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Research Article

Variations In Cvd Risk Factors And Age In African Americans: The Jackson Heart Study.

Dr. Clifton Addison (C.A.), Dr. Brenda Jenkins (B.J.), Dr. Monique White (M.W.), Dr. Marinelle Payton (M.P.).

Jackson Heart Study Graduate Training and Education Center Department of Epidemiology and Biostatistics School of Public Health Jackson State University Jackson, Mississippi, USA

Abstract

Background: As the United States and other countries face the prospect of a rapidly aging population, promoting health for people as they get older should become a strategy for preventing disease, and assuring the maximum quality of life possible. This review examines how selected risk factors for cardiovascular disease (CVD) evolve during the aging process. The authors seek to elucidate the variations in selected CVD risk factors based on age in the Jackson Heart Study African American cohort in Exam 1 (2000-2004).

Methods: Risk factors selected for examination in this report include: anthropometry measures, including Body Mass Index (BMI), waist circumference, and neck circumference; biological measures that included systolic blood pressure, diastolic blood pressure, and glucose levels; lipids that included HDL, LDL, and total cholesterol; structural risk factors that included Left Ventricular Mass and Cystatin C; psycho-social factors that was represented by depression scores. The JHS participants' mean scores were compiled and stratified by age and gender. The analyses were examined to determine how the risk of cardiovascular disease manifests in African Americans in the Jackson Heart Study by age.

Results: This study confirmed an interaction between age and selected cardiovascular risk factors among the African American cohort of the Jackson Heart Study which can facilitate an understanding of differences in risk factors in at-risk populations.

Conclusions: An understanding of the age-associated transitions can assist with strategies to promote health and prevent, reduce, delay, or treat cardiovascular diseases in the people as they advance in years.

Keywords: Jackson Heart Study, Aging, Risk Factors, Cardiovascular Disease, African Americans.

INTRODUCTION

In order to improve one's chances of living with good health, feeling healthier, energized, and maintaining a long-lasting good health status, it is important to understand the prevailing and underlying health risks that can sometimes lead to premature morbidity and mortality. Individuals and healthcare professionals can take steps to manage the potential risks in an attempt to ensure that they benefit from the type of positive physical and mental health that can promote and enable a good quality of life. Research emanating from the last few decades has accentuated the fact that the adoption of a healthy lifestyle has the potential to protect against serious and disabling chronic diseases, like hypertension, diabetes, heart disease, and other complications of the cardiovascular system. Making preventive care a priority and understanding and addressing the risk factors can mitigate the initiation and subsequent impact of chronic diseases that are often preventable.

The public health literature suggests that the risk of developing diseases increases with aging, and these diseases have the tendency to decrease life expectancy. As the United States and countries around the universe face the prospect of a rapidly aging population, promoting health for people as they get older should become a strategy for preventing disease, and assuring the maximum quality of life possible. This section focuses on some selected risk factors for cardiovascular disease (CVD), and how these risks evolve during the aging process. An understanding of the age-associated transitions can assist with strategies to promote health and prevent, reduce, delay, or treat cardiovascular diseases in the people as they advance in years. The authors seek to elucidate the variations in selected CVD risk factors based on age in the Jackson Heart Study African American cohort in Exam 1 that spanned the period 2000-2004.

***Corresponding Author:** **Dr. Clifton Addison** , Department of Epidemiology and Biostatistics School of Public Health Jackson State University, Jackson, Mississippi, USA. **Phone:** 601-979-8765 , **Email:** clifton.addison@jsums.edu.

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STUDY SAMPLE

The Jackson Heart Study (JHS) is a community-based cohort study initiated to assess the etiology of cardiovascular diseases among African Americans. The study that began in 2000, funded by the National Heart Lung and Blood Institute (NHLBI) of the National Institutes of Health as a longitudinal investigation of genetic and environmental risk factors that have contributed to the disproportionate burden of cardiovascular disease in African Americans. It was originally initiated as a collaboration between three Mississippi academic institutions, Jackson State University, Jackson, Mississippi, Tougaloo College, Tougaloo, Mississippi, and University of Mississippi Medical Center, Jackson, Mississippi. The JHS recruited African American residents living in the Jackson, Mississippi, metropolitan area of Hinds, Madison, and Rankin Counties.

The JHS cohort completed three clinical examinations (Exam 1, 2000-2004; Exam 2, 2005-2008; and Exam 3, 2009-2013). Exam 4 began in 2020 with a projected completion date of 2025. From its inception in 2000, the JHS has generated extensive data on traditional and emerging cardiovascular disease risk factors responsible for the disproportionate burden of CVD in African Americans [1,2].

Instrumentation and Analyses

The risk factors selected for examination in this report include the following: anthropometry measures that included Body Mass Index (BMI), waist circumference, and neck circumference; biological measures that included systolic blood pressure, diastolic blood pressure, and glucose levels; lipids that included HDL, LDL, and total cholesterol; structural risk factors that included Left Ventricular Mass and Cystatin C; psycho-social factors that was represented by depression scores. The JHS participants' mean scores were compiled and stratified by age and gender [3]. The analyses were examined to determine how the risk of cardiovascular disease manifests in African Americans in the Jackson Heart Study by age. Below is a description of the analyses and the results of the data evaluations gleaned from an examination of Figures 1-12.

