

What We Know About Cardiac Function of Our Retired People

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Background: Bangladesh is one of the twenty countries in the world with the largest elderly populations, and by 2025, along with four other Asian countries, will account for 44% of world's total elderly population. This rapidly increasing population is a new and important group in terms of social and health policy in the country. As retired geriatric population is increasing day by day and there is a striking increase in their life expectancy and age is a key risk factor for coronary artery disease and because morbidity and mortality from coronary artery diseases increase with age. so evaluation of the cardiac function of retired persons are essential. **Objective:** To analyze the cardiovascular function of retired geriatric population in terms of measurement of ejection fraction by echocardiography.

Design: This was a cross-sectional study. **Participants:** 70 Retired persons aged 57 years and above without known hypertension, diabetes, renal diseases as study group and 70 healthy adult aged 18-55 years as control group were included in this study. All were obtained from different areas of greater Mymensingh districts of Bangladesh. **Intervention:** Ejection fraction by echocardiography.

Out come measures: Ejection fraction fraction %. **Results:** Significant decrease of ejection fraction was found in the study group(57 years and above) in comparison to control group.(P<0.01) The mean ejection fraction in different age group shows that there is decrease in ejection fraction of study groups than the control groups irrespective of age. **Limitation:** There was scarcity of Echocardiography at Mymensingh Medical College Hospital. Color doppler echocardiograph was poorly available at the present settings. So diastolic function can not be assessed. **Conclusion:** Though the mean ejection fraction value was significantly decreased in 57 years and above, which was progressively decreased by age, yet nearly all the values(2.72%) were within normal physiological limits. So, it seems that the retired geriatric population was having good cardiac function in our setting.

Key Words : Retirement, Geriatric, Ejection fraction, Echocardiography

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Introduction

Geriatric population is defined as population aged 60 years and above. The phenomenon of population aging (defined as increase in the median age of the population) is already a major social and health problem in the developed countries. As a proportion of the total population the geriatric population has been steadily increase over the decade. This rapid growth of the population of

the elderly is a challenge to medical profession, the administration & society.¹

A small proportion (around 6%) of the total population of Bangladesh constitute the elderly population but the absolute number of them is quite significant (about 7.2 million) and the rate of their increase is fairly high.² The physiological changes that occur with geriatric population show a marked increase in inter-individual variation in function. Many physiological processes in

older people deteriorate substantially but some individual show little or no change. Environmental factors such as lack of exercise, poor diet, cigarette smoking and alcohol consumption are thought to play a vital part in this and a healthy life style remains worth encouraging. Genetic factors may also be important in explaining individual variation.³

The outstanding physiological changes in the cardiovascular system due to aging are- progressive slowing of the resting heart rate and reduction of maximum heart rate following exercise. However the resting heart rate rises again at very old age. Loss of elasticity of the windkessel vessels also occur. The blood pressure particularly the systolic blood pressure progressively rises⁴. Elderly patients >65 years currently accounts for 42-52 % of ICU admission.⁵

Retirement means to withdraw from something, according to the dictionary. Until the final, irrevocable, and mortal retirement arrives, whenever one withdraws from something, one cannot escape from going on into something else. For an active healthy person, retirement can mean only withdrawing from one form of activity to enter into another.⁶ On retirement, the income is suddenly reduced. Economic hardship, with continued low standard of living, affects the body and mind. Retirement, change in housing, illness or death of spouse greatly affect the physical wellbeing of the aged persons. The socioeconomic problems of the elderly are aggravated by the lack of social security, inadequate facilities for health care, rehabilitation and recreation.¹

The notion that retirement harms health is a durable one, which has persisted for several related reason-loss of income, isolation, frustration and disesteem can attend retirement. Against this rationale for health decline, the opposite notion –that retiring can benefit health.

It is reasonable to argue that removal from a noxious work environment or reduction of work role demands could have a protective effect on health.⁷

Major life events like retirement may trigger two types of reaction in old age:

1. An adjustment reaction to old age, characterized by mild anxiety, uncertainty about future plans, mild slip disturbance may be mild depression.
2. A more severe depression requiring fairly intensive psychopharmacological and psychotherapeutic treatment.⁸

The ejection fraction is a valuable index of ventricular function.⁹ Damage to the muscle of the heart, during myocardial infarction or in cardiomyopathy, impairs the heart's ability to eject blood and therefore reduces ejection fraction. This reduction in the ejection fraction can manifest itself clinically as heart failure. In addition, ejection fraction is one of the most important predictors of prognosis.

Ejection fraction is commonly measured by echocardiography. Other methods of measuring ejection fraction include cardiac MRI, fast scan cardiac computed axial tomography (CT) imaging, Ventriculography, Gated SPECT and the MUGA.

