I INTRODUCTION

When health is absent, wisdom cannot reveal itself, strength cannot fight and intelligence cannot be applied.
- Herophilus

Health is an essential component for well-being of the human kind and is a positive concept emphasising social and personal resources as well as physical capacities. Health is not just a state, but also a resource for everyday life (WHO, 2005).

A healthy diet is essential for growth, development and improvement of quality and length of life. Optimum health can be obtained with optimum nutrition. Balanced diet containing calories and essential nutrients, both macro and micro can prevent nutritional deficiencies, excesses and future illnesses (Hemalatha and Prakash, 2002).

Healthy diet provide the right balance of carbohydrate, fat and protein to reduce risks for chronic diseases and are a part of a productive life style. Such diets are obtained from a variety of foods that are available, affordable and enjoyable. Nourishment is also a prime requirement to maintain health and to keep away from illness.

Nutritional and health status are determined by assessing the consumption pattern. Thus it is well established that nutritional status is a major determinant of the health and well-being of the population. In India, people living in the backward and drought prone rural areas, urban areas and those belonging to the socially background groups like schedule castes and tribal communities are highly susceptible to undernutrition and it is a pressing issue putting the health of these population in a state of emergency.

India is the home to large number of indigenous people, who are still untouched by the lifestyle of the modern world. With more than 84.4 million, India has the largest population of tribal people in the world. These tribal people, also known as the adivasis, the poorest in the country, who are still dependent on hunting, agriculture and fishing. All tribal people have their own culture, tradition, language and lifestyle (http://www.ecoindia.com/tribal).
The word ‘Tribe’ denotes a group of people living in primitive conditions. Around 80 per cent of tribal population is found in Central India. There are around 636 scheduled tribe categories in India (http://www.forests.tn.nic.in/tribaldevelopment/tribaldevelopmenthome.html).

Adivasi is an umbrella term for a heterogenous set of ethnic and tribal groups claimed to be the aboriginal population of India. They comprise a substantial indigenous minority of the population of India (http://www.ecoindia.com/tribal).

Adivasi societies are particularly present in Andhra Pradesh, Bihar, Chattisgarh, Gujrat, Jharkhand, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu, West Bengal and some Northeastern states and the Andaman and Nicobar Islands.

Tribes are one of the most exploited and deprived sections of the population in the Indian society. In all indications of development, they remain the most excluded despite the fact that various kinds of policies and programmes have been pursued for their upliftment in the post-independence India. The exclusion from the development has adversely affected the quality of life of the tribal people (Sarkar et al., 2006).

India being the second largest tribal dominated creed after Africa, which is one of the most fascinating nations of the world from anthropological point of view. The total tribal population of India in rural is 11.3 per cent and in urban is 2.8 percent (Census of India, 2011). As many as 427 tribal communities are residing in India of whom 75 are declared as primitive tribal groups who are spread across the country.

Tribes are found in approximately 461 communities, with almost 92 per cent of them residing in rural areas, mostly in remote underserved forest regions with little or no basic civic amenities like transport, roads, markets, health care, safe drinking water and sanitation. Tribal communities therefore they lag behind other communities with respect to attainment of income, education, health and other requisites for food and nutrition (Srinivasan and Mohanty, 2004 and Banik et al., 2007).
Tribal population still largely depend on the agriculture and forest products for their livelihood and they follow a relatively homogenous lifestyle with their food habits, dietary practices and general pattern of living (Patwardhan, 2000). The most frequently used cereals are maize, millets or rice and these form part of a major meal at least once daily (Kapil et al., 2003).

Tribal population in Tamil Nadu is 6,51,321. There are around 38 tribes and sub-tribes in Tamil Nadu and literacy rate is 27.9 per cent of the population. The tribal people are predominantly farmers and cultivators and they are much dependent on the forest lands. Of all the distinct tribes, the Kotas, the Todas, the Irulas and the Kurumbas form the larger groups, who mainly had a pastoral existence. Other tribes include Kattunayakan and Paniyan amongst others (www.indiainfoweb.com/TamilNadu/tribes/irulas.html).

