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EPIDEMIOLOGICAL STUDY OF HYPERTENSIVE PATIENTS BASED ON BMI AND LVMI

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ABSTRACT:

Introduction: Cardiovascular diseases, an umbrella term encompassing a gamut of health issues affecting the heart and blood vessels, remain one of the principal causes of morbidity and mortality worldwide. Hypertension, or high blood pressure, is a particular concern given its insidious nature and its role as a significant risk factor for heart disease. It not only damages blood vessels and the heart but also leads to conditions like left ventricular hypertrophy (LVH) resulting in an increased Left Ventricular Mass Index (LVMI), a critical indicator of cardiac health. Evaluating the relationships and impacts among cardiovascular diseases, hypertension, and LVMI is pivotal to improving healthcare intervention strategies and patient outcomes. Hypertension is a widespread health concern affecting millions globally, with its prevalence varying by age and sex. This silent yet potentially lethal ailment is intimately tied to an increased Left Ventricular Mass Index (LVMI), an essential determinant of cardiac health, speaking volumes about the heart's condition. Age and sex, the two fundamental demographic factors, deftly modulate the incidence and severity of hypertension and LVMI, with each stratum reflecting distinct physiological realities. The multifaceted relationships among hypertension, LVMI, age, and sex underscore the necessity of a comprehensive, nuanced health assessment framework. In the subsequent discussion, we will delve into the intricate relationships those variables share, using the most recent studies and clinical evidence to illuminate our understanding and enhance proactive healthcare interventions. Obesity is a modifiable risk factor hence interventions in the form of change in behaviour, diet and weight reduction will help in achieving required body mass index. This in turn will help in improving left ventricular mass index. Primary prevention of obesity can be planned in hypertensive at an early stage in order to prevent its progression to left ventricular hypertrophy.

Aims and Objectives: This study examines the correlation between Body Mass Index (BMI) and Left Ventricular Mass Index (LVMI), emphasizing the potential impact of gender, age, and the duration of hypertension in a geriatric hypertensive population.

Methodology: The study was conducted in the Department of Physiology and Cardiology at the Pushpagiri Institute of Medical Science and Research Centre of hypertensive adults over a year and used a previously determined correlation coefficient to calculate your sample size of 114. The participants were inclusive of adult

hypertensives aged 20-60 years and exclusive of several cases including those with valvular heart disease, a history of renal disease, pregnancy, and physical disabilities. It seems that the study comprehensively defined terms such as hypertension and obesity according to specific guidelines and used various tools for data collection.

Results: The findings indicate that there is a moderate positive correlation between Body Mass Index (BMI) and Left Ventricular Mass Index (LVMI) specifically among males aged 61-70 years. This suggests that as BMI increases, LVMI also tends to increase in this specific demographic group. Interestingly, no such correlation was observed in females of the same age group. Moreover, the correlation was not significant for males or females in any other age groups. This could suggest that age, gender, and body mass may all play roles in left ventricular mass, at least among those in the 61-70 age group. The study also demonstrates a varying relationship between Body Mass Index (BMI) and Left Ventricular Mass Index (LVMI) amongst patients, contingent on the duration of hypertension. In patients with less than 5 years of hypertension, there is a moderate positive correlation between BMI and LVMI. This means an increasing BMI is associated with an increase in LVMI in this group. In contrast, among patients with a hypertension duration of 5 to 10 years, there is only a negligible correlation between BMI and LVMI. This suggests that BMI plays a minor role in affecting LVMI in this group. Lastly, in the group with hypertension duration above 10 years, no significant correlation between BMI and LVMI was found. This means the two variables are independent or the relationship very faint in this group. The study also found a weak positive correlation between Body Mass Index (BMI) and Left Ventricular Mass Index (LVMI) in participants aged 61 to 70 years. This means that within this age group, a slight increase in BMI may be associated with a somewhat increase in LVMI. However, the relationship is weak, indicating that while a higher BMI may slightly contribute to a higher LVMI in this age segment, there are likely other contributing factors. In contrast, no significant correlation was detected between BMI and LVMI among other age groups. Thus, in these age groups, a change in BMI does not seem to strongly affect changes in LVMI. Such conclusions can be important in understanding and managing health risks, especially those relevant to heart health, among different age groups. It may also highlight the need for age-specific interventions and treatment protocols.