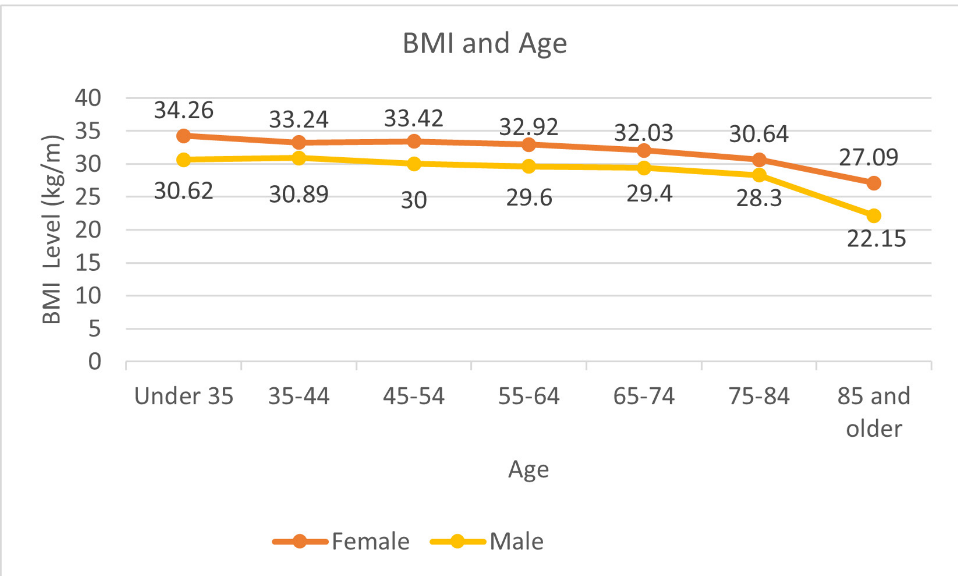
Anthropometry Measures

Many public health professionals are aware of the increasing prevalence of overweight in all corners of the world. Obesity, assessed using body mass index (BMI) >30 kg/m2, is an established risk factor for development of coronary heart disease (CHD) in healthy individuals. Furthermore, obesity is associated with many of the known cardiovascular risk factors, such as hypertension and dyslipidemia.

Prior studies have demonstrated lower all-cause mortality in individuals who are overweight compared with those with normal body mass index (BMI), but whether this may come at the cost of greater burden of cardiovascular disease (CVD) is unknown [4].

In this study, obesity was associated with shorter longevity and significantly increased risk of cardiovascular morbidity and mortality compared with normal BMI. Despite similar longevity compared with normal BMI, overweight was associated with significantly increased risk of developing CVD at an earlier age, resulting in a greater proportion of life lived with CVD morbidity.

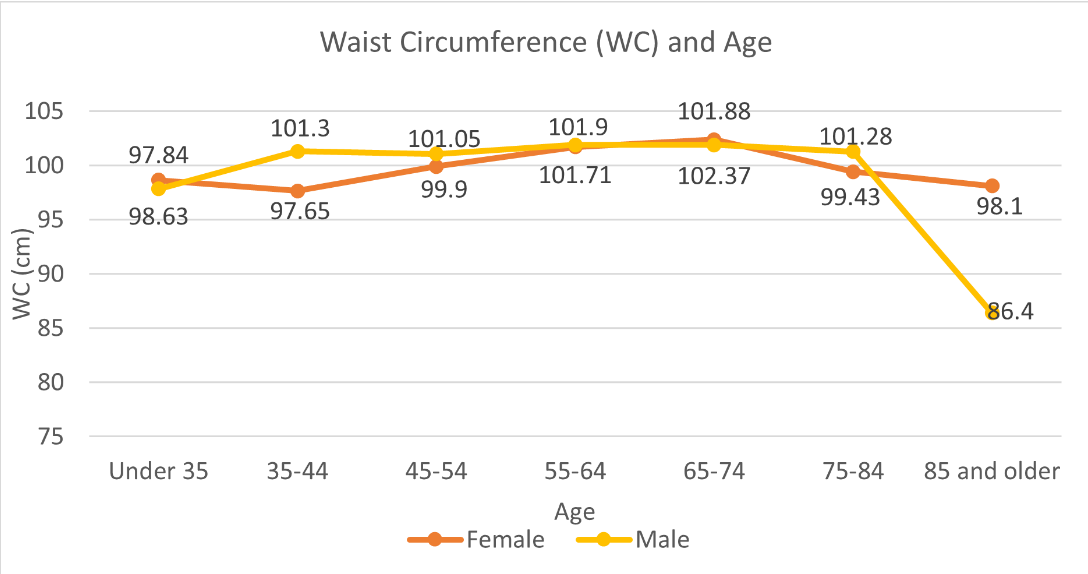
Figure 1. BMI by Age



Research indicates that fat around the waist rather than around the hips increases the risk for heart disease and type 2 diabetes. The risk for heart disease and type 2 diabetes increases when the waist size is greater than 35 inches for women or greater than 40 inches for men [5]. Some researchers believe that there is a causal relationship between WC and increased risk of CHD.

