CHAPTER - I

INTRODUCTION
Let us cherish and love old age;  
for it is full of pleasure,  
if one knows how to use it  
- Seneca

Old age, to the unlearned, is winter;  
To the learned, it is harvest time  
- Yiddish Proverb

Ageing is a process that begins at conception and continues until death. Its gross descriptive characteristics have been known throughout history. It is inexorable, ubiquitous, and affects all forms of life. Beyond such generalisations its sub-characteristics vary among species and, within limits. Within each species, the average age at death varies with sex, incidence of disease, accident rate and environmental conditions (especially the quality and quantity of nutrition) (Ordy, 1984).

Good nutrition is necessary for good health. By definition, nutrition is the combination of processes by which the living organism receives and utilizes the food necessary for the maintenance of its functions and for the growth and renewal of its components. Nutrition is the science of foods, the nutrients and other substances therein, their action, interaction and balance in relationship to health and disease, the processes by which the organism ingests, digests, absorbs, transports and utilizes nutrients and disposes of their end products. In addition, nutrition must be concerned with social, economic, cultural and psychological implications of food and eating (Robinson, 1978; Robinson and Marilyn, 1982).

Health is the state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity. Health care professionals perform nutrition assessment to evaluate people’s health from a nutrition perspective. Nutritional status is the condition of health of the individual as influenced by the utilization of the nutrients.
Nutritional assessments identify the nutritional factors that can be improved to achieve optimal health. For people who are ill, nutritional assessments alert health care professionals to nutrition factors, that may hinder responses to medical treatment and recovery from illness. Nutrition assessments performed at regular intervals provide ways to monitor changes in nutritional status which can be determined by the collection of information by historical dietary data, anthropometric measurement, biochemical analysis and clinical examinations, conducted by a skilled dietitian or other qualified health care professionals. The assessor uses many techniques to collect information from these sources and interprets each finding in relation to the others, in order to create a complete picture of a person's nutritional status. (Ree, 1956)

The idea that the food one eats determines the person one becomes has for long been proclaimed and believed. If this is so, then older persons with long standing, well established nutritional patterns are composites of what they have eaten in their past. Their nutritional status therefore reflects diets which may or may not have been entirely nutritionally satisfactory; eating habits which may or may not have provoked minor or major nutrient deficiencies, and past diseases or conditions which may or may not have affected nutritional status and requirements (Pike and Brown, 1970).

It must also be realised that the diet, nutritional status, and health of older persons are also affected by many non-nutritional factors which include cultural influences on food selection, lack of knowledge concerning what and how much to eat, inadequate income to buy sufficient quantities of required foods, physical infirmities which may affect mobility and therefore interfere with food purchase and susceptibility to food fadism. However, regardless of the past, or inspite of it, intervention with good nutrition at any stage of life may contribute to current and future health.
Throughout one's life span, there is an intimate relationship between genetic and environmental determinants of dietary intake of the macro nutrients: carbohydrates, lipids and proteins. Generally carbohydrates and lipids are known as the major sources of energy, or fuels of the body. Proteins, with their amino acids, provide the building blocks of the body. According to the recommended guidelines of the food and nutrition board, carbohydrates should comprise 40 to 45 percent, lipids 30 to 35 percent and high quality proteins, with appropriate essential amino acids, comprise the rest of total nutrient intake of healthy adults (Kreutzer, 1980).

Evaluations of carbohydrate, lipid and protein requirements of the elderly are generally made in terms of these Recommended Dietary Allowances (RDA) of hypothetical "average" values for the adult population. Even longitudinal studies of nutritional requirements from maturity to old age use the RDA's of average adults as reference standards. Although body weight is a useful reference as a starting point, there is considerable need to assess optimum proportions of macronutrient requirements in the elderly in terms of more specific age related changes in behaviour, physiology, biochemistry and morphology. Age dependent biochemical changes are of special interest for assessment of appropriate RDA's for the elderly, since diet is known to modify the biochemical composition of subcellular organelles, cells, tissues and organs (Kreutzer, 1980).