Irula or Irulas, a scheduled tribe, are one of the major tribes of Tamil Nadu and are distributed in 12 districts. The total population of Irulas in Tamil Nadu is 1,55,606 (77,942 males and 77,664 females) and their literacy rate is 34.3 per cent. In Tamil Nadu, the Irulas are known by several names as Irulas, Iruligaru, Iruliga, Iruvan, Villiar, Kadu poojari. The name Irula is supposed to be derived from the Tamil word “Irul” meaning darkness which refers to their darker skin complexion (www.indianetzone.com/2/tribes_tamil_nadu_india.htm).

Irulas mainly live in Kanchipuram, Nilgiris and Villupuram districts of Tamil Nadu. Ethnically they belong to the Negroid race. Their language is a mix of Tamil and Kannada. The Government of India identified the Irula as one of the six primitive tribal groups of Tamil Nadu.

Their main occupations are snake and rat catching besides trading in snake skin and forest products such as honey, bee wax and forest wood. The Irula economy began to decline after the laws to prevent snake skin trade and preserve forest regions were enacted.

Malaria, pneumonia, respiratory disorders, snakes and scorpion bites, diarrhoea and fever are commonly reported ailments. Young tribal girls enter the reproductive age as victims of under nourishment and anaemia. They face
greater health risks as a result of early marriage, frequent pregnancies, unsafe deliveries, sexually transmitted diseases and are exposed to a greater risk of reproductive morbidity and mortality.

Adolescence is defined commonly as the time between the onset of puberty and adulthood and it is a very significant phase in human life. Adolescent is the second most critical period of physical growth in life cycle after the first year. Twenty five per cent of adult height is attained during adolescence. For many adolescents, inadequate quality and quantity of food are the prime determinants of nutrition problems (Kurz and Welch, 2004). Unfortunately adolescent girls are a neglected sector of the population and ignorance with regard to nutritional requirement, hygiene and illness are responsible for the low nutritional status of adolescent girls.

Adolescent girls often suffer from anaemia which is detrimental to growth and perpetuates the vicious cycle of malnutrition (Jolly et al., 2008). The main nutritional problems affecting adolescents include undernutrition in terms of stunting, thinness, catch-up growth, iron deficiency anaemia, iodine, vitamin A and calcium deficiencies and deficiencies of zinc and folate (Hart et al., 2003). Iron deficiency anaemia can be associated with low dietary intake of iron, inadequate absorption of iron or excessive blood loss.

Women are more likely to suffer from nutritional deficiencies than men for reasons including women’s reproductive biology, low social status and lack of education (Gillespie, 2003). Prevalence of undernutrition in women is high and it is positively associated with economic status, poverty, dietary intake, nutritional and health status (Ramachandran, 2007). Around 50 per cent of Indian women suffer from nutritional anaemia (Bently and Griffiths, 2003; Metha et al., 2007 and deBenoist et al., 2008).

The largest determinant of undernutrition among population is micronutrient deficiency of vitamin A, iodine and iron. The most highly and specifically affected are those in rural areas and scheduled caste and tribe (India: Nutrition UNICEF) (http://www.unicef.org/india/nutrition188.htm).
Studies carried out by National Nutrition Monitoring Bureau (NNMB, 2003) in the rural population revealed that the prevalence of undernutrition, as assessed by weight for age is about 40 to 50 per cent and that of iron deficiency anaemia is about 70 per cent.

A study by Mishra (2005) using the National Family Health Survey (NFHS-3) found that in almost all the states of India, tribal households had a higher incidence of childhood stunting (52.3%) than non-tribal households (42.8%). Using the same data set, Nagda (2004) reported that anaemia is prevalent among more than 80 per cent of tribal children. Iron deficiency is recognized as the major cause of anaemia in tribal communities (Vyas and Choudhry, 2005).

Studies have also reported deficient intake of calories and protein among tribal populations relative to the Indian Recommended Dietary Allowances (RDA) which may explain the high rates of stunting among their group (Mittal and Srivastava, 2006).

These studies indicated that comparatively, the overall health of the tribal people is inferior to that of people elsewhere in India and that poor environmental sanitation and unhygienic personal practices predispose tribal population to high risk of infection and malnutrition.