Figure 2 examines waist circumference measures of males and females based on age in the JHS cohort. On this overweight/obesity factor, there is little variation in the waist circumference measures of males and females at every age group from under 35 years of age to the 75-84. After age 84 both males and females display a decreasing waist circumference.

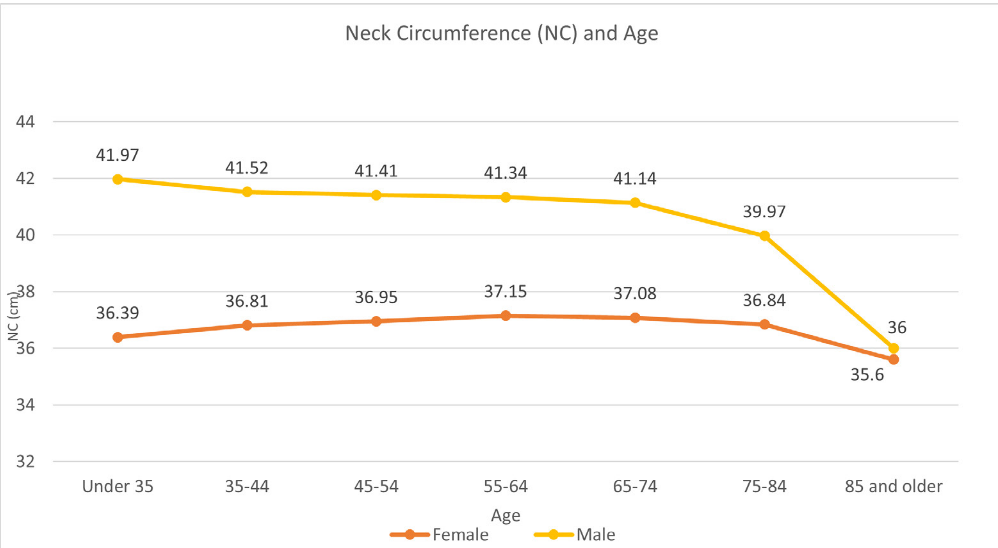
Figure 2. Waist Circumference by Age.



Increased neck circumference is a representation of the upper-body fat that is considered a risk for development of cardiovascular disease. Neck circumference is related closely related to cardiovascular risk factors in patients with hypertension, and should be included as a part of the process when screening for cardiovascular diseases. The neck can serve as a medium for identifying overweight or obese patients, in addition to highlighting the type of obesity [6,7].

Figure 3 examines neck circumference measures of males and females based on age in the JHS cohort. On this overweight/obesity factor, males display greater neck circumferences measures than females at every age group from under 35 years of age to the 85 and over age group. At the 85 years old and above range, males and females almost identical neck circumference values. In the case of the males and females individually, males demonstrate that their neck circumference values have decreased consistently as the age categories increased, while with the females, except between 55 and 74, where an increase in neck circumference is noticed.

Figure 3. Neck Circumference by Age

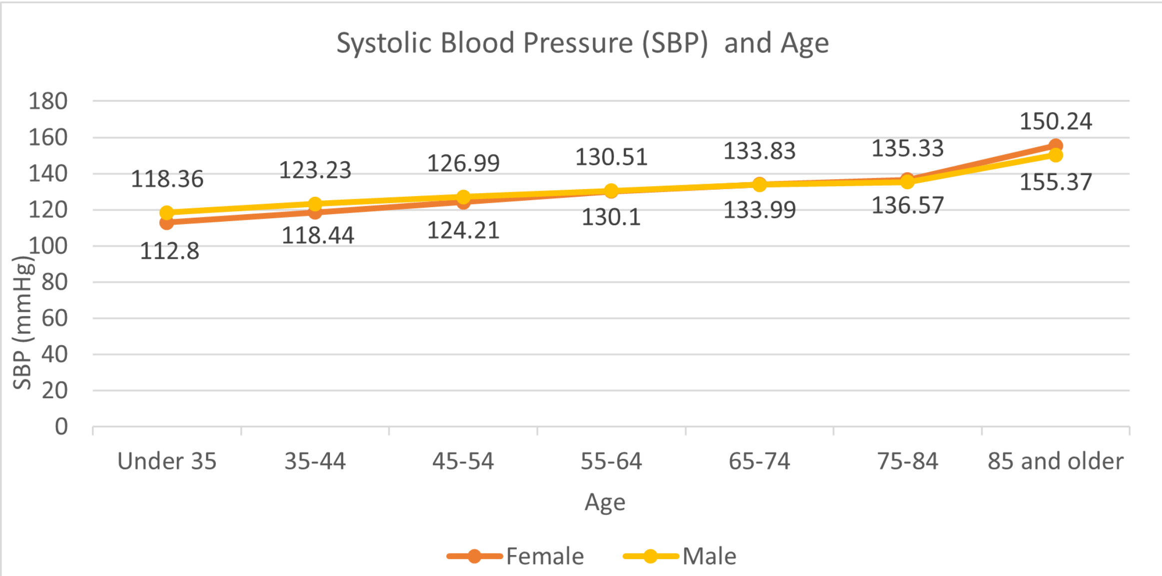


BIOLOGICAL MARKERS (MEASURES) AND AGE

Prevention of age-related increases in blood pressure can potentially reduce the negative vascular consequences that are associated with aging. Adequate treatment and prevention strategies for those diagnosed with hypertension can reduce much of the burden attributed to blood pressure-related CVD [8].

