

**EFFECTIVENESS OF AMLA JUICE WITH ELEMENTAL  
IRON AMONG ADOLESCENT GIRLS ON IRON  
DEFICIENCY ANAEMIA IN GOVT. MANOHARA  
SCHOOL AT SELLUR, MADURAI**

**M.Sc (NURSING) DEGREE EXAMINATION  
BRANCH – IV COMMUNITY HEALTH NURSING**

**COLLEGE OF NURSING  
MADURAI MEDICAL COLLEGE, MADURAI - 20**



*A dissertation submitted to*

**THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY,  
CHENNAI – 600 032.**

*In partial fulfillment of requirement for the degree of*

**MASTER OF SCIENCE IN NURSING**

**APRIL – 2015**

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## ACKNOWLEDGEMENT

*“I will praise you, O Jesus, with my whole heart,  
I will tell all your marvellous works,*

Drops of water make an ocean. Although bricks give the structure of the house, proper foundation makes it strong. A thesis, however, insignificant it is, can seldom be claimed as the work of an individual. There have been persons who stood beside all my efforts to successfully complete my study.

I praise and thank **God Almighty** for his abundant grace, kindness, care and blessings showered upon me throughout the study. I, the investigator of this study, owe my sincere thanks and gratitude to all those who have contributed towards the successful completion of the endeavour.

My sincere thanks to **Captain Dr.B.Santhakumar, M.Sc (F.Sc),MD(F.M),PGDMLE, Dip. ND (F.N) Dean, Madurai Medical College, Madurai**, for granting me permission to conduct the study in this esteemed institution.

Truly admitting I have no words in my dictionary to express my inner feeling of inefficient indebtedness towards my research guide **Mrs.S.Poonguzhali, M.Sc (N), M.A, M.B.A, Ph.D., Principal**, Department of Medical Surgical Nursing, College Of Nursing, Madurai Medical College, Madurai, who endowed me an opportunity to work under the shadow of his able supervision. Her inspiration, guidance, keen observation and amazing perspicacity throughout my research were really a great essence for the completion of this work. Without her help and insights, this endeavour might have never been come into shape.

I feel opportunistic to express my debt of gratitude to my subject Guide **Mrs.R.Amirthagowri, M.Sc(N)**, Lecturer , College Of Nursing, Madurai Medical College, Madurai for her meticulous and logical approach in solving problems.

I also wish to express deep sense of gratitude to **Mrs.G.Selvarani M.Sc (N)**, Faculty in Nursing, College of Nursing, Madurai Medical College, Madurai for her advices, healthy discussions and valuable suggestions at the time of need, her innovative ideas and giving me a wide exposure of the latest technologies existing in the current topic assigned to me.

My special thanks also extend to **Mrs. N. Rajalakshmi . M.Sc.(N)** and **all faculties of college of Nursing, Madurai medical college**, Madurai for their guidance and support for the completion of my study.

My Sincere thanks to **Dr.M.Saleem, M.D (Community Medicine), Associate Professor, Institute Of Community Medicine** for his generous support, keen interest, valuable corrections, guidance to translate this study into illustration.

I express my deep sense of gratitude to for his valuable suggestions and fruitful discussions throughout this whole work. I would like to express my thanks **MR. MANI** for his patient help in statistical analysis.

I express my thanks to **Mr.S.Kalaiselven, M.A, B.I.L.Sc., Librarian**, College of nursing, Madurai Medical College, Madurai, for his cooperation in collecting the related literature for this study.

I also wish to express deep sense of profound gratitude to It gives me immense pleasure and privilege to thank **to Mr. Paul Jeyakumar, Correspondant** limited to granting me permission to conduct the study in his school and give his expert opinion and useful feedbacks, support throughout this period.

My affectionate thanks to **my lovable family members** and friends, it would not have been possible to complete this thesis without the support, patience and endurance during the course of the study.

My deep heartfelt gratitude and sincere thanks to all the **Adolescent girls** who remained as my study samples in spite of their routines and extend their fullest cooperation.

## ABSTRACT

**Title :** Effectiveness Of Amla Juice With Elemental Iron Among Adolescent Girls On Iron Deficiency Anaemia In Govt. Manohara School At Sellur, Madurai. **Objectives :** To assess the level of iron deficiency anemia among adolescent girls; To evaluate the effectiveness of amla juice with elemental iron among adolescent girls on iron deficiency anemia; To find out the association between the level of iron deficiency anaemia among adolescent girls with their selected socio demographic variables. **Hypotheses :** There is a significant difference between pre and post test level of iron deficiency anaemia among adolescent girls ; There is a significant association between the level of iron deficiency anaemia among adolescent girls with their selected socio demographic variables. **Methodology:** The conceptual framework was based on Wiedenbach's Helping art in clinical theory. Pre experimental one group pre-test - post test design was used & 40 subjects were selected by purposive sampling. The study was conducted at Government Manohara School at Sellur, Madurai. After obtaining an informed consent from their parents, Pre test was done by using self administered questionnaire and anaemia symptoms were assessed with observation check list and estimation of haemoglobin by cell count method in the clinical laboratory before and after intervention. **Results :** The mean pre test mean score was increased from 9.35 to 10.11. the 't' value 6.05 was much higher than the table value at 0.001( pre set level of significance was 0.05). **Conclusion:** The study concluded that amla juice with elemental iron was effective on increasing the haemoglobin level among adolescents girls.



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# *Introduction*

# CHAPTER I

## INTRODUCTION

*“Maturity is a high price to pay for growing up.” - Tom Stoppard*

Health is a fundamental human right and health is central to the concept of quality of life . Adolescents is a period of second decade of life and constitute over one fifth of India’s population. Adolescence begins when the secondary sex characteristics appear and ends when somatic growth is completed and the individual is psychologically mature, capable of becoming a contributing member of society. Adolescents are in the age group of 12 to 18 years. The girl should have weight approximately 42-64 kg and height approximately 155-169 cm. Total nutrient requirements are increased during adolescence age to support a period of dramatic growth and development. Eating right food at right time will prevent the nutritional deficiencies especially Iron deficiency disorders (**Dorothy *et al.*, 2007**).

Adolescence is a critical stage in the life cycle, when the health of females is affected due to growth spurt, beginning of menstruation, poor intake of iron due to poor dietary habits and gender bias. Iron deficiency anaemia affects over 60% of the adolescent girls in India. Anaemia in adolescent girls has far-reaching implications. The anaemic adolescent girls grow into adult women with compromised growth, both physical and mental conditions. These women have low pre-pregnancy weight, and are more likely to die during childbirth and deliver low birth weight babies.

Iron is one of the micronutrient, used for formation of haemoglobin, oxygen transportation, brain development, regulation of body temperature and muscle activity. When the iron is decreased in human body, it is called as iron deficiency. Iron deficiency is the most common etiological factor in anaemia.

The decreased haemoglobin level is called as iron deficiency anaemia (Park, 2007). Anaemia is a serious public health problem, which affects the mental and physical development, as well as health maintenance and work performance. Iron deficiency is by far the most common cause of anaemia worldwide. About 2 billion people suffer from varying degrees of anaemia in developing countries. Iron deficiency occurs when insufficient iron is absorbed to meet the body's needs. This may be due to inadequate iron intake, poor iron absorption, increased iron need or chronic blood loss. Prolonged iron deficiency leads to iron deficiency anaemia (IDA)..

Adolescence is the period when the individual can be shaped and moulded into great adults psychologically. The sense of identity and crisis of intimacy and isolation increase as adolescent progress towards young adulthood and move from dependency to the beginning of independence. Metamorphically adolescents change their behavior patterns and values as well. The rates of change in attitude, interest are seen as parallel to the rate of physical change in the growth and development of an adolescent, The emotional disturbance might lead them to react to frustration through maladjusted behavior by children were more in Schools and Colleges [Lalitha,1999]

Global database by World Health Organisation [2007] on child growth and malnutrition and national family health survry-2 in India, had suggested that adolescent girls of urban, semi urban & rural schools in India are found to be anemic & prevalence rate between 61.9 to 88.1 percentage, begin highest among rural girls



of higher order as compare to urban poor girls irrespective of their age menarcheal status. This could be due to difference in dietary habits, worm infestation, poor hygiene, poor sanitation.

India is one of the fastest growing youth populations in the world with an estimate 190 millions adolescent of which 22% are girls, the government of Tamilnadu Directorate of public health and preventive medicine [2002] conducted a study on prevalence of anemia among adolescent girls in the urban girls were anemic. Directorate of public health reports stated that 3.44% of school adolescents are anemic out of which 59% of them are receive iron & folic tablets.

Anemia is one of the most widespread public health problems, especially in developing countries like India & has important health & welfare, social & economic consequences, these include repaired cognitive development, reduced physical work & in severe cases, increased risk of mortality particularly during the perinatal period. There is also evidence that anemia may result in reduced growth & increased morbidity. Given the magnitude of the problem, greater efforts are needed to develop & implement programs both to prevent & to control anemia. Park [1998] suggested that iron deficiency anemia is a major nutritional problem in India and in many other developing countries 20-40% of natural deaths are due to anemia during pregnancy.

Stoltzfus [2003] consider iron deficiency to be one of most prevalent forms of malnutrition. yet there has been a lack of consensus about the nature & magnitude of health consequences of iron deficiency in population. The public health importance of iron deficiency anemia which was made as part of the global burden of disease [GBD] 2000 project, iron deficiency is consider to contribute to death and disability & also through its direct contribution to cognitive impairment, decreased work productivity,

and death from severe anemia based on meta-analysis of observational studies, mortality risk estimates as the decreased risk in mortality for each 1g/dl increase in mean hemoglobin concentration, on average, globally 50% of the anemia is assumed to be attributable to iron deficiency. globally iron deficiency ranks number among 26 risk factors included in the Global Burden Diseases 2000, and accounts for 8,41,000 deaths & 35,057,000 disability adjusted life. There is an urgent need to develop effective & sustainable intervention to control iron deficiency anemia.

There are several types different types of anaemia, The seven common types of anaemia are

- ❖ Iron Defficiency anaemia
- ❖ Thalassaemia
- ❖ Aplastic anaemia
- ❖ Haemolytic anaemia
- ❖ Sickle cell anaemia
- ❖ Pernicious anaemia
- ❖ Fanconi anaemia

The most common form of anaemia is iron deficiency anaemia which is usually due to chronic blood loss caused but excessive menstruation. Increased demands for iron , such as foetal growth in pregnancy, and children undergoing rapid growth spurts in infancy and adolescence, can also caused iron deficiency anaemia. This condition is treated with iron supplementation as well as the treatment of the underlying cause of the iron deficiency.

The bio availability of iron can be enhanced by positive dietary habits reduce the intake of inhibitors and enhanced iron absorption through vit-C, Vit.A rich fruits & vegetables. [yegammai & A.swarnalatha,2003]

In India, the existing prevalence studies were carried out mostly in northern states, agarwal had documented that the prevalence of anemia was 46% in pre menarcheal girls as compared to 48% in post menarcheal girls in the urban slums of north east Delhi,. in rural India a survey is conducted among 13 to 19 years old girls & found out anemia prevalence rate of 83% among girls in schools & 93% among girls not in school.[agarwal,1998]

Iron deficiency anemia is a major nutritional problem of both developed & developing countries.4.5 billion people of the world's population are anemic. the incidence of anemia is highest among women & young children varying between 60% to 70% .[yegammai & swarnalatha,2003]

Dietary iron exists in 2 form heme iron found in hemoglobin, myoglobin & some enzymes., heme iron found in plant foods but also in some animal food. The absorption of heme iron is affected only minimally by the composition of food media & gastro intestinal secretions., but non haeme iron absorption is affected by other compounds in food that inhibits or enhance its absorption, phytate, tanins which are polyphenols in tea inhibits where as presence of calcium helps to improve absorption.

Iron absorption refers to the amount of dietary iron that the body obtains. Healthy adults absorb about 10% to 15% of dietary iron, but individual absorption is influenced by several factors.

Storage levels of iron have the greatest influence on iron absorption. Iron absorption increases when body stores are low. When iron stores are high, absorption decreases to help protect against toxic effects of iron overload. Iron absorption refers

to the amount of dietary iron that the body obtains. Healthy adults absorb about 10% to 15% of dietary iron, but individual absorption is influenced by several factors.

Meat proteins and vitamin C will improve the absorption of nonheme iron. Tannins (found in tea), calcium, polyphenols, and phytates (found in legumes and whole grains) can decrease absorption nonheme iron. Some proteins found in soybeans also inhibit nonheme iron absorption. It is most important to include foods that enhance nonheme iron absorption when daily iron intake is less than recommended, when iron losses are high and when only vegetarian nonheme source of iron are consumed. **(Rani, 2010)**. Iron deficiency anaemia will be prevented by adequate dietary intake or iron such as green leafy vegetables such as amaranthus, spinach, coriander leaves, drumstick leaves, radish leaves, vegetables such as beet root, drumstick, cereals like ragi, barley, rice (raw milled), legumes like bengal gram dhal, black gram dhal, soyabean, nuts and oil seeds and fruits such as chickoo, pomegranate and jaggary **(Swaminathan, 2008)**

Storage levels of iron have the greatest influence on iron absorption. Iron absorption increases when body stores are low.. Iron absorption is also influenced by the type of dietary iron consumed. Absorption of heme iron from meat proteins is efficient. Absorption of heme iron ranges from 15% to 35%, and is not significantly affected by diet. In contrast, 2% to 20% of non-heme iron in plant foods, such as rice, maize, black beans, soybeans and wheat is absorbed. Non-heme iron absorption is significantly influenced by various food.

Iron deficiency is the most common and widespread nutritional disorder in the world and affects a large number of children and women in developing countries, it is the only nutrient deficiency which is also significantly prevalent in industrialized

countries. The numbers are staggering 2 billion people i.e. – over 30% of the world's population are anemic, many due to iron deficiency, and in resource-poor areas, this is frequently exacerbated by infectious diseases. Iron deficiency affects more people than any other condition, constituting a public health condition of epidemic proportions. causing , protein-energy malnutrition, iron deficiency exacts its heaviest overall toll in terms of ill-health and premature death. Iron deficiency and anaemia reduce the work capacity of individuals and entire populations, bringing serious economic consequences and obstacles to national development. Overall, it is the most vulnerable, the poorest and the least educated that are affected by iron deficiency.

One of the major problem affecting adolescent girls is anaemia, a familiar nutritional problem to be concentrated more to improve their quality of life., since they are going to be the future home makers

Amla strengthens absorption and assimilation of food. It improves digestion and stimulates our taste buds to relish food better. It can be used by everyone without fear of gastric irritation, or increased acidity. It aids in better absorption and assimilation of iron from the gut. It also acts as a laxative in large doses due to its high fibre content

Global data base by World Health Organisation (2007) on child growth and malnutrition and National Family Health Survey – 2 (2007) in India, had suggested that adolescent girls of urban, semi urban and rural schools in India are found to be anaemic and the prevalence rate to be between 61.9 to 82.1 percentage, being highest among rural girls of higher order as compared to urban poor girls irrespective of their age and menarcheal status. This could be due to differences in dietary habits, worm infestations, poor hygiene, and poor environmental sanitation.

Anaemia is a major public health problem throughout the world particularly for women of reproductive country. As per district level health survey, prevalence of anaemia in adolescent girls is very high 72-6% in India with prevalence of severe anaemia among them much higher 21.1% than that in preschool children 2.1% in adolescent girls, educational or economic status does not seem to make much of difference in terms of prevalence of anaemia. Prevention, detection or management of anaemia on adolescent girls has till now not received much attention. It is imperative to screen them from anaemia and treat them.

A pre experimental study conducted on seven men and three women (mean age, 31.2 years; range, 20-45 years) received a strictly controlled regular diet during 2-weeks on control period, followed by the regular diet supplemented with daily consumption of Amla juice. At the end of each period, blood samples were withdrawn for assays of blood glucose, blood minerals, vitamin C, glutathione reductase, immunoglobulin E, hemoglobin, blood indices and cells, serum ferritin, serum iron, and iron-binding capacity. Results showed that Amla juice increased antioxidant agents; it increased blood vitamin C concentration by 47% and glutathione reductase by 7%, increased serum iron by 20% and decreased plasma ferritin by 11%. It may be concluded that Amla juice increased antioxidant agents, serum iron and blood indices, and trace elements and decreased immunoglobulin E, liver and muscle enzymes, and fasting blood sugar in healthy subjects.

An experimental was conducted to assess the effectiveness of oral administration of *Emblica officinalis* (Linn.) was found to be effective in protecting girls against the anaemia. Not only haemoglobin and also protects hematological and biochemical modulation in blood. The 30 girls were taking daily *Emblica officinalis*

duration of eight weeks. A significant increase in the RBC, WBC, hemoglobin, and hematocrit values was observed in the mothers treated with *Emblica officinalis* extract as compared to the hematological values observed the girls in an other group 21 members without treatment of *Emblica officinalis*. The results show that the girls need any nutritive supplementation which will increase the hematological values to meet the needs of nutritive value. Suggestions of this study are the supplementation of *Emblica officinalis* can prevents the anaemia in adolescents.

A study was conducted to reveal the improvement of consuming vitamin C foods to improve the hemoglobin levels. The participants from Baroda city were given a mixed diet in a hotel with vitamin C rich guava, citrus fruits, lemon juice . At the end of one month interventional trail, there was a very significant rise in hemoglobin levels of the study participants.

## **1.1 NEED FOR THE STUDY**

Iron deficiency anaemia is the most prevalent nutritional problem in the world today affecting all societies in developed and developing alike. Adolescent girls are particularly susceptible to iron deficiency anaemia because of the increased need for the dietary iron for haemoglobin and myoglobin synthesis, during this rapid period of growth, when blood volume and muscle mass are expanding in adolescent girl. As an individual adolescent girl need extra iron according to the stage of development.

Anaemia is the term that indicates a low red cell count and a below normal haemoglobin or haematocrit level. The prevalence of anaemia in India is reported that in urban and rural is 50% and 60% respectively. The solution for combating anaemia are both inexpensive and effective by providing iron rich diet increasing iron absorption by inclusion of ascorbic acid in diet.

Nutrition in adolescence has not received adequate attention. Beside from anaemia due to iron deficiency, chronic malnutrition and other micronutrient deficiencies such as zinc deficiency may also affect adolescence.. Nutritional needs of the adolescent are increased due to speedy growth during adolescence. The diets of the adolescence provide extra energy protein and vitamins to meet the additional requirements for rapid weight gain. Iron deficiency anaemia which is high in incidence world wide and the most prevalent anaemia and is caused by inadequate absorption or excessive loss of iron. The term anaemia refers to a deficiency in the number of circulating red blood cells available for oxygen transport; Anaemia is a reduction below the normal in the number of erythrocytes. The haemoglobin and the volume of packed red cells reduced by rapid blood loss, impaired production of Red blood cells or increased destruction of erythrocytes.

Anaemia is the most form of malnutrition among adolescent today. It is one of the public health significance in our country. Adolescent (10-19) constitute >20% of our population in India & 50% suffer from iron deficiency anaemia. Both urban and rural, suffer from anaemia & being more in girls than boys. Poor economical status faulty dietary pattern, lack of awareness & education, urbanization prevalence of malaria, hookworm & other infestation, repeated bacterial infections also influence the incidence & nature of anaemia among growing children and adolescents.

A true experimental study was conducted by Vijayalakshmi et. al (2000) to assess the bio availability of iron from mug beans and its effect on the nutritional status of adolescent girls, at Mulaivail, Karur. 150 samples were selected between the age group of 12-18 years. The anthropometric measurement and serum hemoglobin, iron binding capacity tests were done for them. The intervention was given for about



40 days. The findings revealed that socio-economic background indicated that 91.6 percent were from nuclear families, 81.8 percent were having a family size of 4-6, seventy four percent of girl's mothers were being illiterate, and over 75 percent in low income group, before the intervention it the mean value of hemoglobin was 9.1 g/dl and after the intervention was 11.3g/ml. There was a significant seen in the hemoglobin level ( $p < 0.001$ ).

In India, 52% of women of reproductive age and 745 of children are anaemic. According to World Health Organisation report in 2011, iron deficiency anaemia is one of the top ten risk factors in developing countries for lost years of healthy life. Conservative estimate suggests that it is the direct cause of 3 to 7% of maternal deaths worldwide. In industrialized countries and non-industrialized countries, prevalence of anaemia among women above 15 years are 10.3% and 42.3% respectively.

Iron deficiency anaemia reduces the work capacity of individuals and entire population brings serious economical consequences and it may be obstacle to national development. Also iron deficiency anaemia is one of the leading causes for morbidity. Iron deficiency has effect on all systems in the human bodies. Long standing severe anaemic may lead to severe, numerous morbidity studies among studies children have been carried out by individual researches mostly in urban areas of India. The incidence of malnutrition including anaemia is 40-70%. Giving health education for prevention of preventable problems and development of healthful living practices, among students, which is one of the recommendations of the school Health Committee (Narayana 2001). The investigator has selected amla to provide vitamin C (ascorbic acid) because it is locally available than any other sources and it has value of Vitamin C (600mg in 100gm of amla) and ferrous sulphate with 20mg of elemental iron for iron supplementation.

