Introduction
Introduction

Aging is defined as a failure to maintain homeostasis under condition of physiologic stress, and this failure is associated with a decrease in viability, and an increase in vulnerability of the individual (Davies loan, 1998).

All multicellular organisms undergo changes with time. The progression of development, reproductive maturity and aging is well recognized. Aging occurs at many different levels - social, psychological, physiologic, cellular and molecular. The progression of development, reproductive maturity, and aging is well recognized, although age associated changes are not easily recognized until the post reproductive stages of the life span (Davies loan, 1998). The aging phenotype is progressively expressed over a long time scale in the mammal and attributing an accurate chronologic age is often difficult. Typical markers in human include loss of height, a reduction in lean body mass, graying of hair, wrinkling of skin, changes of movement. Some or all of these changes may be present in elderly people. These alterations along with others have been described as "normal" aging. It has been argued that aging changes should satisfy four criteria. They should be universal in the species, degenerative, progressive and intrinsic. These criteria were designed to separate aging from other time related changes of development, maturation and age-associated disease. (Davies loan, 1998; Strechler B L, 1962).

Most of the cross sectional studies show a decrease in the physiologic effectiveness from over the age of 35 years onwards. The graphs of nerve conduction velocity, (Mann D, Michael A, 1998) cardiac index,(Aronow W S, 1998) maximum breathing capacity (Connolly M J, 1998) and glomerular filtration rate (Jassal V et al,1998) show a considerable decline with age. Systems comprise subunits that act together to carry out a function that cannot be done by an individual component. The subunits and a biologic system are easy to describe; organs, cells and molecules are both the structure and the information needed to maintain that structure, so that it functions

"Study of Electrocardiographic Changes in Elderly Persons"
satisfactorily. An analysis and failure in homeostasis has to consider each of these factors. The summary is that the breakdown of complex organ systems can be explained in cellular and molecular terms. (Davies loan, 1998)

Indeed, the many damaging processes and agents that organisms encounter during life cause the progressive deterioration with age of the physiologic systems that begins during young adulthood. Apparently, repair systems during post maturation and life are not able to fully eliminate the damage. The result is a progressive functional inadequacy of the physiologic systems due to the accumulation of damage (Masoro EJ 1998).

Aging causes decreased elasticity and compliance of the aorta and great arteries. There alterations result in a higher systolic arterial pressure and an increased impedance of left ventricular ejection and subsequent mild LV hypertrophy and interstitial fibrosis. (Aronow W S, 1998; Lakatta Edward G, 1993; Resnick Neil M, 2001).

A decrease in the rate of myocardial relaxation also occurs. As a result, the LV becomes stiffer and takes longer time to relax and fill in diastole, thus increasing the importance of a properly timed atrial contraction in contributing to a normal LV end diastolic volume and forming the basis for diastolic dysfunction and congestive heart failure (CHF) (Spirito Paolo, Maron B J, 1988). There is also a 50-75% loss of pacemaker cells in the sinus node accompanied by a decrease in intrinsic and maximum sinus rate (Aronow W S, 1998, Cheitlin Melvin D, Zypes Douglas P, 2001). The number of atrioventricular (AV) nodal cells seem to be preserved, although an increase in AV nodal delay (PR interval) is common (Lakatta Edward G, 1998). Increased fibrosis of the fibrous skeleton of the AV annuli occur along with fibrosis and loss of specialized cells in the His bundle and bundle branches that can result in heart block (Lakatta Edward G, 1998). Heart valves thicken and calcification results at the base of the aortic valve and mitral annulus (Aronow W S, Kronzon Itzhak, 1990). Aging causes a decreased sensitivity of the heart to beta adrenergic agonists and a diminished reactivity to chemoreceptors and baroreceptors (Lakatta Edward G, 1993; Aronow W S, 1998). There is no

"Study of Electrocardiographic Changes in Elderly Persons"
decrease in myocardial contractility solely as a result of aging, but diseases that do result in decreased contractility, such as hypertension and coronary artery disease are common in this age group.

Cardiac output remains normal at rest, but with a slower heart rate there is an increased reliance on the Frank Starling mechanism to increase stroke volume and keep the cardiac output normal. With exercise a decrease in the ability to achieve maximum heart rate and oxygen consumption is seen in older as compared to younger patients. However, ejection fraction (EF) is kept normal by the increased stroke volume sustained by the larger LV diastolic volume seen with exercise (Chetlin Melvin D, Zypes Douglas P 2001, Aronow Wilber S 1998).

ECG is an important investigation to detect these changes. It helps us to detect the changes induced by various diseases. Hypertension causes left ventricular hypertrophy. There are also changes in heart rate, rhythm in the form of conduction disturbances. It also helps us to determine the condition of the cardiac muscles in the form of ischaemia and infarction. The age selected valvular changes could also be studied using an ECG. It is also helpful in certain clinical circumstances like systemic diseases that affect heart, determination of the effect of cardiac drugs, disturbances in electrolyte balance, specially potassium and evaluation of function of cardiac pacemakers (Schamroth Leo 1990, Gold Schlager Nora, Goldman Mervin J 1989).

Out of the various ECG changes known and studied some are particularly known to be more common in the elderly, viz; the prevalence of exercise induced silent ischemia manifested by ST-T changes, increased from 7% in those less than 50 years of age to 36% in those 70 years of age or older (Gerstenblith Gary, Brocklehurst, 1998); changes in the rate, due to sinus node dysfunction with advancing years is hardly significant (Martin Anthony, 1998) whereas changes in the rhythm are quite common. First degree AV block occurs in between 5-10% of apparently healthy old people. Higher degrees of blocks are uncommon (Martin Anthony 1998). The arrhythmia most commonly seen in the elderly is atrial fibrillation, with a prevalence rate of about 11%. Ectopics are

"Study of Electrocardiographic Changes in Elderly Persons"
so common that at times they are regarded normal findings in the ECG of persons of this age group with an occurrence rate of as high as 80% of apparently healthy old people (Martin Anthony 1998). Changes like LVH are common in patients with hypertension or valvular heart diseases like AS, AR and MR (Channer K S, 1998).

Thus this study is planned to detect the various ECG changes in the elderly population and its correlation with their clinical evaluation.

**

"Study of Electrocardiographic Changes in Elderly Persons"