Conclusions Cardiovascular diseases, particularly hypertension, pose a significant global health issue as they increase morbidity and mortality rates. There is an observed link between hypertension and an increased Left Ventricular Mass Index (LVMI), with noteworthy variations related to age and sex. This underlines the importance of demographic-tailored health strategies. Obesity, a risk factor that can be modified, has an impact on LVMI. Therefore, interventions focusing on behaviour, diet and weight can enhance health outcomes. Managing obesity in patients with hypertension from early stages could potentially prevent the progression to left ventricular hypertrophy

INTRODUCTION

Cardiovascular diseases, an umbrella term encompassing a gamut of health issues affecting the heart and blood vessels, remain one of the principal causes of morbidity and mortality worldwide (1). Hypertension, or high blood pressure, is a particular concern given its insidious nature and its role as a significant risk factor for heart disease. It not only damages blood vessels and the heart but also leads to conditions like left ventricular hypertrophy (LVH) resulting in an increased Left Ventricular Mass Index (LVMI), a critical indicator of cardiac

health. Evaluating the relationships and impacts among cardiovascular diseases, hypertension, and LVMI is pivotal to improving healthcare intervention strategies and patient outcomes (2).

Hypertension is a widespread health concern affecting millions globally, with its prevalence varying by age and sex. This silent yet potentially lethal ailment is intimately tied to an increased Left Ventricular Mass Index (LVMI), an essential determinant of cardiac health, speaking volumes about the heart's condition (3). Age and sex, the two fundamental demographic factors, deftly modulate the incidence and severity of hypertension and LVMI, with each stratum reflecting distinct physiological realities. The multifaceted relationships among hypertension, LVMI, age, and sex underscore the necessity of a comprehensive, nuanced health assessment framework. Obesity is a modifiable risk factor hence interventions in the form of change in behaviour, diet and weight reduction will help in achieving required body mass index (4). This in turn will help in improving left ventricular mass index. Primary prevention of obesity can be planned in hypertensive at an early stage in order to prevent its progression to left ventricular hypertrophy.

In the subsequent discussion, we will delve into the intricate relationships those variables share, using the most recent studies and clinical evidence to illuminate our understanding and enhance proactive healthcare interventions.

AIMS AND OBJECTIVES

This study examines the correlation between Body Mass Index (BMI) and Left Ventricular Mass Index (LVMI), emphasizing the potential impact of gender, age, and the duration of hypertension in hypertensive population. This study also compares the correlation between body mass index and left ventricular mass index with gender, age, duration of hypertension in the study group.

METHODOLOGY

Study Design: The study was conducted in the Department of Physiology and Cardiology at the Pushpagiri Institute of Medical Science and Research Centre of hypertensive adults over a year and used a previously determined correlation coefficient to calculate your sample size of 114. The participants were inclusive of adult hypertensives aged 20-60 years and exclusive of several cases including those with valvular heart disease, a history of renal disease, pregnancy, and physical disabilities. It seems that the study comprehensively defined terms such as hypertension and obesity according to specific guidelines and used various tools for data collection. Study tools: This study utilizes a pilot tested interviewer-based questionnaire, standard weighing machine, measuring tape, and mercury sphygmomanometer to gather data and explore the link between Body Mass Index (BMI) and Left Ventricular Mass Index (LVMI) in hypertensive patients aged 20-60 years. After approval from the research and ethics committee, written informed consent was obtained from each participant. Participant history, anthropometric measurements, and blood pressure readings were meticulously recorded, followed by BMI calculations using the QUETLET index. The blood pressure was measured using both palpatory and auscultatory methods. Left Ventricular Mass (LVM) was assessed with 2D guided M mode echocardiography and calculated using the Devereux formula. LVM was subsequently corrected for height following Cuspidi et al.'s recommendations. This comprehensive approach to data collection provides valuable insights regarding the relationship of BMI with LVMI in the context of age, gender, and hypertension duration,

enhancing our understanding of cardiovascular risks in hypertensive patients. Statistical Analysis: The data were analysed inputting the data into Microsoft Excel, doing the statistical analysis using IBM SPSS Statistics for Window. We used the Pearson correlation test to analyse the relationship between BMI (Body Mass Index) and LVMI (Left Ventricular Mass Index). Using a p-value of less than 0.05 as the threshold for statistical significance is a commonly accepted practice. This threshold generally indicates that there is less than a 5% chance that the results occurred due to random chance, suggesting a statistically significant relationship.

RESULTS

The findings indicate that there is a moderate positive correlation between Body Mass Index (BMI) and Left Ventricular Mass Index (LVMI) specifically among males aged 61-70 years.