Thus, the overall health of the tribal people calls for attention. Due to poor environmental sanitation and unhygienic personal practices, the majority of Irulas are malnourished and this has led to many Irulas becoming chronically ill.

Several studies have documented a close relationship between the tribal eco system and their nutritional status (Kodavanti et al., 2006). Inadequate health care facilities and ecological degradation further aggravate the situation.

Beliefs, customs and food stuffs available in the region has a greater influence on the nutritional status of the community and with regard to tribes, it is more relevant as they have a stronger bondage with regard to their traditional food practices and values.
Nutrient intake depends on actual food consumption which is influenced by factors such as economic situation, eating behaviour, emotional atmosphere, cultural influences, effect of various disease condition on appetite and the ability to consume and absorb adequate nutrients (Kathleen, 2011).

Women play a pivotal role in child care but are denied access to the resources they need to fulfil their responsibilities, which comprises education, health care services and job training (Malhotra and Passi, 2002).

Poor health has repercussions not only for women but also for their families, therefore, it is important to use an appropriate measure to combat nutritional deficiencies especially iron deficiency anaemia (Rawat, 2001).

The high rates of anaemia among tribal populations provide additional evidence of the possibility of marginal zinc deficiency in tribal areas. A study has shown that intake of population in tribal regions was significantly lower than that of any of the other regions (Agte et al., 2005).

Adolescence marks an important landmark in the development of an individual in the sense that it comprises early half of growth period. Significant increases in physical dimensions are observed during this period. Due to several factors like heredity, environment, socio-economic status, illness and malnutrition in childhood, growth spurt during adolescence varies in intensity and duration from individual to individual (Savitha et al., 2013).

There is a general agreement that many adolescent girls in India need iron supplementation, which in turn will improve pre-pregnancy haemoglobin status and iron stores. Possibly, it may be easier to build their iron and folate reserves by supplementation / dietary diversification and education through schools (Agarwal, 2003).

Several intervention programmes have been initiated to combat the micronutrient deficiencies especially iron deficiency anaemia. The most commonly adopted strategy is the dietary supplementation which will be effective, preventive and curative (http://www.who.int/nutrition/publications/micronutrients/guidelines_for_Iron_supplementation.pdf).
Though adolescence is a neglected area, it is being increasingly realized that if focused attention is given to adolescence, a very significant improvement could be made in the life of women in their long reproductive years as well as the life of their offspring.

While research on the situation analysis of anaemic adolescent girls is needed, it is equally imperative to explore intervention strategies which are acceptable, affordable and will reduce anaemia in these girls in the long term.

A varied array of interventions exist that are designed to prevent and correct iron deficiency anaemia. These include dietary improvement, fortification of foods with iron, iron supplementation, and other public health measures, such as helminth control. All of these approaches improve iron status in some contexts. The appropriate use of iron supplements will be an important part of anaemia control programmes in almost all contexts, but supplements should be viewed as one of several tools in the battle against iron deficiency anaemia. The amount of iron absorbed from the diet is not sufficient to meet many individual requirements of the population.

The priority among target groups for iron supplementation is based on the likelihood of both iron deficiency and the public health benefits resulting from its control. Supplementation would also benefit women of reproductive age, preschool children, school-age children, and adolescents, and this might be a reasonable strategy. In these target groups, the decision to supplement will most likely depend on feasibility, which might be the highest in a day care or school setting for children and adolescents or in a workplace setting for women. Iron supplements are essential for the rapid treatment of severe iron deficiency anaemia in all sex and age groups.

The efficacy of once or twice weekly supplementation in school-age children, adolescents and non-pregnant women is promising and the operational efficiency of intermittent dosing regimen has to be evaluated.

The best source of iron is red meat, especially beef and liver. Chicken, turkey, pork, fish and shellfish also are also good sources of iron. Examples of non-meat foods that are good sources of iron are iron-fortified breads and
cereals, peas, lentils, white and red baked beans, soybeans and chick peas, tofu, dried fruits such as prunes, raisins and apricots, spinach and other dark green leafy vegetables. Vitamin C helps the body to absorb iron. Good sources of vitamin C are vegetables and fruits especially citrus fruits. Fresh fruits, vegetables and juices usually have more vitamin C.