The National Family Health Survey, conducted in 2005-06, presents the statistics that mark a growth in cases pertaining to anaemia. Most of the anaemic patients, especially women, suffer from mild to severe deficiency of iron. The haemoglobin count in most of the adolescent girls in India is less than the standard 12 g/d, the standard accepted worldwide. “Normally women are not aware of their tendency of being anaemic. They don’t have any complaints otherwise. It is only when they come for blood test for some disease. It was found that they are anaemic,” reported by Dr. R. S. Chatterjee, Sr. Consultant of Rockland Hospital, New Delhi. Iron deficiency anaemia (IDA) is the most prevalent form in India, but “Lack of consciousness among women aggravates the situation, as now a days, they attach more importance to losing weight” reports. Dr Anant Mohan of All India Institute of Medical Sciences, New Delhi. The National Family Health Survey, conducted in 2005-06, presents the statistics that mark a growth in cases pertaining to anaemia. Most of the anaemic patients, especially adolescent girls, suffer from mild to severe deficiency of iron. The haemoglobin count in most of the adolescent girls in India is less than the standard 12 gm, the standard accepted worldwide. Dr Anant Mohan of All India Institute of Medical Sciences, New Delhi.

Dr Rajaratnam Abel (2009) said, “Following early childhood (<2years), during the adolescent growth spurt, the risk of iron deficiency and anaemia reappears for both boys and girls, after which it subsides for boys but remains for girls because of blood loss. Iron deficiency affects the ability of adolescents to read, write and learn also”. The prevalence of anaemia is 44.8% with severe anaemia being 2.1%, moderate 6.3% and mild anaemia 36.5%. This indicates the importance of including adolescents in the risk group to improve their iron status and the need for planning

intervention programs that would increase the haemoglobin levels among adolescent girls through prophylaxis treatment, dietary modification and helminthic control. Increasing the educational level of rural girls would also ensure safe motherhood.

Amla juice strengthens the body's immune power and has proved to be an excellent remedy for anaemia, especially for children and adolescents where other blood forming remedies have failed. Thus, the researcher was interested to conduct a pre-experimental study to know the effectiveness of amla juice upon anemia that may lead to less difficulty and higher success rate.

Iron deficiency anaemia is the most prevalent micro nutrient deficiency among adolescent. Iron deficiency and anaemia are associated with impaired cognitive functioning, lower school achievement and mostly lower physical work capacity .adolescent are at risk of developing iron deficiency anaemia because of the increased iron requirement for growth. Infectious diseases such as malaria, schistomiasis and hookworm affect both girls and boys, contributing to anaemia by affecting the absorption of iron (or) increasing the loss of iron.

Raina *et al.*(7) documented a prevalence of severe anemia (Hb <8 g/dl) as 37% in rural Haryana. Mehta(5) found 4.8% severe anaemia, 22.4% moderate and 36.6% mild anemia among adolescent girls of the same age group in the urban slums of Bombay. In the present study the prevalence of mild anaemia of 36.5% is the same as that of Bombay urban slum girls and severe anaemia was only 2.1%. The study showed that the overall prevalence of anaemia among children in the age between 13 and 14 years was 52.88% (476/900). shows the prevalence of anaemia in school children of a Tamil Nadu. The highest prevalence of anaemia was present in the age group of the ninth year for both the sexes and the minimum frequency was in the age

group of the tenth year in the girls and the 13<sup>th</sup> year for boys. Children who participated in the study did not show any symptoms like easy fatigue or dizziness.

Amla remains a popular Tonic consumed across the Globe,. 81.2% of amla fruit is water, thus it is a very good source of skin moisturizing. It is the richest natural source of Vitamin C., 100 gm of Amla contains about 600 mg. of vitamin C, which is thirty times the amount found in oranges. It also contains calcium, iron, protein, tannic acids, sugar, phosphorus, carbohydrates etc.

Eating a Amla everyday also helps in improving in blood and curing anaemia as it is a good source of vitamin C. The juice of fresh Amla fruit is given as tonic, for anti-bilious remedy. It is also helpful in burning sensation, over thirst, dyspepsia and other ailments of digestive system especially for pregnant mothers during pregnancy. Dried amla gives excellent results in hyperacidity, ulcers and blood impurities. It is also used both internally and externally as a decoction and paste some of the common uses of amla fruit are: amla expels toxins from body and improves defense mechanism of the body.

Amla is the most widely used herb in the ayurveda, it helps in balancing three Doshas, Vayu, Pitta and Kapha and helps in digestive problems, heart problems, improves defense mechanism, improves eye sight, adds a natural glow to hair and body and is a store house of Vitamin C. Gooseberry remains a popular Tonic consumed across the Globe. 81.2% of gooseberry fruit is water, thus it is a very good source of skin moisturizing.

The investigator has seen that most of the adolescent girls were anaemic during school health programme and malnourished during her community postings. The

investigator felt that correcting current dietary habits in a vulnerable group of young may result in dietary changes that can ultimately improve the iron status. Hence this has stimulated, the investigator to conduct the study to assess the effectiveness of amla juice with elemental iron on anaemia, among adolescent girls. The investigator has selected amla to provide vitamin C (ascorbic acid) because it is locally available and cheap than any other sources and it has value of Vitamin C (600 in 100gm of Amla ) and ferrous sulphate with 20mg of elemental iron for iron supplementation.

Also during the review of literature the investigator come across many studies on synthetic ascorbic acid and iron absorption. Only few studies are a natural ascorbic acid iron absorption. This gave to the investigator to study the effect of amla juice on iron absorption.

## **1.2. STATEMENT OF PROBLEM**

A study to evaluate the effectiveness of amla juice with elemental iron among adolescent girls on iron deficiency anaemia in govt. Manohara school at sellur, Madurai.

## **1.3 OBJECTIVES OF THE STUDY**

1. To asses the level of iron deficiency anemia among adolescent girls at Govt. Manohara School, sellur, Madurai.
2. To evaluate the effectiveness of amla juice with elemental iron among adolescent girls on iron deficiency anemia at Govt. Manohara School, sellur, Madurai.
3. To find out the association between the level of iron deficiency anaemia among adolescent girls with their selected socio demographic variables.

#### 1.4. HYPOTHESES

**H1** : There is a significant difference between pre and post test level of iron deficiency anaemia among adolescent girls.

**H2** : There is a significant association between the level of iron deficiency anaemia among adolescent girls with their selected socio demographic variables.

#### 1.5. OPERATION DEFINITIONS

- **EFFECTIVENESS** : It refers to the increase in serum hemoglobin level after the administration of amla juice with elemental iron for a period of 30 days to the adolescent girls and it is measured by cell count method in the clinical laboratory, at Madurai Medical College, Madurai.
- **AMLA JUICE WITH ELEMENTAL IRON** : Administration of amla juice 20ml, which is extracted from 100gm of amla and 20mg of iron tablet which is prescribed by Medical Officer during school health programme and it is being given daily after lunch for the period of 4 weeks.
- **IRON DEFICIENCY ANEMIA** : In this study, iron deficiency anaemia refers to anaemia that develops from lack of Haemoglobin in the blood due to inadequate iron rich diet, parasitic infestation and poor iron absorption and in which the haemoglobin value is less than 12 gm/dl among adolescent girls. The iron deficiency anaemia is confirmed through smear test by Pathologist.
- **ADOLESCENT GIRLS** : In this present study adolescent girls refers to the age group of 13-15 years who are studying in Govt. Manohara School, Sellur., at Madurai.

## **1.6. ASSUMPTION**

The study assumed that,

- Adolescents may not have adequate knowledge that amla enhance the iron absorption.
- Adolescent girls are prone to develop iron deficiency anaemia due to, insufficient iron in the diet and poor absorption of iron in the body.

## **1.7. DELIMITATION**

- The study is limited to conduct study among adolescent girls who were studying in a Govt. Manohara school at Sellur in Madurai district.
- The study is limited to girls in the age group of 13-15 years for the period of one month.

## **1.8. PROJECTED OUTCOME**

The amla juice will help the adolescent girls to enhance their iron absorption and thereby increasing the haemoglobin level.

# *Review of Literature*



## **CHAPTER – II**

### **REVIEW OF LITERATURE**

This chapter presents a review of related literature relevant to the study. A review of literature related research and theory on a topic has become a standard and virtually essential activity of scientific research projects “Review of literature is a critical summary of research on a topic of interest, often prepared to put a research problem in context or as the basis for an implementation project” Review of literature was undertaken to gain depth knowledge on various aspects of the problem under this study.

The literature gathered from extensive review of electronic media were depicted under the following headings

The section has two parts

Part – A : Review of Literature

Part – B : Conceptual frame work

## PART – A

### REVIEW OF LITERATURE

In this study the relevant literature reviewed has been organized and presented under the following headings.

- Literature related to the prevalence and distribution of iron deficiency anaemia.
- Literature related to Factors and symptoms Related to iron deficiency.
- Literature related to iron deficiency anaemia and changing dietary behaviours among adolescent girls.

#### 2.1. The prevalence and distribution of iron deficiency worldwide

**Premalatha, T., Valarmathi, S., Srijayanth, P., Sundar, JS., Kalpana, S. (2012)** A cross-sectional survey was executed to estimate the prevalence of iron deficiency anaemia among adolescent school girls in Chennai, Tamil Nadu. A sample of 400 female school students in the age group of 13-17 years were selected by using stratified random sampling method. Socio demographic details, anthropometric measurements were obtained. Haemoglobin was estimated using cyanmethaemoglobin method. Study results shows that the prevalence of anaemia was found to be 78.75% among school students. Chi-square statistics shows significant association ( $p < 0.05$ ) of anaemia is with type of family, socioeconomic status and diet. In this study 42.5% of girls with BMI < 18 were found to be anemic. This study predicts that haemoglobin level tends to decrease as age progresses.

**Meenal ,VK., Durge, PM., Kasturwar, NB. (2012).** A cross sectional community based study was conducted among 272 adolescent girls in an urban slum area under Urban Health Training centre, department of Community Medicine, NKP

Salve Institute of Medical science, Nagpur from June 2009 to February 2010. Out of five areas one area was selected by simple random sampling. Information regarding socio-demographic and menstrual factors was recorded in pre-designed, pre-tested proforma. Haemoglobin estimation was done by Sahli's haemoglobin meter. Data was analyzed by mean, standard deviation and chi square test. The study result shows that the prevalence of anaemia was found to be very high (90.1%) among adolescent girls. Majority of the girls were having mild or moderate anaemia (88.6%). The study concluded that nutrition education along with nutritional supplementation and iron folic acid tablets should be provided to all girls.

**Ramzi ,M., et.al. (2011).**A cross sectional study was conducted to investigate the prevalence of anaemia, iron deficiency anaemia and related risk factors in adolescent school girls in Kavar urban area in southern Iran. A total of 363 adolescent school girls were evaluated. Socioeconomic, demographic and related risk factors were obtained by a questionnaire. Hematological parameters and serum iron indices were measured. The study results shows that there were 21 cases of anaemia (5.8%), 31 (8.5%) iron deficiency and 6 (1.7%) iron deficiency anaemia . Most of anemic girls (85.7%) had mild anaemia. MCV, TIBC, age, and BMI had statistically significant relationship with haemoglobin. Only parasites infestation in the last three months had a 6.83 times more risk of anaemia than those without this history

**Tatala, Asobayire ; Abalkhail and Shawky, Hashizume et al., 2011** Iron deficiency is the most prevalent and common micronutrient deficiency in the developing world today . The public health effects of iron deficiency include anemia, decreased intellectual and work performance as well as functional alterations of the small bowel (Osiki, 1993). Beside other vulnerable age groups, such as infancy and

early childhood, adolescence is placed at a high risk level for developing iron deficiency, due to a combination of menstrual iron losses in girls and a rapid physical growth, especially in boys .

According to United Nation International Children Emergency Fund,(2011); report, the prevalence of iron deficiency varies widely depending on the criteria used to establish the diagnosis. Variables include age, socioeconomic status, family size, nutritional status, and total income of the family. According to United Nation International Children Emergency Fund report two billion people suffer from anaemia worldwide and most of them have iron deficiency anaemia, especially in underdeveloped and developing countries, where 40-50% of children are iron deficient .

**Halileh and Gordon, 2010** Iron deficiency is a global nutritional problem, which mainly affects infants, children, and women of childbearing age. Using anaemia as an indicator of iron deficiency, an estimated 30-60% of women and children in developing countries are iron deficient. Even in developed countries, iron deficiency warrants significant public health concern (Halileh and Gordon, 2006). In developing countries, the main cause of iron deficiency is low iron bioavailability in diet. The consequences of iron deficiency are many and serious, affecting not only individuals' health but also the development of societies and countries. Prevention and control of iron deficiency in all age groups within societies with different iron requirements, necessitates coordination of various intervention programs .

**Lucy, 2009** ; The results of studies that focused on adolescent girls and children; showed that anaemia is a common problem among children aged 12-16yrs. (West Bank, 21%; Gaza, 19%) as reported by Halileh and Gordon). Another study

conducted by Care committee reflects that despite the levels of malnutrition, the prevalence of anaemia among children 12-16yrs of age varies little between the West Bank (43.8%) and the Gaza Strip (44%). Four of every five children in both areas have inadequate serum iron levels (Lucy, 2003)

**Wharton, 2009**, Iron deficiency was relatively common in all studied age groups. The prevalence rates were (32.4%, 35.3%, 25.9%, and 12.1%) for children 6-8 years old, 9 to 11 years old, 12 to 14 years old and above 15 years, respectively. Differences in prevalence rates were statistically significant ( $P = 0.01$  at  $D = 0.05$ ). These results clearly demonstrate the poor iron dietary intake by these children.

**Provan, 2009; Beard, 2009** Adolescents are vulnerable to iron deficiency because of increased iron requirements related to rapid growth. Iron needs are highest in males during peak pubertal development because of a greater increase in blood volume, muscle mass and myoglobin . Iron needs continue to remain high in females because of menstrual blood loss, which averages about 20mg of iron per month, but may be as high as 58 mg in some individuals .

**Wharton, 2009;** With respect to family size, the prevalence of iron deficiency was 20.1%, 33.2%, 23.2% and 19.6% among families with 1-3 members, 4-6 members, 7-9 members and more than 10 members, respectively. Clearly no link could be established between family size and iron deficiency as one might speculate that increased prevalence of iron deficiency would correlate with increased family size due to the fact that large families require more income to support nutritional needs.

**Halileh and Gordon, 2008;** A descriptive study shows that higher prevalence of iron deficiency associated with increased family income. Our findings with respect to prevalence of iron deficiency and family income (24.9% low; 28.1% medium and 30.2% high income) are contradictory to the believe that poverty is a contributing factor to iron-deficiency anaemia because families living at or below the poverty level may not be getting enough iron-rich foods. Again, one should mention that family behaviour and social habits regarding eating and food types might contribute to these differences.

**Ramzi ,M., et.al. (2011).**A cross sectional study was conducted to investigate the prevalence of anaemia, iron deficiency anaemia and related risk factors in adolescent school girls in Kavar urban area in southern Iran. A total of 363 adolescent school girls were evaluated. Socioeconomic, demographic and related risk factors were obtained by a questionnaire. Hematological parameters and serum iron indices were measured. The study results shows that there were 21 cases of anaemia (5.8%), 31 (8.5%) iron deficiency and 6 (1.7%) iron deficiency anaemia . Most of anemic girls (85.7%) had mild anaemia. MCV, TIBC, age, and BMI had statistically significant relationship with haemoglobin. Only parasites infestation in the last three months had a 6.83 times more risk of anaemia than those without this history .

## **2.2 Literature related to Factors and symptoms Related to iron deficiency**

### **Anaemia:**

**Siddharam, S .M., Venketesh, G. M., Thejeshwari, H. L. (2011)** A cross sectional survey was conducted in selected anganwadi centres of rural area of Hassan district. The study was conducted to estimate the prevalence of anaemia among adolescent girls and to study the socio demographic factors associated with anaemia.

The study result shows that the prevalence of anaemia was found to be 45.2%. A statically significant association was found with iron deficiency anaemia, weight loss and anaemia, pallor and anaemia. In the present study it was seen that among the 45.2% of anaemic adolescent girls 40.1% had mild anaemia, 54.92% had moderate anaemia and 4.92% had severe anaemia. The study was concluded that a high prevalence of anaemia among adolescent girls was found, which was higher in low economic strata. It was seen that anaemia affects overall nutritional status of adolescent girls.

**Wankhade., et. al.(2011)** A study was designed to investigate the prevalence of anaemia, a common low haemoglobin condition, in young female population of Aurangabad region (MS).108 female college students participated in the study. The haemoglobin (Hb), level was measured using Sahli's haemoglobinometer. Anaemia was defined as a situation where Hb is less than 12 g/dl. Further the anaemia was categorized into severe, moderate and mild based on the Hb levels. The study result shows the prevalence of anaemia was 83.34 percent. Normal haemoglobin status was found in 16.66 percent of the subjects. The study was concluded that anaemia is common among 13 to 15-year old females of Aurangabad region.

**Neetu Gupta, (2010).** A descriptive study conducted on symptoms of anaemia at Jabalpur. The study revealed that majority 36(42.9%) girls had history of shortness of breath on exertion, 36 (42.9%) girls had complaint of easy fatigability, and 41(48.8%) girls had loss of appetite. In a study on supplementation effect of iron and folic acid capsule on anemic adolescent girls it was reported, that majority of subjects participated in the study complained for lethargy (72.22%) and breath-lessness on exertion (64.81 %) Problem of anorexia was faced by about (35.18%) of the subjects.

**Asheri, H., Kianmehr, A (2010)** An analytical study conducted among Indian adolescent girls to physical examination of adolescent girls with mild anaemia depicted that, majority of girls 48 (57.1%) girls had pale conjunctiva. Appearance of tongue was pale color for 34(40.5%) girls. 14 (28.6%) girls had pale skin and pale face. In a study on supplementation effect of iron and folic acid capsule on anaemic adolescent girls the symptoms of anaemia were observed among all the subjects with wide range of variation. Paleness of eyes was in maximum number of the subjects (62.96 %). However, the paleness of skin and flat nails were found in (66.66%) and (33.33%) percent of subjects respectively.

**Lloyd Van Winkle, (2009).** A descriptive study conducted to assess personal hygiene history the of anaemia among adolescent girls in Jhirli: Among 84 girls, 79(94%) girls had adequately maintained and 5(6%) girls had moderately maintained , only 1(1.2%) girl had poor level, her haemoglobin level was 6.2 gm/dl. Among girls, however, menstruation increases the risk for iron deficiency anaemia throughout their adolescents. An important risk factor for iron deficiency anaemia is personal hygiene maintenance.

**Verma, A., (2008).** A cross-sectional descriptive study was carried out among school going adolescent girls in urban as well as rural schools of the Lucknow district, Uttar Pradesh, India. Most of the girls 73(86.9%) were non-vegetarian and 11(13.1%) girls were vegetarian. Majority 64(76.2%) girls had the habit of drinking coffee/tea, 39(46.4%) girls had habit of drinking once a day, 23(27.4%) had habit of drinking twice a day and 2(2.4%) girls had habit of drinking coffee/tea more than two times in a day and 20(23.8%) girls had no habit of drinking coffee/tea. Anaemia was found to



be higher among girls with the attributes of those with habit of post meal consumption of tea/coffee

**Stoltzfus (2007).** A cross-sectional study was conducted on epidemiology of iron deficiency anaemia in Zanzibari school children. With regard to history of worm infestation, only five (6%) girls had done de-worming in the past, majority 79(94%) girls had not done de-worming in the past. Most of the girls, 51(61%) had toilet facility at home, 26(21.5%) girls practiced open field defecation and only 7(5.9%) used the public toilet. In school all the 84(100%) girls used the toilet facility. 79(94%) girls used cheppals while going to toilet, 5(6%) used no chapels while going to toilet. 46(54.8%) girls washed hands with soap and water after each defecation, 38(45.2%) girls washed with plain water after defecation. Reported that worm infestation has influence on anaemia largely. It was found that 25% of all anaemia, 35% of iron deficiency anaemia and 73% of severe anaemia was attributable to hookworm infection.

**Goel. S.,( 2007).** A cross sectional survey was conducted in selected anganwadi centres of rural area of Hassan district. Among 84 girls, 30(35.7%) girls had history of dizziness, 28(33.3%) girls had history of palpitations. In another study on prevalence of anaemia, it was observed that the signs and symptoms headache, fatigue, dyspnoea, palpitations, and syncope attacks were significantly more prevalent in anaemic subjects.

### **2.3. Literature related to iron deficiency anaemia and changing dietary behaviours among adolescent girls.**

**Hafzan Yusoff., Wan Nudri Wan Daud., Zulkifli Ahmad. (2013)** This study which was started in year 2010 involved 280 respondents (223 girls, 57 boys,

age: 16 yr) from schools in Tanah Merah. The selection criteria were based on haemoglobin level (Hb = 7 – 11.9 g/dL for girls; Hb = 7 – 12.9 g/dL for boys). They were divided into 2 groups. The first group received nutrition education package, whereas another group was entitled to receive non-nutrition education intervention. Both interventions were implemented for 3 months. The changes in awareness among respondents of both groups were evaluated using multi-choices questionnaire. Nutrition education receiver group demonstrated improvement in awareness at post-intervention. No substantial improvement was demonstrated by the counterpart group.