In addition to the uncertainty of Recommended Dietary Allowances (RDA) of carbohydrates, lipids and proteins, there is even greater uncertainty concerning RDA's for vitamins and minerals, which are involved in a wide range of metabolic processes. They may also serve as structural components of certain tissues. Vitamin and mineral deficiency in the elderly may be due to inadequate intake relative to physiological requirements. It has been estimated that the loss of 20 to 90 percent of micronutrients in refining, processing, and cooking of foods, may be a major factor in poor nutrition
of the elderly. Vitamin deficiencies in the elderly include primary and secondary deficiencies. In primary deficiencies inadequate consumption of a specific vitamin occurs relative to optimum physiological function. In secondary deficiencies, intake may be adequate but absorption, distribution and excretion may be impaired. Wide variation in psychological attitudes, socio-economic status, physiological condition and state of health among the increasing proportion of elderly make it difficult to assess the RDA's for vitamins and minerals. Finally, apart from the macro and micro nutrients; water, another essential component, is necessary to maintain proper fluid balance. It has been recommended that the individuals, 65 years old, should consume two litres of fluid daily, 50 percent of which may come from foods, so that two to five glasses of water per day are still essential. (Ord, 1954)

It is generally recongised that after maturity there are important age related changes - behavioural, physiological, biochemical and morphological that can result in changes in food preferences and/or nutritional requirements. Geographic factors, food availability and socio-economic status may all limit the quality of nutrition, particularly proteins, in the diet of elderly people living on fixed or minimal incomes. Organically the brain, endocrine organs, digestive and the cardiovascular systems are pertinent to nutrition in ageing due to their role in regulation of food behaviour, homeostasis, metabolism, and the transformation and distribution of nutrients in the body. Changes in personality and altered attitudes towards food represent major variables affecting quality and level of nutritional intake. Age related changes in sensory perception of smell and taste are known to result in significant changes in the ability to discriminate among foods and to influence food preferences (Schiffman and Covey, 1984). Older people whose sense of vision, taste and smell are impaired are also likely to be impaired in the ability to select and prepare a balanced diet. Declining neuromuscular coordination may reduce gross movements and breathing capacity, resulting in loss of appetite. Lack of exercise may also impair appetite and digestion.
There are other physiological functions that gradually decline with age. This decline is not uniform, but shows considerable variability among different individuals and even among cells, tissues and organs of the same individual. Some of the physiological decline can be detected under basal or resting conditions, while others can be observed primarily under stress on challenge (Kohn, 1978). Under basal conditions, cardiac output, maximum oxygen uptake, renal plasma flow, maximum breathing capacity, muscle strength and other physiological functions related to energy balance decline with increasing age (Shock, 1972). Various reviews have summarized cardiovascular, endocrine, immune, respiratory, reproductive, gastro-intestinal, skeletal, dental, and excretory system changes that can affect dietary intake and nutritional status in the elderly (Masaro, 1976; Porta, 1980).

The increasing incidence of heart disease, cancer and cerebrovascular disorders in the elderly, are generally considered to represent major influences on nutrition. Excess dietary cholesterol, saturated fat, and sodium intake, lack of exercise, smoking, alcohol, obesity and stress have all been implicated in hypertension and heart diseases (Kreutler, 1980). Maturity onset diabetes is highly age dependent. It can be controlled by diet, weight loss, and insulin therapy. The incidence of nutritional anaemias is greater in the elderly than in younger adults. Of direct concern for adequate nutrition are a variety of digestive and gastro-intestinal disorders in the elderly. Impaired smell and taste can affect appetite and hunger; dental changes may limit intake of solid foods with high quality protein and fibre components; peptic ulcers cause gastric discomfort that results in dietary restrictions; high fat diets are known to cause gastric distress in gall bladder disorders. Diverticulosis and constipation often result from diets consisting largely of processed, easy to chew foods that are inadequate in fibre containing fruits, vegetables, whole grain breads and cereals (Kreutler, 1980).
As a broad generalization concerning post maturity changes in health affected by nutrition, it seems relevant to note that nutrition plays a major role not only in the etiology of the leading diseases in the elderly but also that diet plays an increasing role in prevention of and in therapeutic intervention in these disorders (Weg, 1978).

