important role of optimal diet combination in the prevention of hypertension. Corresponding conclusions were made by Singh *et al.* 2017, Rhee *et al.* 2020, Wang *et al.* 2022; Meher *et al.* 2023.

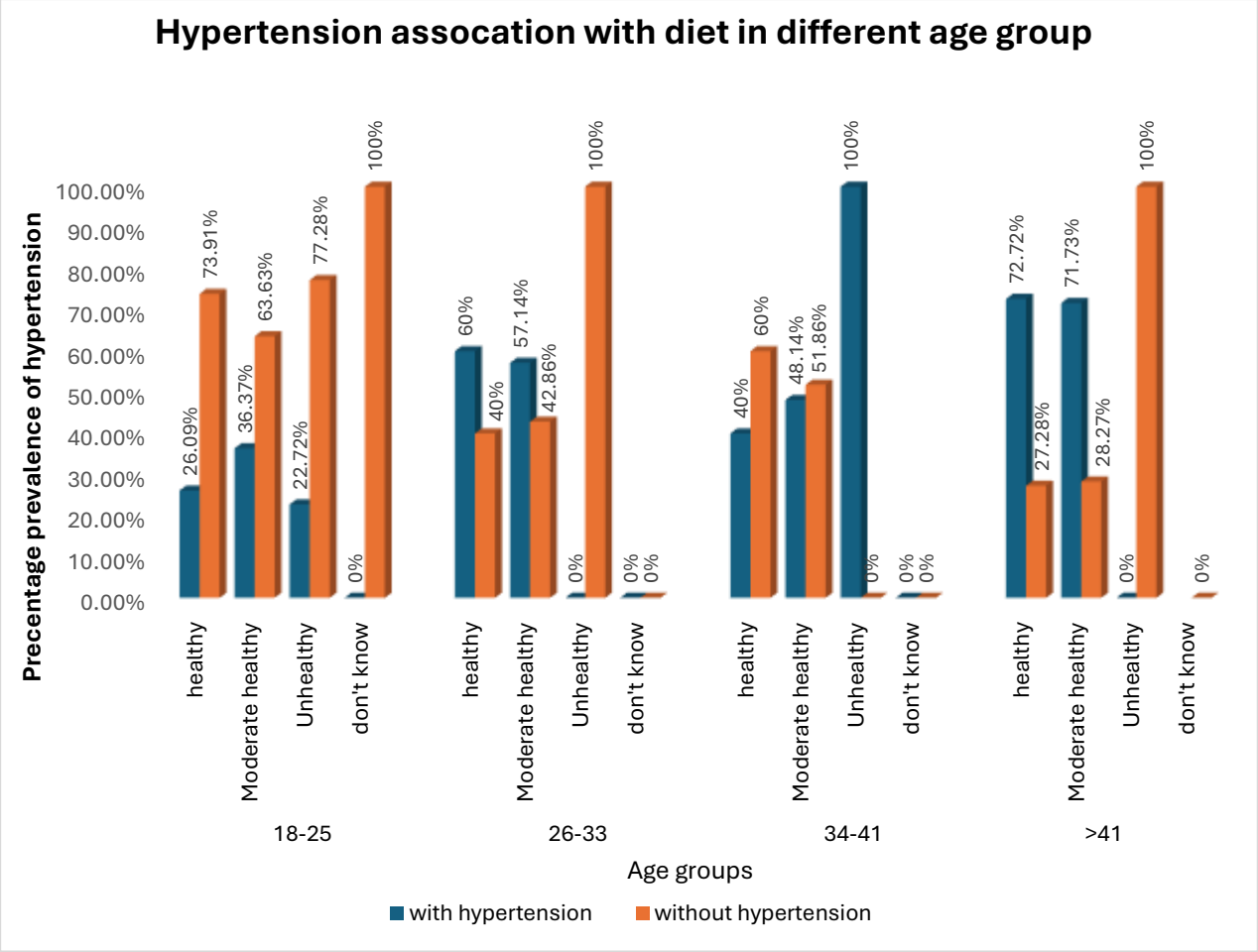

Figure 4: Distribution of hypertension based on age groups and dietary habits

As shown in the Figure 5, the distribution of hypertension across various age groups is in relation to smoking and tobacco consumption habits. Smoking/tobacco use is strongly associated with hypertension, In the 18–25 age group, hypertension is considerably higher among former smokers (71.42%), regular smokers (54.54%), and occasional smokers (53.84%) compared to never users (26.36%). The 26-33 and 34-41 age groups followed