Characteristic	Status	N	Percent
Gender	Male	65	57.0
	Female	49	43.0
Regular medication	No	21	18.4
	Yes	93	81.6
Age group	< 50 yrs	25	21.9
	51- 60 yrs	31	27.2
	61- 70 yrs	38	33.3
	> 70 yrs	20	17.5
Duration of Hypertension	< 5	27	23.7
	5 - 10	62	54.4
	> 10	25	21.9

This suggests that as BMI increases, LVMI also tends to increase in this specific demographic Table 1: Description of the population group.

Interestingly, no such correlation was observed in females of the same age group. Moreover, the correlation was not significant for males or females in any other age groups. This could suggest that age, gender, and body mass may all play roles in left ventricular mass, at least among those in the 61-70 age group

Table 2: Descriptive Statistics

	N	Minimum	Maximum	Mean	S.D
Age	114	33	84	60.06	11.53

Table 3: Correlation between BMI and LVMI

Age group	Gender	Pearson correlation (r)	P value

< 50 yrs	Male (n=16)	0.338	0.20
	Female (n=9)	-0.046	0.96
51 – 60 yrs	Male (n=20)	0.253	0.28
	Female (n=11)	0.326	0.33
61 – 70 yrs	Male (n=16)	0.561	0.024*
	Female (n=22)	0.282	0.20
> 70 yrs	Male (n=13)	0.207	0.49
	Female (n=7)	0.362	0.43

*Correlation is significant at the 0.05 level

The findings indicate that there is a moderate positive correlation between Body Mass Index (BMI) and Left Ventricular Mass Index (LVMI) specifically among males aged 61-70 years.

Table 4: Correlation between BMI and LVMI

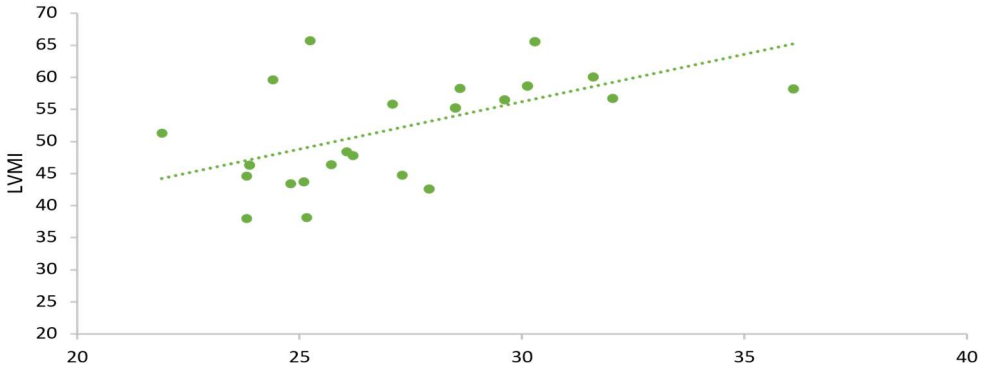
Duration of hypertension	Pearson correlation (r)	P value
< 5	0.581	0.001**
5-10	0.259	0.042*
>10	0.032	0.88

**Correlation is significant at the 0.01 level

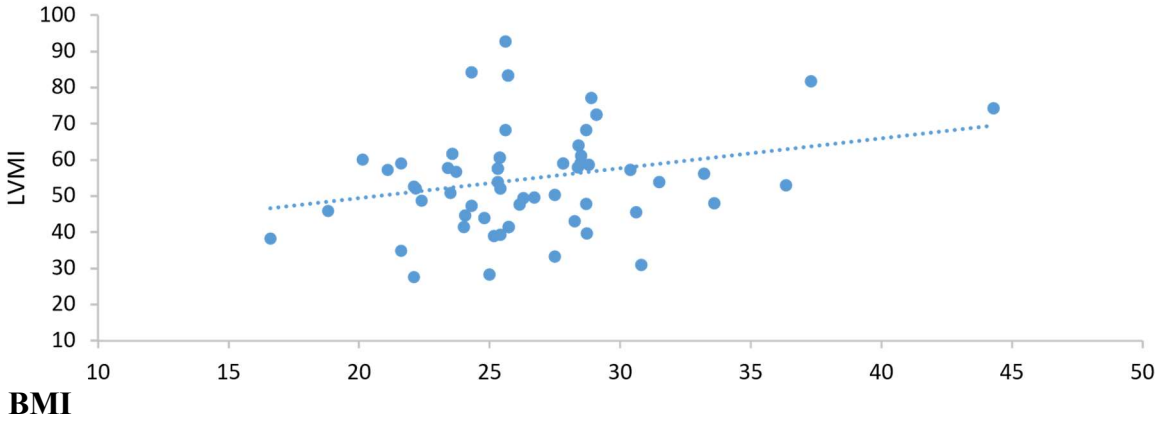
*Correlation is significant at the 0.05 level