**Neeba Aniyam. (2011)** A pre experimental study was conducted to assess the effectiveness of Nutritional intervention on Anaemia among adolescent girls with iron deficiency anaemia in Nachiyampalayam at Dharapuram, Tamil Nadu. A sample of 50 adolescent girls. The samples that had less than 11gm of Haemoglobin. Samples were visited every day in their homes and made to consume nutritional balls and one guava. After 30days the study result shows that in before nutritional intervention among 50 adolescent girls with iron deficiency anaemia depicts that 8(16%) had mild levels of anaemia, 33(66%) had moderate levels of anaemia and 9(18%) had severe levels of anaemia. In the after nutritional intervention 29(58%) had mild levels of anaemia and 21(42%) had moderate levels of anaemia. the mean scores of pre test and post test level of anaemia among adolescent girls 14.828 (SD + 1.16) and 13.54 (SD + 0.55) respectively. Thus the difference in pretest and post-test mean was 1.29. The overall pre-test mean percentage was 29.656, where as the post test mean percentage was 27.08. Post test level of anaemia mean score is less than the pre test score. Paired ‘t’ value is 8.94 which was significant at 0.05 level. The mean and standard deviation findings showed that the nutritional intervention was effective in increasing the haemoglobin level among adolescent girls with iron deficiency anaemia.

**Aspuru, K., Carlos Villa., Bermejo, F., Herrero, P., et al. (2011)** The daily requirements of iron are 1–3 mg/day; these requirements increase during the growth period,. Because gastrointestinal absorption of iron is limited, the diet must contain between 15 and 30 mg/day. Efforts should be focused on promoting the access to iron-rich foods (eg, meat and organs from cattle, fowl, fish, and poultry, and non-animal foods such as legumes and green leafy vegetables) and foods that enhance iron absorption (some fruits, vegetables, and tubers).

**Jyoti Sajjan, B., Kasturiba., Rama, K. Naik., Pushpa, C., Bharati. (2011)** A experimental study was conducted to determine the impact of nutrition education intervention on the haemoglobin status of 60 anaemic rural adolescent girls aged between 13-16years for three months. Experimental and control of 30 each group. The experimental group was further divided into two groups as student communicators (n=10) and student communicators (n=20). The student communicators were given three days nutrition education training by nutrition experts on the identified areas using the educational materials like charts, posters, blow-ups, messages and power point presentations on the importance of iron. The communicators were asked to pass on the information to communicate group. The pre and post scores of the experimental and control groups were assessed. The student t-test showed significant difference between the mean knowledge within the experimental group. In the communicators group, a significant increase (7.70%) in the haemoglobin level was observed. Hence, from the study it can be concluded that, nutrition education is one of the appropriate, effective and sustainable approach to combat iron deficiency anaemia.

**The Centre for Young Women's Health, Children's Hospital at Boston (2009)** showed that breakfast with cereals; whole wheat breads and legumes contain iron, however this is non-heme iron which is not easily absorbed. To increase iron absorption from these food sources, the centre recommends the addition of Vitamin C such as the introduction of orange juice or other fruits (Centre for Young Women's Health, Children's Hospital Boston, 1999-2006). As we mentioned earlier non-hem sources of iron such as legumes constitute a major source of iron and inclusion of enough amounts of vitamin C is essential to insure a proper absorption of iron. The observed practices of the parents do not reflect this attitude as only 24.8% of the iron deficient students seems to take fruit juice.

**Doyle et al., 2009** ; Tea influences the absorption of non-heme iron as heme iron is relatively unaffected by tea. Many studies reflect that there is a higher risk of anaemia amongst tea drinkers compared to none tea drinkers. Only in populations with marginal iron status seems to be a negative association between tea consumption and iron status. Our findings are consistent with these conclusions since 39.7% of iron deficient students drink too much tea, and 24.3% of them drink it in moderate amount, which make them more susceptible to iron deficiency.

**Stoltzfus et al., 2009;** Hookworm infection is endemic in many tropical countries, and chronic blood loss due to hookworm is a significant contributor to anaemia, particularly moderate and severe anaemia. The degree of iron deficiency anaemia due to hookworm depends on the content and bio-availability of iron in the diet, the size of body iron stores, and the intensity and duration of the infection. *Trichuris trichura*, *Schistosoma haematobium*, and *Schistosoma mansoni* may also contribute, but in isolation they are unlikely to result in severe anaemia.

**Kurz, 2009;** Anaemia is reported to be the largest nutritional problem among adolescents in developing countries. In this study, adolescent girls were more anaemic than boys due to not wearing chepels for their regular work. Only post-menarche girls were included and thus the findings reflect the increased requirement for iron in girls as a result of menstruation and not wearing chepels regularly. . However, in both groups more than fifty percent of the anaemic and non-anaemic groups were iron-deficient.

**Lwambo, 2007; Tatala et al., 2007;** A study in Mwanza, and in Lindi region showed an even higher prevalence of anaemia, and iron deficiency among adolescent school children. Inadequate dietary intake, as well as the intestinal parasites, especially hookworm that is endemic in the study area, contribute to anaemia and iron deficiency in this group (Stoltzfus et al., 1997a; Tatala et al., 1998). The results of our study highlight the need for intervention to improve the iron status in adolescents.

**Stoltzfus et al., 2007;** Periodic de-worming through the school system is another approach that is recommended in areas with high hookworm prevalence. In Zanzibar, 4-monthly school based de-worming was found to reduce the incidence of severe anaemia (Hb <7g/dl) by 55%. In addition, the school system should be utilised to promote anaemia-preventive activities in the communities.

**Liu. 2007; Ridwan., 2007; Schultink & Gross, 2007;** Decreasing the dosage and frequency of iron supplementation is another strategy being promoted to improve the effectiveness of iron supplementation. In recent years, a number of study results have suggested that weekly iron supplementation was as effective as daily iron supplementation in raising Hb levels, in various groups at risk of iron deficiency anaemia, and that the smaller dose administered in the intermittent regime was

associated with fewer side-effects and thus better compliance. The effectiveness of the intermittent dosage regime has also been challenged, with the main argument that, based on the calculated increased physiological iron requirements, sufficient iron could not be supplied by the weekly regime. An expert review of studies conducted in developing countries on a weekly versus daily supplementation, as well as more recent studies, concluded that daily supplementation was better than weekly supplementation for adolescents.

**Agdeppa-Angeles, 2007; Bothwel, et al. 2006;** On the other hand, a prolonged intermittent regime might be of benefit to non-pregnant women and adolescents, although it is also suggested that further, better-designed, studies are needed to resolve the issue of intermittent versus daily dosages. In addition, whatever dosing schedule is adopted, the fundamental problems – lack of supplies, inadequate knowledge of health workers, and poor counselling of women – have to be addressed in order to improve the effectiveness of iron supplementation programmes.

**Geissler et al., 2005; Mann & Truswell, 2007;** Iron is mainly absorbed in the duodenum and upper jejunum. There are two types of iron in the food; haem iron are combined with haemoglobin and myoglobin in animal origin foods such as meat, poultry and fish (haem, 40%), and non-haem iron are combined from iron salts and iron in other proteins such as ferritin, which is present in both foods of plant origin (non-haem, 100%) and foods of animal origin (non-haem, 60%)

**Gibney et al., 2009; Nes et al., 2009** Malaria was significantly ( $p < 0.001$ ) more prevalent among the anaemic girls, girls had significantly ( $p < 0.001$ ) higher prevalence of malaria compared with other parities. There was no association between the level of haemoglobin and the malaria parasite count. Among the anaemic

adolescent malaria parasites were present in over 52%, compared with 17% ( $p=0.019$ ) prevalence among the non-anaemic girls . Iron deficiency was prevalent also in the anaemic and non-anaemic girls.

**Geissler & Powers, 2005; Barasi., 2007;** Factors promoting iron absorption was increased (ascorbic acid, citric acid, lactic acid, fructose and peptider from protein sources) enhance the solubility of the iron, facilitating absorption. The absorption of non-haem iron can be improved when a source of haem iron is consumed in the same meal. The previous studies results show that the most important enhances of non-haem iron absorption are ascorbic acid (vitamin C), meat and fish.

**Thuy, 2003; Thuy., 2005; Geissler & Powers, et al. 2005;** There are several foods such as amla, guava and citrus fruits, which promotes iron absorption from plant foods. Evidence also exists that the promotion of iron absorption of vitamin C mainly from fruits, juices, potatoes and some other tubers, and other vegetables such as green leaves, cauliflower, and cabbage. The prevalence of anemia was found to be 78.75% among school students. Chi-square statistics shows significant association ( $p<0.05$ ) of anemia is with type of family, socioeconomic status and diet.

**Mennen et al., 2007;** Factors inhibiting iron absorption was explained (phytate, polyphenols, oxalate, phosphates, calcium and zink) either bind with iron, making it less soluble, or compete for binding sites. Phytates, polyphenols, oxalate and phosphate block iron absorption such as in whole cereal grains; tea, coffee, nuts; spinach and egg yolk; respectively. Iron-binding phenolic compounds (tannins) present in black, green and herbal tea are not at risk of iron owing to any kind of tea drinking for healthy adults. Dairy products rich in calcium such as milk or cheese can

inhibit iron absorption. A experimental study was conducted to assess the effectiveness of iron absorption , the samples(500), the number of anaemic girls had reduced from 141 before the intervention to 79 after – mean haemoglobin increasing from 12.2 to 13.0 ( $p < 0.001$ ) and in the 279 paired samples prevalence of anaemia had reduced from 105 to 58 - mean haemoglobin increasing from 12.1 to 13.0 ( $p < 0.001$ )

**Institute of Health Management Pachod, Pune. (2009)** A recent study was carried out on 1142 adolescent girls residing in 16 slums of Pune. The main objective was to increase the number of daily meals adolescent girls eat from 2 meals to 3-4 meals, and to encourage girls to consume iron rich foods on a daily basis. Weekly iron and folic acid tablets were given in the first 3 months; Blood samples were collected at baseline and end of the study, and haemoglobin was estimated. Findings showed that anaemia is significantly more likely among girls who eat two or fewer meals in a day, have been sick in the past year, and consume few iron rich foods. It was also found that intervention has influenced dietary behaviour with a significant increase in the intervention site compared to the control site in the percentage of girls who eat more than 3 meals a day, eat lemon with their meals, as well as in the frequency of eating fruits. Blood testing showed that mean Hb levels increased from 5.8 to 9.5 gm/dl for severely anaemic 3girls, and from 8.9 to 11.2 gm/ dl for moderately anaemic girls.

**Nimalai singh., Reshma boolchandani., Kanika varma., Divya Bang., Beena Mathur., Shubha Dube. (2009)** The experimental study was conducted on 25 adolescent girls (13- 18 years ) in an orphanage of Jaipur city. Out of 25 girls 12 comprised of experimental group and 13 were control. Experimental girls were given 15



gm Leaf concentration every alternate days for a period of 30 days .Nutritional status of subjects was assessed using anthropometry, dietary, clinical assessment and haemoglobin estimation. Results showed that the haemoglobin levels were estimated at baseline, mid – intervention, and after intervention. After supplementation period of 1 month significant increase in haemoglobin levels were observed.

### **Literature related to effectiveness of vitamin C on anaemia**

**Hurrell, 2006; Tetens et al., 2007;** A study was conducted in Bangalore to assess whether the iron deficiency anaemia in young working women can be reduced by increasing the consumption of cereal based fermented foods or gooseberry at workplace .The study employed 302 women aged 18-23 years .Out of these, a group of 80 women were given 20 ml of gooseberry juice containing 40 mg of vitamin C three times a week once in a month .The haemoglobin status of this group of women improved significantly from 11.20 g/dl to 12.70 g/dl. The study revealed that the type of workplace lunch was of greater significance than Information, Education and Communication.

**Rani, V., Brouwer, Inge., Khetarpaul, N., Zimmerman, M.B. (2009)** A randomized controlled study was conducted to find out the efficacy of a Local Vitamin-C Rich Fruit in Improving Iron Absorption from Mungbean Based Meals and its effect on Iron Status of Rural Indian Children. 300 samples at school of Mangali village situated in Hisar district of Haryana state in a school feeding program for seven months. Main study parameters/endpoints: Primary outcome will be the measurement of body iron stores (mg/kg of body weight) based on the ratio of serum transferrin receptor to serum ferritin. Three weeks before the trial available children in selected schools will be screened for eligibility of the study on the basis of medical

health questionnaire. Deworming will be done at least 20 days before the start the feeding trial with a single dose of Albendazole (400 mg), that will be given again after three months. These 300 children will be assigned to three groups (100 children each group). Group-1 will be served with the normal school feeding program (SFP) meal and this group will also serve as control group for the study. Group-2 will be served with mungbean test meal and group-3 will be served with guava fruit in addition of mungbean test meal. Meals to all children will be provided for six days in a week up to seven months. All meals will be served at mid morning (11.00 am to 11.30 am). Effect of intervention will be assessed in terms of iron status of children. After supplementation period of 7 months significant increase in haemoglobin levels were observed in experimental group 3.

**Dr. Jaya Mohanraj et.al., (2008)** A simple random experimental study was conducted a study to assess the effectiveness of nutritional intervention among women with anaemia in Thiruvallur District total of 60 anemic adolescent girls aged 15-20 years. In which 30 anaemia adolescent girls has control group. In pretest haemoglobin level was assessed. Interventions include deworming, nutritional (iron rich) balls with vitamin “c” rich food (guava) was administered for 30 days . The nutritional balls weighing 50 gms made up of Cowpea, Amaranth tristis, Roasted Bengal gram, Bajara, Gingly seeds and Jaggery. This ball gives 5.79 mg of iron and 100 gms of fresh guava contain 212 mgs of ascorbic acid . In post test the effect of nutritional intervention on the improvement of haemoglobin level was assessed among the women with anaemia . Independent student “t” test was used to find out the effectiveness of nutritional intervention. The result showed that there was a reduction in the percentage level of 7-9 gms/dl in women from 30% to 3.3% and 60% to 86.7% in the range between 9-11 gms/dl in experimental group.

**Tara Gopaldas, (2008)** This efficacy trial for both employers and employees (young working women 18 to 23 years of age) was undertaken to determine whether culturally acceptable dietary changes in lunches in the workplace and at home could bring about a behavioural change and improvement in their iron-deficiency anaemia status. Maximum weight was given to increasing consumption of gooseberry juice. The 30-days interventions were supervised at the workplace. In Unit 1 (80 women) received 20 ml of gooseberry juice (containing 600 mg of vitamin C) with elemental iron 30mg daily for a month. Women in unit 2 (70 women), the positive control, received 400 mg albendazole once plus ferrous sulphate tablets (30 mg elemental iron) daily. No gooseberry juice was given. The pre-post impact measures were dietary and nutrient intake, knowledge and practice, and haemoglobin status. In units 1, the haemoglobin status of the women improved significantly from 11.10 to 12.30 g/dl, 11.20 to 12.70 g/dl, and 11.50 to 13.00 g/dl, respectively. In unit 2, the values were 10.90 g/dl before and after intervention. It was concluded that the haemoglobin levels of the workers can easily be improved, that also lead to better employer–employee relations.

**Department of Biochemistry & Biotechnology, Annamalai University, (2009);** *Phyllanthus emblica* (amla), one of the most common medicinal herbs has been widely used in ayurvedic medicines. Amla is a rich source of vitamin C, among 1 gm of vitamin C per 100 ml fresh juice, and requisite for the synthesis of collagen, which is liable for keeping the cells of the body together. It has the same amount of vitamin C present in two oranges. It increases the red blood cell count and helps to promote good absorption of iron. Numerous experimental evidences has shown that amla fruit possess antioxidant, hepato protective, hypocholesterolemic and anti-inflammatory activities.

**Department of Pharmaceutical sciences, Coimbatore medical college, Coimbatore, (2009) ;** *Emblica officinalis* is a natural, efficacious, an antioxidant with the richest natural source of Vitamin C. *Emblica officinalis* berries have the highest amount of naturally occurring vitamin C of any ripe fruit in the world used as a traditional food. Numerous studies conducted on *Emblica officinalis* fruit suggest that it has anti-viral properties and also functions as an anti-bacterial and anti-fungal agent. The gelatinous plum-sized Amla fruit contains naturally occurring vitamin, heat stable vitamin C. A clinical study on patients with pulmonary tuberculosis showed that the vitamin C contained in *Emblica officinalis* was better assimilated than synthetic vitamin C. Further research of contemporary and traditional medical literature indicates that *Emblica officinalis* either in combination with other herbs or alone has been useful in the amelioration of colds, warts, skin afflictions, influenza, anemia, diabetes, lung conditions, elevated cholesterol and as an immune restorative in cancer conditions.

**Mukesh Deshmuckh et al;** A quasi experimental study States that effectiveness of gooseberry supplementation in prevention of anaemia among antenatal mothers at the selected hospitals in Kerala. A sample consists of 60 primi gravid mothers and multi gravid 30 in experimental and 30 in control group was chosen by purposive sampling technique was used for this study. The result of the study shows that post test results showed that the level of anaemia in experimental group 29 (96.7 %) had mild anaemia, one (3.3%) had moderate anaemia and no women had severe anaemia, and in control group 25 (83.3%) had mild anaemia, five (16.7%) had moderate anaemia and no body had severe anaemia. The level of practice among antenatal women in first trimester showed that 23 (76.7%) were moderately practice, 7 (23.3%) were adequately practice and no one had inadequate practice

**Deshmukh, P.R.et.al., (2008)** A study was conducted to evaluate the effectiveness of a weekly regimen among slum and tribal of Nasik district, Maharashtra, India. The study was conducted to reveal the improvement of consuming vitamin C foods to improve the haemoglobin levels. The participants from Baroda city were given a mixed diet in a hotel with vitamin C rich guava, citrus fruits, lemon juice. At the end of nine months interventional trail, there was a very significant rise in haemoglobin levels of the study participants.

## **PART-B**

### **CONCEPTUAL FRAME WORK**

The conceptual framework provides a conceptual perspective regarding the interrelating phenomena. It deals with abstractions (concepts) that are assembled by virtue of their relevance to a common theme. Conceptual models are useful in the research process in clarifying concepts and their associations, in enabling researchers to place a specific problem into appropriate context.

The investigator adopted a Widenbach's prescriptive theory (1969) as the foundation for developing the conceptual framework. Ernestin Wiedenback proposes helping art of clinical nursing theory in 1969 for nursing, which describes a desired situation and way to attain it. Nursing is a helping service that is rendered with compassionate skill and understanding to those in need of care, counsels and confidence is the area of health (1977).

#### **Widenbach's theory is made up of three factors as follows:**

- The central purpose
- Prescription
- Realities

#### **CENTRAL PURPOSE:**

The central purpose defines that quality of health she desires to effect or sustain in her patients and specifies what she recognizes to be her special responsibility in caring of the patient. In this study the central purpose is to treat the iron deficiency anaemia among adolescent girls.

## **PRESCRIPTION:**

Once the nurse identified her own philosophy and recognizes that the patient has autonomy and individuality, she can work with the individual to develop a prescription or plan of care. It will specify the nature of action that will fulfil the nurse's central purpose. A prescription may be voluntary or involuntary. A prescription is a directive to at least 3 kinds of voluntary actions.

- Mutually understood and agreed upon action (recipient and practitioner)
- Recipient-directed action and (ways in which to be carried out).
- Practitioner-directed actions (practitioner carried action).

In this study, the investigator planned to provide the amla juice with elemental iron among adolescent girls on iron deficiency anaemia.

## **REALITIES:**

The realities are:

- Agent
- Recipient
- Goal
- Means
- Framework

## **THE CONCEPTUAL FRAMEWORK OF THIS NURSING THEORY**

### **CONSISTS OF FOLLOWING STEPS**

- 1) Identification of the patients need for help
- 2) Ministration of the help needed
- 3) Validation that the action taken was helpful to patient.

## **IDENTIFICATION OF THE HELP NEEDED:**

The nurse identifies the patient need. In this study the need was identified by observation check list and haemoglobin estimation among adolescent girls on iron deficiency anaemia.

## **MINISTRATION OF THE HELP NEEDED:**

Ministering to the patient, the nurses apply a comfort measure, or therapeutic procedure. In this study it refers to administration of amla juice with elemental iron to the adolescents with iron deficiency anaemia.

### **Ministration had two components:**

#### ***Prescription:***

The nurse provides care to the patient. Amla juice with elemental iron was provided to the adolescents with iron deficiency anaemia. In this study the juice was prepared by the investigator. based upon review of the literature and experts guidance. The juice is around about 20 ml extracted from 100gm of amla. The juice is prepared hygienically and measured.

#### **Realities:**

It refers to the physical, physiological, emotional and spiritual factors that come into play in situation involving nursing action. The five realities identified by Wiedenbach's are agent, recipient, goal, means and framework.

**1. Agent:** According to the theorist, the agent who is the practicing nurse or her delegate is characterized by the personal attributes, capacities, and most importantly commitment and competencies in nursing. In this study the researcher is the agent.



**2. Recipient:** According to the theorist the recipient, the patient is characterized by personal attributes, problems, capacities, aspirations and most important the ability to cope with the problems being experienced. In this study the adolescent girls with iron deficiency anaemia were the recipients.