Acharya (2003) states that low birth weight infants are due to poor maternal nutrition and in turn they are at a greater risk of growth retardation during childhood. Thus nutrition and health of the adolescent girls who are “mothers to be” will be adversely affected. Breaking this cycle of malnutrition and improving women’s health are major challenges and these can be overcome by proper nutrition intervention programmes. Major factor influencing health status is education, especially female education.

Nutrition education is the vital aspect of health care. The health and nutrition messages can be delivered by any modern media as well as traditional media like television, radio, folk song, drama, puppetry, handouts, booklets, posters and pamphlets (NNMB, 2002).

Nutrition education might be an important strategy to combat iron deficiency anaemia in adolescent girls, stressing the importance of haemophilic nutrients and consumption of green leafy vegetables, which are excellent source of iron and micronutrients.

Literacy programmes and training sessions on the importance of good practices is the foundation for health and development for adults and children and a milestone to achieve a better quality of life.

Government of India has been implementing several programmes for overall development of the tribal communities. In addition, there are 75 micro projects for the development of primitive tribal groups living in secluded regions of the country.

The majority of Irulas are malnourished, know little about sanitation and have less access to hospitals. This has led to many Irulas becoming chronically ill.
The adolescent population of Irula tribes are unaware of the significance of nutrition and health. Adolescent Anaemia Control Programme (AACP) in 2009 implemented jointly by the state departments of Health and Family Welfare; Women and Child Development has several components ranging from screening teenagers for anaemia, counseling them on good eating habits, preventing intestinal worm infestations and ensuring the administration of folic acid and elemental iron.

The incidence of the disease is on the rise among the tribal population. Comparatively, the literacy rate has increased but the traditional food practices and life style of tribes are changing gradually.

It is obvious that health and nutrition status of tribal adolescent girls and women in interior inaccessible regions of Tholampalayam panchayat, Karamadai block, Coimbatore district are poor due to lack of nutritional awareness, non-availability of health services and malnutrition linked disease burden on tribal adolescent girls. Transport, drinking water and sanitation facilities are unsatisfactory. Though Government funds and nutritional schemes are available for tribes, still disease burden is increasing and resulting in negative growth rate. The growth spurt during early adolescence mounts pressure on the overall nutritional requirements of adolescent girls and the major micronutrients of concern in adolescent growth and development are iron, calcium and iodine.

It is imperative to safeguard and protect the adolescent girls and women population from malnutrition and to improve the overall health of the tribal population. Through nutrition and health education, good environmental sanitation can be emphasised, to adopt hygienic personal practices and to improve their nutritional status. With this background, the research study is focused on improving the health status of tribal adolescent girls by enhancing their haemoglobin level. Use of novel types of supplements other than allopathic supplement has a better strategy to overcome anaemia. Hence the alternative strategy is through food, which is cost effective and free of side effects.
The supplementation of iron rich foods will promote the health of the tribal adolescent girls by controlling the incidence of nutritional deficiency disorders. This may promote the health status by which they will be empowered to face the challenges in their future life. Also there is an urgent need to educate and enlighten the tribal population on the importance of proper nutritional aspects and to retain the traditional food habits and thereby sustain good health.

Imparting nutrition education to reduce the incidence of lifestyle diseases is a step towards avoiding ill health and emphasises that the greatest panacea is indeed prevention. With this background the present study was undertaken with the following objectives:

**General objectives:** To understand the dietary practices of Irula tribes and assess the impact of intervention programmes among target groups.

**Specific Objectives:** To

- study the socio-economic status of the selected tribal population
- understand the dietary practices and identify the use of medicinal plants
- observe the nutritional deficiency disorders among the selected population
- develop a product suitable for dietary intervention and
- implement intervention programmes and study its impact on selected target groups.

**Hypothesis**

1. There will be improvement in the haemoglobin status of adolescents after the administration of formulated iron rich supplementary mix.

2. Dietary practices and health status of selected adolescents and adult women will be improved after health and nutrition education intervention programme.