a similar trend where half of the never users, 54.54% and 48.28%, respectively, were hypertensive because of lifestyle and genetic factors. In older individuals (above 41), the rate of hypertension remains high across all categories, including non-smokers (71.70%), indicating that age and BMI become more dominant factors in determining the hypertension risk. Studies by Singh *et al.* 2017 and Meher et al., 2023 revealed that smokers, including those using various tobacco products, were more likely to have hypertension as compared to non-smokers. Our results are in alignment with their findings.

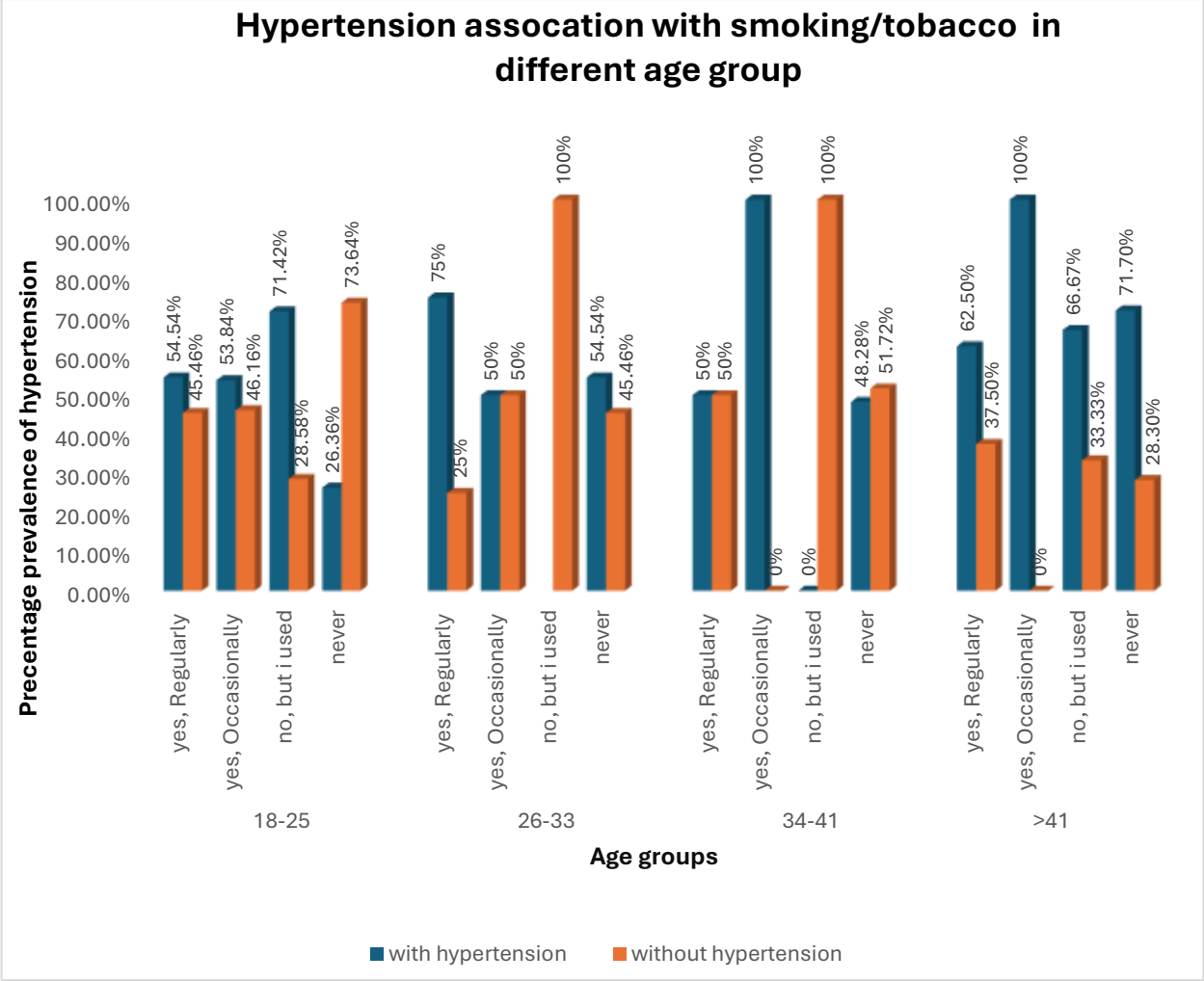

Figure 5: Distribution of hypertension based on age groups and smoking/tobacco consumption habit.