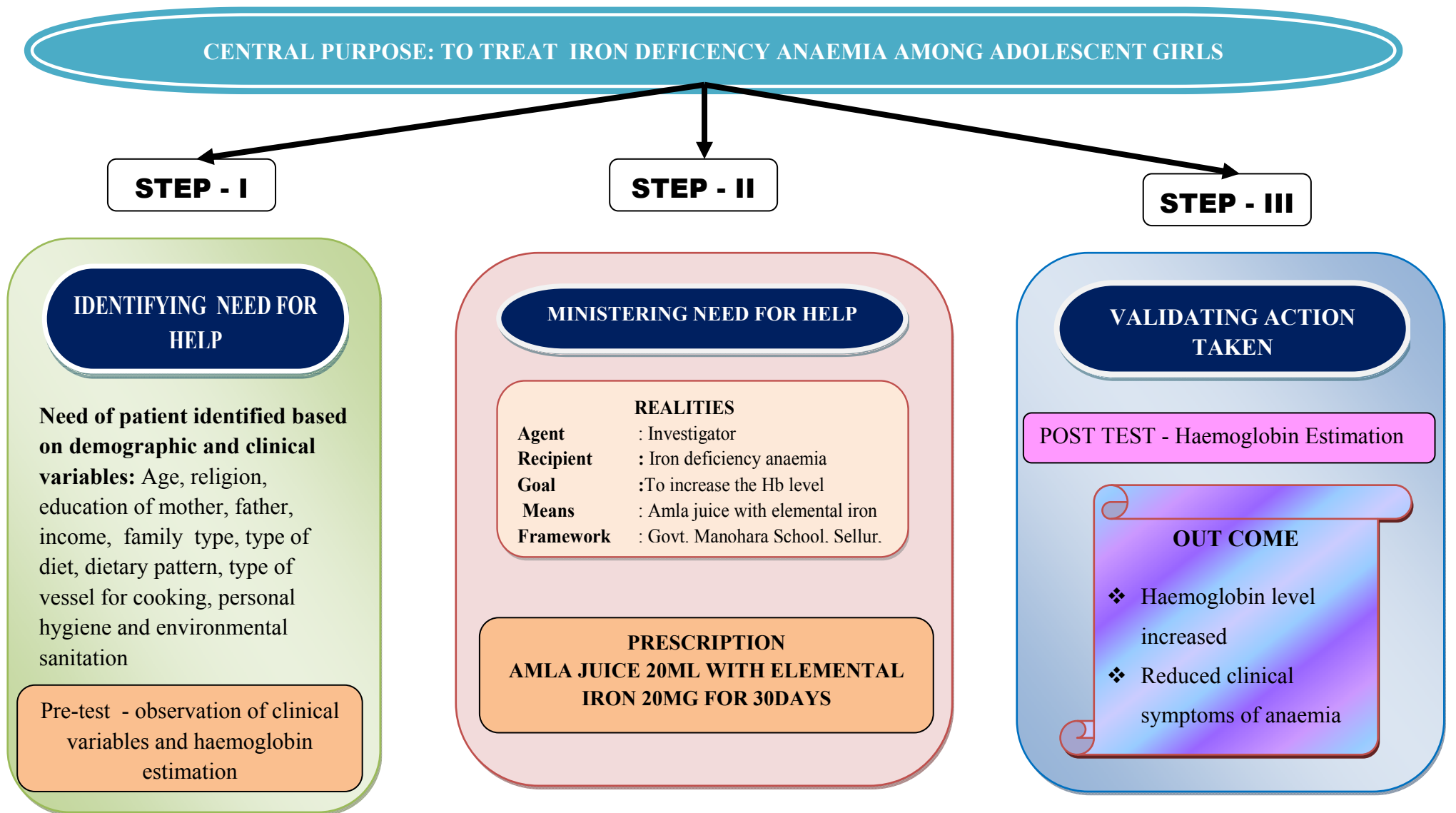
**3. Goal:** According to the theorist, the goal is the desired outcome the nurse wishes to achieve. The goal is the end result to be attained by the nursing action. In this study the goal was to increase the haemoglobin level among the adolescent with iron deficiency anaemia.

**4. Mean:** According to the theorist, the mean comprise the activities and devices through which the practitioner is enabled to attain her goal. In this study, Means were the amla juice with elemental iron.

**5. Framework:** According to the theorist, it consists of human, environment, professional and organizational facilities that not only make up the context within which nursing is practiced but also constitutes its currently existing limits. In this study the framework was Govt. Manohara School , Sellur, Madurai.

#### **VALIDATING THE ACTION TAKEN:**

After help has been ministered the nurse validates that the actions were indeed helpful. Here the investigator validated by means of post test assessment of Hb estimation. The subjects had increased Hb level after the consumption of the amla juice with elemental iron.



**FIG.1. CONCEPTUAL FRAME WORK WAS BASED ON WIEDENBACH'S PRESCRIPTIVE THEORY, (1969)**

# *Methodology*



### **3.3 RESEARCH VARIABLES**

Variables are character that can have more than one value, the three categories of variables discussed in the present study were;

#### **Independent variable:**

Amla juice with elemental iron .

#### **Dependent variable:**

Haemoglobin level.

#### **Baseline variable:**

Age, religion, education, family Income, type of family , Education of father and mother, number of children in the family, type of vessels used for cooking, type of diet, Dietary pattern, personal Hygiene and Environmental sanitation.

### **3.4. SETTING OF THE STUDY**

The setting was selected based on acquaintance of the investigator with the institution, feasibility of conducting the study, availability of the sample, permission and proximity of the setting to investigation.

The study was conducted in Govt. Manohara School, Sellur, at Madurai.

### **3.5 POPULATION**

All adolescent girls

#### **TARGET POPULATION**

The target population in this study was all adolescent girls with iron deficiency anaemia.

## **ACCESSIBLE POPULATION**

Adolescent girls with iron deficiency anaemia who are studying in Govt. Manohara school at Sellur, in Madurai were the accessible population.

### **3.6 SAMPLE**

Samples are adolescent girls with iron deficiency anaemia who are studying in Govt. Manohara School, Sellur, at Madurai those who have fulfilled the inclusion criteria.

### **3.7 SAMPLE SIZE**

The total sample size was 40 adolescent girls.

### **3.8 SAMPLING TECHNIQUE**

Non probability Purposive sampling technique was used to select the sample for the study.

### **3.9 . CRITERIA FOR SAMPLE SELECTION**

The study samples were selected by the following inclusion and exclusion criteria

#### **Inclusion criteria**

- Adolescent girls between the age group of 13 -15 years.
- Adolescents girls with haemoglobin level between 7 gms % - 11.9 gms%.
- Who were willing to participate.

#### **Exclusion criteria**

- Who were taking iron supplement.
- Those who were on medical treatment.
- With any systemic disease

### **3.10. DEVELOPMENT OF TOOL**

After extensive review of literature and discussion with the experts and with the researcher's personal and professional experience a structured self administered questionnaire were used to collect the demographic data of adolescent girls.

### **3.11. DESCRIPTION OF TOOL**

The tool for data collection consists of 3 parts namely

#### **PART I**

Consists of demographic variables of adolescent girls (age, education, religion, family income, education status of mother and father, type of family, type of diet, dietary pattern , personal hygiene and environmental sanitation.

#### **PART II**

Clinical assessment of symptoms of anaemia with observation checklist used to assess the symptoms of anaemia among adolescent girls.

#### **PART III**

Clinical assessment of haemoglobin level estimation among adolescent girls before and after intervention .

### **SCORING PROCEDURE (AS PER WHO)**

Mild anaemia	- 10.1 to 11.9 gm%
Moderate anaemia	- 7 – 10 gm %
Severe anaemia	- < 7 gm % haemoglobin level

### **3.12. VALIDITY AND RELIABILITY OF THE TOOL**

#### **Content Validity**

The content validity of the self administered questionnaire has been checked and evaluated by 5 experts including 4 from the community health departments, and one from director of Preventive and Social Medicine, Madurai Medical College. Experts were requested to judge the items for the clarity, relevance, comprehensiveness and appropriate of the content. Appropriate modification was made in each part as per the suggestion given by the experts.

### **3.13 RELIABILITY**

The tool was administered to 10 samples representing the characteristic of the population. The reliability coefficient was calculated through inter-rater method. The co-relation co-efficient  $r = 0.971$ . The tool was found to be highly reliable.

### **ETHICAL CONSIDERATION**

The research proposal was approved by the experts of the Dissertation Committee of College of Nursing, Madurai Medical College, Madurai, and the same was approved by Institutional Review Board, Independent Ethical Committee of Government, Rajaji Hospital, Madurai-20 for conducting the pilot study and main study. The formal permission was obtained from DDHS, Madurai. The committee suggested the researcher to continue the study with necessary modification.

### **3.14. PILOT STUDY**

The pilot study was conducted in Govt. Manohara School, Sellur, at Madurai from 1. 8. 14 to 8. 8. 14 with 10 adolescent girls (7<sup>th</sup> std) who are studying in the Govt. Manohara School, after obtaining an informed consent. The purpose was to



find out the feasibility of the study. The questionnaire was found to be feasible and result showed that they were appropriate and feasible.

### **3.15. PROCEDURE FOR DATA COLLECTION**

The data collection procedure was done for 4 weeks (12.8.14 to 15.9.14) in Govt. Manohara School, Sellur, Madurai. The data was collected and written permission was obtained to conduct the study from the parents of the samples. The samples were informed by the researcher about the nature and purpose of the study. After obtaining the verbal and written consent, the demographic data have been collected with the use of self administered questionnaire and assessment was done as per observation checklist and pre-test including estimation of haemoglobin level among adolescent girls were tested by cell count method and iron deficiency anaemia is confirmed through smear test in the clinical laboratory by the Pathologist. On the first day deworming done by giving T.Albendazole 400mg per sample as prescribed by Medical Officer. Next day onwards the amla juice 20ml with elemental iron 20mg (as prescribed by the Medical Officer) was given after food to the samples daily for 30 days. The 20 ml of amla juice contains 600 mg of vit.c After that on 31<sup>st</sup> day the post test was done by assessment of haemoglobin estimation by cell count method.

### **3.16 PLAN FOR DATA ANALYSIS**

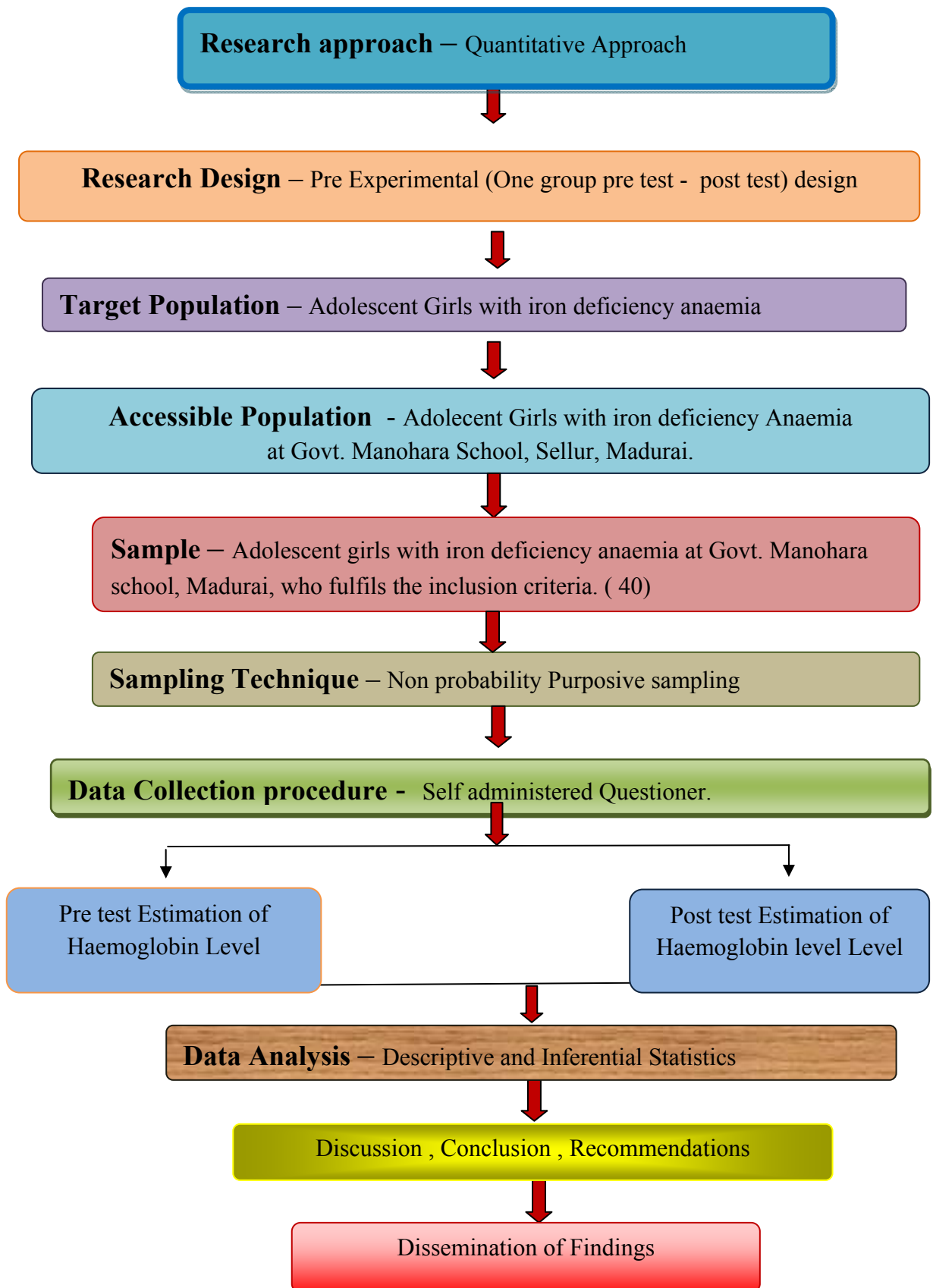
The demographic variables were analyzed by using descriptive measure (frequency and percentage). The haemoglobin level were analyzed by using descriptive measures (mean and standard deviation). The effectiveness of amla juice with elemental iron was analyzed by using paired 't' test. The association between

haemoglobin level with their selected demographic variables among adolescent girls were analyzed by using inferential statistics (chi-square).

### **3.17. PROTECTION OF HUMAN SUBJECTS**

The investigator obtained approval from dissertation committee, The Government Rajaji hospital ethical committee, and formal written permission from the DDHS and Asst. Elementary Educational Officer. Each individual client was informed about the purpose of the study and confidentiality was promised and ensured. Both verbal and written consent was obtained from all the study subjects and data collected was kept confidential. The names of the subjects were not disclosed in any form. The client had freedom to leave the study at any time without any reason. Anonymity was maintained throughout the study.

## SCHEMATIC REPRESENTATION OF RESEARCH STUDY



*Data Analysis And  
Interpretation*

## CHAPTER – IV

### DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and interpretation of the data collected from 40 Adolescent girls with anaemia in order to assess the effectiveness of amla juice with elemental iron on iron deficiency anaemia. The purpose of analysis was to reduce the collected data to manageable and interpretable form, so that the research problem can be studied and tested.

According to Polit and Hungler (2005) analysis is the method of organizing, sorting and scrutinizing data in such a way that research questions can be answered. The analysis and interpretation of data of this study is based on the data collected through assessment of symptoms for anaemia with observation checklist and haemoglobin estimation among adolescent girls. The results are computed by using descriptive (mean, frequency percentage distribution and standard deviation) and inferential statistics. The study findings are presented in the section as follows.

- Section I : Distribution of demographic variables of the adolescent girls.
- Section II : Distribution of the pre-test haemoglobin level among adolescent girls
- Section III : Distribution the post-test haemoglobin level among adolescent girls
- Section IV : Effectiveness of amla juice with elemental iron intervention among adolescent girls.
- Section V : Association between the level of iron deficiency anaemia with their selected socio demographic variables.

**SECTION I**

**DATA ON DEMOGRAPHIC VARIABLES OF ADOLESCENT GIRLS**

**TABLE -1**

**FREQUENCY AND PERCENTAGE DISTRIBUTION OF ADOLESCENT GIRLS ACCORDING TO DEMOGRAPHIC VARIABLES**

(n=40)			
<b>S.NO</b>	<b>DEMOGRAPHIC VARIABLE</b>	<b>Frequency (f)</b>	<b>Percentage (%)</b>
1	Age in years		
	a. 13yrs	38	95%
	b. 14 yrs	2	5%
	c. 15 yrs	-	-
2.	Education		
	a. 7th	-	
	b. 8 <sup>th</sup>	40	100%
3.	Religion		
	a. Hindu	37	92.5%
	b. Muslim	3	7.5%
	c. Christian	-	-
4	Family Income		
	a. Rs.3000 – 5000	34	85%
	b. Rs.5001 – 10000	6	15%
	c. Rs.10001 – above	-	-
5.	Type of Family		
	a. Nuclear	32	80%
	b. Joint	8	20%
	c. Extended	-	-
6.	Educational status of Father		
	a. Uneducated	24	60%
	b. Primary	4	10%
	c. Higher secondary	12	30%

<b>S.NO</b>	<b>DEMOGRAPHIC VARIABLE</b>	<b>Frequency (f)</b>	<b>Percentage (%)</b>
7.	Educational status of mother a. Uneducated b. Primary c. Higher secondary	21 6 13	52.5% 15% 32.5%
8	No. of children in the family a. Upto 2 b. Above 2	17 23	42.5% 57.5%
9.	Type of Diet Vegetarian Non-vegetarian	13 27	32.5% 67.5%
10.	Type of vessels for cooking a. Iron b. Aluminum c. Others	12 22 6	30% 55% 15%
11.	<b>Dietary Pattern</b> - Preference of Junk food a. Yes b. No	14 26	35% 65%
12.	Habit of taking Tea / coffee(within 1 Hr) a. Yes b. No	8 32	20% 80%
13.	Intake of green leaves in the food. a. Yes b. No	27 13	67.5% 32.5%
14.	Habit of washing the fruits and vegetables before consumption a. Yes b. No	28 12	70% 30%
15.	Personal Hygiene Maintenance of adequate personal Hygiene a. Yes b. No	21 19	52.5% 47.5%

<b>S.NO</b>	<b>DEMOGRAPHIC VARIABLE</b>	<b>Frequency (f)</b>	<b>Percentage (%)</b>
<b>16.</b>	Wearing chepals regularly. a. Yes b. No	30 10	75% 25%
<b>17.</b>	Habit of hand washing after using toilet. a. Yes b. No	28 12	70% 30%
<b>18.</b>	<b>Environmental Sanitation</b> - Had attack of Malaria before a. Yes b. No	3 37	7.5% 92.5%
<b>19.</b>	History of treatment for parasitic infection. a. Yes b. No	14 26	35% 65%
<b>20.</b>	Have sanitary latrine at home. c. Yes d. No	38 2	95% 5%

**The above table reveals according to the age distribution** among adolescent girls, 38(95%) of them were 13 years old, 2 (5%) of them were 14 years and none of them were in 15 years,

**In the aspect of educational qualification**, all (100%) the subjects were in 8<sup>th</sup> standard. **Regarding religion**, majority 37 (92.5%) were Hindu , and 3 (7.5%) of them were belongs to Muslim.

**Based on the family income**, 34, (85%) subjects had monthly income of Rs. 3000 – 5000, and 6 (15%) of them had Rs. 5001 – 10000 respectively.



**Regarding the type of family**, 32, (80%) were from nuclear family, and 8 (20%) of them were joint family.

**Based on educational status of the sample's father**, 24 (60%) of them were uneducated, 4 (10%) of the sample's father were finished their primary education and 12 (30%) of them were upto higher secondary level. **According to the educational status of the mother**, 21 (52.5%) subject mothers were uneducated, 6 (15%) were completed primary education and 13 (32.5%) of subject mothers were completed higher secondary.

**Based on number of children in the family**, 17 (42.5%) subjects had one or two children in the family and 23 (57.5%) subject families had above two children in the family..

**On the basis of the type of diet**, 13 (32.5%) were vegetarian and remaining 27 (67.5%) were consuming non – vegetarian.