Figure 4 examines systolic blood pressure measures of males and females based on age in the JHS cohort. On this blood pressure factor males display the same diastolic blood pressure measures as females at every age group from under 35 years of age to the 85 and over age group. There is little variation based on age category across the entire cohort.

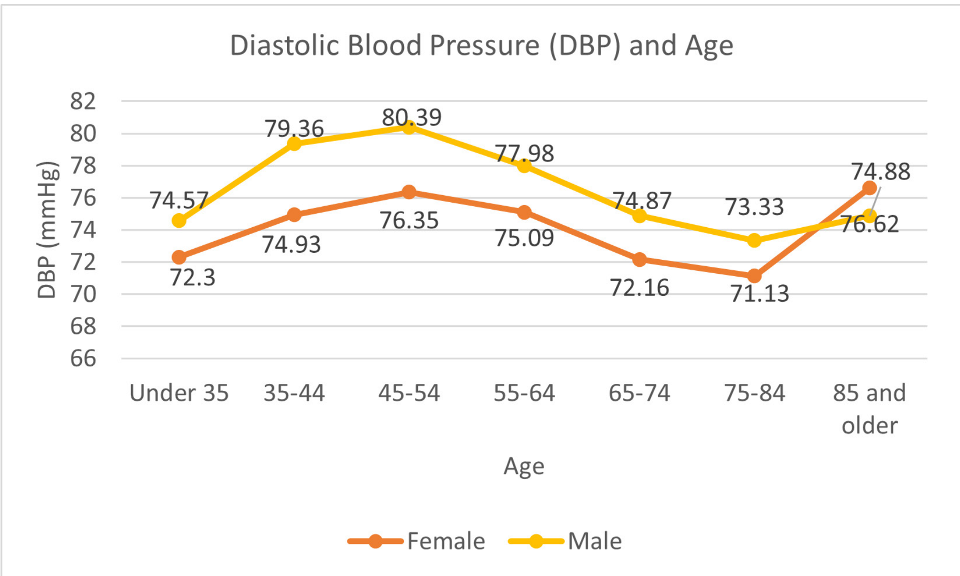
Figure 4. Systolic Blood pressure and Age.



There is a distinct association between diastolic blood pressure and cardiovascular events. Epidemiological studies have asserted that both high diastolic pressure and diastolic blood pressure below a certain level are associated with higher risk of cardiovascular disease events [9].

Figure 5 examines diastolic blood pressure measures of males and females based on age in the JHS cohort. Males display higher diastolic blood pressure measures than females at every age group up to the 75-84 age group. After the 75-84 age range, the female participants display a sharp spike surpassing the male participants.

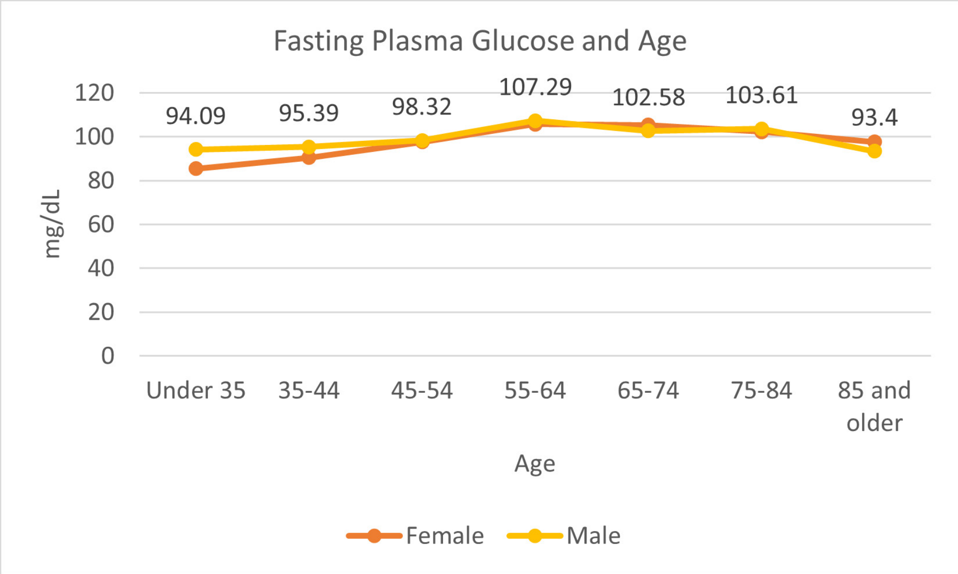
Figure 5. Diastolic Blood Pressure and Age



Insulin is a hormone that helps regulate sugar (glucose) in the blood. When blood sugar levels get too high, it poses a significant health risk. Diabetes is the most common cause of kidney failure worldwide and predisposes patients to higher risk of cardiovascular disease, particularly heart failure (HF), and death [10].