As ageing progresses, physical activity, lean body mass, and basal metabolism decline, resulting in a net decrease in total energy requirements. Since many elderly people do not decrease their total carbohydrate and fat intake, there is a gradual building of fat tissue in the body with a progressive increase in body weight. There is increasing recognition that RDA’s change from maturity to senescence. In surveys of post maturity changes in blood glucose levels, little change has been found in fasting blood glucose levels with increasing age. However, in glucose tolerance tests, glucose tolerance deteriorates significantly with age. It has been proposed that the deteriorating glucose tolerance may be due to decreased target tissue responsiveness to insulin. Surveys of post maturity changes in lipid metabolism have generally found increasing concentrations of serum lipids, particularly cholesterol, phospholipid and triglycerides. Cross-sectional studies have indicated that adipose tissue mass increases with age upto 55 years, remain unchanged, or decreases subsequently.

Unlike excess dietary intake of sugar and fat, excessive intake of proteins is not considered a serious problem for most healthy adults, including the elderly. In view of the protein composition of enzymes, proteins together with vitamins, minerals and hormones constitute the basic metabolic machinery of the body. Proteins, unlike carbohydrates and lipids, cannot be stored in appreciable quantities and after maturity are utilized for protein synthesis and body maintenance. Despite the great importance of proteins in health and disease states of the elderly, until recently very few
experimental studies have dealt with post maturity changes in protein requirements and/or metabolism (Weg, 1978). Based on decreased rate of protein synthesis and decline of body protein mass with age, it has been estimated that dietary protein requirements may decrease by 30 percent between 20 and 75 years of age. However, it seems likely that the elderly who suffer from gastro-intestinal problems, from disease, who take medication, and who are exposed to stress may require a high protein intake. (Young, 1976).

Height, weight, skinfold thickness, waist circumference and similar indices of anthropometric dimensions may also provide gross but useful indications and guidelines for nutrition and health in old age. Although height and weight are determined by heredity, nutritional factors and other environmental interactions can modify this hereditary potential significantly. Mature and elderly adults who maintain their body weight at the level of 25 year old of their height tend to live longer. However, in reference to height/weight tables for the elderly several important morphological changes that can affect the organ systems of the body must also be recognised. There may be some shrinkage in height due to shrinkage in cartilaginous material between bones of the spinal column. Calcification and ossification of tissues may cause muscles and joints to become less flexible so that bones are more likely to fracture and ligaments are easily torn. In addition to slower reflexes, age related changes in muscles, ligaments, joints and bones are responsible for stiffness, stooped posture, and decreased neuro muscular coordination (Ordy, 1984).

The need for accurate body composition information in elderly subjects is becoming more important as greater number of people reach old age. An overview is given to describe some of the practical reasons as to why body composition data are
necessary in various applied settings. These needs for additional body composition data in elderly subjects include the following uses: to prevent malnutrition in institutionalised persons, to screen for health risks, to plan intervention and evaluate therapy, to study mechanisms of fat pattern change and correlates of stature loss; to study associations among fat patterning and mortality; as a prognostic indicator for conditions receiving treatment and to develop improved reference standard for ambulatory and non ambulatory elderly persons. Hence there is a need for simple, rapid, accurate procedures that can be used to record serial measurements of the changing body composition. These data are needed to determine changing nutrient and energy requirements, drug dosages, and other therapeutic requirements (Kuczmarski, 1989).

There is a persuasive evidence that the elderly are more susceptible to some infectious diseases and that some infections are associated with greater morbidity and mortality. The data in humans point to a defect in delayed immune mechanisms in the elderly; this is expressed as deficits in delayed dermal hypersensitivity and a failure of T.Lymphocytes to respond to stimulation. Theoretically both infectious diseases and carcinogenesis could be affected favourably by enhanced cellular immunity. Duchateau et al. (1981) studied the relation between zinc and immunity and their findings suggested that the addition of zinc to the diet of old persons could be an effective and simple way to improve their immune function. Thus considerable potential benefit can be derived from the study of relationships between zinc nutriture and cellular immunity in the elderly, a group with a high incidence of both cancers and life-threatening infectious diseases.