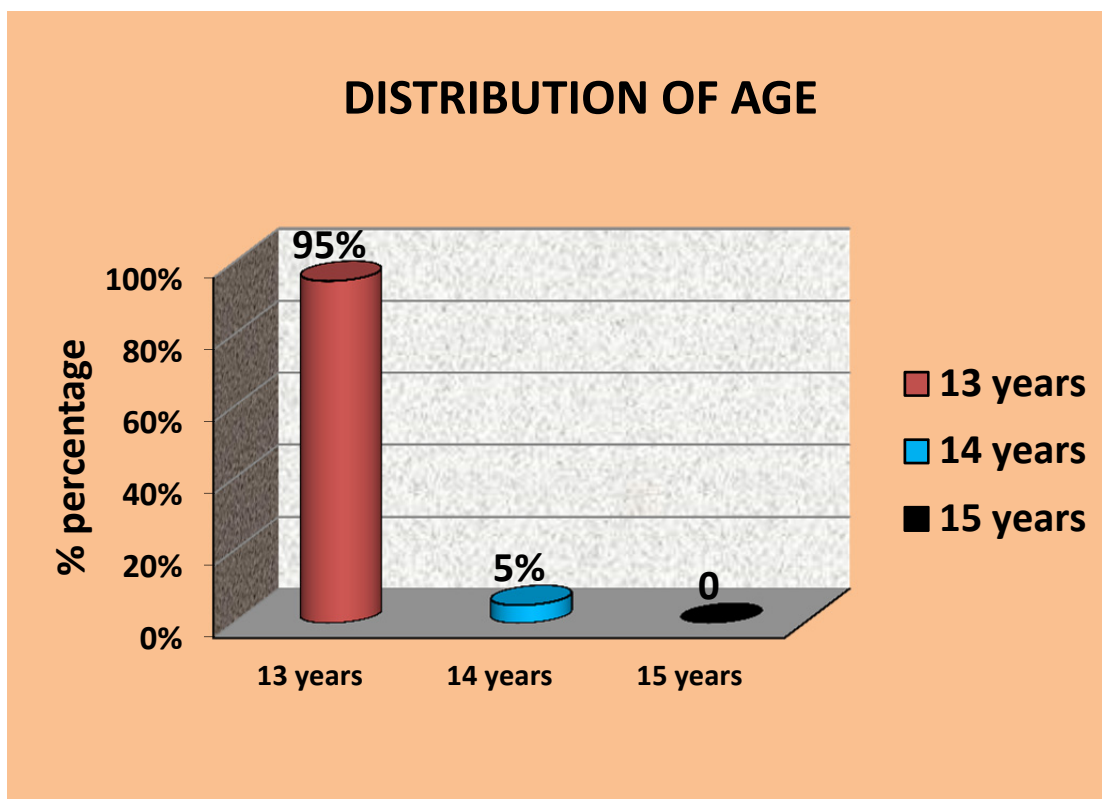
**Regarding the type of vessels for cooking**, 12 (30%) subjects family had using iron vessels for cooking, 22 (55%) subjects were using Aluminium vessels for cooking.

**On the basis of other dietary pattern**, 14 (35%) subjects are preferred junk food, and 26 (65%) are not preferred junk food. **The habit of taking tea / coffee** after food, 8 (20%) had the habit of taking tea / coffee within the hour of food and 32 (80%) of them were did not have the habits. **Intake of green leaves** in the food, 27 (67.%) subjects had the practice of taking green leaves and 13 (32.5%) subjects were not taking green leaves in the diet. **Habit of washing the fruits and vegetables**, 28 (70%) subjects had the habit of washing before consumption, and 12

(30%) were not had the habit of washing the fruits and vegetables before consumption.

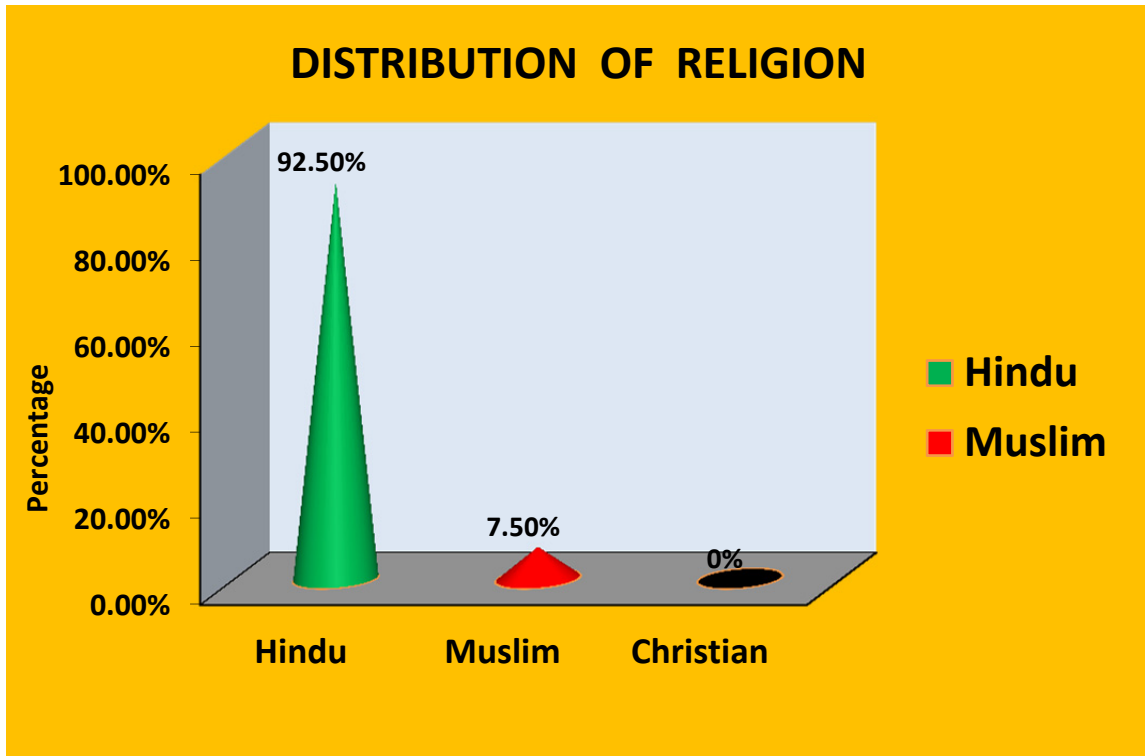
**Regarding Personal Hygiene**, 21 (52.5%) subjects were maintained adequately and 19 (47.5%) subjects were not maintained adequately. **Regarding wearing chepals**, 30 (75%) subjects are wearing chepals regularly and 10 (25%) were not wearing chepals regularly. **Habit of washing hands after using toilet**, 28 (70%) subjects were having the habits of washing hands with soap after toileting, and 12 (30%) subjects were not practised the habit of washing hands after toileting.

**Regarding environmental sanitation**, 3 (7.5%) subjects were affected with malaria and remaining 37 (92.5%) are had not affected with malaria. Also 14 (35%) adolescent girls had treatment for parasitic infection and 26 (65%) were not affected with parasitic infection. Among 40 subjects, 38 (95%) subjects had sanitary latrine at home and 2 (5%) of them are not having sanitary latrine at home.



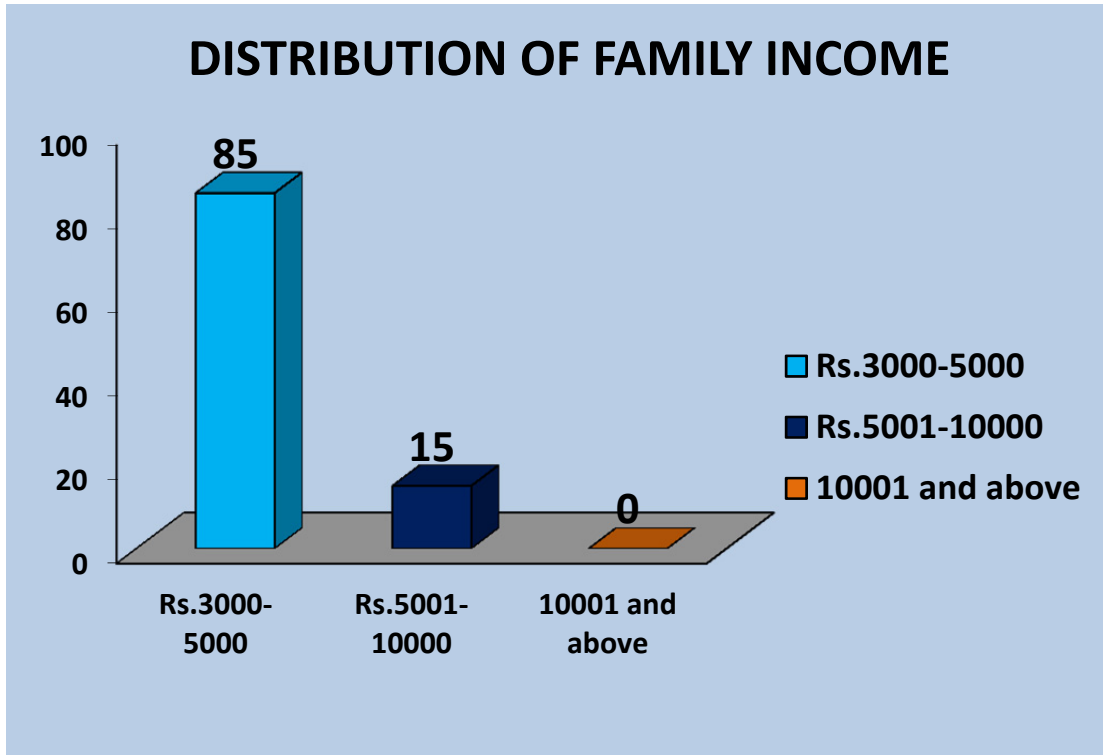
**Figure 3 : Percentage distributions according to age in years among adolescent girls on iron deficiency anaemia.**

The above cylindrical diagram, shows that 38 (95%) subjects were 13 years old, 2 (5%) of them were 14 years and none of them were in 15 years of age.



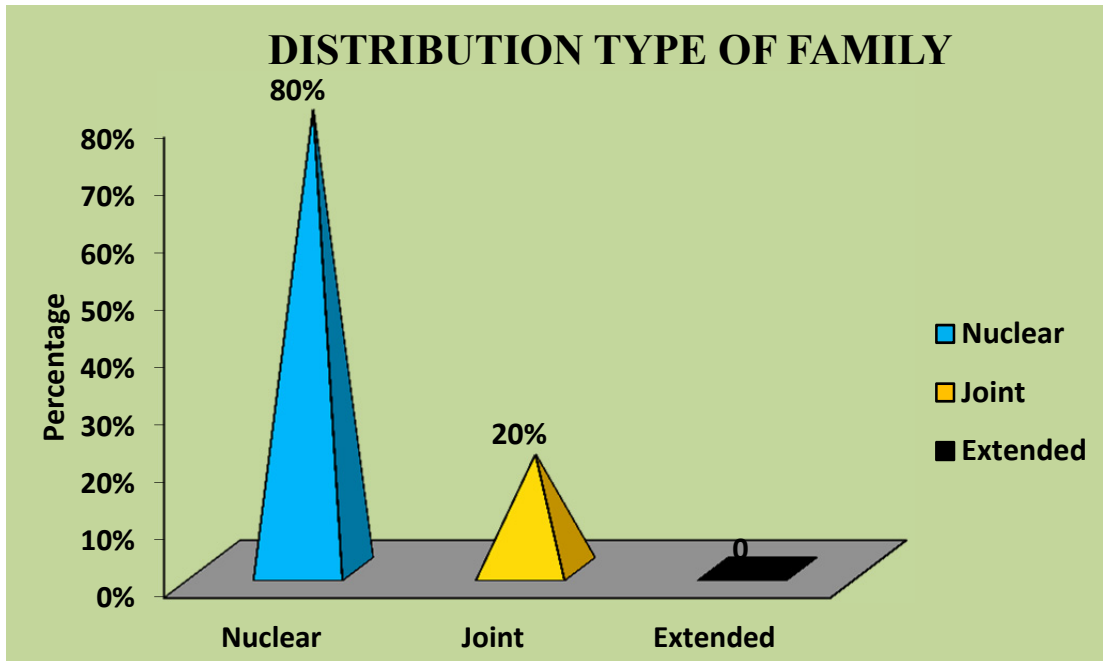
**Figure 4 : Percentage distribution of religion among adolescent girls on iron deficiency anaemia.**

The above cone diagram shows that the percentage wise 37 subjects (92.5%) belongs to Hindu background, and 3 (7.5%) of them belongs to Muslim Background and none of them belongs to Christian.



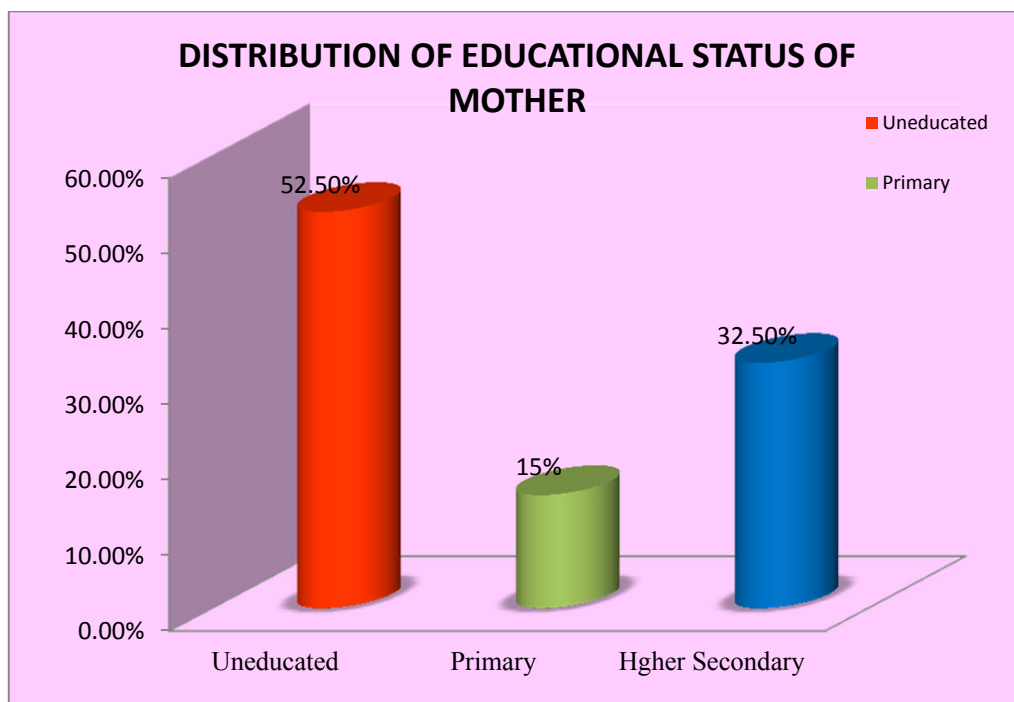
**Figure 5 : Percentage distribution of Family Income among adolescent girls on iron deficiency anaemia.**

The above bar diagram shows that in aspect of family income, majority of the subjects 34 (85%) family income was between Rs. 3000 – 5000/-, and 6 (15%) of them had Rs. 5001 – 10000 as monthly income. No subjects had the family income of 10,001 and above.



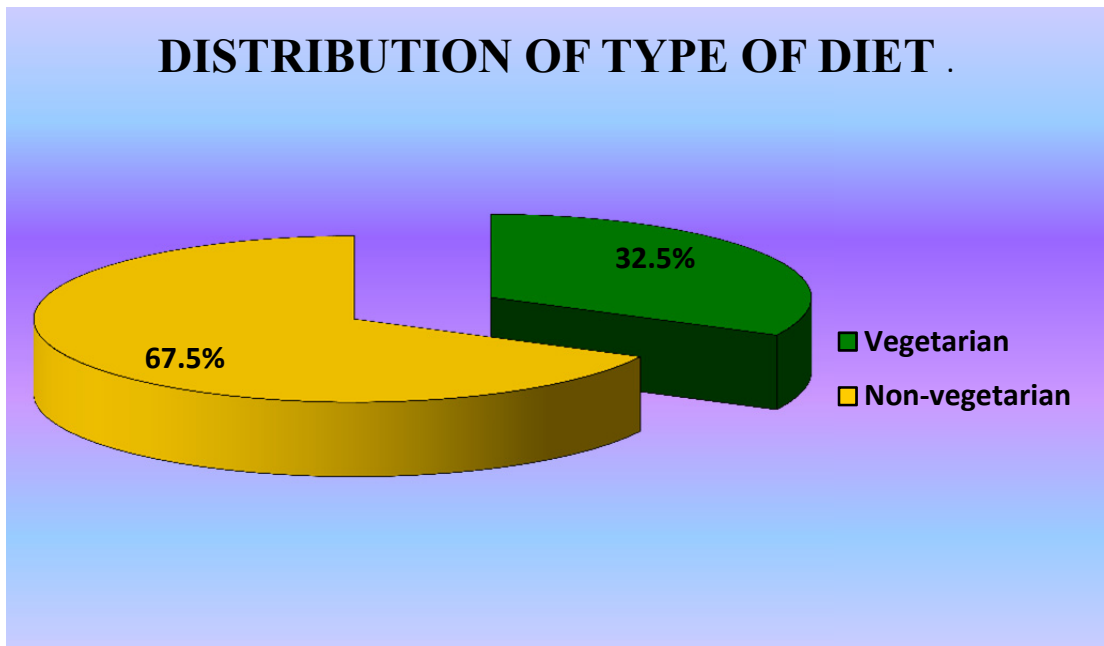
**Figure 6 : Percentage Distribution of family type among adolescent girls on iron deficiency anaemia.**

The above pyramid diagram reveals that 32 (80%) subjects are in a nuclear family and 8 (20%) subjects are in a joint family and none of them were belongs to extended type.



**Figure 7: Percentage distribution of educational status of the mothers among adolescent girls on iron deficiency anaemia.**

The cylindrical diagram reveals that 21 (52.5%) subjects mother were uneducated, 6 (15%) subjects mother were completed their primary and 13(32.5%) subjects mother were completed upto higher secondary.

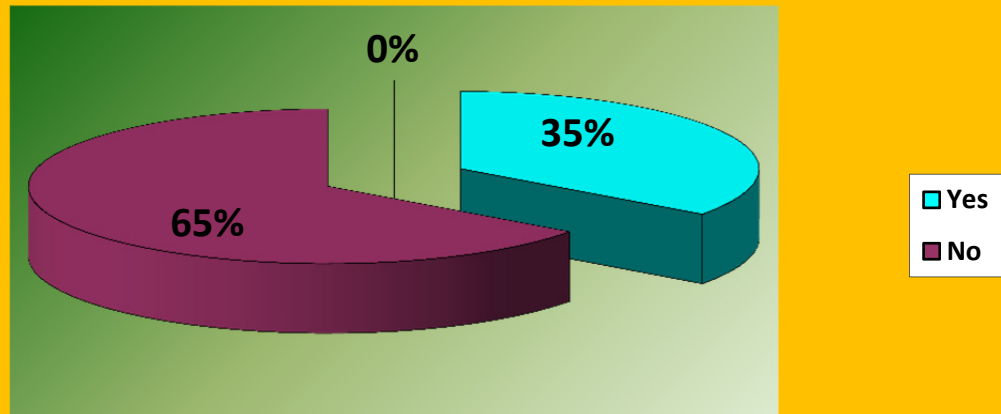


**Figure 8 : Percentage distribution of type of diet among adolescent girls on iron deficiency anaemia.**

The above pie diagrams shows that 27 (67.5%) subjects were non – vegetarian, and 13 (32.5%) subjects were belongs to vegetarian.

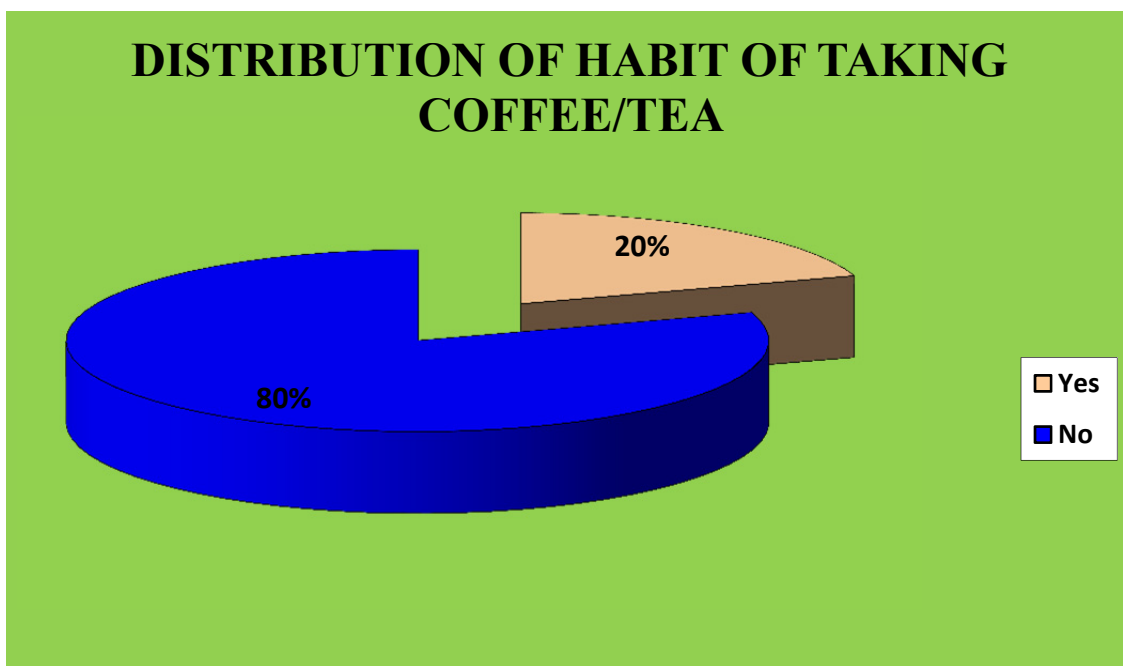


## DISTRIBUTION OF PREFERENCE OF JUNK FOOD



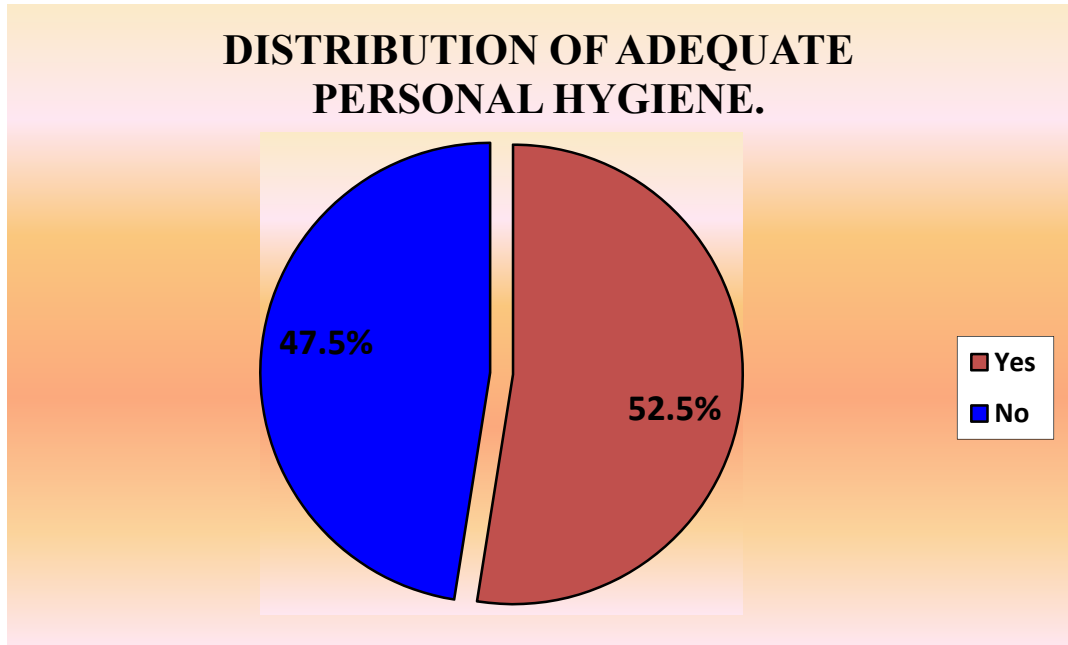
**Figure 9 : Percentage distribution of preference of junk food among adolescent girls on iron deficiency anaemia.**

The above pie diagram 14 (35%) subjects were preferred junk food and 26 (65%) subjects were not preferred junk food.



