DISSERTATION ON

"A STUDY TOASSESS THE EFFECTIVENESS OF IRON SUPPLEMENT WITH VITAMIN C VERSUS AMLA JUICE AMONG ADOLESENCE GIRLS STAYING SELECTED FEMALE NURSING HOSTEL, MADRAS MEDICAL COLLEGE, CHENNAI -03

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CERTIFICATE

This is to certify that this dissertation titled **"A study to assess the effectiveness of iron supplements with vitamin c versus iron supplements with amla juice among adolescents girls staying selected female nursing hostel, Madras Medical College, Chennai - 03"** is a bonafide work done by Ms. H. Lakshmi Devi, M.Sc (N) II year student, College of Nursing, Madras Medical College, Chennai submitted to **The Tamil Nadu Dr. M. G. R Medical University, Chennai.** In partial fulfillment of the requirements for the award of degree of **Master of Science in Nursing, Branch – IV, Community Health Nursing,** under our guidance and supervision during the academic year from 2015 – 2017.

Dr. V.KUMARI., M.Sc (N)., Ph.D,
Principal,
College of Nursing,
Madras Medical College,
Chennai – 03.

Dr. R.NARAYANA BABU, M.D.DCH
Dean,
Madras Medical College,
Chennai – 03.

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Approved by dissertation committee on **12.07.2016**

RESEARCH GUIDE

Dr. V. Kumari., M.Sc. (N)., PhD, **……**
Principal,
College of Nursing,
Madras Medical College,
Chennai – 03.

CLINICAL SPECIALITY GUIDE

Mrs. L. Shanthi, M.Sc. (N)., **……**
Reader
Head of the Department,
Department of Community Health Nursing,
College of Nursing,
Madras Medical College,
Chennai-03.

MEDICAL EXPERT
Dr. Joy Patricia Pushparani., M D., **……**
Professor
Institute Community Medicine
Madras medical college,
Chennai - 03.

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THE TAMILNADU Dr.M.G.R MEDICAL UNIVERSITY, CHENNAI
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And not giving it"

- William Arthur Ward

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ABSTRACT

Title : A study to assess the effectiveness of iron supplement with vitamin c versus amla juice among adolescence girls staying selected female nursing hostel, Madras Medical College, Chennai -03

Adolescents constitute nearly 23 percent of the population in India. Their nutritional requirements are more like iron, iodine, and calcium. Nearly half of them suffer from nutritional anemia 37 percent girls are stunted. Adolescent period is the best time to correct the growth, deficiency if any . 45 percent of girls are undernourished, 20 percent of boys are undernourished. Information regarding anaemia is markedly emerging health problem among adolescents girls .It affects their physical growth they have to get some valuable awareness from this health education programme.

Need for the study: The effects of anemia are many , which make the adolescents girls prone to other diseases. Thus proper supplementation and appropriate education to the adolescents girls will definitely help in reducing the morbidity and mortality in adolescents girls.

Objectives:

1. To assess the pre- test level of haemoglobin among adolescent girls of nursing students Hostel.
2. To assess the effectiveness of iron supplementation with tablet vitamin c among the adolescents girls staying nursing students hostel.
3. To assess the effectiveness of iron supplementation with amla juice among adolescents girls staying nursing students hostel.
4. To compare the effectiveness of iron supplementation with tablet vitamin c versus Iron supplementation with Amla Juice.

Key words: Effectiveness, Iron supplement, Vitamin C, Amla juice, Adolescents Girls.

Methodology:

Research Approach	Quantitative research approach.
Duration of the study	Four weeks (20.11.2016 to18.12.2016).
Study sitting	Nurse's Hostel, Madras Medical College, Chennai - 03.
Research Design	True experimental research design
Study population	Adolescents girls with anemia.
Sampling technique	Simple Ramdom Sampling technique.
Sample size	60 adolescents girls

Data collection procedure: The study was conducted in selected urban Medical College of Chennai, after obtaining permission from the Dean, Principal, College Of Nursing, Head of the Department of community health nursing, Chennai. A self-introduction was given by the investigator and the informed written consent was obtained from adolescent girls and benefits of Amla were explained to the participants. The objectives and purpose of study was explained and confidentiality was maintained. Before starting the procedure T. Albendazole 400 mg was given. The data collection procedure was done for a period of 4 weeks and the time taken for data collection from each adolescent girls was 10 – 15 mts and 5 – 10 mts for doing blood test for each girl and the investigator selected 60 samples (30 in experimental group I and 30 in experimental group II) by true experimental, simple random sampling technique using lottery method based on the inclusion and exclusion criteria. Pretest hemoglobin level was assessed by sahli's method in both groups, 100 grams amla contains 600 mg of vitamin c, make it 600 ml divided into 6 students, each student getting 100 ml of amla juice with elemental iron was given in experimental group I, elemental iron with tablet vitamin C given to experimental group II. Every night after dinner of 45 mts tablets are given for 4 weeks. The post assessment was conducted both experimental I & II groups after 7 days.

Data analysis: Data were tabulated analyzed with descriptive statistics like frequency distribution, percentage distribution, graphical representation, mean, standard deviation and inferential statistical like chi – square, 't' test, proportion test.

Study results: The findings of the study revealed that Mean haemoglobin gain of adolescents girls given iron supplement with vitamin C was found to be 10.22 grams and mean haemoglobin gain of adolescents girls given amla juice was found to be 11.29 grams. The findings showed that there is a statistically significant improvement in adolescents girls taking iron supplement with amla juice when compared to iron supplement with vitamin c**"t" value** of **2.p= 0.05***** Thus the hypothesis was statistically proved.

Discussion: Hypothesis was proved by the great statistically significance occurs after intervention strategy.The chi square test shows that there is statistically significant between the post test increases of hemoglobin value of adolescent girls.

Recommendation: The same study could be conducted on a large sample to create awareness, Study could be conducted to evaluate the effectiveness of amla juice and elemental iron upon anemia during adolescents period. The study could be conducted with other available local resources eg. Guava, lemon. Every 3 months or 6 months health camp should be organized in the secondary school or colleges to prevent adolescent anemia.

Conclusion: The investigator thereby concluded that the implementation of amla juice in improving the nutritional status of adolescents girls would be beneficial in promoting the health of the adolescents girls.

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ABBREVIATIONS

AA	**-**	**Ascorbic acid**
BMI	**-**	**Body Mass Index**
CRP	**-**	**C- Reactive protein**
$FeSo_4$	**-**	**Ferrous sulphate**
GBD	**-**	**Global burden of disease**
Hb	**-**	**Haemoglobin**
IDA	**-**	**Iron deficiency anemia**
IFA	**-**	**Iron folic acid**
MDG	**-**	**Millenium Development Goal**
RBC	**-**	**Red blood cell**
RDA	**-**	**Recommended dietary allowance**
WHO	**-**	**World Health Organization**
UNICEF	**-**	**United Nation International Childrens Emergency Fund**
RCP	**-**	**Randomized Control Trail**
NFHS	**-**	**National Family Health Survey**

CHAPTER I

INTRODUCTION

"Adolescents are resources to be developed ……..

…… Not the problems to be fixed!

Adolescence is a period frequently marked by increased rights and privileges for an individual. As a child grows from childhood to adulthood they began to spend more time with their friends and less time with their parents. It is the period of developmental transition taken place between childhood and adulthood. It involves changes in personality as well as in physical intellectual and social development. Adolescence are facing lot of challenges irrespective of their physical development. Most of the adolescent suffer from anaemia.

In today scenario, in the last two decades girls has emerged in the world affecting our personnel, social, emotion, public life due to low level of hemoglobin. It has made a significance impact on the quality of life. Decision making has become a very complex process due to insufficient iron diet scarce resources, time pressure and unavoidable compulsion to crazy to take junk food gaining faster than the ability of taking normal nourishment it has made decisive for eating. Adolescence is a formative period of life. It is a crucial period because major physical, psychological, (emotional) and social changes take place. Their nutritional requirements are more like iron, iodine and calcium. Adolescents constitute nearly 23 percent of the population in India, 45 percent of girls are under nourished.

Adolescence period is the best time to correct the growth deficiency if any. Because of growth spurt, there is increasing demand and decreased intake of diet leading on to malnutrition. The major problem being anemia, more so among girls because of menstrual loss, bleeding disorder, associated infections and infestations like ancylostomatis. Conversely over weight and obesity are also increasing because of changes in life styles and food habits **Suryakantha AH** (2014)[1.]

Adolescence is a period of rapid physical growth and more physical activities. Therefore girls require well balanced nutritious diet to have normal growth and keep fit. The adolescents should learn to relax and eat properly at meal time. They should avoid taking junk food. Inadequate diet leads to malnutrition and results in various deficiencies e.g Puberty goiter to iodine deficiency, night blindness due to vitamin A deficiency, anemia due to lack of iron especially in girls. Dietary deficiency may be due to ignorance, food fads, literacy, size of family, cultural factors, gender discrimination, poverty etc. It is therefore very important to educate adolescents, their parents, community and society about the nutritional needs of adolescents and young adults and planning and preparing nutritious diet using inexpensive food **Krishna Kumari Gulani (2016).**[2]

Anemia is one of the most widespread public health problems, especially in developing countries like India which has important health and welfare, social and economic consequences. These includes repaired cognitive development, reduced physical work has increased risk of mortality particularly during perinatal period. There is also evidence that anemia may result in reduced growth , increased morbidity. Hence, greater efforts are needed to develop and implement programs both to prevent and to control anemia.

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 especially during pregnancy **Park (1998)**[3]**.**

Stultzfus (2003) considered that iron deficiency is one of the most prevalent forms of health consequences of Iron deficiency in major population. The public health importance of iron deficiency anemia (IDA) 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 contributions to cognitive impairment, deceased work productivity and from severe anemia as per the meta –analysis of observational studies, mortality risk estimates as the decreased risk in mortality for each 1g/dl increase in mean

hemoglobin concentration. An average, globally 50% of the anemia is assumed to be attributed to iron deficiency. Globally iron deficiency ranks number among 26 risk factors included in the GBD 2000 and accounts for 841,000 deaths and 35,057,000 disability – adjusted life. There is an urgent need to develop effective and sustainable interventions to control iron – deficiency anemia.[4]

The bioavailability of iron can be enhanced by positive dietary habits reduce the intake of inhibitors & enhance iron absorption through Vitamin C and Vitamin A rich fruits , vegetables. Low haemoglobin level can also the due to Vitamin C deficiency once can increase their vitamin c intake by consuming food like amla are treated as excellent source of vitamin c also apple good source of iron. Try to have amla ,apple empty stomach a little before meals. It act body absorb the nutrients faster iron cannot be fully absorbed by body with out help of vitamin c, other sources like papaya , orange , bell pepper **Live strong Health veda** (2017) [5]

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 was 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)[6].

Anemia is a major public health problem world wide, is often ignored in both developed, developing countries. In developing countries it serves as a primary cause for 40% of maternal death directly or indirectly. World health report of 2002 identified anemia is one among the top risks for infant mortality, maternal mortality, and preterm. During adolescent anemia is more prevalent in both sexes due to growth sprut. i.e intestinal mal absorption disorder often due to dietary factors, folic acid deficiency producing bulky, frothy, offensive stool, especially in girls where they are exposed to risk of onset of menarche. Prevalence of anemia is high in vulnerable groups even in higher socio economic status. This stress is the need to investigate the factors associated with the

prevalence of anemia. Due to the lack of nutritive contents in the diet. The nutritional needs widens after the onset puberty, prevalence of anemia is effective when the strategy is focused right from adolescence for their future reproductive life and this will contribute to achieve Millennium Development Goal (MDG). 2002

1.1 NEED FOR THE STUDY

" **It is better to light a candle than to curse the darkness"**

(Chinese proverb)

Adolescence is the period most rapid growth second to childhood. The physical and physiological changes that occur in adolescence plays a great demand on their nutritional requirements and make them more vulnerable to anemia. Anemia in the adolescence causes reduced physical and mental capacity and diminished concentration in work and educational performances and poses a major threat future safe motherhood in girls. It is estimated that fifty percent of the adolescents are having below 10 grams of haemoglobin. Now a days most of the adolesents girls having beauty conscious . So that they neglecting food more over hostel girls improper taking diet schedule they found of junk food. The adolescents girls are become lethaigic, poor concentration, not attensive, low level of haemoglobin level.

The world's adolescent population is facing a series of serious nutritional challenges which are not only affecting their growth and development but also their livelihood as adults. Yet, Adolescents remain largely neglected, difficult – to – measure and hard –to – reach population, in which the needs of adolescent girls in particular , or often ignored. The commonest causes of anemia in developing, countries, particulary among the most vulnerable people(adolescents),are nutritional disorders and infections.

Anemia is the most common due to malnutrition among adolescents today. It is public health significance in our country Adolescents (17 – 19 years) constitute > 20 % of our population in India 50% suffer from iron deficiency anemia . Both urban, rural, suffer from anemia and being more in girls than boys, poor economic status faulty dietary

pattern, lack of awareness education, urbanization, prevalence of malaria, hookworm, other infestation, repeated bacterial infection also influence the incidence, nature of anemia growing children in adolescents. In India prevalence of anemia among adolescents girls were 56% and this amount to an average 64 million girls at any point.

It is estimated that 50 % of adolescent girls suffer from poor absorption of iron in the diet. Among adolescent girls is now recognized as global health care problem, which leads to poor concentration, loss of memory. The women comprise the majority of the adolescent's girls having low haemoglobin level (10 grams) in developing countries. In future which leads to major complication to child bearing, lactation, other complications.

Also during the review of literature the investigator comes across many studies on synthetic ascorbic acid, iron absorption. Only few studies are natural ascorbic acid, iron absorption. This gave insight to the investigator to study the effect of Amla juice on iron absorption.

The investigator has selected Amla juice to provide vitamin C (Ascorpic Acid) because of it locally and, naturally available sources than other sources and also it has high value of Vitamin C (600 mg in 100 gm amla juice), ferrous sulphate with 30 mg of elemental iron for iron supplementation .

The following cutoff points which were suggest by the WHO was used to determine whether IDA was a major problem among the general population.

Table 1.1

Prevalence	**Public health problem**
< 5%	Not a problem
5 -14.9%	Low magnitude
15-33.9%	Moderate magnitude
40-above %	High magnitude

1.2 Statement of the problem:

"A study to assess the effectiveness of iron supplement with tablet vitamin C versus amla juice among adolescence girls staying female nursing hostel, Madras Medical College, Chennai -03."

1.3 Objectives:

1. To assess the pre -test level of haemoglobin among the adolescent girls of female Nursing students Hostel Madras Medical College, Chennai – 03.
2. To assess the effectiveness of iron supplementation with tablet vitamin C among the adolescents girls staying nursing students hostel.
3. To assess the effectiveness of iron supplementation with amla juice among adolescents girls staying nursing students hostel.
4. To compare the effectiveness of iron supplementation with tablet vitamin c, versus Iron supplementation with Amla Juice.

1.4 Operational definition:

Assess: Refers to a process of evaluating the effectiveness of measurement of hemoglobin while giving iron supplement with of tablet vitamin c versus iron supplement with amla juice to adolescence girls.

Effectiveness: Refers to producing in intended result in terms of increased the haemoglobin level after the administration of amla juice and elemental iron supplementation for a period of 4 weeks to the adolescent girls.

Iron supplement: Is the form of tablet from the state government supply which contain ferrous sulphate, folic acid, tablets contains dried ferrous sulphate-335mg. Elemental iron 100mg, folic acid -500mg.

Vitamin c: Ascorpic acid, a factor essential for integrity of intercellular cement in many tissue especially capillaries and there by enhance the absorption iron. 100 mg for each group II adolescence girls.

Amla juice: Is prepared from the 100 grams of amlas which contains 600 mgs of vitamin c has been cut into small pieces and grinded in the mixture adding 500 ml of water. The juice has been filtered to use with in one hour. For each student 100 ml of amla juice given they are getting natural source of amla juice100 mg vitamin c daily.

Adolescent girls: In this study adolescent girls refer to the age group of 17-19 years.

Anaemia: Refers to the level of haemoglobin between < 11grams, which is measured by Shali's test method.

1.6 Assumptions:

The study assumed that

- Most of the adolescent girls are anemic.
- Vitamin c enhance the iron absorption and there by increasing the hemoglobin level.
- Increased iron absorption is related with an increasing in hemoglobin level .
- Amla juice it is natural, consists lots of nutritive values which enhance the iron absorption and increase haemoglobin .

1.6 RESEARCH HYPOTHESIS:

H1: There will be an increase in hemoglobin level of adolescent girls receiving iron supplements with Amla Juice than adolescent girls receiving iron supplements with Tablet vitamin C.

1.7 DELIMITATIONSTHE STUDY

- The study was delimited to sample size was 60 adolescent girls.
- Data collection period was 4 weeks.
- Study will be limited to adolescent girls in the age group 17-19 years.
- The study was conducted among adolescent girls in a selected hostel staying in nursing hostel.
- Adolescent girls who are staying in hostel studying I and II year Basic B.Sc nursing course.

CHAPTER II

REVIEW OF LITERATURE

Review of literature for the present study has been organized under the following headings:

2.1.1 Prevalence of anemia among adolescents

2.1.2 Iron deficiency anemia

2.1.3 Effectiveness of iron supplement with amla juice

2.1.4 Effectiveness of iron supplement with vitamin c

2.1.1 Prevalence of anemia among adolescents

Akbari et al (2017) Iron deficiency anemia (IDA) is a major health issue in those aged less than 18 years old with high impact on their development Systematic review and met analysis of these data would reveal a more realistic view of the prevalence of iron deficiency (ID) rates, the heterogenic index of the studies was determined using the Cochran's test (Q) and I2. Then, based on the heterogenetic results, a random effects model for estimate pooled prevalence of IDA was used. Meta-regression was applied to determine heterogeneity suspected factors. The prevalence of IDA was 7.9% (95% CI: 4.1-11.7) in males and 8.5% (95% CI: 6.1-10.8) among females aged under than 18 years.[5]

Iron deficiency anaemia – A situation analysis Population profile UNICEF

Population = 1103 million, adolescent population = 226 million (20.5%), Adolescent girls (10-19 years) = 109.4 million (48.4%), adolescent girls in school (15-19 years) = 16.4 million (15%) Adolescent girls out of school (15-19 years) = 38.2 million (35% Anaemia prevalence Iron deficiency anaemia (IDA) prevalence reported to vary, 2, 3 from 56% - 90.1%, 67.8 – 98.5 million adolescent girls are anaemic. Contributory causes of iron deficiency anaemia. Traditional cereal based diet – poor bioavailability, Early marriage 2%, Median age of marriage = 17.7 % years. Percent married by18

years = 58%, Median age at first birth = 20 years Percentage of adolescents who have begun child bearing= 16.