Figure 6 illustrates alcohol consumption correlation with hypertension. In the 18–25 group, non-drinkers had the lowest hypertension rate (25.18%), while quitters and occasional drinkers showed higher rates (71.42% and 56.67%, respectively). In the age group 26-33, hypertension was alarmingly high among regular drinkers (100%) and occasional drinkers (68.75%), while only 33.33% of non-drinkers had hypertension. In the age group 34-41, former drinkers (100%) and occasional users (83.33%) were hypertensive, compared to only 38.47% of non-drinkers. Above 41, 100% of regular users and 62.5% of occasional users were hypertensive, indicating that in older adults, age, BMI and unhealthy lifestyle play a major role in hypertension risk in addition to alcohol consumption. In 2024, a study by Chen *et al.* concluded that alcohol consumption is closely related to hypertension development. Although in the same group, the rate of hypertension of non-drinkers is higher (72.54%) as compared to other age groups because of individuals with greater BMI. Similar finding of Bhardwaj *et al.* 2010; Kumar *et al.* 2016; Katoch *et al.* 2020 and Babu *et al.* 2024 support our findings.

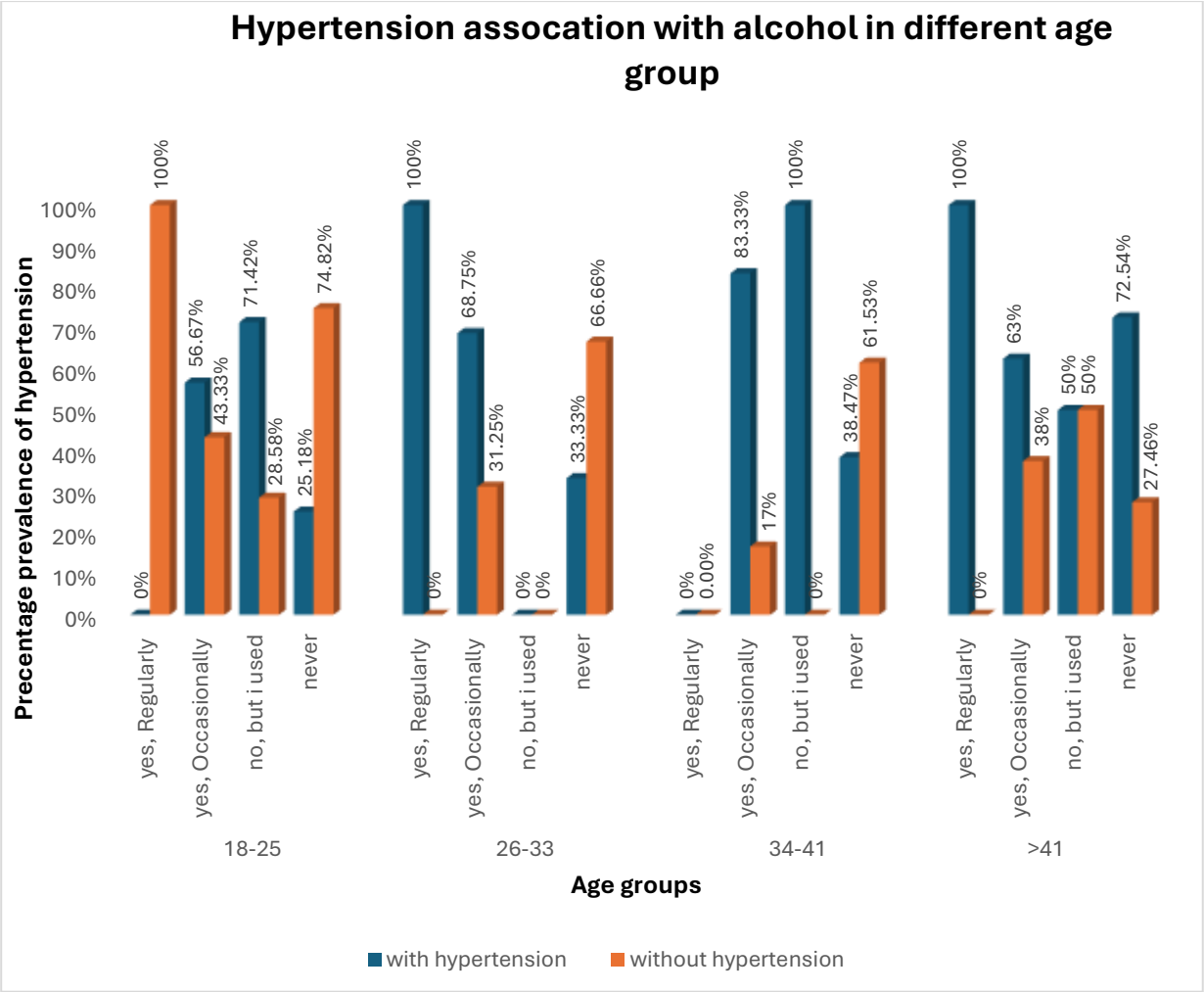

Figure 6: Distribution of hypertension based on age groups and alcohol consumption

Figure 7 depicts the distribution of hypertension across age groups in relation to physical activity, revealing varying patterns. In the 18–25 and 26–33 age groups, physically active individuals had slightly higher hypertension rates (33.63% and 60%, respectively) compared to inactive ones (28.99% and 54.17%). This unexpected trend may be influenced by confounding factors such as academic or work-related stress, dietary habits, or genetic predisposition, which may override the benefits of physical activity at younger ages. In contrast, the 34–41 group expressed lower hypertension in active individuals (36.37%) than in inactive ones (54.54%), aligning with known benefits of regular exercise in midlife. These findings are supported by Hedge and Solomon's (2015) study, which reported that regular physical activity is associated with lower blood pressure and reduced cardiovascular risk. Interestingly however, in the >41 age group, hypertension was more prevalent among active participants (76%) than inactive ones (69.77%). This may be due to reverse causality, where older individuals diagnosed with hypertension adopt physical activity as part of treatment. Overall, the data suggests that while physical activity can help reduce hypertension risk, its effectiveness is age-dependent and influenced by additional lifestyle and health-related factors (Hedge *et al.* 2015; Hayes *et al.* 2022).