Figure 6 examines glucose measures of males and females based on age in the JHS cohort. With the exception of the under 35 to the 35-44 age group where males display a higher glucose level than females, form the 45-54 age group to the 85 and over age group, males and females display similar glucose levels, leveling off between 65 and 85 and above.

Figure 6. Glucose and Age

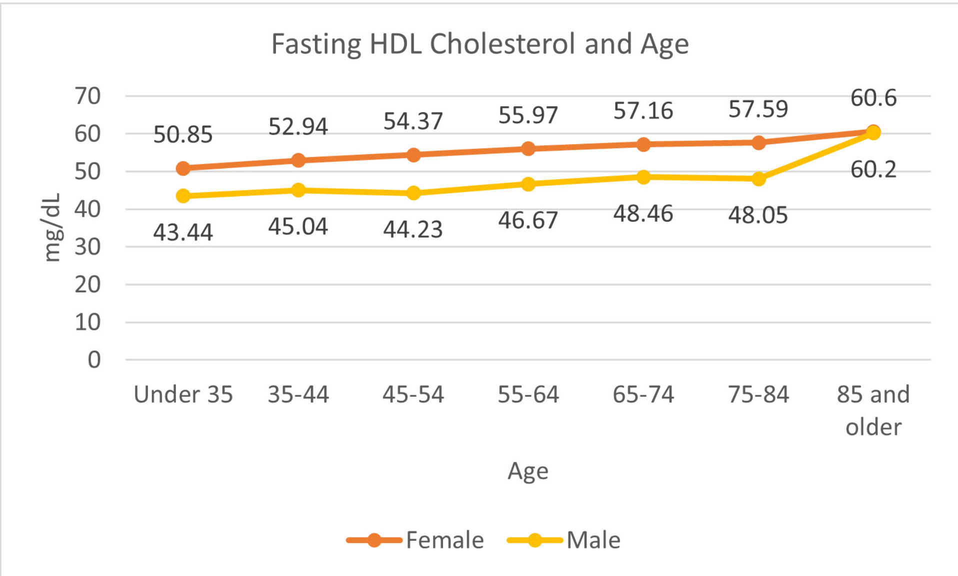


Lipids and Age

Some researchers believe individuals with extremely high HDL measures have better cardiovascular outcomes [11].

Figure 7 examines HDL cholesterol measures of males and females based on age in the JHS cohort. Female participants displayed higher HDL cholesterol measures than males in all age groups. However, male participants demonstrate an increase from the age category 75-84 to the ages 85 and over, rising to the same level as the female participants.

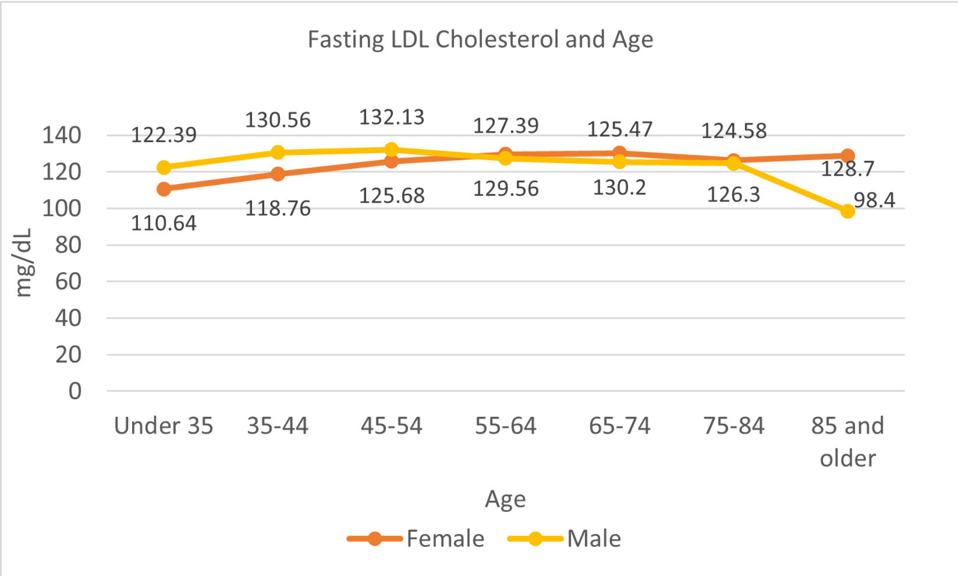
Figure 7. HDL Cholesterol and Age



Low-density lipoprotein cholesterol (LDL-C) is a risk factor for CVD. Public health professionals believe that lowering LDL-C can reduce CVD risk. The lowering of LDL-C to address CVD is called primary prevention because LDL-C is associated with an increased risk of CVD mortality. Pignone, Phillips and Mulrow (2000) believed that LDL-C is a significant risk factor for CVD death [12].