Weekly Iron and Folic Acid Supplementation (WIFS) India Case 4 Study

Place – Lucknow, Uttar Pradesh**,** Subjects – 150, 700 school going and non-school going adolescent (10 – 19 years) girls, Prevalence of anaemia – 92.6% in school going girls and 73.3% in non- school going girls Treatment - weekly iron and folic acid supplements (100 mg elemental iron and 500µg folic acid) to school going girls (supervised) and non-school going girls (non supervised), Deworming tablets (albendazole, 400 mg) at the beginning and after 6 months. Impact – Hb levels increased from 105 g / L to 117 g / L in school going girls and 113 g / L to 120 g / L in non-school going girls in 6 months. Anaemia prevalence significantly decreased from 92.6% to 58.0% in school going girls and 73.3% to 39% in non school going girls. Conclusion – Weekly iron–folic acid supplementation[18]

Low MS ((2016) Iron-deficiency anaemia is highly prevalent among non-pregnant women of reproductive age (menstruating women) worldwide, although the prevalence ishighest in lower-income settings. randomised controlled trials (RCTs) andquasi-RCTs comparing daily oral iron supplementation with or without acointervention (folic acid or vitamin C), for at least five days per week at any dose, to control or placebo using either individual- or cluster-randomisation. Inclusion criteria were menstruating women (or women aged 12 to 50 years) Iron-deficiency anaemia has been associated). Women receiving iron had a higher haemoglobin concentration at the end of intervention compared to women receiving control (mean difference (MD) 5.30, 95% CI 4.14 to 6.45, 51 studies, 6861 women, high quality evidence).[4] A national nutritional anaemia-control programme in India, focusing on supplementation of iron to pregnant women after the first trimester of pregnancy, failed to make an impact. It is prudent to recommend the correction of iron stores before the woman becomes pregnant. 'Efficacy' of weekly supplementation of iron has been proved to improve iron stores in adolescence in many studies abroad and in India. The objective was to study the 'effectiveness' of a weekly iron-supplementation regimen among urban-slum, rural, and tribal girls of Nashik district, Maharashtra,

India. A baseline and the mid-term assessments were done using the cluster-sampling techniques. In each stratum, 30 clusters were identified. Twelve and 10 adolescent girls from each cluster were identified in the baseline and mid-term surveys respectively. The haemoglobin estimation was done using the HemoCue system. Data were analyzed using the Epi Info software (version 6.04). The overall prevalence of anaemia came down significantly to 54.3% from 65.3%. The decline was statistically significant ($p<0.001$) in tribal girls (48.6% from 68.9%) and among rural girls (51.6% from 62.8%). But the decline was not statistically significant among urban slum girls. Similarly, a significant rise in the mean haemoglobin levels was seen among tribal and rural girls. However, it did not increase significantly among urban slum girls. The programme had performed poorly in urban-slum areas, as the mean number of tablets consumed in urban-slum areas was only 5.6±3.3, as against 6.7±2.6 tablets in tribal girls and 7.2±2.2 tablets in rural girls. Considering the biological and operational feasibility and the effectiveness of the intervention, weekly supplementation of iron to adolescent girls should be universally started to correct the iron stores of a woman before she becomes pregnant[32].

Harinder Singh 2015 The study was conducted in the field practice areas of Department of Community Medicine, IGMC, and Shimla. A total of 421 girls were studied. They were clinically examined & predesigned & pre tested proforma as were filled up. Haemoglobin assessment was done using Filter paper Cyanmetha hemoglobin technique. Out of the sample of 421 girls in our study a total of 235 (55.34%) girls were found to be anaemic (Hb less than 12 g/dl). Mean haemoglobin in the study subjects was observed to be 11.46□3.16 and median value was found to be 11.6.gm/dl. From the literature searches, documented in the review of this thesis, the prevalence of anaemia in adolescent girls from India varied from 46 to 88%, and mean haemoglobin values varied from 7.6 to 12.7g/dl. So it was concluded that anaemia is prevalent in girls around menarche and Iron & folic acid supplementation is one of the most important nutritional interventions for adolescent girls.[6]

Pasricha SR (2015) Anemia is common among people living in low- and middle-income countries, and alleviation of the global burden of anemia is an

essential global health target over the next decade. Estimates have attributed about half the cases of anemia worldwide to iron deficiency; a range of other causes probably make a similar overall contribution. Individuals living in low-income settings experience a simultaneous high burden of infection with inflammation and iron deficiency. At least in children, iron supplementation exacerbates the risk of infection in both malaria-endemic and non endemic low-income countries, whereas iron deficiency is protective against clinical and severe malaria.[14]

Flaming TD (2013) Anemia is an important cause of health loss, nonfatal anemia burden for 23 distinct etiologies in 188 countries, 20 age groups, and both sexes from 1990 to 2013. All available population-level anemia data were collected and standardized. Anemia burden is high. Developing countries account for 89% of all anemia-related disability. Iron-deficiency anemia remains the dominant cause of anemia.[21]

Swati Dixit (2011) Anaemia is a serious health threat in adolescent girls iron intake is an important factor of blood haemoglobin level with in intake. This multistage observation study was conducted in 586 adolescents girls of age. Iron intake was found adequate in only 203% girls nutritional knowledge was found significantly associate with iron intake, but it was not associated with haemoglobin level in girls. This study concludes that nutritional knowledge may affect dietary intake of iron but it transformation in better haemoglobin level lacking due to other bio socio factors. In south East Asia impaired cognitive processes in adolescent was found to be associated with anemia improved after supplementation. A study of indian children aged 1-14 years indicated that the immune response was significantly depressed in those with haemoglobin count below 10 grams / dl.[23]

Melkam Tesfaye, Tilahun Yemane et al (2015) A cross-sectional study was conducted among 408 school adolescents An interviewer-administered questionnaire was used to collect socio demographic. According to the World Health Organization, 2 anemia in this study can be considered of mild public health significance; indeed, it was a public health problem among school adolescents in the area. School-based

intervention among school adolescents based on identified determinant factors will be very important for the prevention and control of anemia among the group.[9]

Vinayaka Prasanna Kappala (2014) A cross sectional study was conducted in a setting of urban slums of Bellary city, Karnataka state, India, during the period of July 2010 to February 2011.A total of four urban slums were included in the study. Within each selected urban slum 100 adolescent girls were studied. The relevant information was collected with anthropometric measurements and haemoglobin estimation. The overall prevalence of any anaemia was 82.5%, the prevalence of mild, moderate and severe anaemia was 37.7%, 36.2% and 8.5% respectively. Socio-demographic factors like religion, education of the girl, occupation of the father, menstrual factors like regular periods and excessive bleeding and nutritional factors like low intake of meat, vegetables and body mass index showed significant association with anaemia.[10]

Anchal singh et al (2011) study was carried out in selected randomly Government senior secondary schools of Ludhiana district of Punjab. A considerable seasonal variation was observed in hematological profile of adolescent girls showing higher values of all the parameters during winter season. The prevalence of anemia (90.84 vs 78.33%) was found higher during summer season. The results of the study concluded that there is statiscally significant seasonal variation in the iron status of adolescent girls.[16]

Shams S, Asheri et.al (2010) conducted a study in Iran to assess the prevalence of iron deficiency anemia in female medical students in Tehran. The study employed 295 female students aged 18 -25 years. Mean corpuscular volume and haemoglobin, serum ferritin serum iron and total binding capacity levels were measured. The study revealed the prevalence of iron deficiency was 40.9 % and that of iron deficiency anemia was 3.8 %.[26]

Abha Choudhary (2006) investigated a community based; cross sectional study was conducted to determine the prevalence of anemia among unmarried, adolescent south Indian girls in an urban slum setting of vellore. A total of 100

apparently healthy girls between the ages of 11 and 18 years were recruited. The prevalence of anemia (Hb <12 g %) was 29 %. Most had mild anemia was not seen. Two – thirds of those with anemia had low serum ferritin (<12 qg/l).[27]

P.R. Deshmukh, B.S. Garg, and M.S. Bharambe A study was conducted effectiveness' of a weekly iron-supplementation regimen among urban-slum, rural, and tribal girls of **Nashik district, Maharashtra, India**. It is prudent to recommend the correction of iron stores before the woman becomes pregnant. 'Efficacy' of weekly supplementation of iron has been proved to improve iron stores in adolescence in many studies abroad and in India. A baseline and the mid-term assessments were done using the **cluster-sampling techniques**. In each stratum, 30 clusters were identified. Twelve and 10 adolescent girls from each cluster were identified in the baseline and mid-term surveys respectively. The haemoglobin estimation was done using the HemoCue system. The overall prevalence of anaemia came down significantly to 54.3% from 65.3%. The decline was statistically significant ($p<0.001$) in tribal girls (48.6% from 68.9%) and among rural girls (51.6% from 62.8%). But the decline was not statistically significant among urban slum girls. Similarly, a significant rise in the mean haemoglobin levels was seen among tribal and rural girls. However, it did not increase significantly among urban slum girls. The programme had performed poorly in urban-slum areas, as the mean number of tablets consumed in urban-slum areas was only 5.6±3.3, as against 6.7±2.6 tablets in tribal girls and 7.2±2.2 tablets in rural girls.[12]

Richa, Mishra C.P (2012) To determine the prevalence of anemia in rural area adolescent girls. Community based cross sectional study conducted, in two rural schools in Varanasi District. Simple random technique was used. The haemoglobin were estimated by Sahil's method, statistical analysis done by history of worm infestation was present in 33.8%.The adolescent girls haemoglobin level less than 12 gm/dl. Anaemia is a significant problem in rural adolescent girls.[20]

2.1.2 Iron deficiency anemia

Vinayaka Prasanna Kappal (2011) A cross sectional study was conducted in a setting of urban slums of Bellary city, Karnataka state Iron deficiency anaemia is the commonest medical disorder and is a problem of serious public health condition with epidemic proportions especially among poor adolescent girls (65-90%). Objectives were to determine the prevalence and determinants of anaemia among adolescent girls living in urban slums A total of four urban slums were included in the study. Within each selected urban slum 100 adolescent girls were studied. The relevant information was collected with anthropometric measurements and haemoglobin estimation .The overall prevalence of any anaemia was 82.5%, the prevalence of mild, moderate and severe anaemia was 37.7%, 36.2% and 8.5% respectively. Socio-demographic factors like religion, education of the girl, occupation of the father, menstrual factors like regular periods and excessive bleeding and nutritional factors like low intake of meat, vegetables and body mass index showed significant association with anaemia. [10]

George (2017) Iron deficiency and iron deficiency anaemia remain prevalent in Australia. Management of iron deficiency involves identification and treatment of the cause of iron deficiency, as well as effective iron replacement. Clinicians should always take a detailed history and perform a comprehensive physical examination of a patient with iron deficiency. Patients should be monitored even if a likely cause of iron deficiency is identified. Patients who fail to respond to iron replacement or maintain iron status should be referred for further investigation, including endoscopy to exclude internal bleeding. Both enteral and parenteral iron are effective at replacing iron. For most adult patients, we recommend trialling daily oral iron (30-100 mg of elemental iron) as the first-line therapy for iron deficiency anaemia should be reserved for life-threatening situations and should always be followed by appropriate iron replacement.[15]

Resmi S (2016) Anemia is common among people living in low- and middle-income countries, and alleviation of the global burden of anemia is an essential global health target over the next decade. Estimates have attributed about half the cases of anemia worldwide to iron deficiency; a range of other causes probably make a similar

overall contribution. Individuals living in low-income settings experience a simultaneous high burden of infection with inflammation and iron deficiency. Atleast in children, iron supplementation exacerbates the risk of infection in both malaria-endemic and non endemic low-income countries, whereas iron deficiency is protective against clinical and severe malaria.[20]

Vinayaka orasanna kappal (2016) Anemia is an important cause of health loss. We estimated levels and trends of nonfatal anemia burden for 23 distinct etiologies in 188 countries, 20 age groups, and both sexes from 1990 to 2013. All available population-level anemia data were collected and standardized. We estimated mean hemoglobin, prevalence of anemia by severity, quantitative disability owing to anemia, and underlying etiology for each population using the approach of the Global Burden of Disease, Injuries and Risk Factors 2013 Study. Anemia burden is high. Developing countries account for 89% of all anemia-related disability. Iron-deficiency anemia remains the dominant cause of anemia.[10].

National family health survey (2005-2006) Iron deficiency anemia is a global public health problem, as compelling and harmful as the epidemics of infectious diseases. With a global population of 6,700 million, at least 3,600 million have iron deficiency and 2000 million out of these suffer from iron deficiency anemia. India continues to be one of the countries with the highest prevalence of anemia. National Family Health Survey (NFHS) 3 estimates reveal the prevalence of anemia to be 70-80% in children, 70% in pregnant women and 24% in adult women[24]. Iron is an essential component of many proteins involved in oxygen transport in the human body and also plays an integral part in the regulation of cell growth and differentiation. The bioavailability of iron depends on several factors, including the form that it takes. Heme iron is the most readily absorbed form of iron and is found in foods such as red meat, shellfish, poultry, and fish. Nonheme iron is less readily absorbed by the body and is found in foods such as fortified cereal, rice, black beans, soybeans, eggs, wheat, and spinach. Although nonheme iron is harder for the body to absorb, it is still an important source of dietary iron. When patients become deficient in iron and diet alone cannot restore iron levels back to normal within a sufficient time frame, iron

supplementation with reduced compounds such as ferrous sulfate is indicated. Vitamin C, also known as ascorbic acid, is a water-soluble vitamin thought to increase the absorption of nonheme iron. Vitamin C acts as a reducing agent to facilitate iron absorption from the GI tract and to enable its mobilization from storage. The vitamin C and iron combine to form an iron chelate complex, which increases the solubility of iron in the small intestine, resulting in increased uptake across the mucus membranes of the duodenum. For this reason, the vitamin C must be consumed at the same time as the iron in order to be effective. Foods such as broccoli, bell peppers, red cabbage, sweet potatoes, tomatoes, cantaloupe, oranges, mangos, and strawberries are considered excellent sources of vitamin C. Vitamin C can also be taken in oral supplement form. Simultaneous consumption of 25-100 mg of vitamin C has been shown to increase the absorption of nonheme iron by four-fold. However, an excess of 200 mg of vitamin C per 30 mg of elemental.

2.1.3 Effectiveness of elemental iron with amal juice

Rajeswari Vaidyanathan, (2016) conducted a true experimental design to compare the effectiveness of honey mixed gooseberry juice with honey mixed ripen guava juice on the level of hemoglobin among anemic adolescent girls studying in selected schools at Dharmapuri dist, Tamilnadu. 30 adolescent girls were selected, sample were divided into 3 groups by simple random sampling. The mean Hb was found to be 9.83 gms. Group I was given honey mixed 30 ml of gooseberry juice. Group II was given 30 ml of honey mixed ripen guava juice. The post test Hb level was monitored for the samples after 45 days. The mean Hb increased to 11.4 grams. Paired t-test had been applied to compare the pre and post test hemoglobin levels and to decide whether it had been statististically significant[18].

Gopaldas (2002) conducted an experimental study among young women 18 – 23years of age in Tara consultancy services, Bangalore. The 180 days intervention consisted of 302 women selected related to iron anemia in this 80 women received 20 ml of amla juice containing 40 mg of vitamin c three times a week. 70 women receives 400 mg albendadole once ferrous sulfate tablets 60 mg elemental iron .The pre –post impact were in women 12.30 g/dl, 12.70 g/dl,13.00 gm/dl respectively increase the

hemoglobin level. Vitamin C is important for human beings. It is necessary for the synthesis of the inter-cellular cementing substance which is responsible for keeping the cells of the body together. The amla fruit is reported to contain nearly 20 times as much vitamin C as orange juice. The edible amla fruit tissue has 3 times the protein concentration and 160 times the ascorbic acid concentration of an apple. The fruit also contains higher concentration of most minerals and amino acids than apples. **Nutritive value** Amla is well known for its nutritional qualities. It is rich in polyphenols, minerals and is regarded as one of the richest source of vitamin C (200-900 mg per 100 g of edible portion). Major components of nutritional importance are reported in Carbohydrate 14.1, Proteins 0.5, Fat 0.1, Fibers 3.7. Mineral matter 0.7, Calcium 0.05, Phosphorus 0.02, Iron 1.5 mg /100g, Vitamin c 600 mg/ 100 g, Nicotinic acid 0.2 mg /100 g, Moisture 81.2.

Medicinal Importance Medicinal Activities Anti oxidants, Anti tumor activity Anti ulcer activity**,** Hypo lipidemic activity**,** Immuno modulatory activity Analgesic activity, Hepato protective activity, Anti inflammatory activity, Gastro protective activity, Anti microbial activity. Amla is rich in Vitamin C or ascorbic acid an essential ingredient that helps in the, absorption of Iron. Supplements of Amla can be very beneficial to patients suffering from Iron deficiency Anaemia.[41]

ICMR bulletin (2000) the national nutritional anemia prophylaxis programme was intiated in 1970 to control iron deficiency anemia in the vulnerable group through daily supplements of iron folic acid tablets. The suggested prophylactic doses of iron and folic acid respectively were 200-400 mg and 1000 mg for 100 days. These tablets were to the high risk groups by the local health workers. Adolescence is the period when the individual can be shaped and molded into great adults psychologically . The sense of identity and crisis of intimacy and isolation increase as adolescence progress towards young adulthood and move from dependency to the beginning of independence Metamorphic ally adolescence 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 , the behavior displayed by children were more in schools and colleges **(Lalitha).**[23]

Februthartany et al, (2002) an experimental study was conducted to assess the efficacy of two different iron supplement administered either on a weekly basis or during menstruation, among post menarcheal female adolescent students in kupang. The study revealed that weekly supplementation of iron tablets continued for 16 weekly contributed a higher improvement to hemoglobin concentration compared with supplementing iron tablets for four consecutive days during menstruation for four menstruation cycles. This suggests that weekly iron supplement is preferable.

Hinton, Sinclair (2006) conducted a study to determine the effect of iron supplementation on iron status and endurance capacity. In this study twenty iron deficient men and women were participated. A30 mg measure of elemental iron as ferrous sulfate daily for 6 weeks was given to the study participants. The results were iron supplementation significantly improves iron status and endurance capacity in iron deficient male and female subjects ($p<0.05$).

Pereira et.al (2007) to evaluate the efficacy of weekly iron supplementation in the treatment of iron deficiency anemia. 267 school children, 6-14 years of age group were randomized into two treatment groups. One group (144) received 200 mg iron sulfate alone, with 40 mg of elemental iron , while the other group (123) received the same iron supplementation dose plus 10.000 IU OF vitamin A. Finally, anemia prevalence was reduced from 48.4% to 17.7% ($p<0.001$) in the group receiving iron supplementation alone and 58.1% to 14.3% ($p<0.001$).

Sharma Anshu et al, conducted a study on identification of an appropriate strategy to control anemia in teenaged girls of poor communities of Delhi and reported that sixty two percent of the respondents in the urban and eighty five percent in the rural area were anemic. The response of the levels of daily iron/folate supplementation was better in comparison to once weekly supplementation improvement in Hb levels of responds due to addition of vitamin C to iron/folate supplementation was more than that with supplementation of iron/folate alone..

2.1.4 Effectiveness of iron supplement with vitamin c

Arkaprabha Sau (2016), conducted an observational-descriptive study among 285 students of class VI to XII at Nachinda J.K. High school, Purba Medinipur, West Bengal, from 20th September to 20th October, 2015. It shows that out of 285 students 67.7% were 'Complaint' to IFA tablet. Two most important causes of noncompliance were 'fear of harm/Unpleasant side effects' and 'past experience of side effects' . Only 80% of the teachers had taken IFA tablet before distribution and 83% ensure not to be consumed the tablet before meal.

Stalin S et al., (2016) conducted a randomized controlled study by comparing the efficacy of supplementation of weekly iron tablets with and without vitamin C in improving hemoglobin percentage in anemia adolescent girls. Studying in government corporation schools. Group A was given weekly oral IFA and group weekly IFA with vitamin C. Hemoglobin, weight and height were recorded at enrollment of study and at 12 and 24 weeks. Statistical significant increase in Hb % was noted in group B(p= 0.000).