Right ventricular volumes being roughly equal to those of the left ventricles, the ejection fraction of the right ventricles is normally equal to that of left ventricles.¹⁰

Left ventricular ejection fraction (LVEF) is determined by the Echocardiography provides important diagnostic, therapeutic, & prognostic information for patients with known or suspected heart diseases.

Qualitative Echocardiographic LVEF is measured using the apical two & four chambers view and was categorized as table I.¹¹

Table-I: Explain the qualitative echocardiographic LVEF categories

Category	Values
Hyper dynamic	= 70%
Normal	= 60 %
Lower limit of normal	= 50%
Mildly reduced	= 45%
Mild to moderately reduced	=40%
Moderately reduced	=35%
Moderate to severely reduced	= 30%
Severely reduced	= 25%

Value below 45% usually represents some decrease in the pumping strength of the heart, while values below 30 to 35% are representative of an important decrease.¹²

Geriatric population is on increase in our country and their morbidity and mortality is associated with cardiac consequences. Therefore, the present study has been design to find out the health status of the retired geriatric population in terms of cardiac status by pulse rate, blood pressure measurement & measuring ejection fraction. The output of this study obviously may help in awareness building with remedy at least in part for geriatric health protection.

Methods

This cross sectional study was carried out in the department of physiology, Mymensingh Medical College, Mymensingh, Bangladesh during the period of July 2007 to June 2008. A total number of 70 retired subjects age 57 and above were included in this study. All the subjects were apparently healthy both physically and mentally. Each individual completed questionnaire concerning there marital and socioeconomic status, history of smoking habit, hypertension and diabetes mellitus, history related to age, history of mental state, history of social state. All the subject was in middle socioeconomic condition. The questionnaire of every subject was filled up by interviewing as well as physical examination of the subjects.

The subjects were obtained from different areas of greater Mymensingh districts. Before taking blood sample, the subjects were briefed about the objectives of the study and their informed consents were taken. A total number of 70 healthy adult aged 18 years to 55 years were taken as control group

A standard echocardiogram is also known as a Trans-thoracic echocardiogram (TTE) or cardiac ultrasound. In this case, the echocardiography transducer or probe is placed on the chest wall or thorax of the subject and images are taken through the chest wall. The images are displayed on a monitor and are recorded either by videotape (analog) or by digital technique. For Trans thoracic examination, patients are typically placed in a left lateral position & scanned from several different left intercostal spaces. The standard trans thoracic views are recorded from parasternal & apical transducer position. Ejection fraction was calculated by Teichholz method. Data were expressed as mean \pm SD & analyzed statistically by unpaired 't' test.

Results

Demographic characters of the study population are presented in Table II and figure 1, 2, 3 display the mean ejection fraction in different groups. The highest value of ejection fraction of study group was 91% and lowest value was 48%.

The mean ejection fraction was significantly ($P<0.01$) lower in study group than that of control group.

Again in male, ejection fraction in study subjects (63.84 ± 78.81) was significantly ($P<0.05$) lower in comparison to that of control subjects (678.65 ± 8.783).

In female, the study subjects had significantly ($P<0.05$) lower mean ejection fraction (61.46 ± 5.66) than that of control subjects (65.32 ± 6.51).

The mean ejection fraction in different age groups stated in figure 4 shows that there is decreased of ejection fraction in study groups than the control groups irrespective of age.

Table – II: Shows the demographic characters of the study population

Group	N	Mean Age (years)	Sex	Religion	Monthly income	Socio economic status	Mean height (meter)	Mean weight (kg)	BMI (Kg/sq.m)
1 = Control	70	36.37	M=48 F=22	Muslim=67 Hindus=3	Between \geq BDT 3000 and \leq BDT 15000	Middle class	1.58	58.49	23.43
2 = Study	70	63.27	M=46 F=24	Muslim=65 Hindus=4 Buddha=1	as above	Middle class	1.6	62.99	24.49

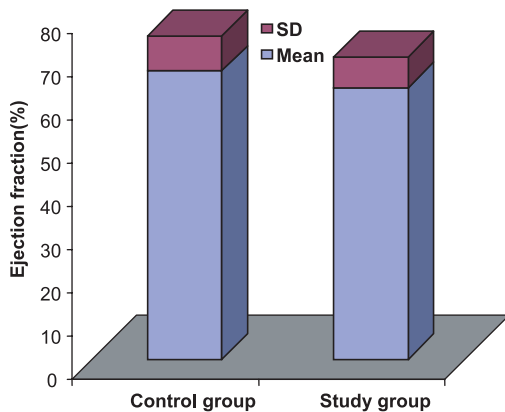


Figure 1: Mean ejection fraction with SD in different group.