Figure 8 examines LDL cholesterol measures of males and females based on age in the JHS cohort. Male participants displayed higher LDL cholesterol measures than females up to the 45-54 age range; Male and female participants' LDL cholesterol measures were about the same between 45-54 and 75-84, after which the female participants rose slightly while the male participants displayed a sharp decline.

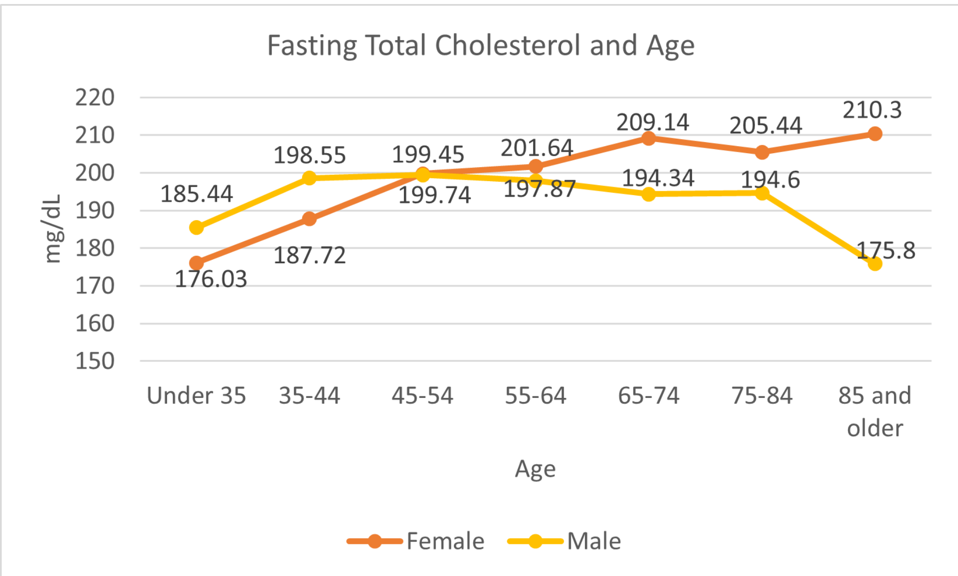
Figure 8. LDL Cholesterol and Age



Elevated total cholesterol (TC) is an established risk factor for cardiovascular disease. Previous studies have found that high levels of serum TC were associated with an increased coronary heart disease mortality rate [12,13].

Figure 9 examines total cholesterol measures of males and females based on age in the JHS cohort. Male participants displayed higher total cholesterol measures than females up to the 45-54 age range, female participants' total cholesterol measures surpassed the male participants and continued to rise up to the 85 and older age range, while the male participants' total cholesterol measures started to drop after the 45-54 age range, and continued with a sharp downward spike at the 75-84 age range.

Figure 9. Total Cholesterol and Age

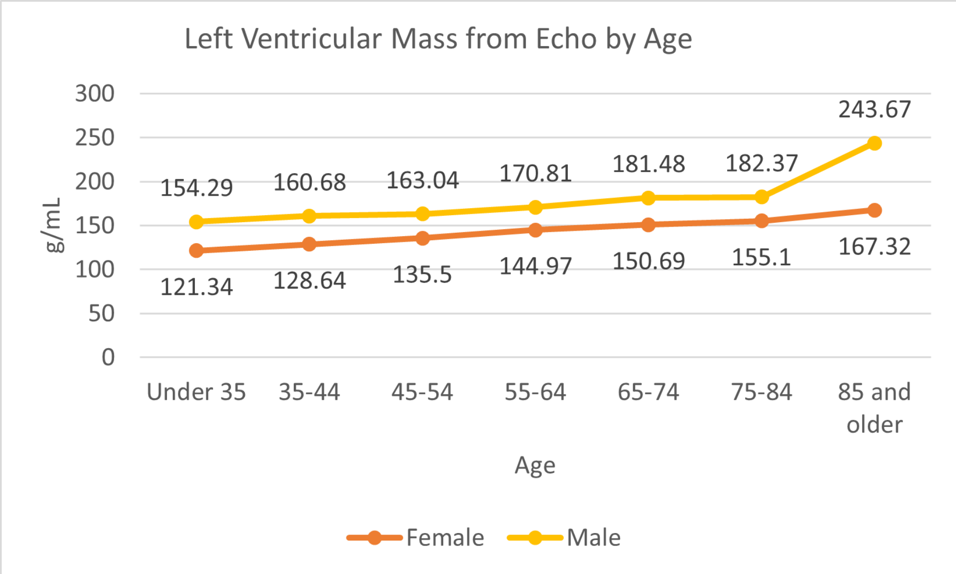


Structural Risk Factors and Age

Research has shown that left ventricular hypertrophy (LVH) is associated with an increased risk for cardiovascular disease (CVD) events and all-cause mortality [14], and is accepted clinically as a reliable prediction tool for CVD prevalence in older persons. Higher LV mass can be used for predicting CVD events in older persons who have a longer exposure to metabolic syndrome and diabetes mellitus. Echocardiographic measurements of LV mass are viewed as standard CVD risk factors in the prediction of CVD events in older persons [15].