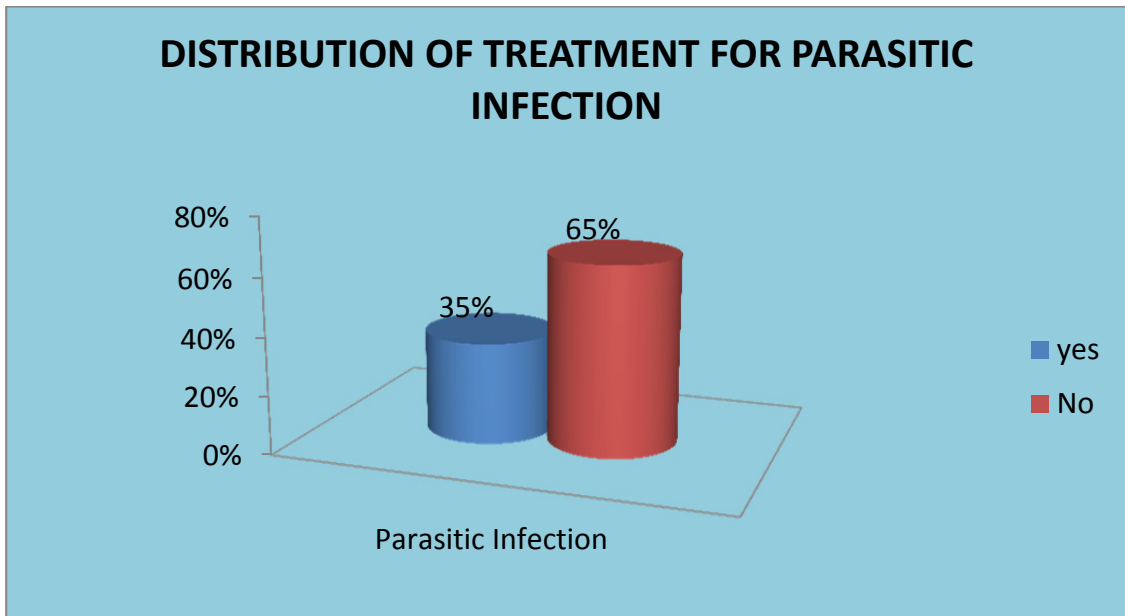
**Figure 10: Percentage distribution of habit of taking Coffee / Tea among adolescent girls on iron deficiency anaemia.**

The above pie diagram reveals that 30 (80%) subjects were not have the habit of taking tea / coffee and 10 (20%) subjects were having the habit of taking tea / coffee.



**Figure 11: Percentage & distribution of personal hygiene among adolescent girls on iron deficiency anaemia.**

The above Pie diagram reveals that 21 (52.5%) subjects were maintaining the adequate personal hygiene whereas 19 (47.5%) subjects were not maintained the adequate personal hygiene.



**Figure 12 : Percentage distribution of treatment for parasitic infection.**

The above column diagram reveals that 14 (35%) subjects were received the treatment for parasitic infection whereas 26 (65%) subjects were not affected with parasitic infection.

## SECTION II

### DISTRIBUTION OF PRE TEST LEVEL OF ANAEMIA SYMPTOMS AMONG ADOLESCENT GIRLS BEFORE AMLA JUICE INTERVENTION

TABLE 2

Pre test level of symptoms of anaemia among adolescent girls

S.No	Symptoms of Anemia	f	%
1.	Paleness of conjunctiva	27	67.5%
2.	Pale tongue	13	32.5%
3.	Anorexia	6	15%
4.	Stomatitis	3	7.5%
5.	Absence of above symptoms	14	35%

The above table interprets that, among 40 subjects, 27 (67.5%) subjects had paleness of conjunctiva, 13 (32.5%) subjects had pale tongue, 6 (15%) subjects had anorexia, and 3 (7.5%) subjects had stomatitis and 14 subjects had absence of above symptoms.

**TABLE 3**  
**Frequency and Percentage of pre - test haemoglobin level among**  
**Adolescent Girls**

n = 40

<b>TEST</b>	<b>MILD</b>		<b>MODERATE</b>	
	<b>f</b>	<b>%</b>	<b>f</b>	<b>%</b>
Pre test	4	10	36	90

It is inferred that 4 (10%) subjects had mild anaemia and 36 (90%) had moderate anaemia and none of them had severe anaemia before intervention.

### SECTION III

#### DISTRIBUTION OF POST TEST LEVEL OF ANAEMIA SYMPTOMS AMONG ADOLESCENT GIRLS AFTER AMLA JUICE INTERVENTION

TABLE 4

Frequency and percentage of post test level of anaemia symptoms among Adolescent Girls after amla juice intervention.

n = 40

S.No	Symptoms of Anemia	f	%
1.	Paleness of conjunctiva	10	25%
2.	Pale Tongue	8	20%
3.	Anorexia	3	7.5%
4.	Stomatitis	3	7.5%
5.	Absence of above symptoms	30	75%

After amla juice intervention 10 subjects had paleness of conjunctiva, 8 (20%) subjects had pale tongue, and 3 (7.5%) subjects had Anorexia and stomatitis respectively after amla juice intervention.

It is inferred that major reduction on symptoms of anaemia among adolescent girls after amla juice intervention for 30 days.

**TABLE 5**

**Frequency and percentage distribution on post test level of anaemia among adolescent girls.**

**n = 40**

<b>TEST</b>	<b>MILD</b>		<b>MODERATE</b>	
	<b>f</b>	<b>%</b>	<b>f</b>	<b>%</b>
Post test	20	50	20	50

The above table describes that after amla juice intervention, 20 (50%) subjects had mild anaemia, and 20 (50%) subjects had moderate anaemia. Most of the adolescent girls haemoglobin level was increased when compared with the pre-test scores.



## SECTION IV

### EFFECTIVENESS OF AMLA JUICE ON IRON DEFICIENCY ANAEMIA.

TABLE - 6

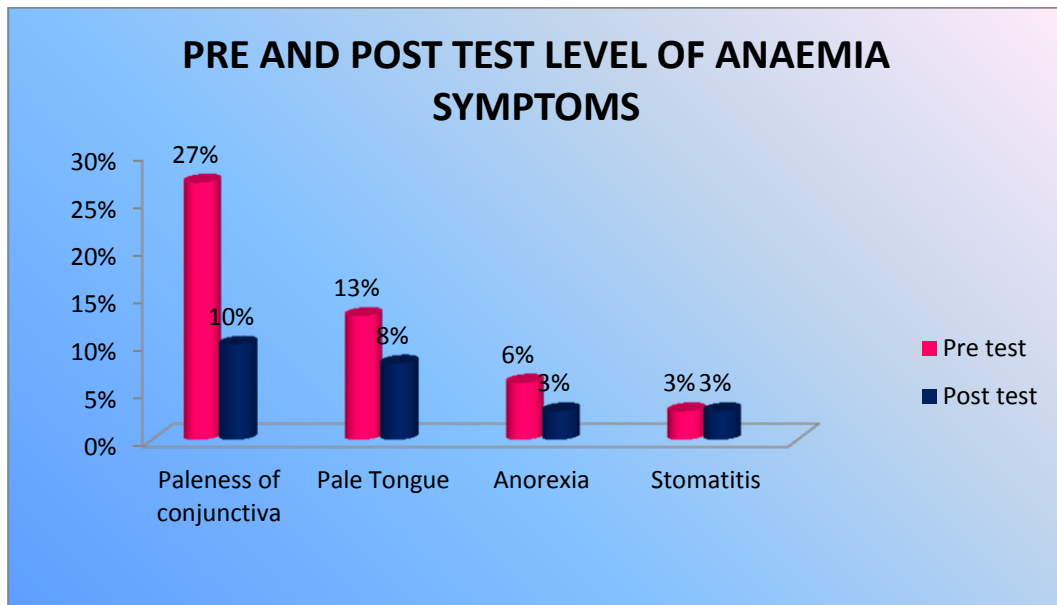
**Comparison of pre – test and post – test symptoms of anaemia among adolescent girls.**

S.No	Symptoms of Anemia among Adolescent Girls	Number of adolescent girls		D
		Pre test	Posttest	
1.	Paleness of conjunctiva	27	10	17
2.	Pale tongue	13	8	5
3.	Anorexia	6	3	3
4.	Stomatitis	3	3	3

Above table represents the effectiveness of amla juice intervention, there was reduced the symptoms of anaemia among adolescent girls. After 30 days of amla juice intervention, paleness of conjunctiva was reduced from 27 (67.5%) to 10 (25%). Regarding pale tongue , it was reduced from 13 (32.5%) to 8 (20%), also anorexia was reduced from 6 (15%) to 3 (7.5%), and 3 (7.5%) subjects had stomatitis after intervention.

It is inferred that the symptoms of anaemia among adolescent girls were high during pre – test, and most of the symptoms of anaemia had reduced after amla juice intervention in post test.

## Distribution of pre and post level of anaemia after amla juice intervention



**Figure 13: Comparison between pre and post test symptoms of anaemia among adolescent girls**

This column chart describes that the symptoms of anaemia was reduced after amla juice intervention.

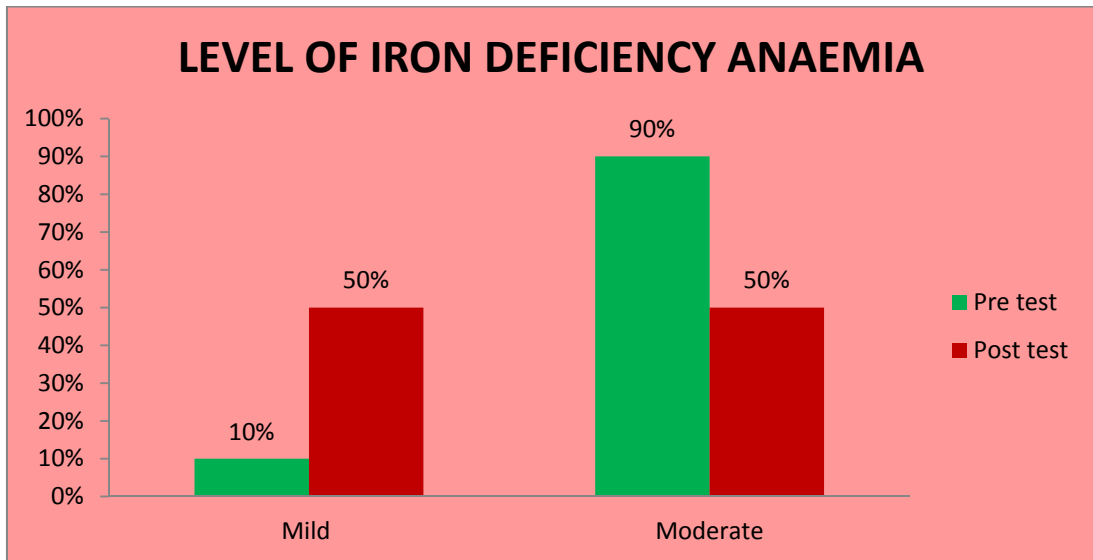
**TABLE 7**

**Comparison of pre and post test Anaemia level among adolescent girls**

<b>TEST</b>	<b>MILD</b>		<b>MODERATE</b>	
	<b>f</b>	<b>%</b>	<b>f</b>	<b>%</b>
Pre test	4	10	36	90
Post test	20	50	20	50

The above table represents the effectiveness of amla juice intervention on improving the haemoglobin level among adolescent girls. In pre test, the adolescent girls 4 (10%) had mild anaemia and 36 (90%) of them had moderate anaemia. Whereas in post test most of them had increased their haemoglobin level, the 36 (90%) moderate anaemia was reduced to 20 (50%) mild anaemia, and 4 (10%) mild anaemia increased as 20 (50%) mild anaemia.

It is inferred that, after amla juice intervention for 30 days moderate anaemia 36 (90%) has been reduced to 20 (50%) as mild anaemia and mild anaemia from 4 (10%) improved to 20 (50%).



**Figure 14: Comparison of pre and post test level of anaemia among adolescent girls.**

The above bar diagram shows that 90% moderate anaemia was reduced to 50% after amla juice intervention.

**TABLE 8**

**Mean, Standard deviation and mean percentage for pre and post test level of anaemia among adolescent girls.**

<b>Subjects</b>	<b>pre test</b>		<b>post test</b>		<b>MD</b>
	<b>Mean</b>	<b>SD</b>	<b>Mean</b>	<b>SD</b>	
Overall	9.35	0.65	10.11	0.57	0.76

Above table reveals that before intervention haemoglobin level among 40 subjects the pre test means was 9.35 with standard deviation of about 0.65. After intervention haemoglobin among 40 subjects , the post test mean was 10.11 with standard deviation of 0.57. The mean deviation in the haemoglobin between pre and post test was 0.76.

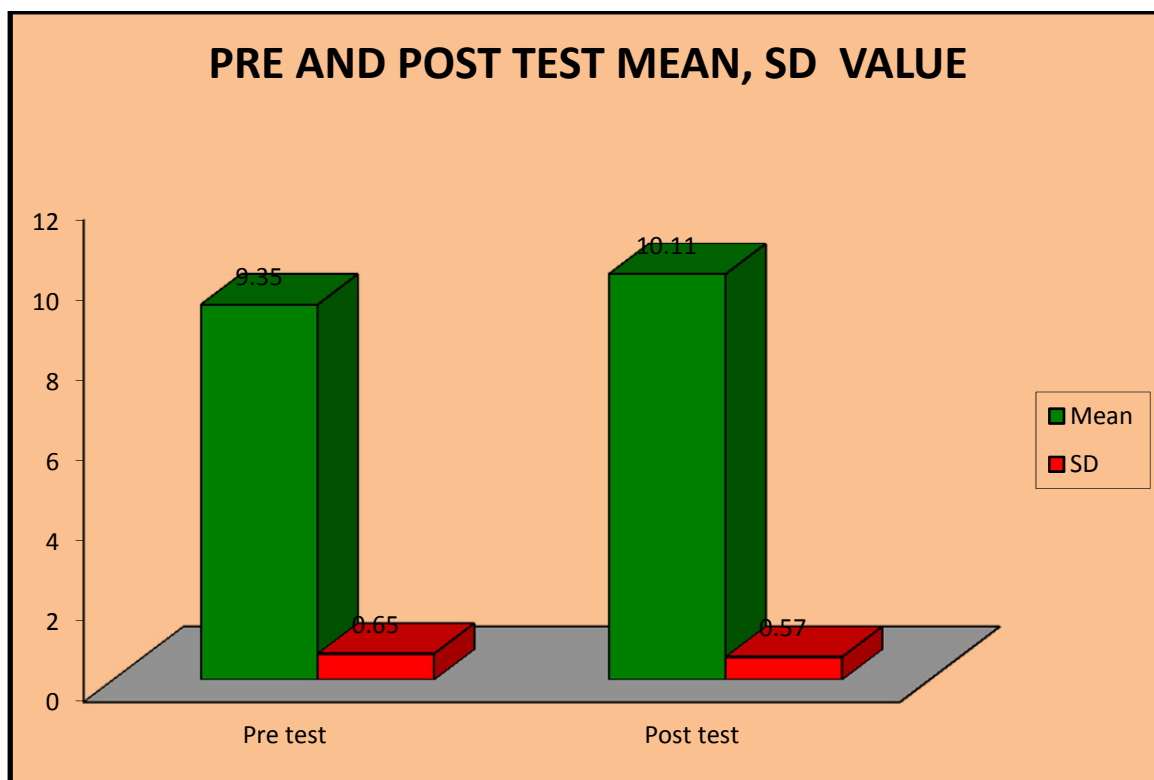
**TABLE 9**

**Paired 't' test - Effectiveness of amla juice with elemental iron intervention on iron deficient anaemia.**

<b>Subjects</b>	<b>pre test</b>		<b>post test</b>		<b>'t' value</b>	<b>p value</b>
	<b>Mean</b>	<b>SD</b>	<b>Mean</b>	<b>SD</b>		
Overall	9.35	0.65	10.11	0.57	6.05	P<0.001

\*-P<0.05 ,significant and \*\*-P<0.01 &\*\*\*-P<0.001 Highly significant

The calculated 't' value (6.05) was much higher than the table value at 0.001 level of significance ( pre set level of significant was 0.05) . The mean score shows the significant change in the Hb level, Thus it was very clear that there was a significant improvement in Hb level among adolescents after amla juice with elemental iron.



**Figure 15: Distribution of mean, SD of pre test and post test haemoglobin level among adolescent girls.**

The above bar diagram shows that the mean haemoglobin level of adolescent girls was increased after intervention whereas SD was decreased after amla juice intervention.

**SECTION - V**

**ASSOCIATE THE EFFECTIVENESS OF AMLA JUICE INTERVENTION WITH THEIR SELECTED SOCIO DEMOGRAPHIC VARIABLES.**

**TABLE 10**

**Association between post test level of anaemia with their selected socio demographic variables.**

S.No	Demographic variables	Mild		Moderate		$\chi^2$	p-value
		f	%	f	%		
1.	<b>Age (in years):</b>						
	a. 13	18	45	20	50	2.11	0.147
	b. 14	2	5	0	0	(df=1)	(Ns)
	c. 15	0	0	0	0		
2.	<b>Education</b>						
	a. 7 <sup>th</sup> std	0	0	0	0	0	1
	b. 8 <sup>th</sup> std	20	50	20	20		(NS)
3.	<b>Religion</b>						
	a. Hindu	18	45	19	47.5		
	b. Muslim	2	5	1	2.5	0.36	0.548
	c. Christian	0	0	0	0	(df=1)	(ns)
4.	<b>Family Income</b>						
	a. Rs.3000-5000	17	42.5	17	42.5		
	b. Rs.5001-10000	3	7.5	3	7.5	0	1
	c. 10001 and above	0	0	0	0	(df=1)	(NS)
5.	<b>5.Type of family :</b>						
	a. Nuclear	15	37.5	17	42.5	0.625	0.429
	b. Joint	5	12.5	3	7.5	(df=1)	(Ns)
	c. Extended	0	0	0	0		
6.	<b>Educational status of father:</b>						
	a. Uneducated	11	27.5	13	32.5		
	b. Primary	1	2.5	3	7.5	2.5	0.287
	c. Higher secondary	8	20	4	10	(df=2)	(Ns)



S.No	Demographic variables	Mild		Moderate		$\chi^2$	p-value
		f	%	f	%		
7.	<b>Education status of mother:</b> a. Uneducated b. Primary c. Higher secondary	6	15	15	37.5	8.45 (df=2)	0.015* (S)
		5	12.5	1	2.5		
		9	22.5	4	10		
8.	<b>Number of children in the family :</b> a. Up to 2 b. Above 2	8	20	9	22.5	0.102 (df=1)	0.749 (Ns)
		12	30	11	27.5		
9.	<b>Type of diet:</b> a. Vegetarian b. Non-vegetarian	8	20	5	12.5	1.02 (df=1)	0.311 (Ns)
		12	30	15	37.5		
10.	<b>Type of vessel for cooking:</b> a. Iron b. Aluminium c. Others	5	12.5	7	17.5	1.72 (df=2)	0.422 (NS)
		13	32.5	9	22.5		
		2	5	4	10		
	<b>Dietary Pattern:</b>						
11.	<b>11.Prefer junk food:</b> a. Yes b. No	1	2.5	13	32.5	15.82 (df=1)	0.000*** (s)
		19	47.5	7	17.5		
12.	<b>Habit of taking tea/coffee after food:</b> a. Yes b. No	1	2.5	7	17.5	5.62 (df=1)	0.018* (s)
		19	47.5	13	32.5		
13.	<b>Intake of Green leaf in your food:</b> a. Yes b. No	14	35	13	32.5	0.114 (df=1)	0.736 (NS)
		6	15	7	17.5		

S.No	Demographic variables	Mild		Moderate		$\chi^2$	p-value
		f	%	f	%		
14.	<b>Habit of washing the fruits and vegetables before consumption:</b>						
	a. Yes	13	32.5	15	37.5	0.47	0.49
	b. No	7	17.5	5	12.5	(df=1)	(NS)
	<b>Personal Hygiene</b>						
15.	<b>Maintenance of adequate personal hygiene:</b>						
	a. Yes	15	37.5	6	15	8.12	0.004**
	b. No	5	12.5	14	35	(df=1)	(S)
16.	<b>Wear chapels regularly:</b>						
	a. Yes	13	32.5	17	42.5	2.13	0.144
	b. No	7	17.5	3	7.5	(df=1)	(Ns)
17.	<b>Habit of hand washing After using toilet:</b>						
	a. Yes	11	27.5	17	42.5	4.28	0.038*
	b. No	9	22.5	3	7.5	(df=1)	(s)
	<b>Environmental sanitation</b>						
18.	<b>Attack of malaria before:</b>						
	a. Yes	2	5	1	2.5	0.36	0.548
	b. No	18	45	19	47.5	(df=1)	(Ns)
19.	<b>History of treatment for parasitic infections:</b>						
	a. Yes	3	7.5	11	27.5	7.03	0.008**
	b. No	17	42.5	9	22.5	(df=1)	(S)
20.	<b>Sanitary latrine at home:</b>						
	a. Yes	19	47.5	19	47.5	0	1
	b. No	1	2.5	1	2.5	(df=1)	(Ns)

\*-P<0.05, significant and \*\*-P<0.01 &\*\*\*-P<0.001 , Highly significant

The above table shows that significant association were found between the level of anaemia among adolescents with their socio demographic variables such as age , income of the family, literacy status of the mother , literacy status of the father and dietary pattern at 0.05 level. Moreover the literacy status of the mother, the dietary pattern such as preference of junk food, the habit to taking tea/ coffee after the food, maintenance of personal hygiene, the habit of washing hands after using toilet and the treatment of parasitic infection were significantly associated at  $p < 0.01$  level among adolescent girls .