Jenifer. A et al., (2013) emphasized a study to obtain rich qualitative data about the type of nutritional supplements and drinks consumed by adolescent girls. Semi-structured focus group interviews (n=16) we reconducted among 78 adolescent girls aged 11-18 years from a co-educational government school. Health education programmes should incorporate the perceptions, aspirations and motivations of young people into planning of interventions and activities in order to make them most relevant.

Mittal M et al., (2011) conducted an intervention study among 104 unmarried adolescent girls with an objective to study the effect of change in dietary behaviors and iron supplementation for reduction of iron- deficiency anemia. The relevant information was collected with anthropometric measurements and Hb estimation. Socio economic status was collected using pre-test questionnaires. Results showed there was an increment of 19.55 g/L hemoglobin in the group of girls receiving IFA supplements whereas hemoglobin decreased slightly in girls in the control group.

Vaidya Prakash et al., (2010) conducted a single blinded, randomized, controlled trial among 1646 boys and girls, aged 11-18 years, attending school in Dehradun district. Students of group I (control) received starch. The outcome measure was to evaluate the effect of sootshekhar Rasa plus sitopaladibChurna in improving nutritional anemia. The overall prevalence of anemia was found to be 81.3%.

Amina Khambalia (2009) examined through a randomized controlled trial study for the effect of daily periconceptional iron (60mg) and folic acid (400 micrograms) vs. folic acid (FA) on iron and folate indicators. In both groups, mean plasma folate concentrations increased from 16.9 to 31.8 nmol/L and the prevalence of low plasma folate concentrations (<10nmol/L) was reduced from 14% to 8%.

Ina de Sao Jose do Rio Preto (2008) conducted a randomized clinical trial in Sao Jose do Rio Preto, Brazil. This iron supplementation study was carried out using two intervention groups. The sample population Faculdade de Medic was 130 infants, randomly allocated to two groups of 65 children. All of them received weekly doses of 25 mg of elemental iron, administered either in the public health care clinic or at their homes. Treatment compliance was shown in both the groups. The prevalence of anemia among all the children was 75% at the beginning. The average increase in hemoglobin concentration levels were 0.75 g/ dl and 0.65 g/dl respectively, for home interventions and health care clinic administration ($P < 0.00005$).

Martina Schmid et al, (2007) conducted a comparative study on dietary intakes and nutrient sources of Dalit mothers and their children living in villages with and without an intervention based on improved access to the traditional Dalit food system. 24 hour recall was conducted with Dalit mothers and their children aged 6-39 months during summer and rainy seasons in 2003. In mothers sorgum contributed 29% of energy, 33% of protein and 53% of iron and green leafy vegetables contributed 21% of vitamin C, and 38% of vitamin A. Our results indicated that traditional food such as surgum, pulses, and green leafy vegetables are major sources of energy, protein, iron, vitamin c and vitamin a , and that mothers from villages with the traditional food intervention had higher intakes of energy, protein and iron.

Anje katelhut et.al (1996) In Indonesia n=84 one group received 60 mg of iron, 500 qg folic 20,000 vitamin A for retinol acetate, another group 60 mg ascorpic acid given for 5 weeks P=0.01, p=0.018 positive effect can be observed by additional of vitamin a, vitamin C "Eye ball analysis" was done. Iron, haemoglobin was improved statistically significant.

Resmed (2014) Increased iron needs, iron intake or absorption Factors that may increase iron needs include heavy menstruation and certain gastric and intestinal conditions. People who have had gastric bypass surgery or have Crohn's disease or coeliac disease are unable to absorb sufficient iron from diet. Decreased iron intake often occurs with vegetarian diets. Excessive doses of antacids can decrease iron absorption in the stomach. Serum iron levels do not reflect total body stores. The best measure of total body iron stores is serum ferritin. However, serum ferritin levels increase very rapidly in the presence of inflammation; therefore, elevated ferritin levels are not always indicative of high iron stores. The amount of iron absorbed from foods is low, ranging from 5 to 35%. A feedback mechanism exists in the body that enhances iron absorption in people who are iron deficient. When gastric acid production is impaired by an age-related decline, certain conditions and use of proton pump inhibitors (PPIs), dietary iron absorption is reduced substantially.

Dietary iron is absorbed by the intestinal mucosa from two separate pools of haem and non-haem iron. Haem iron, derived from haemoglobin and myoglobin, is well absorbed (15-35%) and relatively little affected by other foods eaten in the same meal. Red meat, chicken, fish contain haem iron.

Non-haem iron is obtained from grains and cereals, legumes, eggs, fruits and vegetables and is less well absorbed (2-10%). The absorption of non-haem iron, the major dietary pool, is greatly influenced by meal composition. Coffee, tea, milk, eggs, calcium, and phosphorus may inhibit non-haem iron absorption from food. With vegetarian diets, phytate is the main inhibitor of iron. Phytates are found in bran and other cereal grains, legumes and nuts. Polyphenols also inhibit iron absorption and occur in various amounts in plant foods and beverages, such as vegetables, fruit, some cereals and legumes, tea, coffee, and wine. Proteins from soybean also decrease iron

absorption.[37]Ascorbic acid (vitamin C) is a powerful enhancer of non-haem iron absorption and can reverse the inhibiting effect of such substances as tea and calcium/phosphate, increasing the absorption of iron from food. Foods containing high amounts of ascorbic acid include citrus fruit, broccoli, and capsicum. Cooking, industrial processing, and storage degrade ascorbic acid and remove its enhancing effect on iron absorption.

In summary, dietary modifications involve increased intake of iron rich foods, increased consumption of fruits and vegetables rich in ascorbic acid to enhance non-haem iron absorption, and reduced intake of tea and coffee, which inhibit non-haem iron absorption.

Vitamin C, also known as ascorbic acid, is a water-soluble vitamin thought to increase the absorption of nonheme iron. Vitamin C acts as a reducing agent to facilitate iron absorption from the GI tract and to enable its mobilization from storage. The vitamin C and iron combine to form an iron chelate complex, which increases the solubility of iron in the small intestine, resulting in increased uptake across the mucus membranes of the duodenum. For this reason, the vitamin C must be consumed at the same time as the iron in order to be effective. Foods such as broccoli, bell peppers, red cabbage, sweet potatoes, tomatoes, cantaloupe, oranges, mangos, and strawberries are considered excellent sources of vitamin C. Vitamin C can also be taken in oral supplement form. Simultaneous consumption of 25-100 mg of vitamin C has been shown to increase the absorption of nonheme iron by four-fold. However, an excess of 200 mg of vitamin C per 30 mg of elemental iron is required to enhance the absorption of highly available iron salts, such as ferrous sulfate. The amount of iron absorption is considered directly proportionate to the amount of vitamin C taken in.

In addition, vitamin C is also thought to counteract the effects of dietary phytates and tannins, which are known inhibitors of iron absorption. Phytates, found in grains, legumes, nuts, and rice, can decrease the absorption of iron by up to 50 percent. Tannins are found in wine, chocolate, teas, and coffee. Eating foods containing vitamin C or taking vitamin C supplements along with these foods can

make up for their inhibiting effects by chemically reducing iron and preventing the formation of less soluble compounds.

Several clinical studies have shown the ability of vitamin C to increase serum iron, ferritin, and hemoglobin concentrations. Overall, increased vitamin C intake through supplementation or dietary consumption represents an important strategy for improving an individual's iron status. However, it is important to assess each individual patient's needs, as supplementation is not always necessary, especially for patients whose diet contains plenty of vitamin C.

Mohan joshi (2010) Nutritional anaemia in India is common morbidity seen in late adolescent and young female population. There are many conflicting opinions regarding dosage of iron folic acid supplementation for managing this simple nutritional deficiency disorder. Hence, this 'Randomized Controlled Trial' was undertaken in adolescent girls suffering from Iron Deficiency Anaemia visiting 'Urban Health and Training Centre' situated in urban slum area. The aim of this study was to assess the (a) Impact of weekly iron folic acid supplementation in comparison with daily iron supplementation for the management of Iron Deficiency Anaemia in adolescent girls visiting 'Urban Health and Training Centre'; (b) Adverse drug reaction profile in 'Weekly Iron Folic Acid Supplementation' and 'Daily Iron Folic Acid Supplementation' regimes; (c) Compliance profile for 'Weekly Iron Folic Acid Supplementation' and 'Daily Iron Folic Acid Supplementation' regimes in adolescent girls.[35]

2.2 CONCEPTUAL FRAMEWORK

Conceptual framework refers to interrelated concepts or abstractions that are assembled together in some rational scheme by virtue of their relevance to a common theme (Polit and Hunger 1999).

Conceptual frame work is an organized phenomenon which deals with concepts that are assembled by virtue of their relevance to a common theme. Hence, the conceptual frame work is based on Modified **Karl Ludwig von Berlanffy general system theory (1972).** Bertalanffy proposed that the classical laws of thermodynamics applied to closed systems, but snot necessarily to "open systems" General Systems Theory is a general science of "wholeness".

This new vision of reality is based on awareness of the essential inter relatedness and inter – dependence of all phenomena – physical, biological, psychological, social and cultural.

Theory is based on the following principles:

- ❖ Parts that make up the system are interrelated.
- ❖ Health of overall system is contingent on subsystem functioning.
- ❖ Open systems import and export material from and to the environment.
- ❖ Permeable boundaries (materials can pass through) .
- ❖ Relative openness (system can regulate permeability).
- ❖ Second Principle of Thermodynamics (ENTROPY).
    - ❖ Entropy must increase to a maximum
    - ❖ Negentropy increases growth and state of survival

Synergy (extra energy causes non summativity – whole is greater than sum of parts)

Equifinality vs." one best way".

Theory is explained as follows:

Input – Throughput – Output

- Maintenance Inputs (energic imports that sustain system)
- Production Inputs (energic imports which are processed to yield a Productive outcome)
- Throughput (System parts transform the material or energy)
- Output (System returns product to the environment).
- Transformation Model (Input is transformed by system)

Based on the Theory:

INPUT: Based on the demographic profile which included age of the adolescent girl of the age, education, family income per month, dietary pattern, type of family, number of children in the family. The samples were divided into two groups. One group was given elemental iron with Amla juice and the other group was given elemental iron with vitamin C tablets.

THROUGHPUT: The input is allowed to interact with the system to yield an output.

OUTPUT: The hemoglobin was assessed in both groups on day thirty.

CHAPTER III

METHODOLOGY

INTRODUCTION

This chapter deals with methodology adapted for the study and includes the description of research design, setting, population, and sample size, sampling technique, criteria for sample selection instruments for data collection .

3.1 Research Approach

Quantitative research approach.

3.2 Research design

Research design adopted for this study is depicted below, True experimental design.

Group	Pre test	Treatment	Post test
Experimental Group -1	O1	X1	O2
Experimental Group – II	O3	X2	O4

Pre test, post test study table

Experimental group I - Adolescent girls given elemental iron with amla juice

Experimental group II - Adolescent girls given elemental iron with tablet vitamin c

XI - Elemental iron with Amla juice

X2 - Elemental iron with tablet Vitamin C

O - Observation

3.3 Study setting:

The study was conducted at the Nursing hostel, Madras Medical College, Chennai -03.

3.4 Duration of the study

The study was conducted for the period of 4 weeks from 20.11 16 to 18.12 16.

3.5 Study population:

The adolescents girls who were staying in the hostel.

3.5.1 Target population: Adolescent girls age between 17-19 years of the age with anemia.

3.5.2 Accessible population: Accessible population of this study was adolescent girls who were studying in the hostel.

3.6 Sample:

The study sample comprised of adolescent girls17-19 years who were anemic and met the inclusion criteria.

3.6.1 Sampling criterion:

Sampling criteria: List of the characteristics essential for inclusion or exclusion in the target population.

3.6.1. (a). Inclusion criteria: The study includes adolescent girls who are

- Staying in the hostel of Madras Medical College, Chennai.
- In the age groups 17 - 19 years.
- Willing to participate in this study.
- With haemoglobin level between 8 - 11grams/dl.

3.6.1 (b). Exclusion criteria: The study excludes adolescent girls who are

- With any other systemic disease / associate illness like thyroid deficiency
- Are allergic to alma juice.
- Had major surgery with in 6 months.
- With the history of bleeding disorders.

3.7 Sample size: 60 adolescent girls (30 – experimental group -I, 30 – experimental group II).

3.8 Sampling technique:

The sampling technique used in this study was Simple random Sampling technique.

3.9 Research Variables:

The Variables included in the study are:

3.9.1 Independent variables: Tablet **Elemental** iron, Tablet vitamin c, Fresh amla juice.

3.9.2 Dependent variable: Haemoglobin level.

3.9.3 Extraneous variables: Demographic variables includes age in years, year of education, family income per month, Dietary pattern, type of the family, Number of children in the family.

3.10 Development and description of tool: The investigator adopted the following step that was carried out in preparing the questioning.

3.10.1 Development of tool:

A structured questionnaire was developed on the basis of objectives of the study. Tool was developed after extensive review of literature from various text books, journals, internet search and guidance from the experts in the field of Nursing and Medical expert from the field of community health nursing. The tool was developed in English and translated into Tamil. Congruency was maintained in translation.

3.10.2 Description of tool:

The tool constructed for the study based on the objectives is grouped under the following sections:

Section A: Comprises demographic variables like age, education, family income, religion, type of family, dietary pattern types of family, number of children in the family.

Section B: Menstrual history of the adolescent girls which consists of age at menarche, menstrual cycle, associated with clots, frequency and menstrual flow.

Section C: Assessment of pre-test, post test level of haemoglobin.

3.10.3 Score interpretation

Hemoglobin level	Value
Normal	**>12 gm/dl**
Mild	**10.1 -11.9 gm/dl**
Moderate	**7.6 – 10.0 gm/dl**
Severe	**< 7.5 gm/dl**

3.11 Protection of human subjects:

It refers to a system of moral values that is concerned with the degree to which research procedure adheres to professional, legal social obligations to study participants.

The study objectives, intervention and data collection procedures were approved by the research and ethical committee of the institution, Informed consent was obtained from adolescent girls. The freedom was given the client to leave the study at her will without assigning any reason. No routine work was altered or withheld. Confidentiality of the subject's information was maintained.

3.12 Reliability of the tool:

The reliability of the tool was established by inter rater reliability method. The obtained reliability correlation co efficient r- value was 0.02. The correlation found the tool to be highly reliable for this study.

3.13 Pilot study:

The pilot is a trail run for the major to test the reliability, practicability, appropriateness and flexibility of the tool for the study. The study was conducted at selected medical college at Chennai by obtaining prior permission from the authorities and conducted with ten adolescent girls, who fulfilled the inclusion criteria. The subjects who were used for the pilot study conducted were excluded for the main study. The data analysed by using descriptive statistics that is percentage, mean, and standard deviation of the variables and were calculated and compared. In the pilot study the researcher had no difficulties and the study was found to be feasible and practicable. The investigator proceeded for the main study.

3.14 Data collection procedure:

The study was conducted in selected urban Medical College of Chennai, after obtaining permission from the Dean, Principal of college of nursing, Head of the department of community health nursing, Chennai. A self-introduction was given by the investigator and the informed written consent was obtained from adolescent girls and benefits of Amla were explained to the participants.The objectives and purpose of study was explained and confidentiality was maintained. Before starting the procedure T. Albendazole 400 mg was given. The data collection procedure was done 10 – 15 mts, for a period of 4 weeks and the time taken for data collection. The sample size was 60 adolescent girls, 30 adolescene were under experimental group I (Elemental iron with amla juice), 30 adolescent girls were under experimental group II (Elemental iron with tablet vitamin c). From each adolescent girls 5 – 10 mts taken for doing hemoglobin blood test by using Sahli's method. Pretest hemoglobin level was assessed by Sahli 's method in both groups, for experimental group I 100 ml Amla juice with elemental iron was given, elemental iron with tablet vitamin c was given for experimental group II in the night after 45 mts daily diner time for 4 weeks, post assessment was conducted after 7^{th}day interval both groups.

3.15 Method of Preparation of Amla Juice:

Ingredients: Amla**,** Water.

Preparation : Amla juice is prepared from the 100 grams of amla's which contains 600mgs of vitamin c has been cut into small pieces and grinded in the mixture adding 500 ml of water. The juice has been filtered to use with in one hour. For each students 100 ml of juice given they are getting naturals source of amla juice100 mg vitamin c daily. It was distributed to sample at free cost under direct supervision of investigator

3.16 Intervention protocol:

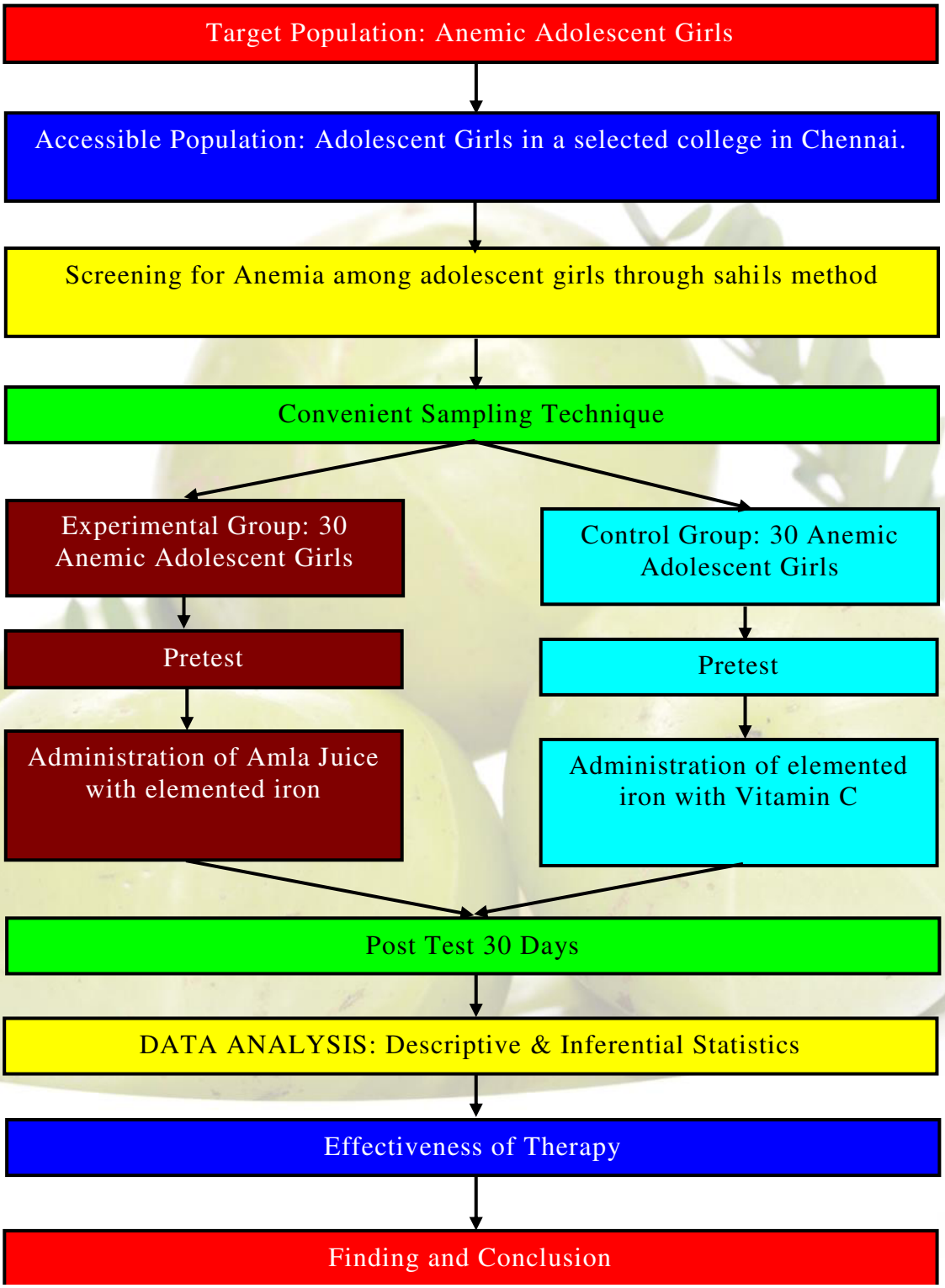
	Experimental group (Group I)	**Group (II)**
Place	Nursing hostel, MMC, Chennai	Nursing hostel, MMC, Chennai
Administered by	Investigator	Investigator
Duration	30 days	30 days
Time	8.45pm after dinner	8.45pm after dinner
Frequency	Once daily	Once daily
Recipients	Adolescent girls who were received elemental iron with amla juice	Adolescent girls who were received Elemental iron with vitamin C

3.17 Data entry and analysis:

At the end of data collection about 4-5 data were entered in coding sheet and SPSS package version was used. The data obtained would be analyzed using descriptive and inferential statistics on the basis of the objectives and hypotheses of the study

1. Organize the data.
2 Frequency and percentage distribution will be used to describe the demographic variables, Mean and standard deviation will be used to assess the level before and after administration of elemental iron with amla juice, elemental iron with tablet vitamin c.
3 Inferential statistics was used to determine the comparison and association.
4 Difference between amla juice and tablet vitamin c was analysed using student independent t 2 test, p-value of 0.05 was considered statistically significant.