Figure 10 examines Left Ventricular Mass scores of males and females based on age in the JHS cohort. Males display higher Left Ventricular mass scores than females. The scores appear to be rising with each age group up to ages 85-84. While both males and females show a sharp increase in left ventricular mass size in the category 85 years and older, it is the male participants who display a sharper spike in left ventricular mass size.

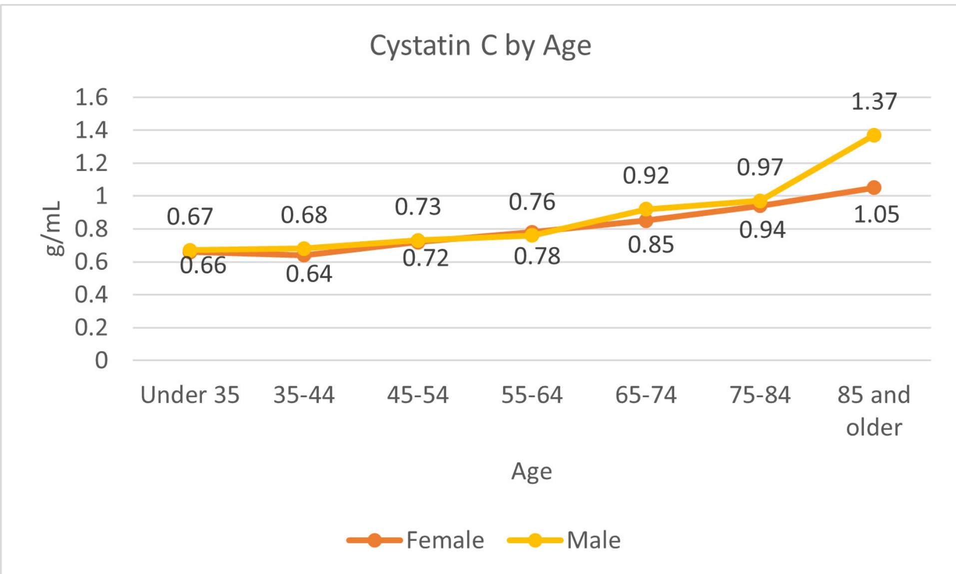
Figure 10. Left Ventricular Mass and Age



Cystatin C is a risk marker for kidney disease. It is considered to be a significant cardiovascular risk factor. Many researchers have concluded that elevated plasma Cystatin C levels are associated with CVD morbidity and mortality [16,18].

Figure 11 examines Cystatin scores of males and females based on age in the JHS cohort. The scores are almost identical among the sexes rising with each age group up to ages 85-84. While both males and females show a sharp increase in Cystatin levels in the category 85 years and older, it is the male participants who display a sharper spike in Cystatin C levels.

Figure 11. Cystatin C by Age

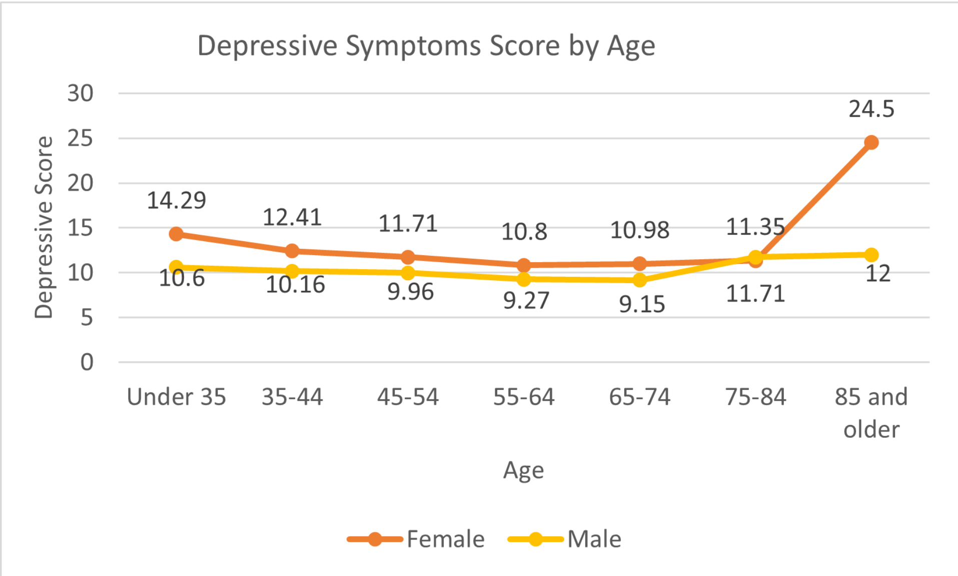


Psycho-Social Risk Factors and Age

A psychosocial risk occurs when a person experiences mental lapses and disability and becomes restricted in the ability to respond adequately to the social environment. In such a situation depression may occur, and that person is unable to concentrate adequately enough to complete normal tasks. When depression results normal psychological and emotional reactions to psychosocial adversity are followed by abnormal responses. Previous studies have accounted a link between depressive disorders and CVD [19]. Many researchers believe that depression and poor mental health are associated with premature CVD. That is why it is imperative to address mental health issues as a strategy to help reduce CVD risk [20]. Further, Harshfield et al. asserted that depressive symptoms (when assessed by the Center for Epidemiologic Studies Depression [CES-D] scale and other validated scales) were significantly associated with incident cardiovascular disease [21].