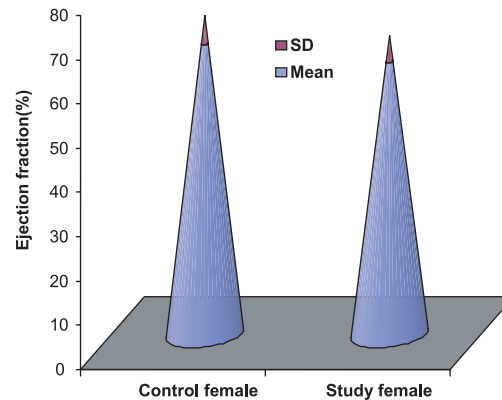


Figure 3: Mean ejection fraction with SD in female.

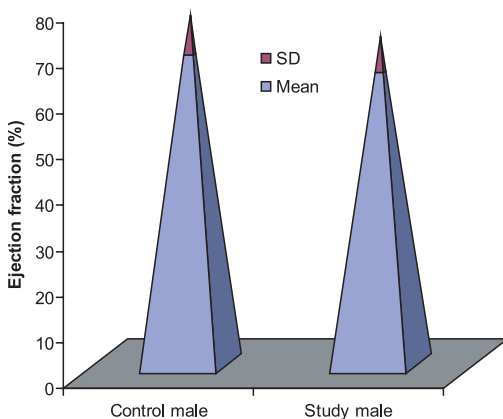


Figure 2: The mean ejection fraction with SD in male

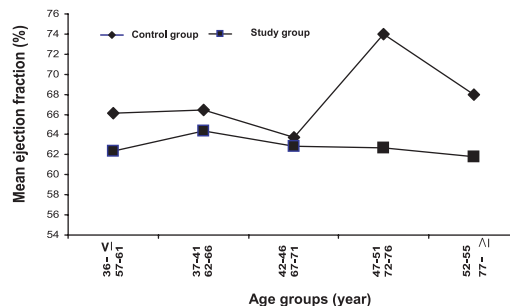


Figure 4: Displays the mean ejection fraction in different age groups.

Discussion

In the present study there was significant decrease in mean ejection fraction of study group when compared to control group. The mean ejection fraction of study male was significantly lower than control male (67.65%). The mean ejection fraction of study female was also significantly lower than control female.

The result is inconsistent because age did not appear to influence ejection fraction at rest.¹³

Another evaluation by Shively and associates found that echocardiographic measurement such as diastolic volume and ejection fraction of older groups were not significantly different from those in the young groups.¹⁴

It was also observed that only 4 cases out of 68 cases of study groups have ejection fraction between 40% to 54% that is, they (2.72%) have mild left ventricular systolic dysfunction and the remaining (97.28%) have normal left ventricular function. In 2001, the Strong Heart Study documented the prevalence of left ventricular dysfunction in 3184 American Indians. They categorized Ejection fraction of 40-54 as mild left ventricular dysfunction and ejection fraction < 40 as severe left ventricular dysfunction. In that study, 86% of patients had normal left ventricular function, 11.1 % had mild left ventricular dysfunction and 2.9 % had severe left ventricular dysfunction.¹⁵

Conclusion

Though, there was a significant decrease in ejection fraction of study group when compared to control group and also between study male female with control male & female. But nearly all (except 2.72% of study population) the results of individual of both groups were with in physiological norms.

The basis of this decrease in cardiac function is unknown but relate to one of several factors.

- Cardiac muscle has a decrease iono-tropic response to catecholamine, both endogenous and exogenous.

- With aging, there is an associated increase in diastolic and systolic myocardial stiffness, perhaps due to increase interstitial fibrosis in the myocardium.
- There is a progressive stiffening of arteries with age, particularly of the thoracic aorta, leading to an increase after load of the heart
- In autopsy studies as many as 78% of subjects older than 70 have been shown to have amyloid deposit in the myocardium, predominantly in atria, but also in the ventricles and pulmonary vessels.¹⁶
- Aged myocardium has lower sensitivity to beta adrenergic modulation, physiologically manifesting as lower heart rate and lower cardiac dilatation at end diastole and end systole. Altered pattern of calcium regulation allows the older heart myocardium to generate force for a longer time following excitation, hence prolongs of systolic phase of cardiac cycle. This in turn reduces the early diastolic filling rate by half. Incomplete emptying of ventricles at end systole, hence reduction of ejection fraction is the prominent characteristics of old heart.¹⁷

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