SCHEMATIC REPRESENTATION



CHAPTER IV

DATA ANALYSIS AND INTERPRETATION

Analysis is categorizing, ordering, manipulation and summarizing of data to obtain the answers for hypothesis.

This chapter deals with analysis and interpretation of data collection from 60 adolescents girls. The study aimed to assess the effectiveness of elemental iron with amla juice for anemic adolescent girls from 60 samples (30 experimental group I and 30 experimental group II). The purpose of analysis was to reduce the collected data to an intelligible and interpretable form so that the relation of the research problem can be studied and tested. The data was collected tabulated and interpreted in this chapter. The data were analyzed by using descriptive and inferential statistics.

Organization of the data:

Section A: Description of demographic variables in the experimental group I and experimental group II.

Section B: Pre and post –test assessment of the haemoglobin level of the adolescent girls.

Section C: Comparing the effectiveness of the iron supplement among the experimental Group I and experimental group II.

Section D: Association of the post–test level of haemoglobin level with the demographic variables.

Section E: Association of the post–test level of haemoglobin level with the clinical variables.

STATISTICAL ANALYSIS

1. Demographic variables in categorical/dichotomous were given in frequencies with their percentages.
2. Hb value was given in mean and standard deviation.

3. Similarities of demographic/clinical variables distribution between Amla juice and tablet Vitamin C groups are analyzed using chi square test.
4. Difference between amla juice and tablet vitamin C was analysed using student independent t-test.
5. Difference between mean pre test and post test was analysed using student paired t-test and difference between frequencies of pre test and post test was analysed using McNemar's test.
6. Association between Hb gain score and demographic variables were analysed using oneway ANOVA F-test /t- test
7. Differences between pre test and post test score was analysed using percentage with 95% CI and mean difference with 95% CI.
8. $P < 0.05$ was considered statistically significant.

SECTION A: DISTRIBUTION OF DEMOGRAPHIC VARIABLES OF ADOLESCENT GIRLS WITH ANEMIA IN THE GROUP I AND GROUP II OF THE ADOLESCENTS GIRLS (AGE, EDUCATION, FAMILY INCOME, DIETARY PATTERN, TYPE OF FAMILY AND NUMBER OF CHILDREN).

Table 4.1: Distribution of demographic variables of study participants

Demographic variables		Group				Chi Square test
		Amla Juice (n=30)		Vitamin C (n=30)		
		n	%	n	%	
Age	17 years	5	16.7%	7	23.3%	$\chi 2$=1.16
	18 years	11	36.6%	13	43.3%	P=0.55
	19 years	14	46.7%	10	33.4%	DF=2
Education status	B.Sc(N) I Year	15	50.0%	15	50.0%	$\chi 2$=0.00 P=1.00
	BSc(N) II Year	15	50.0%	15	50.0%	DF=1
Family Monthly income	Rs.2001-4000	11	36.6%	15	50.0%	$\chi 2$=1.81
	Rs.4001-8000	15	50.0%	10	33.3%	P=0.61
	Rs.8001-10000	2	6.7%	3	10.0%	DF=3
	> Rs.10000	2	6.7%	2	6.7%	
Dietary pattern	Vegetarian	5	16.7%	7	23.3%	$\chi 2$=0.42 P=0.52 DF=1
	Non Vegetarian	25	83.3%	23	76.7%	
Type of family	Nuclear Family	19	63.3%	20	66.7%	$\chi 2$=0.07 P=0.78 DF=1
	Joint Family	11	36.7%	10	33.3%	
Number of children in the family	One	2	6.7%	2	6.7%	$\chi 2$=0.75 P=0.86 DF=3
	Two	15	50.0%	18	60.0%	
	Three	11	36.6%	8	26.6%	
	> Three	2	6.7%	2	6.7%	

NS= Not significant

P > 0.05 is not significant

DF= Degrees of Freedom

The above Table 4.1 revealed.

In considering the **Age** wise distribution of adolescent girls 14 (46.7%) were 19 years of age in group I, group II 10 (33.4%), 11 (36.6%) were 18 years in group I, group II 13 (43.3%), were 17 years of adolescent girls were 5 (16.7% in group I , 7 (233%) were in group II.

In **Educational wise** distribution study participants B.Sc I and II year Nursing students are same 50 %.

In the **Monthly income** status 15 (50.%) of adolescents girls who were given group I were Rs 4001-8000 per month , in group I 10 (33.3 %), group I Rs 2001 – 4000/ per month 11(36.6%), were group II 15 (50.%). Only 2(6.7%) economical status Rs 8001- 10,000/ per month. were present in Group I ,were group II 3(10.%). Rs 4001-8000/ per month were group I 15(50.0%. group II10 (33.3) and remaining > Rs.10000 in both group.

In the **Dietary Pattern**25 **(**83.3 %)of adolescent girls given group I were Non vegetarian, 16.7 % had vegetarian, were Group II 23 (76.7 %) were given Non – vegetarian, 7 (23.3%) were given vegetarian.

In the **Type of family** 19 (63.3%) of were comes under Nuclear family. About 11 (36,7 %) of adolescents girls were given joint family in the group I were 20 (66.7 %) of adolescents group II Nuclear family, 10 (33.3 %) of were given Joint family.

In **Number of children in the family** 2 (50 .0%) in the group I of adolescent girls two children in the family, 11 (36.6 %) were 3 childeren, 8 (26.6%) of adolescent girls were 3 childeren, remaining 2 (6.7 %) more than 3 childeren in the family.

Table 4. 2: Distribution of clinical variables of study participants

Clinical Variables		Group				Chi Square test
		Amla Juice (n=30)		Vitamin C (n=30)		
		n	%	n	%	
Height	130 -140 cm	2	6.7%	2	6.7%	$\chi2$=0.58 P=0.90 DF=3
	141 -150 cm	13	43.3%	14	46.7%	
	151 -160 cm	10	33.3%	11	36.6%	
	161 -171 cm	5	16.7%	3	10.0%	
Weight	36 -45 kg	8	26.7%	6	20.0%	$\chi2$=0.51 P=0.77 DF=2
	46 -55 kg	14	46.6%	14	46.7%	
	56 -65 kg	8	26.7%	10	33.3%	
BMI	< 16.0	5	16.7%	3	10.0%	$\chi2$=2.18 P=0.7 DF=4
	16.1 - 17.0	6	20.0%	4	13.4%	
	17.1 - 18.5	6	20.0%	7	23.3%	
	18.6 - 20.0	5	16.7%	9	30.0%	
	20.0 - 25.0	8	26.6%	7	23.3%	
Age at menarche	10-12 years	3	10.0%	4	13.3%	$\chi2$=0.16 P=0.68 DF=1
	13-15 years	27	90.0%	26	86.7%	
	16-18 years	0	0.0%	0	0.0%	
Frequency of your menstrual cycle	< 21 days	3	10.0%	3	10.0%	$\chi2$=0.68 P=0.71 DF=2
	21 - 28 days	10	33.3%	13	43.3%	
	> 28 days	17	56.7%	14	46.7%	
Number of days of menstrual flow	< 3 days	6	20.0%	8	26.6%	$\chi2$=1.10 P=0.57 DF=2
	3 - 5 days	15	50.0%	11	36.7%	
	> 5 days	9	30.0%	11	36.7%	
Amount of menstrual flow	Normal Flow	11	36.7%	15	50.0%	$\chi2$=1.09 P=0.29 DF=1
	Minimal Flow	19	63.3%	15	50.0%	
Did you receive any blood and blood products	Yes	0	0.0%	0	0.0%	$\chi2$=0.00 P=1.00 DF=1
	No	30	100.0%	30	100.0%	
Do you take coffee or tea?	Yes	25	83.3%	27	90.0%	$\chi2$=0.58 P=0.44 DF=1
	No	5	16.7%	3	10.0%	

NS= Not significant

P > 0.05 is not significant

DF= Degrees of Freedom

Above Table 4.2 revealed the clinical variable of adolescent girls who are partipated in the study.

In **Height** of adolescent girls 141- 150 cms were 13 (43.3%) in group I were 151-160 cms of adolescent girls were10 (33.3 %), 5 (161-171) cms of height, **remaning** 2 (130 -140) cms height of adolescent girls were in both group, 14 (46.7%) of adolescent girls were In group II given adolescent girls, 11 (36.6 %) of adolescent girls were 151-160 cms, 3 (10.0%) of adolescent girls were 161-171 cms present.

In **Weight** of adolescent girls were 14 (46.6 %), 46-55 kg, who were given group I 36.-45kg of girls 8 (26.7), 56-65 kg of adolescent girls were 8 (26.7 %) of weight, were14 (46.7%) of adolescent girls were 46-55 kg who were given in group II, 10 (33.3 %) of adolescent girls were under 56-65 kg 10 (20.0 %) of adolescent girls were 36-45 % who were given group II.

In group I 20.6% were in 20-25% of them were in 16.12 -17.0 another 20% of them 17.1-18.5and 16.7% were in 18.6 – 20.0 and remaining 16.7 % were in below 16 of **BMI** status.

In group II 30 % belongs to 18.6 -20.0 , 23.3% of them were in 22-25 and another 23.3% were in 17.1-18.5, 13.4% belong to 16.1-17 and remaining 10% were in below 16 of bmi status.

In **Age at Menarche 90.0** % of group I participants attained menarche at 13-15 years, and remaining 10.0% attended 10-12 years. 86.7 % of group ii attained menarche at13-15 yrs and remaining 13.3 % were attained menarche at 10-12 years.

In **Frequency of your menstrual cycle: 56.7**% were in Group I have >28 days cycle, 33.3 % of adolescent girls were 21-28 days cycle, only 10.0% of adolescent girls were < 21 days cycle. in the Group II of adolescent girls were 46.7 % of them were in >28 days menstrual cycle, 43.3 % were in 21-28 days cycle, only 10.% of them were < 21 days cycle.

In **Number of days of menstrual flow** 50 % of Group I & 36.7% of Group II were in 3-5 days 30 of Group I & 36.7 % of Group II were < 5days 20% of Group I and 26.6 % of group were in< 3 days of menstrual flow.

In **Amount of menstrual flow**63.3 % of GroupI and 50 % of Group II minimal menstrual flow 36.7% of Group I & 50% of Group II were in normal flow. None of the participants in Group I &II were not **received any blood or blood products.** In taking hot beverages 83.3% of group I and 90 % of group II were **like coffee or tea** and remaining participants were not like any hot beverages.There is no statistically significant difference between experimental Group I and GroupII.

SECTION B: PRE AND POST –TEST ASSESSMENT OF THE HAEMOGLOBIN LEVEL OF THE ADOLESCENT GIRLS.

Table 4.3: Pretest and posttest level of hemoglobin score

(Iron supplement with Amla Juice) Group I

	Group I				Extended McNemar's test
	Pretest		Posttest		
	n	%	n	%	
Normal	0	0.0%	8	26.7%	$\chi 2=21.47$ p=0.001*** DF= 3 significant
Mild	4	13.3%	14	46.6%	
Moderate	24	80.0%	8	26.7%	
Severe	2	6.7%	0	0.0%	
TOTAL	30	100.0%	30	100.0%	

DF= Degrees of Freedom

Significant P < 0.05 *

Very high significant at P ≤ 0.001

Above table 4. 3 revealed the pre -test and post -test hemoglobin level of adolescent girls of female Nursing students in Iron Supplement with Amla Juice group. In pretest, none of the adolescent girls are have normal level of hemoglobin score, 13.3% of the adolescent girls are have mild hemoglobin level of score, 80.0% of the adolescent girls are having moderate level of score and 6.7% of the adolescent girls are having severe level of score. In posttest, 26.7% of the adolescent girls are having normal level of hemoglobin score, 46.6% of the adolescent girls are have mild hemoglobin level of score, 26.7% of the adolescent girls are have moderate level of score and none of the adolescent girls are have severe level of hemoglobin score. Pretest and posttest difference of statistical significance was p<0.05.

Score interpretation

Hemoglobin level	Value
Normal	>12 gm/dl
Mild	10.1 -11.9 gm/dl
Moderate	7.6 – 10.0 gm/dl
Severe	< 7.5 gm/dl

Table 4. 4: Pre test and post test level of hemoglobin score

(Iron supplement with tablet Vitamin C)

	Group II				Extended McNemar's test
	Pretest		Posttest		
	n	%	n	%	
Normal	0	0.0%	3	10.0%	$\chi 2=11.94$ p=0.001*** DF= 3 significant
Mild	3	10.0%	10	33.3%	
Moderate	25	83.3%	17	56.7%	
Severe	2	6.7%	0	0.0%	
TOTAL	30	100.0%	30	100.0%	

DF= Degrees of Freedom

Significant P < 0.05 *

Very high significant at P ≤ 0.001

Above table 4.4 revealed the pre - test and post - test hemoglobin level of adolescent girls of female Nursing students in Iron Supplement with tablet Vitamin C group. In pretest, none of the adolescent girls are having normal level of hemoglobin score, 10 % of the adolescent girls are having mild hemoglobin level of score, 83.3% of the adolescent girls are having moderate level of score and 6.7% of the adolescent girls are having severe level of score. In posttest, 10 % of the adolescent girls are having normal level of hemoglobin score, 33.3% of the adolescent girls are having mild hemoglobin level of score, 56.7% of the adolescent girls are having moderate level of score and none of the adolescent girls are having severe level of hemoglobin score. Pretest and posttest difference of statistical significance was calculated using Extended McNemar's test.

Table 4.5: Pre test and post test mean difference of hemoglobin level in iron supplement with tablet vitamin c group

Test	No. of adolescent girls	Mean ±SD	Mean Difference= Posttest - Pretest	Paired t-test
Pre test	30	9.27 ±1.10	0.95	**t=5.58 p=0.001*** DF=29 significant**
Post test	30	10.22 ±1.19		

DF= Degrees of Freedom

Significant P < 0.05 *

Very high significant at P ≤ 0.001

Above table4.5 revealed the pre- test and post - test mean difference of iron supplementation with Vitamin C among the adolescents girls of female nursing students.

In pretest, iron supplementation with tablet vitamin C group adolescent girls are have 9.27gm/dl hemoglobin value score after intervention, they are have 10.22gm/dl hemoglobin value. Difference between pretest and posttest mean hemoglobin value is 0.95gm/dl, this difference is statistically significant. Statistical significance was calculated using student paired t-test.

Table4. 6: Effectiveness of iron supplement with tablet vitamin c

Test	**No. of adolescent girls**	**Mean ±SD**	**Posttest - Pretest= gain score with95%CI**	**% of gain score from baseline data with95%CI**
Pre test	30	9.27 ±1.10	0.95(0.60 – 1.29)	**10.2% (6.4% - 13.9%)**
Post test	30	10.22 ±1.19		

Above table 4.6 represents the average, tablet vitamin C group adolescent girls are gained 10.2% hemoglobin value of score from baseline hemoglobin value after iron supplementation with Vitamin C intervention.

Table 4. 7: Pre test and Post test mean difference of hemoglobin level in iron supplement with amla juice group

Test	No. of adolescent girls	Mean ±SD	Mean Difference= Posttest - Pretest	Student Paired t-test
Pre test	30	9.38 ±1.06	1.91	**t=8.40 p=0.001*** DF=29 significant**
Post test	30	11.29 ±0.96		

DF= Degrees of Freedom

Significant P < 0.05 *

very high significant at P ≤ 0.001

Above table 4.7 represents the pre-test and post-test mean difference of iron supplementation with Amla juice among the adolescents girls .

Table 4. 8: Effectiveness of iron supplement with amla juice

Test	**No. of adolescent girls**	**Mean ±SD**	**Posttest - Pretest= gain score with95%CI**	**% of gain score from baseline data with95%CI**
Pre test	30	9.38 ±1.06	1.91(1.45 – 2.37)	**20.4% (15.4% - 25.3%)**
Post test	30	11.29 ±0.96		

Above table 4.8 shows thatOn an average, Amla juice group adolescent girls are gained 20.4% hemoglobin value of score after iron supplementation with Amla juice intervention.

Table 4. 9: Pre-test level of hemoglobin score among Iron supplement with tablet Vitamin C and Iron supplement with Amla Juice groups

	Group II		Group I		Chi square test
	T. Vitamin C		Amla juice		
	n	%	n	%	
Normal	0	0.0%	0	0.0%	χ^2=0.16 p=0.92 DF= 2 not significant
Mild	3	10.0%	4	13.3%	
Moderate	25	83.3%	24	80.0%	
Severe	2	6.7%	2	6.7%	
TOTAL	30	100.0%	30	100.0%	

DF= Degrees of Freedom

not significant P > 0.05

Above table4. 9 revealed the pretest tablet vitamin C and Amla juice group hemoglobin level. In tablet vitamin C group, none of the adolescent girls are having normal level of hemoglobin score, 10% of the adolescent girls are having mild hemoglobin level of score, 83.3% of the adolescent girls are having moderate level of score and 6.7% of the adolescent girls are having severe level of score. In Amla juice group, none of the adolescent girls are having normal level of hemoglobin score,13.3% of the adolescent girls are having mild hemoglobin level of score, 80.0% of the adolescent girls are having moderate level of score and 6.7% of the adolescent girls are having severe level of hemoglobin score. In pretest, tablet Vitamin C and Amla juice group hemoglobin level of difference is not statistical significant and it was confirmed using chi square test.