There was no significant association was found between level of anaemia with their demographic variables like age, education, religion, family income, type of family, educational status of father, number of children in the family, type of vessels for cooking, habit of washing fruits and vegetables before consumption ,intake of Greenleaf in the diet, wearing chepels, previous episode of malaria and having latrine at home. .

**TABLE 11**

**Association between post test level of anaemia with their selected clinical variables.**

S.No	Signs and symptoms of Anemia	Pre – test		Post-test		Mc Nemar’s $\chi^2$ -Test	P-value (Level of significance)
		Yes	No	Yes	No		
1.	Paleness of conjunctiva	27	13	10	30	0.39	0.531 (Ns)
2.	Pale tongue	13	27	8	32	10.31	0.001 (S)
3.	Anorexia	6	34	3	37	25.97	0.000 (S)
4.	Stomatitis	3	37	3	37	28.9	0.000 (s)

The above table shows that significant association were found between the level of anaemia and clinical variables such as paleness of conjunctiva , pale tongue , anorexia fatigue, pica, glossitis, and stomatitis at 0.05 level. Moreover pale tongue, anorexia, and stomatitis were significantly associated at  $p < 0.01$  level among adolescent girls. And the remaining variable such as paleness of conjunctiva was not associated with the level of haemoglobin score significantly.

# *Discussion*

## **CHAPTER - V**

### **DISCUSSION**

The aim of the present study was to evaluate the effectiveness of amla juice with elemental iron among adolescent girls in Govt. Manohara School, Sellur, at Madurai. The study was conducted by using pre experimental (one group pre test and post test) design. The adolescent girls who are studying in a 8<sup>th</sup> std in Govt. Manohara School Sellur, at Madurai who have mild and moderate anaemia was selected for this study. The sample size was 40 adolescent girls who are studying in the 8<sup>th</sup> std at Govt. Manohara School, sellur, Madurai. The self administered questionnaire was used to assess the demographic variables.

The data was analyzed through both descriptive statistics (mean, frequency percentage, and standard deviation) and inferential statistics (paired 't' test and  $\chi^2$  test). This study has been discussed based on the objectives and the following supported studies.

#### **DISCUSSION OF SOCIO DEMOGRAPHIC VARIABLES**

Regarding the age among 40 adolescent girls, 38(95%) subjects were 13 years old, 2 (5% ) subjects were 14 years and none of them were in 15 years.

In the aspect of educational qualification, all (100%) of them were in 8<sup>th</sup> standard.

In the basis of the religion, 37 (92.5%) belongs to Hindu background, and 3 (7.5%) of them were belongs to Muslim background.

Based on the family income, 34 ( 85%) subjects had monthly income of Rs. 3000-5000 , and 6 ( 15%) subjects had Rs. 5001 – 10000 respectively.

Regarding the type of family, 32 (80%) subjects were from nuclear family, and 8 (20%) subjects were come from joint family.

Regarding the educational status of the subjects father , 24 (60%) subjects father were uneducated, 4 (10%) subjects father were finished their primary, and 12 (30%) subject father were finished upto higher secondary. Then, the educational status of the mother 21 (52.5%) subjects mother were uneducated, 6 (15%) were finished their primary and 13 (32.5%) subjects mother were finished their higher secondary.

Based on the number of the children , 17 (42.5%) subject families had with 2 children and 23 (57.5%) subject families had above 2 children only.

On the basis of the type of diet, 13 (32.5%) subjects were vegetarian and remaining 27 (67.5%) were practising non-vegetarian.

Regarding the type of vessels for cooking, 12 (30%) subjects family were using iron vessels for cooking, 22 (55%) subjects were using Aluminium vessels for cooking and 6 (15%) subjects were used other type of vessels for cooking.

On the basis of the dietary pattern, 14 (35%) subjects were preferred junk food, and 26 (65%) were not preferred the junk food. The habit of taking tea / coffee after food, 8 (20%) subjects were had the habit of taking tea / coffee within the hour of food and 32 (80%) subjects were did not have the habits. Intake of green leaves in the food, 27 (67.5%) subjects had the practice of taking green leaves and 13 (32.5%) were not taking green leaves in the diet. Habit of washing the fruits and vegetables, 28 (70%) subjects had the habit of washing before consumption, and 12 (30%) were not had the habit of washing the fruits and vegetables before consumption.

Regarding the Personal Hygiene, 21 (52.5%) subjects were maintained adequately and 19 subjects were not maintained adequately. Regarding wearing chepals 30 (75%) subjects were wearing chapels regularly and 10 (25%) subjects were not wearing chepals regularly. Habit of washing hands after using toilet, the 28 (70%) subjects were the habit of washing hands with soap after using toilet, and 12 (30%) subjects were not practised the habit of washing hands after using toilet.

Based on environmental sanitation, the 3 (7.5%) subjects had affected with malaria and remaining 37 (92.5%) subjects were not had the history of attack of malaria. Also 14 (35%) subjects had treatment for parasitic infection and 26 (65%) subjects were not treated for parasitic infection. Among 40, 38 (95%) subjects had latrine at home and 2(5%) subjects were not having latrine at home.

#### **FINDINGS BASED ON THE OBJECTIVES:**

**The first objective of the study was to asses the level of iron deficiency anemia among adolescent girls at Govt. Manohara School, sellur, Madurai.**

The present study reveals that the haemoglobin level among 40 adolescent girls before amla juice with elemental iron intervention, 1 (2.5%) subject had 8.2 gm, 8.4gm, and 8.5 gm respectively. Then 3 (7.5%) subjects had 8.6 gm, 12 (30%) subjects 9gm, 4 (10%) 9.2 gm, 1 (2.5%) had 9.4 gm, 4 (10%) had 9.5 gm, 4 (10%) 9.6 gm, 2 (5%) had 9.8 gm, 3 (7.5%) subjects had 10 gm, and 1 (2.5%) had 10.2, 10.5, 11, and 11.2 gm respectively.

It is inferred that 4 (10%) subjects had mild anaemia and 36 (90%) had moderate anaemia and none of them had severe anaemia before intervention.



The present study was consistent with the study was conducted by **Sundar, JS., Kalpana, S. ( 2012)**. A cross-sectional survey was executed to estimate the prevalence of iron deficiency anaemia among adolescent school girls in Chennai, Tamil Nadu. A sample of 400 female school students in the age group of 13-17 years were selected by using stratified random sampling method. The present study revealed that the prevalence of anaemia increased with the age of adolescent girls among 40, the majority of girls were 38(95% ) of them were 13 years old , 2 (5% ) of them were 14 years.

The present study was consistent with another study was conducted by **(Manoranjan Pal et al., 2009)** an analytical study to assess the prevalence of anaemia among girls from households the North-eastern states. The Majority 74(88%) adolescent girls belonged to Hindu religion only 10 (12%) girls were Christians. The highest prevalence of anaemia among the Northeastern states was observed among girls from households with a low standard of living, non-Christian girls, girls from Scheduled Tribes. The highest percentages of girls with normal haemoglobin were reported among Christian Scheduled Tribes.

**The second objective of the study was to evaluate the effectiveness of amla juice with elemental iron among adolescent girls on iron deficiency anemia at govt.**

**Manohara School, sellur, Madurai.**

Amla juice with elemental iron intervention was given to adolescent girls for 30 days to evaluate the effectiveness through post test haemoglobin level 20 (50%) subjects had mild anaemia, and 20 (50%) subjects had moderate anaemia. Most of the adolescent girls haemoglobin level was increased when compared with the pre-test scores. After amla juice with elemental iron intervention , paleness of conjunctiva

was reduced for 27 (67.5%) to 10 (25%). Pale tongue was reduced from 13 (32.5%) to 8 (20%), and anorexia was reduced from 6 (15%) to 3 (7.5%) after amla juice intervention.

It is inferred that major reduction on symptoms of anaemia among adolescent girls after amla juice with elemental iron intervention for 30 days.

The study conclude that the amla juice with elemental iron intervention was very effective as evident from the following findings with respect of increased haemoglobin level. It also revealed that the post test mean score 10.11 was higher than the pre test mean score 9.35. The mean deviation is 0.76 and obtained 't' value 6.05 was significant at  $P < 0.05$  level. Hence the stated hypothesis was supported. Thus there was significant difference between pre test and post test haemoglobin level among adolescent girls. It was inferred that the amla juice with elemental iron intervention increased the haemoglobin level and reduced the symptoms of anaemia among adolescent girls.

The study was consistent with **Brady et. al (2003)** conducted a clinical study on iron supplementation and absorption in the presence and absence of ascorbic acid. The study revealed that fortification with ascorbic acid increases the bio availability in both presence and absence of inhibiting substances (coco, caffeine items).ascorbic acid contains micro encapsulation with Lecithin, which protect the iron particles from the action of inhibiting substances (84%) when human takes the iron supplements along with ascorbic acid helps to get the higher amount of iron absorption ( $p=0.02$ ).

The study was consistent with another study of **Cinju john (2009)** who conducted a study in Bangalore, to assess whether the iron deficiency anaemia in young working women and the results showed that it can be reduced by increasing the

consumption of cereal based fermented foods or gooseberry at workplace .The study employed 302 women aged 18-23 years .Out of these, a group of 80 women were given 20 ml of gooseberry juice containing 40 mg of vitamin C three times a week once in a month. The haemoglobin status of this group of women improved significantly from 11.20 g/dl to 12.70 g/dl. The study revealed that the type of workplace lunch was of greater significance than Information, Education and Communication.

**Thus hypothesis I there is a significant difference between pre and post test level of iron deficiency anaemia among adolescent girls .was accepted.**

**The third objective of the study is to find out the association between the level of iron deficiency anaemia among adolescent girls with their selected socio demographic variables.**

In order to find out the association between the anaemic status based on haemoglobin score and selected variables  $\chi^2$  was computed. While testing the association between the anaemic status based on haemoglobin score and their socio demographic variables such as age , income of the family, literacy status of the mother , literacy status of the father and dietary pattern at 0.05 level. Moreover the literacy status of the mother, the dietary pattern such as preference of junk food, the habit to taking tea/ coffee after the food, maintenance of personal hygiene, the habit of washing hands after using toilet and the treatment of parasitic infection were significantly associated at  $p < 0.01$  level among adolescent girls .

There was no significant association was found in level of anaemia with the demographic variables like age, education, religion, family income, type of family, educational status of father, number of children in the family, type of vessels for cooking, habit of washing fruits and vegetables before consumption ,intake of

Greenleaf in the diet, wearing chepels, previous episode of malaria and having latrine at home. .

The present study was consistent with the study was conducted by (**Verma, A., 2008**) A cross sectional survey was conducted, the patterns of anaemia and dietary habits among adolescents , that majority of the girls 64(76.2%) had the habit of drinking coffee/tea, 39(46.4%) girls had habit of drinking once a day, 23(27.4%) had habit of drinking twice a day and 2(2.4%) girls had habit of drinking coffee/tea more than two times in a day and 20 (23.8%) girls had no habit of drinking coffee/tea. Anaemia was found to be higher among girls with the attributes of those with habit of post meal consumption of tea/coffee.

The present study quotes the another study was conducted by **Dheeraj Shah** (2007), it was found that children born to mothers who were illiterate and who belongs to schedule caste/ tribes were more likely to be anaemic than their counter parts. Further children born to moderately and severely anaemic mothers were more anaemic themselves, reflecting the consequences of poor maternal health status on the health of children.

The present study consistent with another study conducted by **George, K.A.** (2000) on the pattern of anaemia and its relations to nutritional status and dietary habits. He revealed that anaemia was reported among both vegetarian and non-vegetarian were anaemic. Changes in the eating behaviour could have potentially affected the iron availability.

The present study consistent with one more study that **Thankachan et al** (2009) revealed that “The addition of ascorbic acid had a significant effect on iron

absorption". Ascorbic acid added to the rice meal and enhanced iron absorption. The study thus revealed that iron status had a significant bearing on the absorption rate. According to Thankachan, the real implication of the study is that, the iron absorption can be enhanced by instituting simple dietary modifications such as addition of vitamin C containing food sources such as ripe papaya (2 to 3 slices, approximately 100 g), or guava (approximately 100 g), or lime juice (1 lime) to main meals. He opines that avoiding coffee or tea along with meals could have a favourable effect on iron absorption.

**Thus hypothesis II There is a significant association between the level of iron deficiency anaemia among adolescent girls with their selected socio demographic variables was accepted.**

*Summary,  
Conclusion &  
Recommendations*

## CHAPTER - VI

### SUMMARY RECOMMENDATION AND CONCLUSION

This chapter deals with summary, conclusion, limitation and recommendations of the study, further it includes implication for nursing practice , nursing education, nursing administration and recommendation for further nursing research.

#### 6.1 SUMMARY

The aim of this study was to assess the effectiveness of amla juice with elemental iron among adolescent girls with iron deficiency anaemia in Govt. Manohara School at Sellur, Madurai.

#### The Objectives of the study was

1. To asses the level of iron deficiency anaemia among adolescent girls at Govt. Manohara School, sellur, Madurai.
2. To evaluate the effectiveness of amla juice with elemental iron among adolescent girls on iron deficiency anaemia at Govt. Manohara School, sellur, Madurai.
3. To find out the association between the level of iron deficiency anaemia with adolescent girls with their selected socio demographic variables.

The following hypothesis was tested:

- H1** : There is a significant difference between pre and post test level of iron deficiency anaemia among adolescent girls .
- H2** : There is a significant association between the level of iron deficiency anaemia with their selected socio demographic variables.

The review of literature enabled to develop conceptual frame work, tool and methodology for the studies. Literature review was done as follows, studies related to prevalence of iron deficiency anaemia among adolescent girls, studies related to factors and symptoms of iron deficiency anaemia, and studies related to changing dietary behaviours among adolescent girls.

The conceptual framework was based on Wiedenbach's Helping art model, Pre experimental -,one group pre test & post test design was used to explore the effectiveness of amla juice with elemental iron on improving haemoglobin level among adolescent girls with anaemia at Govt. Manohara School, Sellur at Madurai. The samples were selected by using Non probability Purposive sampling technique the sample size was 40. The structured self administered questionnaire was used for data collection to assess the symptoms of anaemia, the observation check list was used and haemoglobin estimation done by cell count method.

The instrument used to collect the data comprised of three sections.

- Part I : deals with demographic data
- Part II : consists of assessment of symptoms of anaemia with observation checklist
- Part III : consist of clinical estimation of haemoglobin level by doing cell count method in the laboratory and amla juice with elemental iron intervention for 30 days.

The content validity was checked by the experts in nursing and medical experts. Reliability was done by interrelated method. Data was collected for a period of 4 weeks among adolescent girls in govt. Manohara school, Sellur at Madurai.



The methodology used for this study was quantitative approach. Pre experimental – one group Pre test and Post test design . The adolescent girls who were studying in Govt. Manohara School , Sellur was selected for this study. The sample size was 40. Non Probability purposive sampling was used to collect the sample. The structured questionnaire was used to collect the demographic variables, symptoms of anaemia were assessed with observation checklist and estimation of haemoglobin level by cell count method .

The data were analyzed through both descriptive statistics (Mean, frequency, percentage and standard deviation and inferential statistics (paired ‘t’ test and chi-square ) were used to test the study hypotheses. Discussion on the study findings were arranged as follows.

#### **MAJOR FINDING OF THE STUDY**

- Most of the adolescent girls were 13 years of age, most of them belong to Hindu religion, almost their family income between Rs. 3000 and Rs. 5000 and many of them were from nuclear family , most of the girls mother and father were uneducated and all are taking non- vegetarian diet.
- Majority of them 36 ( 90% )girls had moderate anaemia and 4 (10%) girls had mild anaemia and severe anaemia was not found among adolescent girls before amla juice intervention.
- After amla juice with elemental iron intervention 16 (40%) adolescent girls were changed from moderate anaemia to mild anaemia .
- The amla juice with elemental iron intervention was very effective in increasing the haemoglobin level.

- While comparing pre-test and post-test symptoms of anaemia among adolescent girls shows that the amla juice with elemental iron intervention was very effective in reducing the symptoms .
- The pre mean value was 9.35 increased after amla juice with elemental iron intervention as 10.11, the mean deviation is 0.76. The 't' value was 6.05 is higher than the table value 0.001, there is a significant difference in the haemoglobin level after amla juice intervention
- Low cost amla intervention is easily available in the community and it is easy to prepare by the community people.

## **6.2 CONCLUSION**

Community health nurse plays an important role in health promotion and prevention of diseases among adolescents. Although the focus of nurses often includes health promotion and health protection, early detection and prompt treatment and care of adolescents with chronic conditions, the primary focus is on education.

The study findings proved that the amla juice with elemental iron intervention increase the haemoglobin level and reduce the symptoms of anaemia among adolescent girls with iron deficiency anaemia. The subjects who received amla juice with elemental iron had a significant improvement in haemoglobin level. There was association between post test haemoglobin level and educational status of mother, preference of junk food, habit of taking tea / coffee with the food, maintenances of personal hygiene, habit of hand washing after using toilet , and history of treatment for parasitic infection.

### **6.3 IMPLICATION OF THE STUDY**

The findings of the present study have practical application in nursing field. The effectiveness of amla juice with elemental iron in improving the anaemic status can be discussed under the following headings.

#### **Nursing practice**

- The study findings will help the nursing personnel to implement the effective use of amla juice with elemental iron at the community level to improve anaemic status among adolescent girls with anaemia.
- It will also help the nursing personnel to conduct regular health assessment at school health services.
- The study findings will enable the nurses and nursing students to educate the parents, teachers and children to identify the level of iron deficiency anaemia through physical assessment.
- The study findings will help the community health nurse to know the importance of adolescent health and motivate the adolescent girls to participate in various health programmes.
- Community health nurse has to plan to conduct the awareness programme in the village regarding the prevalence of anaemia .

#### **Nursing Education**

- The study will motivate the nursing personnel to include amla as a low cost dietary management for iron deficiency anaemia ..
- Also enables the nursing personnel to include physical assessment as an approach to determine the level of iron deficiency anaemia in curriculum.

- Helps to ensuring students to identify level of iron deficiency anaemia among adolescent girls through observation of symptoms.
- Student nurses have to update their knowledge regarding the method of identifying anaemia.
- The study will help the nursing students to learn about the effectiveness of amla in improving the iron absorption and anaemic status.

### **Nursing Research**

- This study motivate the investigators to conduct further studies related to this study.
- Research on sustainable activities to develop awareness and decrease anaemia.
- The findings of the present study helped to do the same study in different age group.
- This study will motivate other investigators to conduct further studies with large samples.
- This study will also motivate other investigators to conduct study for longer duration.

### **Nursing administration**

- Nursing administrator provide in- service education to improve their knowledge in various aspects of detection and management of iron deficiency anaemia.
- Nursing administrators should give more emphasis on conducting the health check up among adolescent girls.