There is a potential for studies on zinc nutriture in the elderly in India, since dietary studies have consistently shown zinc intakes to be well below the recommended levels in the West. Reports indicated that Zinc absorption is less in elderly than in
young subjects (Sandstead et al., 1982). The commonly found clinical symptoms associated with zinc deficiency such as poor wound healing, impaired immune response and taste acuity occur more frequently in the elderly than in young subjects. As zinc is related to loss of appetite as well as decreased taste acuity, it is appropriate to study the zinc levels of the aged.

Nutrition has been described as a 20th century science. In 1943, the Food and Nutrition Committee of the National Research Council published the first table of dietary standards. Gerontology began in the late 1950’s and expanded very rapidly in 1970’s. The emergence of nutritional gerontology can be attributed to advances in biochemistry of nutrition, physiology and biochemistry of ageing and to the understanding that nutrition is a major factor in health and disease.

The elderly have been one of the most neglected population groups with respect to investigations of nutritional status and establishment of nutritional requirements, due primarily to the limited number of people who lived longer than 65 years. This situation is changing dramatically. In India, the population of the aged has been steadily increasing. India currently ranks fourth among the countries in the world with a population of more than 50 million elderly. By the turn of this century there will be 76 million Indians over the age of 60 years, a number equal to almost the entire population of Germany and twice that of most European Countries and be second only to China. The population is expected to increase further to nearly 150 million by the year 2025, constituting the largest number of elderly in any country in the world. (Schiffman, 1993).

Till recently, older people were invariably staying with their children who cared for them. Today, with the fast onslaught of industrialization and urbanization, joint family systems are collapsing and family is becoming nuclear. The growing tendency
of the migration of children is compelling an increasing proportion of older people to live by themselves either alone or in old age homes/institutions. It has been reported from western studies, that the over all nutritional status of elderly individuals living alone or with their families tend to be better than that of Institutional individuals. The picture in India in this regard is unclear and little information is available.

Research studies on the nutritional status of the elderly in the general population or institutions in India are very limited. The studies on dietary status of elderly in the West indicate lower intakes of protein and iron. Regarding the deficiency signs, anaemia was more prevalent in the aged as compared to adults. A number of studies indicated lowered serum albumin and haemoglobin levels. Mani and Mahajan (1980) stated that a fair number of nutrition surveys for infants, children and mothers have been undertaken in India in the past. But very few studies are available regarding the actual intake of nutrients by the old people. Pushpamma (1981) indicated that diets of elderly population are deficient in many nutrients. They observed that only 40 to 60 per cent of calcium requirement was met and that iron requirement was adequately met in males, while only 64 per cent of the requirement was met in aged females. In the Indian context, the research conducted on aged people is limited. Nutritional assessment of elderly through anthropometric measurements revealed that only one fourth of the subjects were in the normal category (Sarojini et al., 1990). This stresses the need for attention to be diverted to the nutritional care of the elderly.

In the light of the foregoing discussion illustrating the changes in the demographic pattern, especially in India and in view of the paucity of published literature on the nutritional status of the elderly in this country, the present investigation was taken up with the following objectives:
1. To assess the nutritional status of a sample of institutionalised elderly drawn from Day care centres, non paying and paying old age homes in Chittoor district of Andhra Pradesh.

2. To assess the nutritional status of the elderly in the sample as influenced by living style, economic status and gender and in a sample of the non-institutionalised (Homebound) elderly drawn from the same locality. Assessment of nutritional status included the four parameters of dietary, anthropometric, biochemical and clinical examinations.

3. To assess the taste acuity of the elderly in a sub sample and compare it with that of younger subjects and

4. To study interrelationships among various dietary constituents, biochemical parameters (haemoglobin, serum total protein, albumin and zinc levels) anthropometric data, clinical examination and taste acuity (perception) data in the sample of the study.