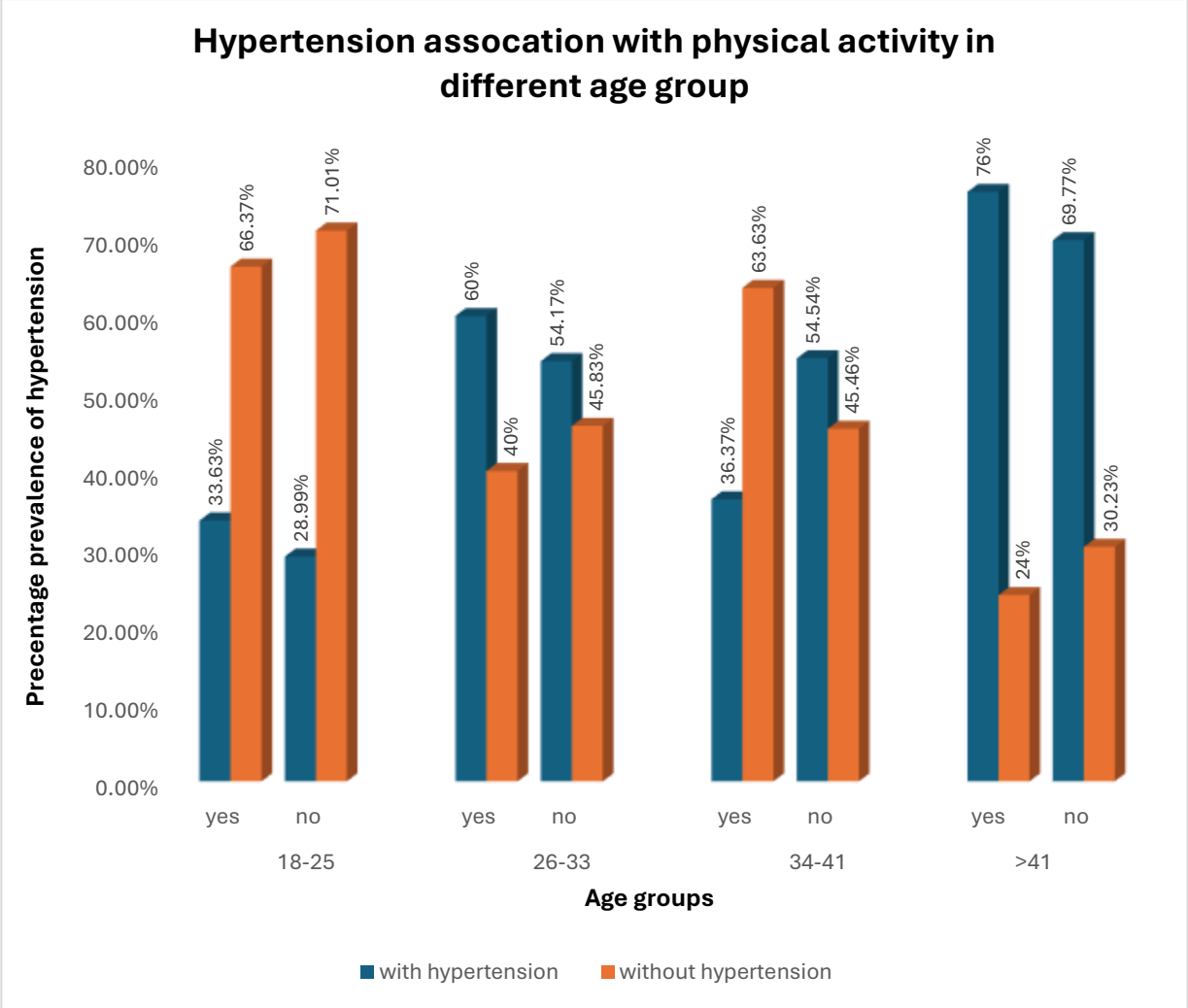

Figure 7: Distribution of hypertension based on age groups and physical activity

Table 5: Distribution of hypertension based on hereditary factor and multiple lifestyle factors

Category	Category types	Number of participants with hypertension	Number of participants without hypertension	Total number of participants
Family history	Yes	55 (48.68%)	58 (51.32%)	113
	No	85 (42.71%)	114 (57.29%)	199
	Don't know	1 (33.33%)	2 (66.67%)	3
Physical activity	Yes	66 (42.03%)	91 (57.97%)	157
	No	75 (47.47%)	83 (52.53%)	158

Diet	Healthy	33 (42.30%)	45 (57.70%)	78
	Moderate healthy	102 (48.34%)	109 (51.66%)	211
	Unhealthy	6 (24%)	19 (76%)	25
	Don't know	0	1 (100%)	1
Smoke/Tobacco	Yes, Regularly	18 (62.07%)	11 (37.93%)	29
	Yes, occasionally	11 (61.11%)	7 (38.89%)	18
	No, but I used	9 (56.25%)	7 (43.75%)	16
	Never	103 (40.88%)	149 (59.12%)	252
Alcohol	Yes, Regularly	7 (70%)	3 (30%)	10
	Yes, occasionally	38 (63.33%)	22 (36.67%)	60
	No, but I used	9 (64.29%)	5 (35.71%)	14
	Never	87 (37.67%)	144 (62.33%)	231