The study also demonstrates a varying relationship between Body Mass Index (BMI) and Left Ventricular Mass Index (LVMI) amongst patients, contingent on the duration of hypertension. In patients with less than 5 years of hypertension, there is a moderate positive correlation between BMI and LVMI. This means an increasing BMI is associated with an increase in LVMI in this group. In contrast, among patients with a hypertension duration of 5 to 10 years, there is only a negligible correlation between BMI and LVMI.. Lastly, in the group with hypertension duration above 10 years, no significant correlation between BMI and LVMI was found. This means the two variables are independent or the relationship very faint in this group.

Graph 1: Scatter plot BMI vs LVMI for duaration of hypertension < 5



Graph 2: Scatter plot BMI vs LVMI for duaration of hypertension 5-10



The study also found a weak positive correlation between Body Mass Index (BMI) and Left Ventricular Mass Index (LVMI) in participants aged 61 to 70 years. This means that within this age group, a slight increase in BMI may be associated with a somewhat increase in LVMI. However, the relationship is weak, indicating that while a higher BMI may slightly contribute to a higher LVMI in this age segment, there are likely other contributing factors. In contrast, no significant correlation was detected between BMI and LVMI among other age groups. Thus, in these age groups, a change in BMI does not seem to strongly affect changes in LVMI. Such conclusions can be important in understanding and managing health risks, especially those relevant to heart health, among different age groups. It may also highlight the need for agespecific interventions and treatment protocols.

Correlation between BMI and LVMI

Age group	Pearson correlation (r)	P value
< 50 yrs (n=25)	0.259	0.21
51 – 60 yrs (n=31)	0.286	0.12

61 – 70 yrs (n=38)	0.383	0.02*
> 70 yrs (n=20)	-0.094	0.694

*Correlation is significant at the 0.05 level

DISCUSSION

Many newer studies have shown that distribution of the body fat have a correlation with long term morbidity and mortality [5,6]. A study conducted by the national heart, lung and blood institute showed association with the BMI and left ventricular mass (7). Another study by Gottdiener et al.. also concluded that BMI is an important indication for LV mass than BP(8).

Our study also shows that BMI plays a minor role in affecting LVMI. Various recent studies showed that sex difference in the elderly cohort, men are affected more than the females (9,10). In our study, as BMI increases, LVMI also tends to increase in this specific demographic group. Interestingly, no such correlation was observed in females of the same age group. Moreover, the correlation was not significant for males or females in any other age groups. This could suggest that age, gender, and body mass may all play roles in left ventricular mass, at least among those in the 61-70 age group. Geriatric hypertension, being one of the primary causes of morbidity and mortality in elderly individuals, has attracted significant notice in the medical and research community. Particularly, adjusting treatment methodologies based on Body Mass Index (BMI) and Left Ventricular Mass Index (LVMI) has been an evolving area of study in the epidemiology of geriatric hypertension.

Epidemiological data shows a strong correlation between BMI and hypertension in the elderly, with obesity being a well-recognized risk factor. An increased BMI often predisposes seniors to hypertension through various mechanisms including increased renal sodium reabsorption and over-activation of the sympathetic nervous system.

On the other hand, LVMI is a significant determinant of cardiovascular morbidity and mortality among hypertensive elders. An elevated LVMI is often an indication of left ventricular hypertrophy resulting from long-standing hypertension. Studies suggest that controlling BMI can help lower LVMI thereby reducing the incidences of cardiovascular events.

Several intervention models based on these variables have shown promising results, such as lifestyle interventions aiming at reducing BMI. However, challenges remain in achieving optimal blood pressure control in obese, elderly individuals. In reference to LVMI, novel therapies are being explored to reverse left ventricular hypertrophy.

CONCLUSION

In conclusion, the epidemiological study of geriatric hypertensive patients requires a multifactorial approach, viewing hypertension not just as an isolated illness, but as an interconnected system involving BMI and LVMI among other factors.

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