Table 4.10: Post-test level of hemoglobin score among Iron supplement with tablet vitamin C and Iron supplement with Amla Juice groups

	Group II		Group I		Chi square test
	T. Vitamin C		Amla juice		
	n	%	n	%	
Normal	3	10.0%	8	26.7%	$\chi 2=6.17$ p=0.05* DF= 2 significant
Mild	10	33.3%	14	46.6%	
Moderate	17	56.7%	8	26.7%	
Severe	0	0.0%	0	0.0%	
TOTAL	30	100.0%	30	100.0%	

DF= Degrees of Freedom

Significant P < 0.05 *

Above table 4.10 shows the post- test tablet vitamin C and Amla juice group hemoglobin level. In tablet vitamin C group, 10% of the adolescent girls are have normal level of hemoglobin score, 33.3% of the adolescent girls are having mild hemoglobin level of score, 56.7% of the adolescent girls are have moderate level of score and none of the adolescent girls are have severe level of score. In Amla juice group, 26.7% of the adolescent girls are have normal level of hemoglobin score, 46.6% of the adolescent girls are have mild hemoglobin level of score, 26.7% of the adolescent girls are have moderate level of score and none of the adolescent girls are have severe level of hemoglobin score. In post- test, tablet vitamin C and Amla juice group hemoglobin level of difference is t statistical significant and it was confirmed using chi square test.

SECTION C: COMPARING THE EFFECTIVENESS OF THE SUPPLEMENT AMONG THE EXPERIMENTAL I AND EXPERIMENTAL II.

Table 4.11: Comparison of pretest level of hemoglobin score among iron supplement with tablet Vitamin C and iron supplement with Amla juice groups

	Group II		**Group I**		**Mean difference**	**Student independent t-test**
	Amla Juice		**T. Vitamin C**			
	Mean	**SD**	**Mean**	**SD**		
Pretest	9.38	1.06	9.27	1.10	0.11	t=0.38 P=0.70
Posttest	11.29	0.96	10.22	1.20	1.07	**t=3.81** **P=0.01****

S= significant NOT SIGIFICANT P > 0.05 AT

* significant at P≤0.05

Above table 4.11 revealed Considering **pre-test**, Amla juice adolescent girls are having 9.38 Hb level, whereas tablet vitamin C group adolescent girls are having 9.27 hb level, the difference is 0.11, it is small and this difference is not statistically significant. Considering **post-test**, Amla juice adolescent girls are having 11.27 hb level, whereas tablet vitamin C group adolescent girls are having 10.22 hb level, the difference is 1.07, it is large and this difference is statistically significant.

Table 4.12: EFFECTIVENESS OF STUDY

		Mean ±SD	Hb gain score	% of hb gain score from baseline score
AMLA JUICE	Pretest	9.38 ±1.06	1.91(1.45 – 2.37)	**20.4% (15.4% - 25.3%)**
	Posttest	11.29 ±0.96		
T. VITAMIN C	Pretest	9.27 ±1.10	0.95(0.60 – 1.29)	**10.2% (6.4% - 13.9%)**
	Posttest	10.22 ±1.19		

Above table 4.12 represent Iron supplement with Amla Juice adolescents girls are gained 20.4% of hemoglobin gain score whereas Iron supplement with tablet Vitamin C Versus Iron Supplement adolescent girls are gained 10.2% of hemoglobin score. The difference in hemoglobin percentage of gain score shows the effectiveness of Iron supplement with Amla Juice.

Table 4.13: Pre test level of hemoglobin score among Iron supplement with Vitamin C and Iron supplement with Amla Juice groups

	Group II		Group I		Chi square test
	T. Vitamin C		Amla juice		
	n	%	n	%	
Normal	0	0.0%	0	0.0%	$\chi 2=0.16$ p=0.92
Mild	3	10.0%	4	13.3%	
Moderate	25	83.3%	24	80.0%	
Severe	2	6.7%	2	6.7%	
TOTAL	30	100.0%	30	100.0%	

DF= Degrees of Freedom

Not significant P > 0.05

Above table 4.13 represent the pretest tablet vitamin C and Amla juice group hemoglobin level. In tablet vitamin C group, none of the adolescent girls are having normal level of hemoglobin score, 10 % of the adolescent girls are having mild hemoglobin level of score, 83.3% of the adolescent girls are having moderate level of score and 6.7% of the adolescent girls are having severe level of score. In Amla juice group, none of the adolescent girls are having normal level of hemoglobin score, 13.3% of the adolescent girls are having mild hemoglobin level of score, 80.0% of the adolescent girls are having moderate level of score and 6.7% of the adolescent girls are having severe level of hemoglobin score. In pretest, tablet vitamin C and Amla juice group hemoglobin level of difference is not statistical significant and it was confirmed using chi square test.

Table 4.14: Post test level of hemoglobin score among Iron supplement with tablet vitamin C and Iron supplement with Amla Juice groups

	Group II		Group I		Chi square test
	Tablet Vitamin C		**Amla juice**		
	n	**%**	**n**	**%**	
Normal	3	10.0%	8	26.7%	$\chi 2=6.17$ p=0.05* DF= 2 significant
Mild	10	33.3%	14	46.6%	
Moderate	17	56.7%	8	26.7%	
Severe	0	0.0%	0	0.0%	
TOTAL	30	100.0%	30	100.0%	

DF= Degrees of Freedom

*** significant P < 0.05**

Above table 4.14 represents the post- test tablet vitamin C and Amla juice group hemoglobin level. In tablet vitamin C group, 10 % of the adolescent girls are have normal level of hemoglobin score, 33.3% of the adolescent girls are having mild hemoglobin level of score, 56.7% of the adolescent girls are have moderate level of score and none of the adolescent girls are have severe level of score. In Amla juice group, 26.7% of the adolescent girls are have normal level of hemoglobin score, 46.6% of the adolescent girls are have mild hemoglobin level of score, 26.7% of the adolescent girls are have moderate level of score and none of the adolescent girls are have severe level of hemoglobin score. In post- test, tablet vitamin C and amla juice group hemoglobin level of difference is t statistical significant and it was confirmed using chi square test.

Table 4.15: Comparison of pre test level of hemoglobin score among iron supplement with tablet vitamin C and iron supplement with Amla juice groups

	Group I		Group II		Mean difference	Student independent t-test
	Amla Juice		T. Vitamin C			
	Mean	SD	Mean	SD		
Pretest	9.38	1.06	9.27	1.10	0.11	t=0.38P=0.70 DF =58not significant
Posttest	11.29	0.96	10.22	1.20	1.07	t=3.81P=0.01** DF =58 significant

NS= not significant

S= significant NOT SIGIFICANT

P> 0.05 AT * significant at P ≤ 0.05

Above table 4.15 revealed considering **pre test**, Amla juice adolescent girls are having 9.38 Hb level, whereas tablet vitamin C group adolescent girls are having 9.27 hb level, the difference is 0.11, it is small and this difference is not statistically significant. Considering **post test**, Amla juice adolescent girls are having 11.27 hb level, whereas tablet vitamin C group adolescent girls are having 10.22 hb level, the difference is 1.07, it is large and this difference is statistically significant.

Table 4.16: EFFECTIVENESS OF STUDY

		Mean ±SD	**Hb gain score**	**% of Hb gain score from baseline score**
AMLA JUICE GROUP I	Pre test	9.38 ±1.06	1.91(1.45 – 2.37)	**20.4% (15.4% - 25.3%)**
	Post test	11.29 ±0.96		
tablet VITAMIN C GROUP II	Pre test	9.27 ±1.10	0.95(0.60 – 1.29)	**10.2% (6.4% - 13.9%)**
	Post test	10.22 ±1.19		

Above table 4.16 shows Iron supplement with tablet vitamin C Versus Iron Supplement with AmlaJuice among adolescents girls are gained 20.4% of hemoglobin gain score whereas Iron supplement with tablet vitamin C versus Iron Supplement adolescent girls are gained 10.2% of hemoglobin score. The difference in hemoglobin percentage of gain score shows the effectiveness of Iron supplement with Amla Juice.

SECTION D: ASSOCIATION OF THE POST –TEST LEVEL OF HAEMOGLOBIN LEVEL WITH THE DEMOGRAPHIC VARIABLES.

Table 4.17: Association between Hemoglobin gain score and Adolescent girls Demographic variables (Amla Juice group)

Demographic variables		n	Hemoglobin gain score						Oneway ANOVA F-test/t-test
			Pre test		Post test		Gain score= post- pre		
			Mean	SD	Mean	SD	Mean	SD	
Age	17 years	5	9.04	.75	10.47	.99	1.43	0.65	**F=3.36 P=0.05* significant**
	18 years	11	10.16	1.08	11.77	1.01	1.61	1.23	
	19 years	14	10.26	1.08	12.97	1.01	2.71	1.35	
Education status	Diploma(N)	15	8.79	1.00	11.15	.98	2.35	1.54	t=0.73 P=0.46
	BSc(N)	15	9.97	.77	11.43	.96	1.47	.64	
Family Monthly income	Rs.2001-4000	11	9.05	1.27	11.27	.79	1.23	1.04	**F=2.92 P=0.05* significant**
	Rs.4001-8000	15	9.70	.92	11.57	1.03	2.43	1.13	
	Rs.8001-10000	2	9.50	.71	10.50	.71	2.48	0.85	
	> Rs.10000	2	8.70	.28	10.10	.14	2.50	1.00	
Dietary pattern	Vegetarian	5	8.98	.71	10.90	.89	1.92	1.33	t=0.70 P=0.48
	Non Vegetarian	25	9.46	1.11	11.37	.97	1.91	1.26	
Type of family	Nuclear Family	19	9.71	.79	11.41	.98	1.70	.96	t=0.81 P=0.42
	Joint Family	11	8.82	1.25	11.09	.94	2.27	1.62	
Number of children in the family	One	2	9.75	1.77	11.35	1.63	1.60	.14	F=0.07 P=0.93
	Two	15	9.39	1.08	11.50	.98	2.11	1.42	
	Three	11	9.45	1.04	10.95	.91	1.50	.97	
	> Three	2	8.50	.71	11.50	.71	3.00	1.41	

Not significant $P > 0.05$

* significant at $P \leq 0.05$

Above table 4.17 shows the association between **Hemoglobin gain score and Adolescent girls Demographic** in Amla juice group. Elder and more income families adolescent girls are gained more hemoglobin value than others. It was confirmed using Oneway ANOVA F-test and student independent t-test.

Table 4.18: Association between Hemoglobin gain score and Adolescent girls Clinical variables (Amla juice group)

Clinical variables		n	Hemoglobin gain score						Oneway ANOVA F-test/t-test
			Pre test		Post test		Gain score= post- pre		
			Mean	SD	Mean	SD	Mean	SD	
Height	130 -140 cm	2	8.50	2.12	11.00	.00	2.50	2.12	F=0.97 P=0.41
	141 -150 cm	13	9.35	1.01	11.48	1.11	2.13	1.33	
	151 -160 cm	10	9.50	1.08	11.15	.82	1.65	1.29	
	161 -171 cm	5	9.58	.91	11.20	1.15	1.62	.63	
Weight	36 -45 kg	8	9.13	.95	11.53	1.16	2.40	1.31	F=1.29
	46 -55 kg	14	9.71	1.07	11.32	.89	1.61	1.13	P=0.29
	56 -65 kg	8	9.06	1.08	11.00	.93	1.94	1.37	
BMI	< 16	5	9.30	1.30	11.20	.84	1.90	1.34	
	16.1 - 17.0	6	9.17	.98	11.17	1.33	2.00	1.26	F=0.72
	17.1 - 18.5	6	9.25	1.41	11.83	.75	2.58	1.74	P=0.58
	18.6 - 20.0	5	9.08	1.14	10.84	1.06	1.76	1.29	
	20.0 - 25.0	8	9.88	.64	11.31	.84	1.44	.68	
Age at menarche	10-12 years	3	8.33	1.15	11.00	1.00	2.67	1.53	F=2.23
	13-15 years	27	9.50	1.00	11.32	.97	1.83	1.21	P=0.03
Frequency of your menstrual cycle	< 21 days	3	8.93	1.53	10.18	1.15	1.25	1.04	**F=3.38**
	21 - 28 days	10	9.03	1.14	12.36	1.29	3.33	1.85	**P=0.05***
	> 28 days	17	9.52	1.00	11.57	1.16	2.05	1.15	**significant**
Number of days of menstrual flow	< 3 days	6	9.92	.66	11.14	.82	1.22	.92	**F=3.27**
	3 - 5 days	15	9.13	.97	11.88	1.08	2.75	1.15	**P=0.05***
	> 5 days	9	9.34	1.33	11.04	.92	1.70	1.55	**significant**
Amount of menstrual flow	Normal Flow	11	9.23	.96	11.68	.98	2.45	1.15	**t=2.04**
	Minimal Flow	19	9.64	1.21	11.23	.98	1.59	.97	**P=0.05*** **significant**
Did you receive any blood and blood products	No	0	9.38	1.06	11.29	.96	1.91	1.24	t=0.00 P=1.00
Do you take coffee or tea?	Yes	30	9.34	1.14	11.35	1.01	2.01	1.33	t=0.49
	No	25	9.60	.55	11.00	.71	1.40	.55	P=0.62

Not significant $P > 0.05$

* significant at $P \leq 0.05$

Above table 4.18 represents the association between **Hemoglobin gain score and Adolescent girls clinical variables** in Amla juice group. 21-28 days frequency of menstrual cycle, 3-5 days menstrual flow girls and normal flow of menstrual flow adolescent girls are gained more hemoglobin than others. It was confirmed using Oneway ANOVA F-test and student independent t-test.

Table 4.19: Association between Hemoglobin gain score and Adolescent girls Demographic variables (tablet Vitamin C group)

Demographic variables		n	Hemoglobin gain score						Oneway ANOVA F-test/t-test
			Pre test		Post test		Gain score= post- pre		
			Mean	SD	Mean	SD	Mean	SD	
Age	17 years	7	9.00	1.00	10.53	1.46	1.53	1.49	F=2.37
	18 years	13	9.49	.99	10.12	.96	0.62	0.62	P=0.11
	19 years	10	9.18	1.34	10.14	1.37	0.96	0.61	
Education status	Diploma(N)	15	9.20	1.01	9.89	1.25	0.69	0.54	t=1.57
	BSc(N)	15	9.35	1.21	10.55	1.09	1.21	1.16	P=0.13
Family Monthly income	Rs.2001-4000	15	9.32	1.13	10.05	1.29	0.73	0.63	**F=2.96 P=0.05* significant**
	Rs.4001-8000	10	8.54	1.11	9.73	1.10	1.19	0.62	
	Rs.8001-10000	3	9.00	1.00	10.47	1.08	1.47	1.02	
	> Rs.10000	2	9.50	0.71	11.29	1.56	1.79	1.01	
Dietary pattern	Vegetarian	7	9.29	1.25	10.89	.70	1.60	1.50	**t=2.27 P=0.03* significant**
	Non Vegetarian	23	9.27	1.08	10.02	1.25	0.75	0.59	
Type of family	Nuclear Family	20	9.36	1.02	10.20	1.07	0.84	0.66	t=0.93 P=0.36
	Joint Family	10	9.10	1.29	10.27	1.49	1.17	1.33	
Number of children in the family	One	2	9.50	0.71	10.00	1.41	0.50	0.71	F=0.15 P=0.92
	Two	18	9.41	1.11	10.39	1.18	0.98	1.13	
	Three	8	9.00	1.20	9.98	1.24	0.98	0.58	
	> Three	2	8.90	1.56	9.85	1.91	0.95	0.35	

* significant at $P \leq 0.05$

Above table 4.19 represents that the association between **Hemoglobin gain score and Adolescent girls Demographic** in tablet vitamin C groupmore income families adolescent girls and vegetarian girls are gained more hemoglobin value than others. It was confirmed using Oneway ANOVA F-test and student independent t-test.

Table 4.20: Association between Hemoglobin gain score and Adolescent girls Clinical variables (Tablet Vitamin C group)

Clinical variables		n	Hemoglobin gain score						Oneway ANOVA F-test/t-test
			Pre test		Post test		Gain score= post- pre		
			Mean	SD	Mean	SD	Mean	SD	
Height	130 -140 cm	2	11.00	.00	11.50	.71	.50	.71	F=1.36 P=0.27
	141 -150 cm	14	9.60	.96	10.26	1.18	.66	.57	
	151 -160 cm	11	8.71	.92	10.05	1.27	1.34	1.30	
	161 -171 cm	3	8.67	1.15	9.83	1.19	1.17	.15	
Weight	36 -45 kg	6	9.57	1.27	10.58	1.20	1.02	1.51	F=0.44 P=0.64
	46 -55 kg	14	9.13	1.05	9.91	1.38	0.78	0.67	
	56 -65 kg	10	9.30	1.16	10.44	.88	1.14	0.87	
BMI	< 16	3	10.33	1.15	10.67	1.53	0.33	0.58	F=0.78 P=0.54 not significant
	16.1 - 17.0	4	9.25	1.50	10.25	.96	1.00	0.82	
	17.1 - 18.5	7	9.14	1.07	10.43	1.27	1.29	1.60	
	18.6 - 20.0	9	9.33	0.87	10.03	1.37	0.70	0.58	
	20.0 - 25.0	7	8.89	1.18	10.04	1.15	1.16	0.49	
Age at menarche	10-12 years	4	9.00	1.15	10.50	.58	1.50	1.29	t=1.29 P=0.21 not significant
	13-15 years	260	9.32	1.11	10.18	1.27	0.86	0.86	
Frequency of your menstrual cycle	< 21 days	3	9.33	1.53	9.67	1.15	0.33	0.58	F=1.03 P=0.37 not significant
	21 - 28 days	13	9.52	1.00	10.39	1.16	0.87	0.62	
	> 28 days	14	9.03	1.14	10.18	1.29	1.15	1.18	
Number of days of menstrual flow	< 3 days	8	9.38	0.99	10.24	0.93	0.96	1.02	**F=3.37 P=0.05* significant**
	3 - 5 days	11	9.25	0.93	10.88	1.06	1.63	0.66	
	> 5 days	11	8.85	1.21	9.60	1.42	0.75	0.78	
Amount of menstrual flow	Normal Flow	15	9.36	1.13	10.70	1.29	1.34	1.06	**t=2.04 P=0.05* significant**
	Minimal Flow	15	9.09	1.01	9.76	1.10	0.67	0.71	
Did you receive any blood and blood products	No	0	9.27	1.10	10.22	1.20	0.95	0.93	t=0.00 P=1.00 not significant
Do you take coffee or tea?	Yes	30	9.14	1.07	10.13	1.20	0.99	0.96	t=0.81 P=0.42 not significant
	No	27	10.47	0.50	11.00	1.00	0.53	0.50	

Not significant $P > 0.05$

* significant at $P \leq 0.05$

Above table 4.20 shows that the association between **Hemoglobin gain score and Adolescent girls clinical variables** in tablet Vitamin C group. 3-5 days menstrual flow girls and normal flow of menstrual flow adolescent girls are gained more hemoglobin than others. It was confirmed using Oneway ANOVA F-test and student independent t-test.

CHAPTER V

SUMMARY OF THE STUDY FINDINGS

The prime aim of the study to assess the effectiveness of elemental iron with vitamin c versus elemental iron with amla juice for adolescents girls to improve the hemoglobin level in iron deficiency amemia .