Table 5 provides a comprehensive analysis of how hereditary factors and lifestyle choices influence the occurrence of hypertension among participants. A notable observation is the role of family history, where 48.68% of individuals with a positive family history of hypertension were affected, compared to 42.71% without such a history. This indicates a genetic predisposition plays a significant part in the development of hypertension. Physical activity also showed a clear impact on individuals who engaged themselves in regular physical activity (42.03% hypertensive) in comparison to those who did not (47.47% hypertensive), supporting the protective effect of exercise against high blood pressure. In terms of diet, the highest prevalence was among those with moderately healthy diets (48.34%), while only 24% of those with unhealthy diets were hypertensive. However, this result is likely skewed due to the small sample size in the "unhealthy" group, making it less reliable. Smoking and tobacco use revealed a strong positive correlation, with regular smokers (62.07%) and occasional users (61.11%) showing markedly higher rates than non-users (40.88%). Similarly, alcohol consumption was significantly linked to hypertension where 70% of regular alcohol consumers had hypertension, followed closely by occasional (63.33%) and former users (64.29%), while only 37.67% of those who never consumed alcohol were affected. Overall, the data underscore that while genetic factors contribute to hypertension, modifiable lifestyle factors such as smoking, alcohol use, physical inactivity, and dietary habits have a substantial influence and offer key targets for prevention and management strategies. In a study by Meher *et al*. 2023 it was found that the adults who smoke, chew tobacco, drink alcohol, are obese,

engage in sedentary behaviour, consume too much salt and have unhealthy lifestyles, are at a higher risk of developing hypertension.

Conclusion

The findings of this community-based study reveal a **high prevalence of hypertension (44.76%)** among the population of Rampur Bushahr, with a significant burden observed across young, middle-aged, and older adults. The risk of hypertension **increased markedly with age**, with individuals aged 41 years and above showing the highest rates.

Body Mass Index (BMI) emerged as a critical risk factor. Overweight and obese individuals particularly women had a significantly higher prevalence of hypertension, underscoring the well-established link between obesity and cardiovascular risk. **Males** were also found to be more affected than females, likely due to behavioural and physiological contributors such as smoking, alcohol consumption, and lifestyle practices.

Educational status showed a complex association with hypertension. Those with lower educational attainment had higher prevalence rates, while a **U-shaped trend** indicated elevated rates even among the highly educated possibly reflecting stress and sedentary routines associated with professional or academic demands. Similarly, **occupational status** influenced hypertension risk, with both employed individuals and homemakers experiencing higher rates, likely due to stress, insufficient physical activity, and excess weight.

Lifestyle-related risk factors such as **tobacco use**, **alcohol intake**, and **positive family history** were strongly and consistently associated with hypertension across all age groups. While **physical activity** and **diet** showed some influence, the associations were less consistent potentially due to sample variation.

Overall, the study highlights the **multifactorial nature of hypertension** and stresses the urgent need for targeted **preventive strategies**. These should include **community awareness programs**, **promotion of healthy lifestyles**, **routine screening**, and **interventions tailored to high-risk populations**, particularly older adults, the overweight or obese, and individuals with unhealthy lifestyle patterns.

Limitations of the Study

This study has several limitations that should be considered when interpreting the results. Firstly, as a **cross-sectional study**, it captures data at a single point in time and thus can identify **associations** but **cannot establish causality** between risk factors and hypertension.

Secondly, key variables such as **dietary habits**, **stress levels**, **tobacco use**, and **alcohol consumption** were obtained through **self-reported questionnaires**, which may be subject to **recall bias** or **social desirability bias**, potentially affecting the accuracy of the data.

A further limitation lies in the **age distribution of the sample**, which was predominantly composed of **young adults (18–25 years)**, mostly students. This age concentration may limit the applicability of the findings to the general adult population of Rampur Bushahr, particularly **middle-aged and elderly individuals**, who may exhibit different risk profiles and health behaviours.

Additionally, the study was conducted in a **limited geographic area Rampur Bushahr which restricts the generalizability** of the findings to other parts of Himachal Pradesh or India.

Although data on **stress levels** were collected via the questionnaire, this variable was **not analysed** in the present study, limiting insights into its role in hypertension among the participants.

Moreover, certain potentially relevant variables such as **family history of hypertension**, the presence of **other chronic conditions**, and **medication adherence** were not thoroughly assessed. The absence of **clinical investigations** such as **blood tests for lipid profile, blood glucose, or kidney function** further constrains the ability to gain a more comprehensive understanding of the risk landscape for hypertension in this population.

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