Figure 12 examines depressive symptoms scores of males and females based on age in the JHS cohort. Female participants displayed higher depressive scores than males throughout the age spectrum (under 35years old to 85 years old and older). While the male participants score increased slightly in the age category 85 and older, females experienced a steeper depression spike in the age category 85 and older.

Figure 12. Depressive Symptoms and Age.



DISCUSSION

Females displayed a higher BMI measure compared to males; females are in the obese category, extending from the under 35 age group to the 75-84 age group. Both groups had similar BMI/age patterns with the decreasing lowest measures occurring from the 75-84 age group to the 85 years and over group.

Waist circumference, an index of central adiposity (obesity) and an estimator of visceral fat, increased for each age group, but began to descend around age 75-84, with the sharpest descent occurring among the males.

Neck Circumference- The males' neck circumference was much greater than the females. Males and females had constant measures throughout their age series up to the 65-74 age range where they both began to decrease; at age 85 and above, males and females had the same neck circumference. Based on the mean neck circumference measures, all of the age groups of men had mean values in the obesity range for men. Similarly, all of the age groups of women had mean values in the obesity range for women.

Systolic blood pressure- Age-related increases in systolic blood pressure have been observed in every age category. Men and women share the similar systolic blood pressure measures throughout the age series. There is a steady gradient in measures up to the 75-84 age category, with a steeper increase going into the 85 and older age category.

Diastolic blood pressure measures show a roller-coaster pattern, climbing steadily between the under 35 group and the 45-54 age group, then descending steadily to the 75-84 age group before rising sharply to the 85 and older age group. The two groups follow the same pattern. However, the males display the highest measures throughout.

Glucose- Age-related increases in glucose have been observed in the under 35 – 55-64 age categories. The glucose patterns of both groups are very similar. They rise steadily to the 55-64 age group, and then they level off up to age 85 and older.

HDL- Age-related increases in HDL have been observed in almost every age category. HDL patterns are similar with incremental changes with each age category; females are higher throughout the age categories.

LDL patterns are similar with levelling off past the under 35 age category and a decrease among the males in the 85 and older age group. with each age category; females are higher throughout the age categories.

Total Cholesterol measures show an irregular pattern in both males and females, with the male measures decreasing in the age categories above 75 years old.

Left Ventricular Mass (LVM)- Age-related increases in LVM have been observed in almost every age category. Left ventricular mass measures show a similar pattern for the genders with a steady incline up the age cycles and a sharper increase after age 75.

Cystatin C- Age-related increases in Cystatin C have been observed in almost every age category. Cystatin C measures show a similar pattern for the genders with a steady incline up the age cycles and a sharper increase after age 75.

Depressive Symptoms: Age-related decreases in depressive symptoms have been observed in almost every age category, except for increases in the 75 and older group. Depressive symptoms show a decline going from the under 35 age group to the 75-84 age group, with an increase from the 74-85 group to the 85 and over group. This increase is greater among the females in the 85 and older group.

CONCLUSION

As people advance in age, they become more susceptible to developing chronic diseases like cardiovascular diseases. Age by itself can be considered a risk factor for developing chronic diseases [22]. This study confirmed an interaction between age and selected cardiovascular risk factors among the African American cohort of the Jackson Heart Study which can facilitate an understanding of differences in risk factors in at-risk populations. The findings can empower public health professionals and community groups to develop prevention and intervention strategies that can guide underserved and other affected persons of different ages to adopt behaviors, practices, attitudes, treatments, and services that can potentially prevent, manage, and control the impact of these risk factors on their cardiovascular health. Chronic diseases in older people is distinct from similar diseases in younger people and the approach to therapy should be different [23, 24]. In some cases, personalized treatment strategies are needed to offset the impact of the risk factors that afflict aging adults.

Author Contributions

Conceptualization: C.A. and B.J.; methodology: C.A. and B.J.; formal analysis: C.A. and B.J.; data curation: C.A. and M.W.; writing—original draft preparation: C.A., B.J. and M.W.; writing—review and editing: C.A., B.J., and M.W.; visualization: C.A and B.J.; supervision: MP and B.J.; project administration: B.J., and M.P. All authors have read and agreed to the published version of the manuscript.

Ethical Approval Statement

Ethical review and approval for this study was granted by the Jackson State University Institutional Review Board (IRB) that covers approval of all JSU JHS GTEC program activities. This study solely utilized de-identified data from the JHS that contain no personally identifiable information, ensuring participant confidentiality and privacy.

Informed Consent Statement

Not applicable. The study involved only secondary data collection.

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Data availability statement

Data are available upon reasonable request.

Conflicts of Interest

The authors declare no conflicts of interest.

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