5.1 Based on demographic findings

- It is evident from 46.7%&out 60 of adolescent girls**age**19 years where 43.3% of adolescents are 18 years.
- In education wise the study participants B.Sc I and II year Nursing students are same 50 %.
- In considering the family types (66.7 %) were **in nuclear family** and 36.7% were in joint family. About (83.3 %) were **non vegetarian** remaining were vegetarian.
- In **number of children in the family** of the study group comes from two children in the family.

5.2 Based on clinical variables findings

- 43.3% of adolescence girls were 141-151 cm **height**
- 46.6 % of adolescence girls **weighted** 46-55 kg .
- 26.6 % of adolescence girls **body mass index** 20 - 25
- 90.0 % of adolescence girls attained **menarche** at 13-15 years.
- Majority of the Adolescent girl were > 28 days of **menstrual cycle** ever month.
- 50 % of adolescent girls were 3- 5 days **number of days menstrual flow .**
- 63.3 % of adolescent girls had minimal amount of menstrual flow.
- None of them adolescents girls were not **receive any blood products.**
- Adolescents girls were habits of drinking coffee , tea **83.3 %** daily.
- In taking hot beverages 83.3% of groupI and 90 % of group II were **like coffee or tea** and remaining participants were not like any hot beverages.

5.3 Findings based on Pre- test and post- test level of hemoglobin score: (Group I - Iron supplement with amla juice):

In pre- test, none of the adolescent girls are have normal hemoglobin score, 13.3 % of the adolescent girls are have mild hemoglobin level, 80% of the adolescent girls are having moderate level and 6.7 % of the adolescent girls are having severe level of hemoglobin.

5.4 Findings based on pre-test and post test level of hemoglobin: (Group II Iron supplement with tablet vitamin C):

In post test 10 % of the adolescent girls are having normal hemoglobin, 33.3% of adolescent girls having mild hemoglobin56.7% of adolescents girls having moderate level of hemoglobin.

5.6 Findings based on pre -test and post- test mean difference of hemoglobin level in iron supplement with tablet vitamin C :

In pre-test iron supplementation with tablet vitamin c group of adolescent girls are have 9.27 gm/dl of hemoglobin after intervention their **10.22 gm/dl** hemoglobin increased. The mean hemoglobin value was **0.95gm/dl**.

5.7 Effectiveness of iron supplement with amla juice:

After administration of amla juice with elemental iron the adolescents girls were gained 20.4% of hemoglobin value.

5.8 Comparison of pre-test level of hemoglobin score among iron supplement with tabletvitamin c and iron supplement with amla juice :

Before administration of amla juice adolescent girls are having 9.38 Hb level tablet vitamin c group of adolescent girls are having 9.27 Hb level, the difference is 0.11 it is small.

Considering post- test amla juice adolescent girls were having **11.27 gm/dl** Hb level , tablet vitamin C group adolescent girls are have 10.22 gm/dl the difference is **1.07** is statistically significant.

5.8 Association between hemoglobin gain score and adolescent girls demographic variable (amla juice):

The association between hemoglobin gain score and adolescent girls demographic in amla juice were **significant at P≤0.05.**

In clinical variables also association between hemoglobin gain score was **significant at P ≤ 0.05.**

CHAPTER VI

DISCUSSION

This chapter deals with the discussion of the result of the results of the data analysed based on the objectives of the study hypothesis the purpose of the study was to assess the effectiveness of iron supplement with tablet vitamin c versus iron supplement amla juice among adolescence girls staying selected nursing hostel, Madras Medical College, Chennai.

The purpose of the study was to assess effectiveness of elemental iron with amla juice for adolescent girls. This would enable to take care of their health to promote their well being by maintaining hemoglobin. Despite to improve the hemoglobin who will prevent illness.

A total 60 adolescents girls were selected using simple random sampling technique. Pre – test was conducted on 60 samples by structure questionnaires tool. After collecting data, the investigator check hemoglobin by Sahil's method. The investigator administered elemental iron with amal juice for group I, elemental iron with tablet vitamin C for group II for 30 days. On 7^{th} day, after intervention post-test was conducted to assess the effectiveness of administration of elemental iron with amla juice by the investigator.

The details of demographic characteristics of 60 adolescents girls who participated in the study were as follows.

In considering the **Age** wise distribution of adolescent girls 14 (46.7) were 19 years of age in group I, group II 10 (33.4%), 11(36.6%) were 18 years in group I, group II 13 (43.3%), were 17 years of adolescent girls were 5 (16.7% in group I, 7 (233%) were in group II.

Swati Dixit (2011) Anaemia is a serious health threat in adolescent girls iron intake is an important factor of blood haemoglobin level with in intake. This multistage observation study was conducted in 586 adolescents girls of age. Iron intake was found

adequate in only 203% girls nutritional knowledge was found significantly associate with iron intake, but it was not associated with haemoglobin level in girls. This study concludes that nutritional knowledge may affect dietary intake of iron but it transformation in better haemoglobin level lacking due to other bio socio factors. In south east Asia impaired cognitive processes in adolescent was found to be associated with anemia improved after supplementation. A study of indian children aged 1-14 years indicated that the immune response was significantly depressed in those with haemoglobin count below 10 grams/dl.[10]

In the **Monthly income** status 15 (50.%) of adolescents girls who were given group I were Rs 4001-8000 per month in group I 10 (33.3 %), group I Rs 2001 – 4000 / per month 11(36.6%), were group II 15 (50%). Only 2(6.7%) economical status Rs 8001-10,000 / per month. were present in Group I, were group II 3 (10%). Rs 4001- 8000 / per month were group I 15(50.0% group II 10 (33.3) and remaining > Rs.10000 in both group.

Pasricha SR (2015) Anemia is common among people living in low- and middle-income countries, and alleviation of the global burden of anemia is an essential global health target over the next decade. Estimates have attributed about half the cases of anemia worldwide to iron deficiency; a range of other causes probably make a similar overall contribution. Individuals living in low-income settings experience a simultaneous high burden of infection with inflammation and iron deficiency. At least in children, iron supplementation exacerbates the risk of infection in both malaria-endemic and non endemic low-income countries, whereas iron deficiency is protective against clinical and severe malaria.[8]

In the **Dietary Pattern** 25 (83.3 %)of adolescent girls given group I were Non vegetarian, 16.7 % had vegetarian, In Group II 23(76.7 %) were given Non – vegetarian , 7(23.3%) were given vegetarian.

In the **Type of family** 19 (63.3%) of were comes under Nuclear family. About11(36,7 %) of adolescents girls were given joint family in the group I. About 20

(66.7 %) of adolescents girls were given in the vitamin c group Nuclear family, 10 (33.3 %) of adolescent girls given Joint family.

In **Number of children in the family** 2 (50 .0%) in the group I of adolescent girls two children in the family, 11 (36.6%) were 3 children, 8 (26.6%) of adolescent girls were 3 children, remaining 2 (6.7 %) more than 3 children in the family.

The above statement was supports by

OBJECTIVE

1. To assess the pre-test level of haemoglobin among the adolescent girls of Nursing students hostel, Madras Medical College, Chennai – 03.
2. To assess the effectiveness of iron supplementation with tablet vitamin c among the adolescents girls staying nursing students hostel.
3. To assess the effectiveness of iron supplementation with amla juice among adolescents girls staying nursing students hostel.
4. To compare the effectiveness of iron supplementation with tablet vitamin c, versus Iron supplementation with Amla Juice .

The **sample** consist of 60 anemia adolescent girls 30 in the experimental group Iand 30 in experimental group II. Adolescent girls in the experimental group were given elemental iron with amla juice whereas in the experimental group II were given elemental iron with tablet vitamin C for the period of 30 days. The age group both groups 60 % of the adolescents were born second in family.

Majority of adolescent girls in the experimental group I & group II belongs to nuclear family. About 63.3 % in the experimental group I 66.7 % , group II. The 16.7 % of adolescent in the experimental group I and 23.3 % of adolescent in the group II were vegetarian.

Discussion based on Objectives:

Objective 1.To assess the pre-test hemoglobin level of adolescent girls of female Nursing students Hostel Madras Medical College, Chennai – 03

30 Samples who were administered elemental iron with amla juice for 30 days showed an average increase in haemoglobin of 11.29 grams**.** The rise in haemoglobin measurements were very minimal and hence were not used to calculated the post experimental status.

The basic survey on the haemoglobin level of the adolescents girls showed that the lack of iron supplements in their foods, nutritional neglect, socio economic status, physiological changes, India helminthic infestation very common which lead to chronic blood loss.

Thus this proves that nutritional neglect , physiological changes lack of iron supplements in their foods, would definitely play a major role in the increase of haemoglobin level of the adolescents girls lack of knowledge and improper screening is the reason for the mortality and morbidity of adolescents girls.

These findings are similar to the True experimental study by **Reeta R et.al ., (2016) .** The samples was divided in to a 3 groups by simple random sampling .Hb level of the samples was measured as pretest. The mean Hb was found to be 9.83 gms. Group I was given honey mixed 30 ml of gooseberry juice. Group II was given 30 ml of honey mixed ripen guava juice. The post test Hb level was monitored for all the samples after 45 days. The mean Hb increased to 11.4 grams.

Objective 2 . To assess the effectiveness of iron supplementation with vitamin c among the adolescents girls nursing students hostel.

30 Samples who were administered elemental iron with tablet vitamin c for 30 days showed an average increase in haemoglobin of 10.22 grams. The rise in haemoglobin measurements were very minimal and hence were not used to calculate the post experimental status.

These finding are similar to the observational - descriptive study was carried out among 285 sample students of class VI to XII at Nachinda J.K. High School, Purba, Medinipur, West Bengal. It shows that out of 285 students 67.7% were compliant to IFA.Two most important causes of non compliance were "Fear of Harm/Unpleasant side effects and past experience of side effects only 80 % of the teachers had taken IFA tablet before distribution and 83% ensure not to be consumed the tablet before meal.

Stalin S et al.,(2016) conducted a randomized controlled study by comparing the efficacy of supplementation of weekly iron tablets with and without vitamin C in improving hemoglobin percentage in anemia adolescent girls. Studying in government corporation schools. Group A was given weekly oral IFA and group weekly IFA with vitamin C. Hemoglobin, weight and height were recorded at enrollment of study and at 12 and 24 weeks. Statistical significant increase in Hb % was noted in group B(p=0.000).

Objective 3. To assess the effectiveness of iron supplementation with amla juice among adolescents girls female nursing students hostel, Madras Medical College.

30 Samples who were administered elemental iron with amla juice for 30 days showed an average increase in haemoglobin of 11.29 grams.

Rajeswari Vaidyanathan, (2016) conducted a true experimental design to compare the effectiveness of honey mixed gooseberry juice with honey mixed ripen guava juice on the level of hemoglobin among anemic adolescent girls studying in selected schools at Dharmapuri Dist, Tamilnadu.30 adolescent girls were selected,sample were divided into 3 groups by simple random sampling. The mean Hb was found to be 9.83 gms. Group I was given honey mixed 30 ml of gooseberry juice. Group II was given 30 ml of honey mixed ripen guava juice .The post test Hb level was monitored for the samples after 45 days. The mean Hb increased to 11.4 grams. Paired t-test had been applied to compare the pre and post test hemoglobin levels and to decide whether it had been statististically significant[18].

Gopaldas (2002) conducted an experimental study among young women 18 – 23years of age in Tara consultancy services, Bangalore. The 180 days intervention consisted of 302 women selected related to iron anemia in this 80 women received 20 ml of amla juice containing 40 mg of vitamin C three times a week. 70 women receives 400 mg albendadole once ferrous sulfate tablets 60 mg elemental iron.The pre –post impact were in women 12.30 g/dl, 12.70 g/dl,13.00 gm/dl respectively increase the hemoglobin level.

Hypotheses:

H_1: There will be an improvement in haemoglobin status of adolescent girls receiving amla juice than receiving tablet vitamin c.

The average haemoglobin of the adolescent girls who had tablet vitamin c for 30 days was around 10.22 grams. The average haemoglobin of the adolescent girls who had amla juice for 30 days was around 11.29, grams. Comparing the effectiveness of vitamin C versus amla juice, the mean difference was found to be 1.07and the **t** value using independent t-test was **t- 3.81 p=0.01** ** **significance.** Point estimate of haemoglobin increase in amla juice is 1.07 gram when comparing with vitamin c. Likely estimate the same study conducted bt the other person will have the mean increase 11.4 grams. It was calculated using mean difference with 95% of CI.

H_2: There will be an association between the selected demographic variables and the haemoglobin of adolescent receiving tablet vitamin c and amla juice.

By using chi square test, there was significant association of haemoglobin increase with the selected demographic variables like age, educational status dietary pattern, type of family, number of the children.

CHAPTER VII

RECOMMENDATION AND CONCLUSION

7.1 IMPLICATIONS Of THE STUDY

The findings of the study have the following implications in the areas of nursing service, nursing education, nursing administration and nursing research.

Some of the implications for the present study in various areas as follows:

NURSING PRACTICE

- Health Nurse must have favorable offer to educate adolescents girls regarding nutritional deficiencies and their complications.
- The study findings also showed that the participants were inadequate knowledge regarding anemia.
- This shows that the health care provider plays a vital role in educating adolescents about anemia and its impact Community on physical and mental health.
- With emerging health care trends nurses must know about the natural supplements and its benefits, health promoting properties and its availability.
- This helps the clinical nurses to use and recommend in order to prevent anemia and many other diseases.

NURSING EDUCATION

- With changing health trends , nursing education must emphasize natural therapy such as administration of amla juice and elemental iron for increasing hemoglobin
- The nursing students should be taught about the importance of the assessment of signs and symptoms of anemia, among adolescents girls , though incorporation of advanced educational technology in curriculum.
- Nursing educators need to lay emphasis on various nutritional supplements and its health promoting properties.

- It will help to reduced maternal mortalities, morbidity, infants mortalities, morbidity in future.

NURSING ADMINISTRATION

- With technological advancements and the ever growing challenges of health care emphasis, the nurse administrators must have a responsibility to provide nurses with substantive continuing nursing education programmes.
- This will enable the nurses to update their knowledge, acquire special skills and demonstrate high quality care.
- Nursing administrators should take adequate steps in formulating protocols and policies in providing client education and plans for manpower, money and material methods and time to conduct successful and useful patient educational programmes.

NURSING RESEARCH

- There is a need for extensive and intensive research in this area.
- It opens a big avenue for research on over weight, hormonal imbalance, any menstrual problem structured teaching programme through this increasing the knowledge.
- So as to generate more scientific data base on which new strategies for reducing the anemia could be developed.

7.2 Limitations :

- The sample size is limited to 60 adolescents .
- The study was limited with in 4 weeks from data collection.

Recommendations

- The same study could be conducted on a large sample to generalize the results.

- A study could be conducted to evaluate the effectiveness of amla juice and elemental iron upon anemia among school children.
- A study could be conducted to find out the other factors affecting adolescent girls along with anemia during adolescent period.
- A study could be conducted with measuring other biological parameter eg . Ferritin level.
- The study could be conducted with other available local resources eg. Guava , lemon.
- The same study will be conducted in the higher secondary school itself to create awareness about anemia.

7.4 Conclusion

Adequate hemoglobin level is very essential for every healthy person . Administration of amla juice and elemental iron supplementation is simple and easy to implement and most acceptable method for anemic adolescents. The finding of the study supports this intervention for girls with anemia which is the best intervention to promote hemoglobin level. The clinical and community health nurse should understand the importance of hemoglobin level among adolesent girls and to attend to the girls with anemia with these types of natural treatment modalities.

PROCEDURE

PREPARATION OF AMLA JUICE

Definition

This is a juice prepared from fresh amla .

Purpose

Amla is containing high vitamin C which will enhance easy absorption of iron.

Preparation of the client

Explain the procedure to the adolescence girls, explain about the action of amla juice.

Sources of amla juice

From Fresh amla

Preparation of amla juice

Is prepared from the fresh amla wash with water remove the seed measuring 100grams of amlas which contains 600 mgs of vitamin C has been cut into small pieces and adding water and grinded in the mixture. The juice has been filtered to use with in one hour. 100 ml of juice given by each students there by they were getting naturals source of amla juice 100 mg vitamin C daily.

Action of amla juice

Amla has remedy to various health problems like easy absorption of iron , healthy skin, improve the immune system, etc, amla juice is taken with iron to promote health,as this helps to absorb iron easily because of their acidic in nature.