- Administration in local and state government takes necessary action to develop positive attitude among adolescent girls regarding their health.

#### **6.4 RECOMMENDATIONS**

- Ongoing in-service education can be conducted to the community health nurse.
- Health teaching regarding the importance of iron rich diet supplementation in the community can be conducted.
- The same study can do it in a large samples.
- The study can be conducted with health education
- The study can be conducted as a case control study.
- The study can be conducted with true experimental research design.
- The same study can be conducted as a comparative design with other nutritional interventions.

#### **LIMITATIONS**

- The investigator could not able to draw the blood for investigation ,need to give counselling before drawing of the blood. No other difficulties were faced by the investigator during the study period.

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# *Appendices*

**APPENDIX - I**  
**SELF ADMINISTERED QUESTIONNAIRE**  
**SECTION – A**

**DEMOGRAPHIC VARIABLES**

**SAMPLE NO :**

**1.Age in years**

- a) 13 yrs
- b) 14yrs
- c) 15 yrs

**2.Education**

- a) 7th std
- b) 8<sup>th</sup> std

**3.Religion**

- a) Hindu
- b) Muslim
- c) Christian

**4.Family Income in Rupees**

- a) Rs. 3000 – 5000
- b) Rs. 5001 – 10000
- c) Rs. 10001 and above

**5.Type of Family**

- a) Nuclear
- b) Joint
- c) Extended

**6. Educational status of Father**

- a) Uneducated
- b) Primary
- c) Higher secondary

**7. Educational status of mother**

- a) Uneducated
- b) Primary
- c) Higher secondary



**8. Number of children in the family**

- a). Upto 2
- b) Above 2 .

**9. Type of Diet**

- a) Vegetarian
- b) Non – vegetarian

**10.Type of vessel for cooking**

- a) Iron
- b) Aluminium
- c) Others

**DIETRY PATTERN**

**11. Do you prefer junk food?**

- a) Yes
- b) No

**12. Do you have habit of taking tea/ coffee after food( within 1 hour)**

- a) Yes
- b) No

**13 . Intake of green leaf in your food?**

- a) Yes
- b) No

**14. Habit of washing the fruits and vegetables before consumption**

- a) Yes
- b) No

**PERSONAL HYGIENE**

**15. Maintenance of adequate personal hygiene**

- a) Yes
- b) No

**16 . Do you wear chapels regularly?**

- a) Yes
- b) No

**17. Do you have habit of hand washing after using toilet?**

- a) Yes
- b) .No

**ENVIRONMENTAL SANITATION**

**18. Have you had attack of malaria before?**

- a) Yes
- b) No

**19. History of treatment for parasitic infections**

- a) Yes
- b) No

**20. Do you have sanitary latrine at home ?**

- a) Yes
- b) .No

## நேர்முகக் காணல் படிவம்

கீழே கொடுக்கப்பட்டுள்ள பகுதியில் உங்களை பற்றியும், இரத்த சோகை நோயைப்பற்றியும், கேள்விகள் உள்ளது. பொருத்தமான விடையை (✓) குறிப்பிடவும் நீங்கள் அளிக்கும் எல்லா விபரங்களும் ரகசியமாக பாதுகாக்கப்படும்

பிரிவு - அ

தனிவிபரப்பட்டியல்

1. வயது

அ) 13 வயது

ஆ) 14 வயது

இ) 15 வயது

2. கல்வித்தகுதி

அ) 7 - 8 ஆம் வகுப்பு

ஆ) 8 - 10 ஆம் வகுப்பு

3. மதம்

அ) இந்து

ஆ) கிறிஸ்துவம்

இ) முஸ்லீம்

4. குடும்பத்தின் மாத வருமானம்

அ) ரூ.5000 கீழ்

ஆ) ரூ.5001 - 10000 வரை

இ) ரூ.10000க்கு மேல்

5. குடும்ப வகை

அ) தனி குடும்பம்

ஆ) கூட்டு குடும்பம்

இ) ஆர்.டி.ஓ.



14. - ñ Å¼üí Öý ¿üö, Èt, ü, ÅÆí ¿ü ¿üØ×ö ÅÆí ¿ü - ñ ¿ü?

அ) ஆம்

ஆ) இல்லை

¿üý Í ò¿üõ

15. ¿üý Í ò¿üõ \$À;ÐÁÉ ¿ü ¿ü - üÇ¿ü?

அ) ஆம்

ஆ) இல்லை

16. காலணிகளை எப்பொழுதும் அணிவீர்களா?

அ) ஆம்

ஆ) இல்லை

17. ÅÄö ¿üÈ¿üòÅý \$°;òò \$À;õÍ " ¿ü ¿üØ×ö ÅÆí ¿ü - üÇ¿ü?

அ) ஆம்

ஆ) இல்லை

Í üÜòòÈ Í ¿ü¿üÅö

18. p¿üü Öýò Å\$Ä;Å; ¿üöí°ø ÅóÐüÇ¿ü?

அ) ஆம்

ஆ) இல்லை

19. குடல்புழு நீக்கத்திற்கு மருந்து எடுத்துள்ளீர்களா?

அ) ஆம்

ஆ) இல்லை

20. - í ¿ü ü ÅÖÈø ¿üÅÄ" È - üÇ¿ü?

அ) ஆம்

ஆ) இல்லை

## SECTION - B

### CLINICAL ASSESSMENT CHECK LIST

S.No	Signs and symptoms of Anemia	Pre – test		Post-test	
		Yes	No	Yes	No
1.	Paleness of conjunctiva				
2.	Pale tongue				
3.	Anorexia				
4.	Fatigue				
5.	Pica				
6.	Glossitis				
7.	Stomatitis				

## **SECTION C**

**Clinical assessment of haemoglobin estimation among adolescent girls before and after amla juice intake**

**BIOPHYSIOLOGICAL MEASUREMENT**

**SCORING PROCEDURE ( AS PER WHO)**

<b>Mild anemia</b>	- 10.1 to 11.9 gm%
<b>Moderate anemia</b>	- 7 – 10 gm %
<b>Severe anemia</b>	- < 7 gm % haemoglobin level

## APPENDIX - II

Ref. No. 68/E4/2/2014,

Govt. Rajaji Hospital,  
Madurai.20. Dated 26.02.2014

Institutional Review Board / Independent Ethics Committee.

Capt. Dr.B. Santhakumar, M.D., (F.M.,) [deanmdu@gmail.com](mailto:deanmdu@gmail.com)

Dean, Madurai Medical College &

Govt Rajaji Hospital, Madurai 625020. Convenor

Sub: Establishment-Govt. Rajaji Hospital, Madurai-20-  
Ethics committee-Meeting Minutes- for February 2014  
Approved list - Regarding.

The Ethics Committee meeting of the Govt. Rajaji Hospital, Madurai was held on 07.02.2014, Friday at 10.00 am to 12.00.noon at the Anaesthesia Seminar Hall, Govt. Rajaji Hospital, Madurai. The following members of the committee have attended the meeting.

1. Dr.V. Nagarajan, M.D., D.M (Neuro) Ph: 0452-2629629 Cell.No 9843052029 <a href="mailto:nag9999@gmail.com">nag9999@gmail.com</a>	Professor of Neurology (Retired) D.No.72, Vakkil New Street, Simmakkal, Madurai -1	Chairman
2. Dr.Mohan Prasad , M.S M.Ch Cell.No.9843050822 (Oncology ) <a href="mailto:drbkcmp@gmail.com">drbkcmp@gmail.com</a>	Professor & H.O.D of Surgical Oncology(Retired) D.No.32, West Avani Moola Street, Madurai -1	Member Secretary
3. Dr. Parameswari M.D (Pharmacology) Cell.No.9994026056 <a href="mailto:drparameswari@yahoo.com">drparameswari@yahoo.com</a>	Director of Pharmacology Madurai Medical College	Member
4. Dr.S. Vadivel Murugan, MD., (Gen.Medicine) Cell.No 9566543048 <a href="mailto:svadivelmurugan_2007@rediffmail.com">svadivelmurugan_2007@rediffmail.com</a>	Professor & H.O.D of Medicine Madurai Medical College	Member
5. Dr.S. Meenakshi Sundaram, MS (Gen.Surgery) Cell.No 9842138031 <a href="mailto:drsundarms@gmail.com">drsundarms@gmail.com</a>	Professor & H.O.D of Surgery Madurai Medical College	Member
6. Mrs. Mercy Immaculate Rubalatha, M.A., Med., Cell. No. 9367792650 <a href="mailto:lathadevadoss86@gmail.com">lathadevadoss86@gmail.com</a>	50/5, Corporation Officer's quarters, Gandhi Museum Road, Thamukam, Madurai-20	Member
7. Thiru..Pala. .Ramasamy , BA.,B.L., Cell.No 9842165127 <a href="mailto:palaramasamy2011@gmail.com">palaramasamy2011@gmail.com</a>	Advocate, D.No.72.Palam Station Road, Sellur, Madurai -2	Member
8. Thiru. P.K.M. Chelliah ,B.A Cell.No 9894349599 <a href="mailto:pkmandco@gmail.com">pkmandco@gmail.com</a>	Businessman, 21 Jawahar Street, Gandhi Nagar, Madurai-20	Member

The following Projects was approved by the committee.



Name of P.G.	Course	Name of the Project	Remarks
V. Anusuya	M.Sc., (Nursing) College of Nursing, Madurai Medical College, Madurai.	A study to assess the effectiveness of Amla juice with Elemental Iron among adolescent girls with anemia at Govt. Monohara School, Sellur at Madurai.	Approved

Please note that the investigator should adhere the following: She/He should get a detailed informed consent from the patients/participants and maintain it Confidentially.

1. She/He should carry out the work without detrimental to regular activities as well as without extra expenditure to the institution or to Government.

2. She/He should inform the institution Ethical Committee, in case of any change of study procedure, site and investigation or guide.

3. She/He should not deviate the area of the work for which applied for Ethical clearance.

She/He should inform the IEC immediately, in case of any adverse events or Serious adverse reactions.

4. She/He should abide to the rules and regulations of the institution.

5. She/He should complete the work within the specific period and if any


Extension of time is required He/She should apply for permission again and do the work.


6. She/He should submit the summary of the work to the Ethical Committee on Completion of the work.

7. She/He should not claim any funds from the institution while doing the work or on completion.

8. She/He should understand that the members of IEC have the right to monitor the work with prior intimation.

  
Member Secretary  
  
Chairman  
Ethical Committee

  
26.2.14 DEAN/Convenor  
Govt. Rajaji Hospital,  
Madurai- 20.

  
24.2.14

To  
The above Applicant  
-thro. Head of the Department concerned

## APPENDIX – III

### PERMISSION LETTER

FROM

V.ANUSUYA  
M.Sc Nursing I year,  
College of Nursing,  
Madurai Medical College,  
Madurai – 625 020

TO

The City Health Officer,  
Madurai Corporation,  
Madurai.

Through The Proper Channel

Respected Sir / Madam,

**Sub:** Permission for conducting dissertation study at Govt. Manohar School, Sellur -  
M.Sc (N) I year Community Health Nursing Student - College of Nursing, Madurai  
Medical College, Madurai – requested-Regarding.

As per the curriculum recommended by the Tamilnadu Dr.M.G.R Medical University, I  
have selected the topic “ **A study to assess the effectiveness of amla juice with elemental  
iron among adolescent girls in selected (Govt) Manohara school, Madurai**” for the partial  
fulfillment of the course.

I kindly request you to consider my letter and allow me to conduct the study in your  
esteemed institution.


Thanking You,

Date : 07.02.2014


Place : Madurai

Yours faithfully,

  
(V. ANUSUYA)

  
7/2/14  
Principal  
COLLEGE OF NURSING  
Madurai Medical College,  
Madurai-20.

Permission Granted.

  
உதவி நுகர்வூல அலுவலர்  
உதவி நுகர்வூல அலுவலர்  
.. உதவி நுகர்வூல அலுவலர்

## APPENDIX - IV

### PERMISSION LETTER

FROM

V. ANUSUYA,  
M.Sc Nursing I year,  
College of Nursing,  
Madurai Medical College,  
Madurai – 625 020

TO

Assistant Elementary Educational Officer,  
Madurai North,  
Madurai.

Through The Proper Channel

Respected Sir / Madam,

**Sub:** Permission for conducting dissertation study at Govt.Manohara School, at Sellur -  
M.Sc (N) I year Community Health Nursing Student - College of Nursing, Madurai  
Medical College, Madurai – requested-Regarding.

As per the curriculum recommended by the Tamilnadu Dr.M.G.R Medical University, I  
have selected the topic “A study to assess the effectiveness of amla juice with elemental  
iron among adolescent girls in selected (Govt) Manohara school, Madurai” for the partial  
fulfillment of the course.

I kindly request you to consider my letter and allow me to conduct the study in your  
esteemed institution.


Thanking You,

Date : 07.02.2014

Place : Madurai

Yours faithfully,

  
(V.ANUSUYA)

S.P-T  
7/2/14  
Principal  
COLLEGE OF NURSING  
Madurai Medical College  
Madurai-20.  
  
உதவித் தொடக்கக்கல்வி அலுவலர்  
மதுரை வடக்கு  
மதுரை-625 002

# APPENDIX -V

## CERTIFICATE OF VALIDATION

This is to certify that the content & Tool

SECTION A- Demographic Data

SECTION B – CLINICAL ASSESSMENT CHECK LIST

Prepared for data collection by V. ANUSUYA , II Year M.Sc(N) student, college of nursing, Madurai Medical College, Madurai , who has undertaken the study field on thesis entitled “**A STUDY TO EVALUATE THE EFFECTIVENESS OF AMLA JUICE WITH ELEMENTAL IRON AMONG ADOLESCENT GIRLS WITH AMEMIA IN GOVT. MANOHARA SCHOOL AT SELLUR, MADURAI**” has been validated by me.



### SIGNATURE OF EXPERT

NAME

:

VEMBU.K

DESIGNATION :

DATE



## CERTIFICATE OF VALIDATION

This is to certify that the content & Tool

SECTION A- Demographic Data

SECTION B – CLINICAL ASSESSMENT CHECK LIST

Prepared for data collection by V. ANUSUYA , II Year M.Sc(N) student,  
college of nursing, Madurai Medical College, Madurai , who has undertaken the study field  
on thesis entitled “A STUDY TO EVALUATE THE EFFECTIVENESS OF AMLA  
JUICE WITH ELEMENTAL IRON AMONG ADOLESCENT GIRLS WITH  
ANEMIA IN GOVT. MANOHARA SCHOOL AT SELLUR, MADURAI” has been  
validated by me.

### SIGNATURE OF EXPERT

NAME :

DESIGNATION :

DATE :

*M. Saleem*  
*2/8/14.*  
DIRECTOR  
INSTITUTE OF COMMUNITY HEALTH  
MADURAI MEDICAL COLLEGE  
MADURAI.

## CERTIFICATE OF VALIDATION

This is to certify that the content & Tool

SECTION A- Demographic Data

SECTION B – CLINICAL ASSESSMENT CHECK LIST

Prepared for data collection by V. ANUSUYA , II Year M.Sc(N) student, college of nursing, Madurai Medical College, Madurai, who has undertaken the study field on thesis entitled "A STUDY TO EVALUATE THE EFFECTIVENESS OF AMLA JUICE WITH ELEMENTAL IRON AMONG ADOLESCENT GIRLS WITH ANEMIA IN GOVT. MANOHARA SCHOOL AT SELLUR, MADURAI" has been validated by me.



SIGNATURE OF EXPERT

NAME : JULIET SYLVIA  
DESIGNATION : Professor, STNC  
DATE : 8/8/14.

## CERTIFICATE OF VALIDATION

This is to certify that the content & Tool

SECTION A- Demographic Data

SECTION B – CLINICAL ASSESSMENT CHECK LIST

Prepared for data collection by V. ANUSUYA , II Year M.Sc(N) student,  
college of nursing, Madurai Medical College, Madurai , who has undertaken the study field  
on thesis entitled “A STUDY TO EVALUATE THE EFFECTIVENESS OF AMLA  
JUICE WITH ELEMENTAL IRON ON ADOLESCENT GIRLS WITH ANEMIA IN  
GOVT. MANOHARA SCHOOL AT SELLUR, MADURAI” has been validated by me.

*A. Ganesh*

**SIGNATURE OF EXPERT**

NAME : *Ganesh A.*  
DESIGNATION : *Lecturer*  
DATE :



## CERTIFICATE OF VALIDATION

This is to certify that the content & Tool

SECTION A- Demographic Data

SECTION B – CLINICAL ASSESSMENT CHECK LIST

Prepared for data collection by V. ANUSUYA , II Year M.Sc(N) student,  
college of nursing, Madurai Medical College, Madurai , who has undertaken the study field  
on thesis entitled “**A STUDY TO EVALUATE THE EFFECTIVENESS OF AMLA  
JUICE WITH ELEMENTAL IRON AMONG ADOLESCENT GIRLS WITH  
ANEMIA IN GOVT. MANOHARA SCHOOL AT SELLUR, MADURAI**” has been  
validated by me.



**SIGNATURE OF THE EXPERT**

NAME: Mr. D. JOHN SAN ARUN PRABU  
M.Sc(LND), M.Sc (PSYD), M.Phil (ASD), PHD.,

DESIGNATION: Professor,

ADDRESS: C. S. I. Jeyaraj annapattanam  
College of Nursing, +  
Allied sciences,

DATE:

Panimalai,  
Madurai - 625004,,



## APPENDIX – VI

From

Mrs. V. ANUSUYA,  
II Year M.Sc(N),  
College of Nursing,  
Madurai Medical College,  
Madurai-20.

To

HEAD OF DEPARTMENT,  
Dept of Pathology,  
Madurai Medical college,  
Madurai.

Through the proper channel.

Respected Sir/ Madam,

Sub: Request for permission to do peripheral smear for content validity of iron in  
anemia.

With due regards, I kindly bring to your notice that I am a postgraduate student of  
College of Nursing, Madurai Medical College, Madurai. I have selected the below mentioned  
topic for dissertation to be submitted to The Tamilnadu Dr. M.G.R. Medical university, Chennai  
as a part of fulfillment of Master of Nursing degree.

**A study to evaluate the effectiveness of amla juice with elemental iron among adolescent  
girls with anemia in Govt. Manohara school, at sellur, Madurai".** I kindly request  
your permission for doing peripheral smear for the subjects to identify the iron deficiency in  
clinical pathology department, which may be helpful for me to proceed with my study.

Thanking you,

Yours sincerely,  
*V. Anusuya*  
(V. ANUSUYA)

Date:

Place: Madurai.

*Permitted  
A. Venkatesan*

PROFESSOR OF PATHOLOGY  
MADURAI MEDICAL COLLEGE  
MADURAI-625020

*Forwarded  
S.P. I  
25/7/14*

## APPENDIX - VII

### CERTIFICATE OF ENGLISH EDITING

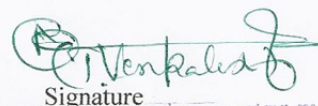
#### TO WHOM SO EVER IT MAY CONCERN

This is to certify that the dissertation "A Study to evaluate the effectiveness of fresh amla juice with elemental iron supplementation of anemia among adolescent girls with anemia in a selected Govt. Manohara School, Sellur Madurai." done by Mrs.V.Anusuya, M.Sc., Nursing II year student, College of Nursing, Madurai Medical College, Madurai-20 has been edited for English language appropriateness.

Name: T. VENKATESH,

Designation: Graduate Teacher (English)

Institution: Muthalamman Hindu High School,  
Padapudupatty, Annanji (P),  
Periyakulam (TK), Theni (DT)  
PIN: 625 531.



Signature

T. VENKATESH B.A., B.L., B.P.W., BA (Ed)  
English Graduate Teacher  
Muthalamman Hindu High School  
Padapudupatty, Annanji Post  
Periyakulam Tk., Theni Dt.-625 531

**CERTIFICATE OF TAMIL EDITING**

**TO WHOMSOEVER IT MAY CONCERN**

This is to certify that the dissertation by V. ANUSUYA II year M.Sc., (N) student, College of Nursing, Madurai Medical College, Madurai, who has undertaken by study field on Dissertation entitled "A study to evaluate the effectiveness of Amla juice with elemental iron among adolescent girls on iron deficiency anaemia in Govt. Manohara School at Sellur, Madurai" has been edited for Tamil language appropriateness.

Thanking You

Name: Tmt M. SARATHA

Designation: Head mistress [Tamil]

Institution: Govt. High school  
T. Kallipatti (PO)  
Periyakulam (T.K)  
Theni (DT)  
Pin - 625605

Signature 28.7.14

GOVT. HIGH SCHOOL  
T. KALLIPATTI (PO)  
PERIYAKULAM (T.K)  
THENI (DT)



## **APPENDIX IX**

### **PREPARATION OF AMLA JUICE**

Get 100gm of amla (4 to 5) washed with water and cut into small pieces and take out the seeds. Then put the amla pieces in a mixing jar and make a paste. Add more pieces of amla into it . Wrap the cloth and squeeze it with hand to take out the juice in a bowl. Amla juice is prepared by the investigator based upon review of the literature and experts guidance. The juice is around about 20 ml extracted from 100gm of amla. The juice is prepared hygienically and measured.

## APPENDIX X