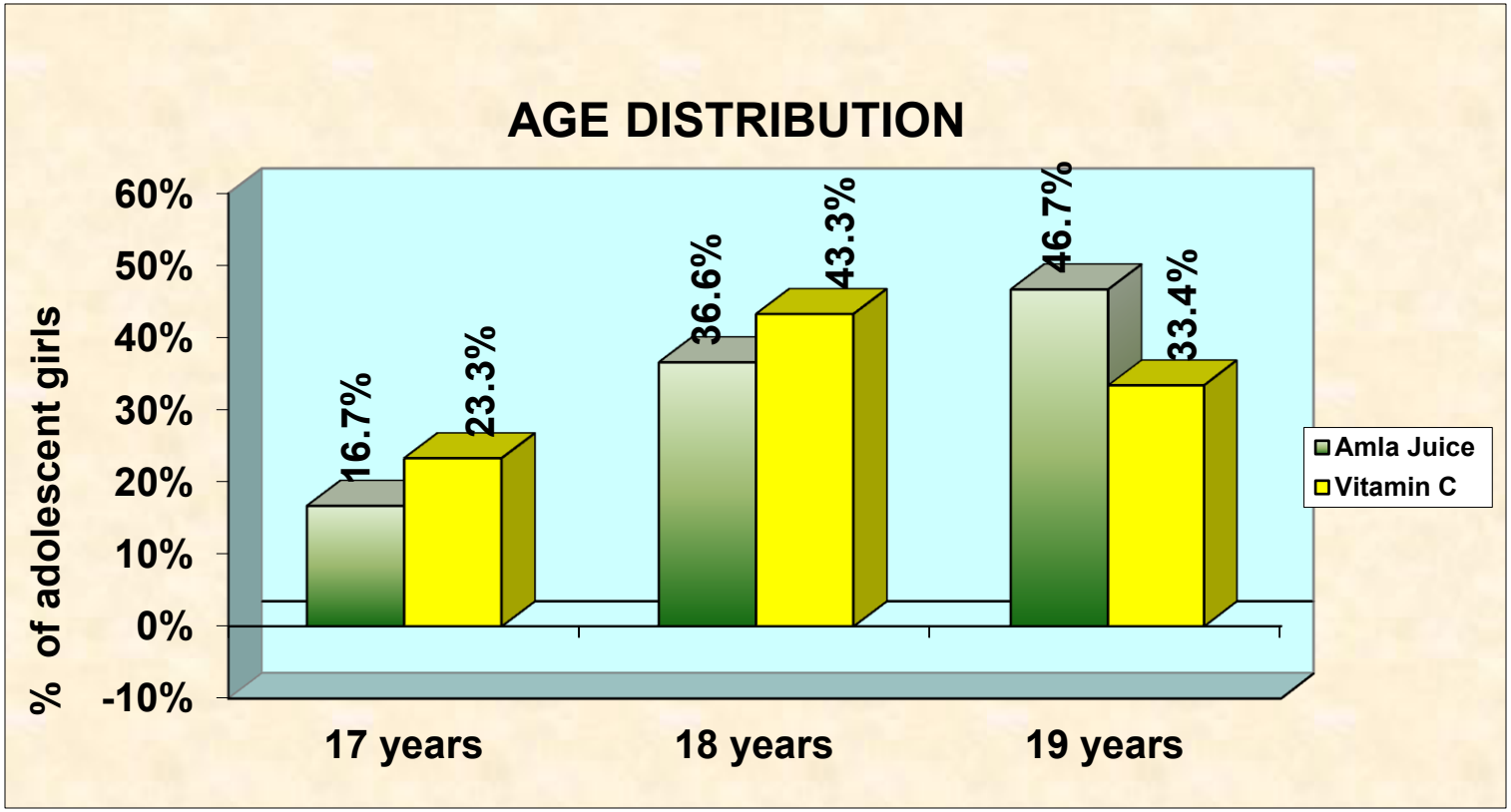


Fig. 4.1. Age wise distribution of study participants in both the groups

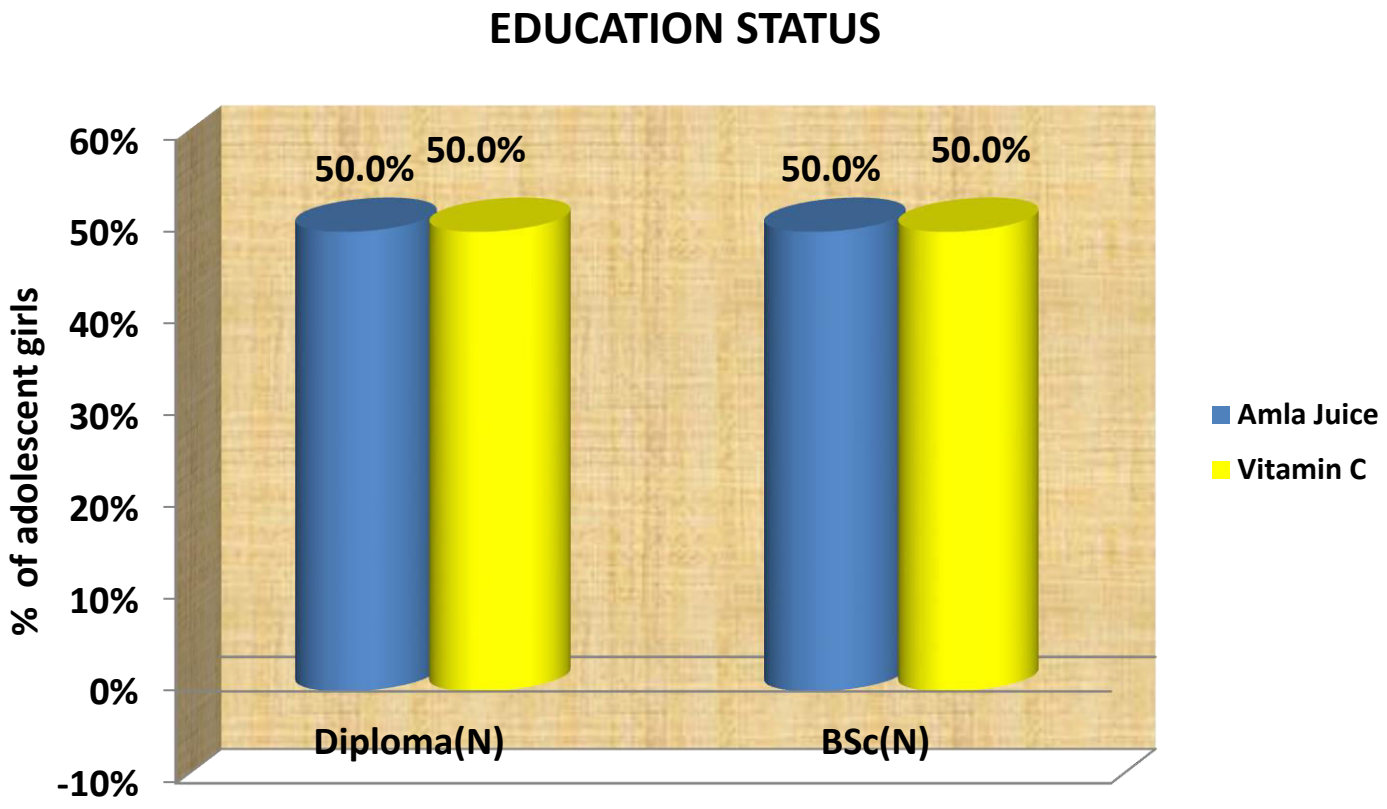


Fig. 4.2. Educational wise distribution of study participants in both the groups.

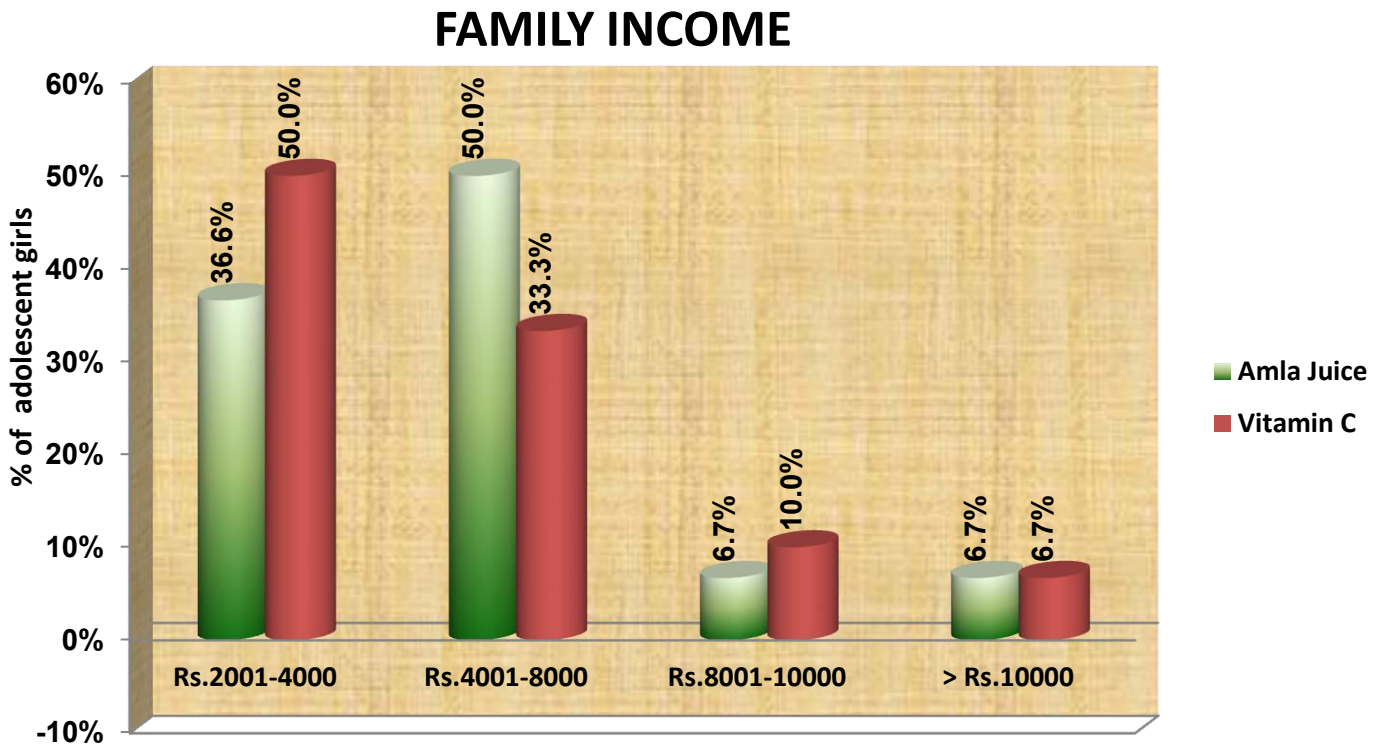


Fig. 4.3. Family income wise distribution of study participants in both the groups.

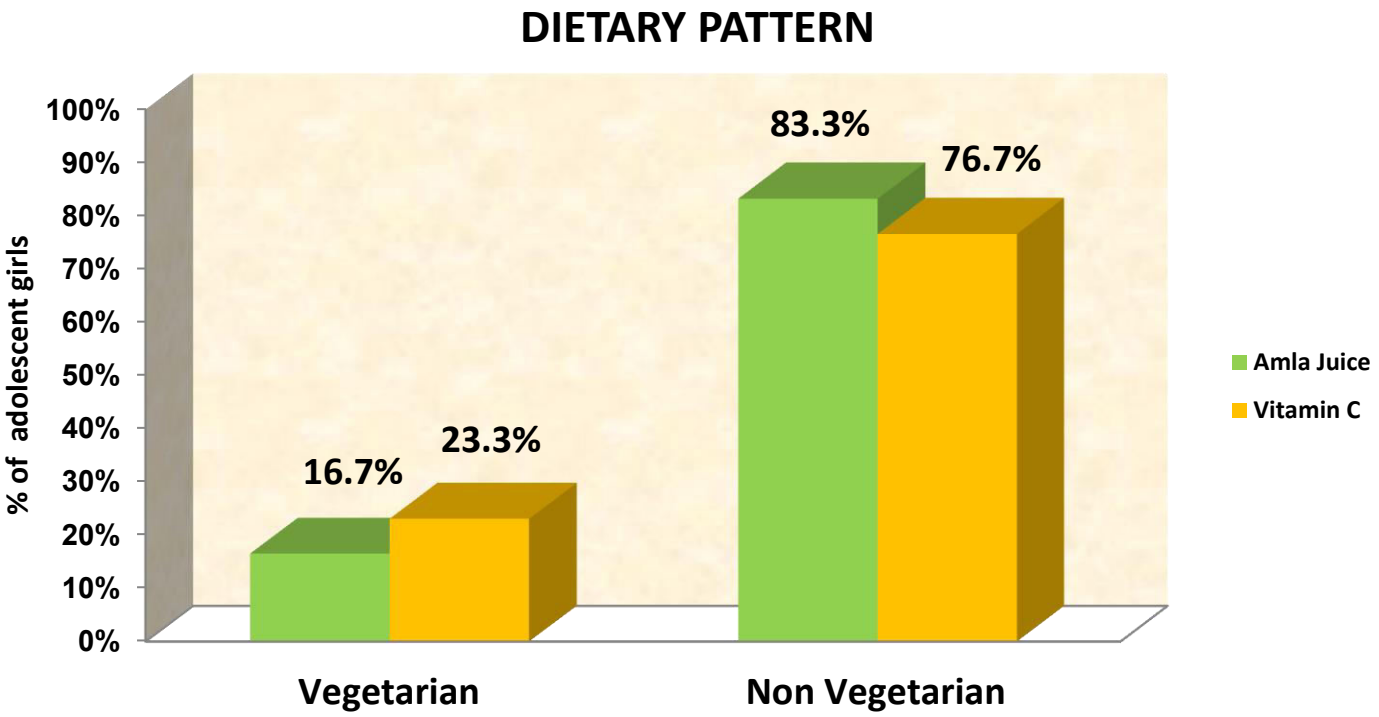


Fig. 4.4. Dietary pattern wise distribution of study participants in both the groups.

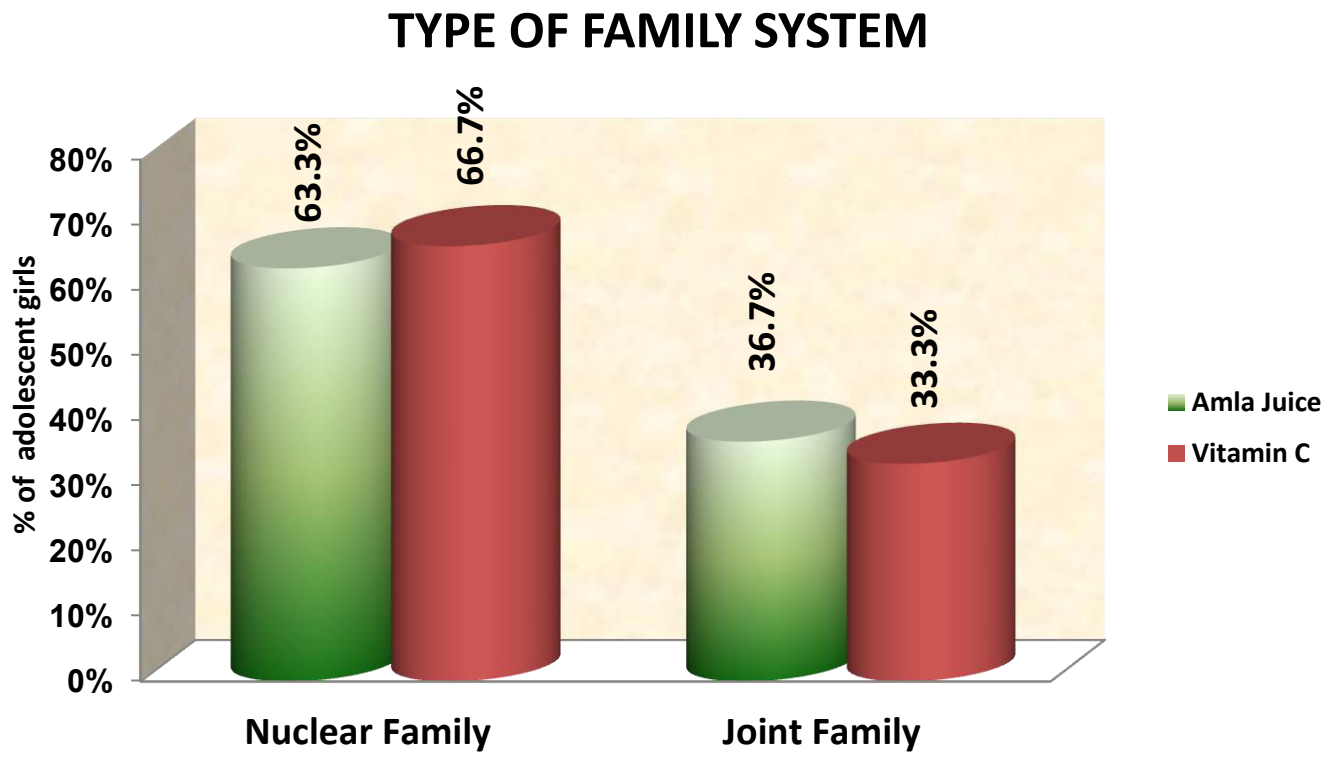


Fig. 4.5. Type of family wise distribution of study participants in both the groups.

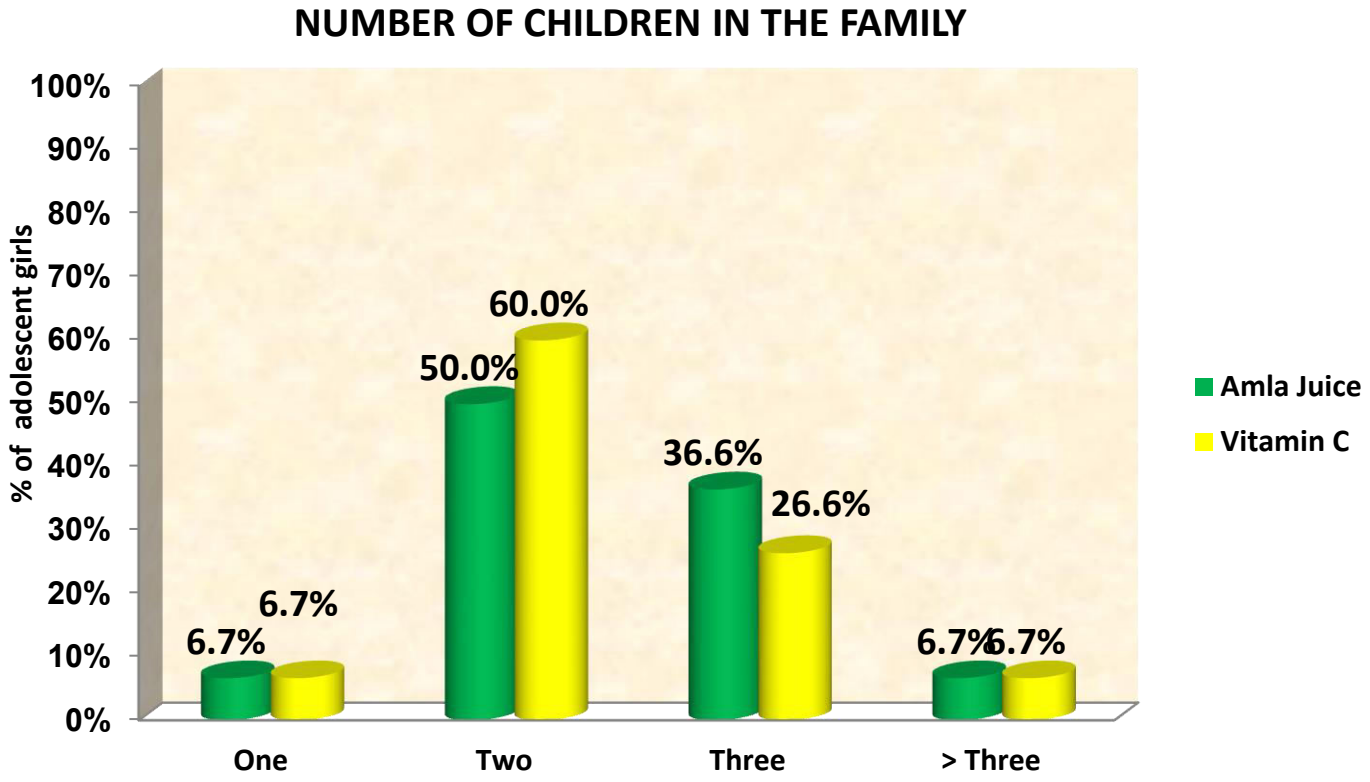


Fig. 4.6. Number of children in the family wise distribution of study participants in both the groups.

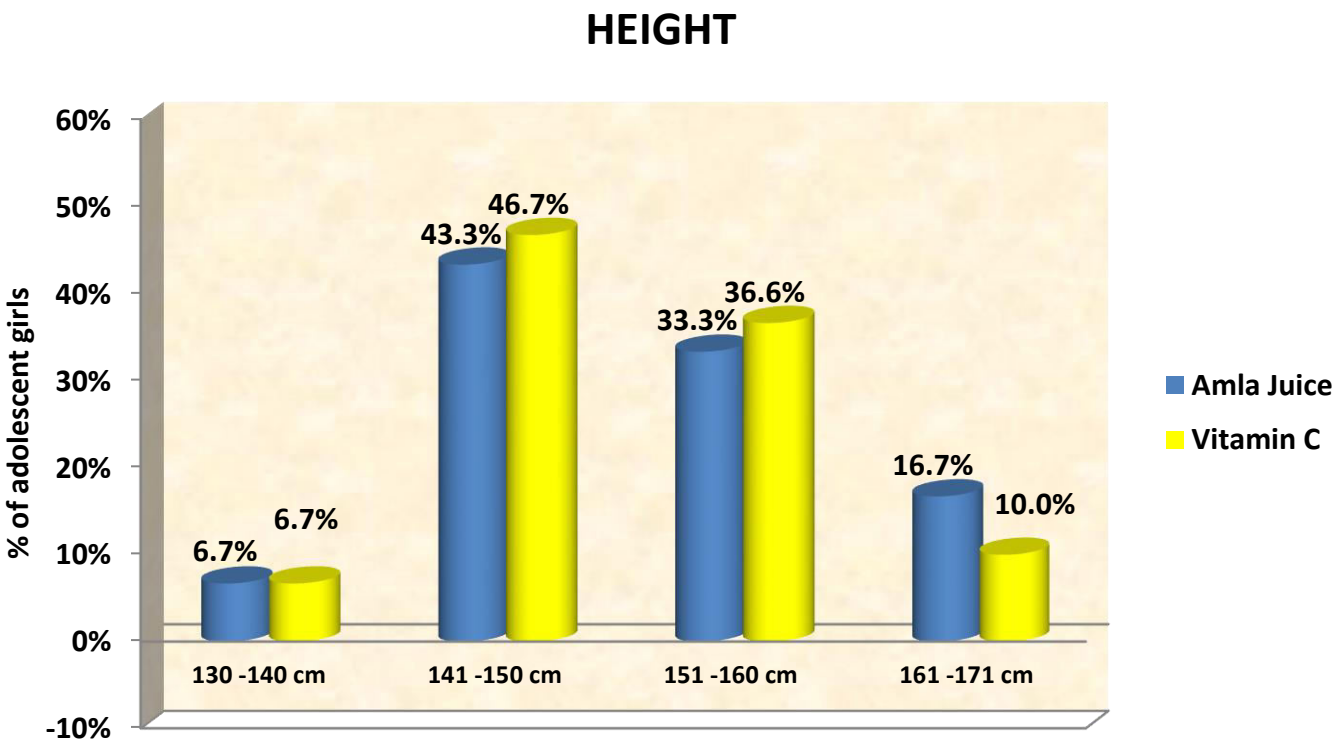


Fig. 4.7. Height wise distribution of study participants in both the groups.

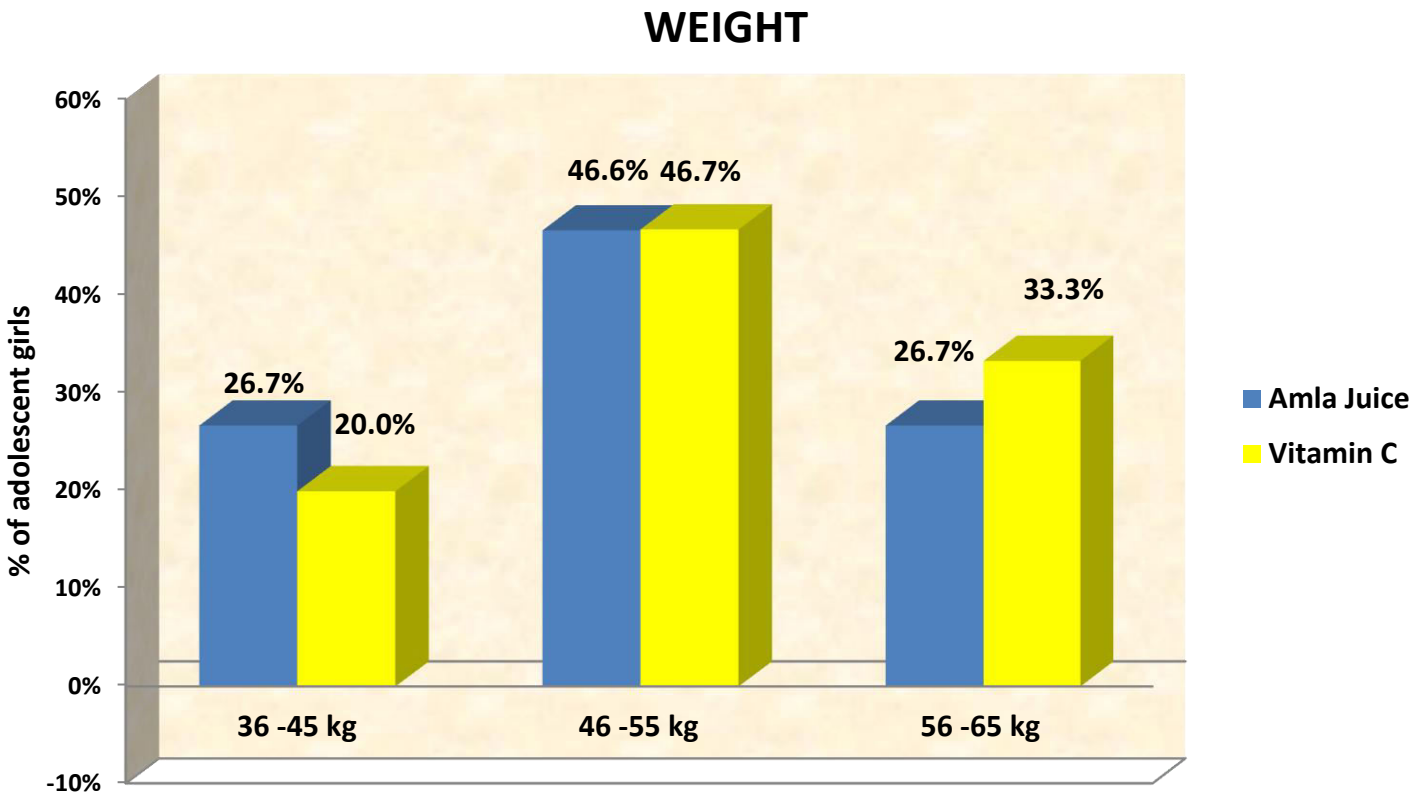


Fig. 4.8. Weight wise distribution of study participants in both the groups.

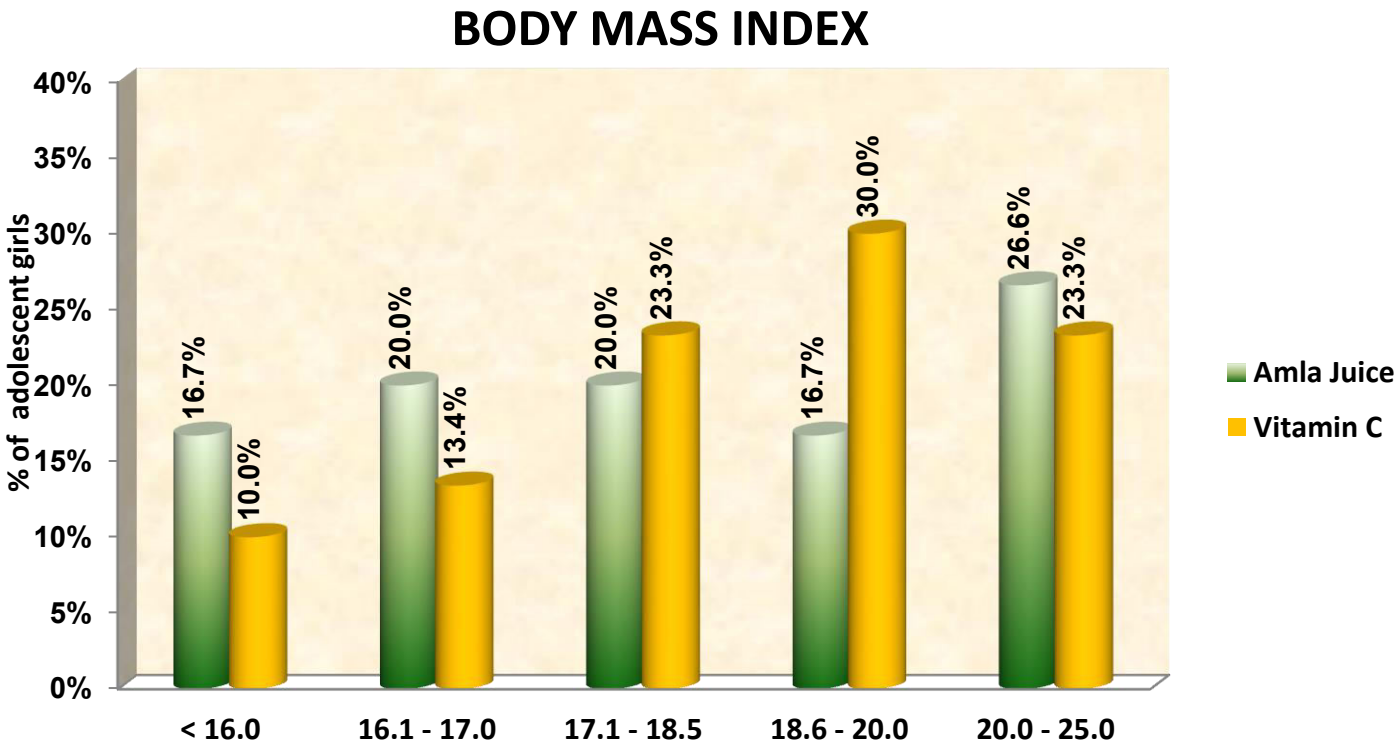


Fig. 4.9. Body mass index wise distribution of study participants in both the groups.

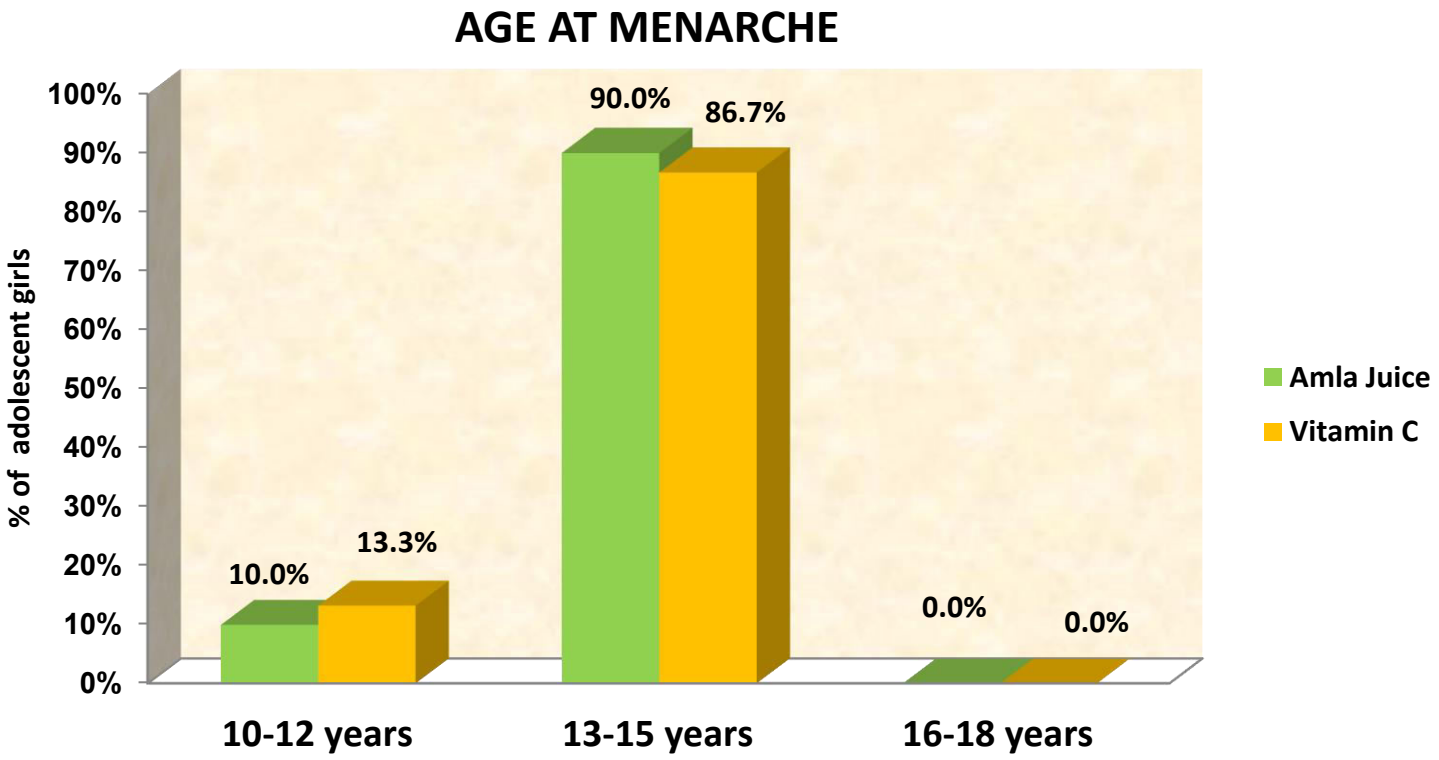


Fig. 4.10. Age at menarche wise distribution of study participants in both the groups.

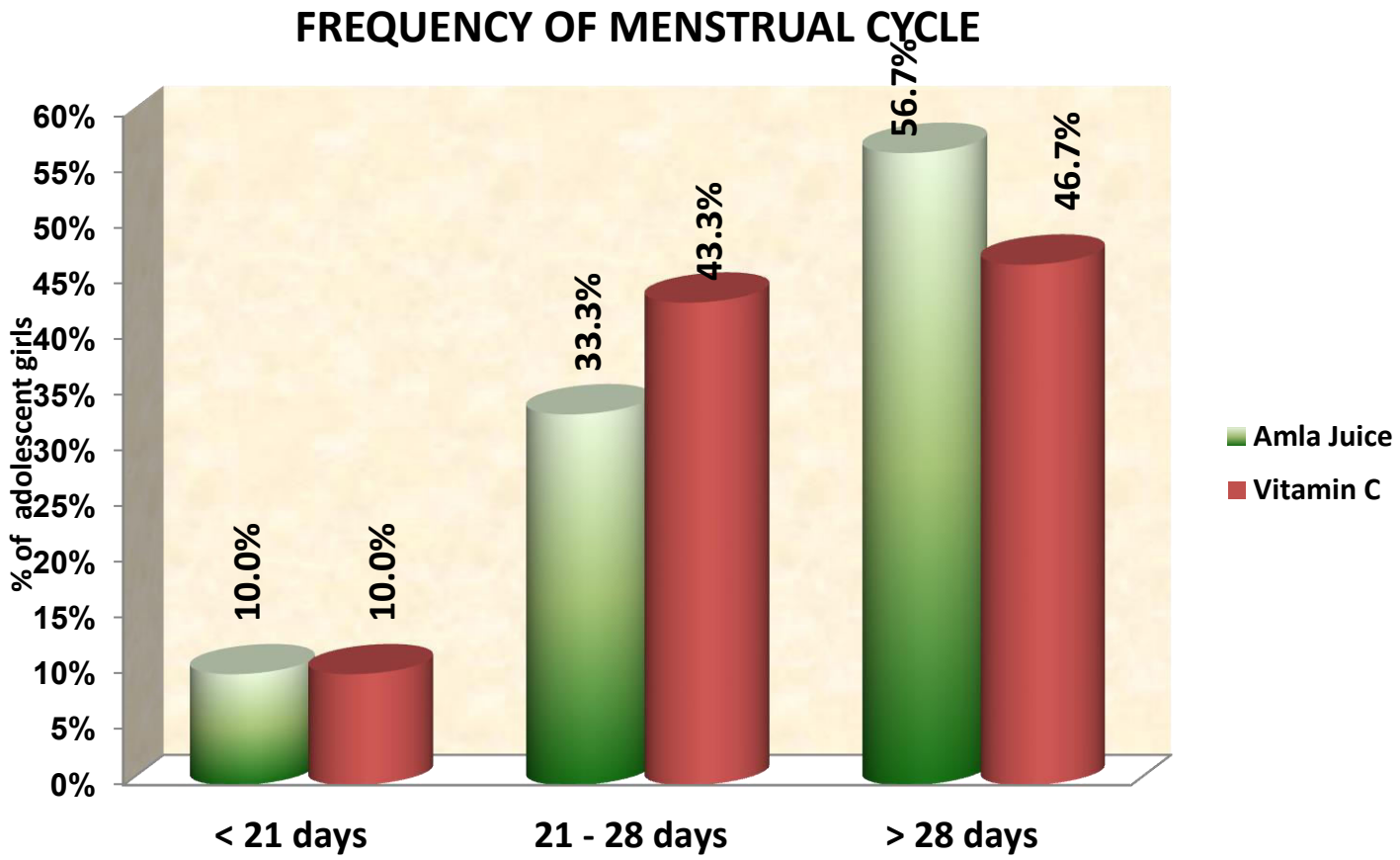


Fig. 4.11. Frequency of menstrual cycle wise distribution of study participants in both the groups.

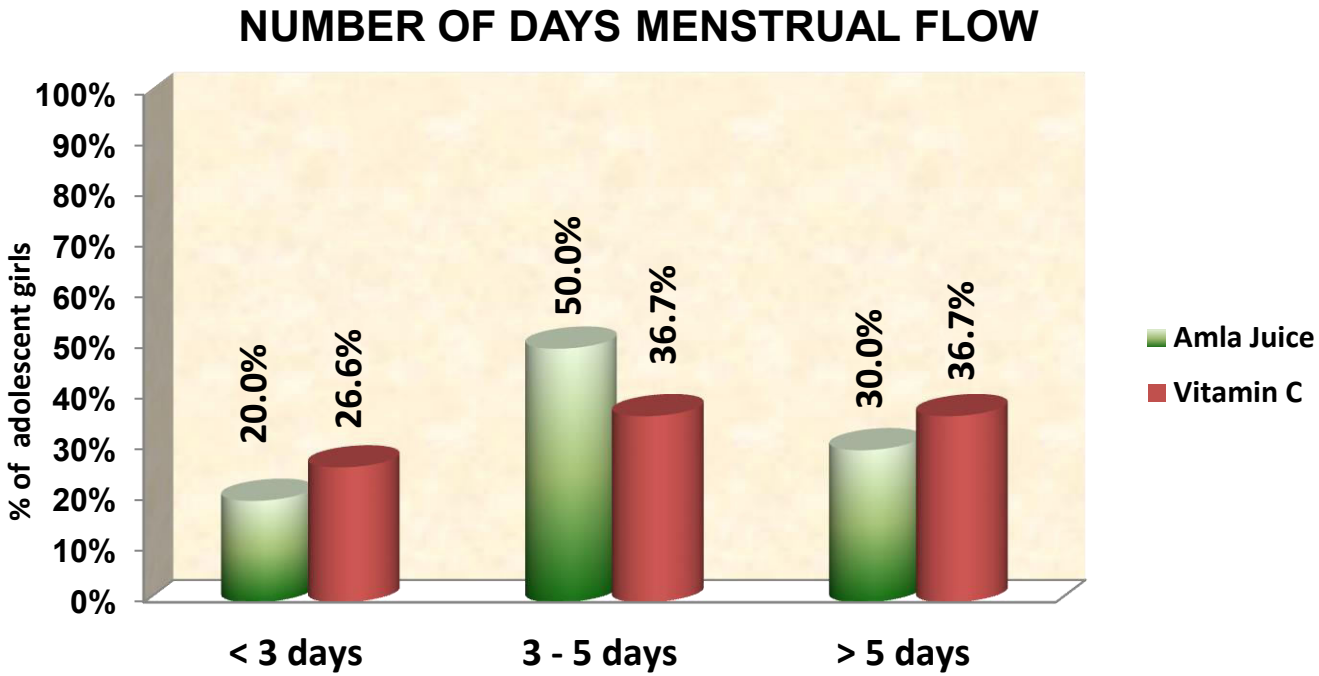


Fig. 4.12. Number of days menstrual flow wise distribution of study participants in both the groups.

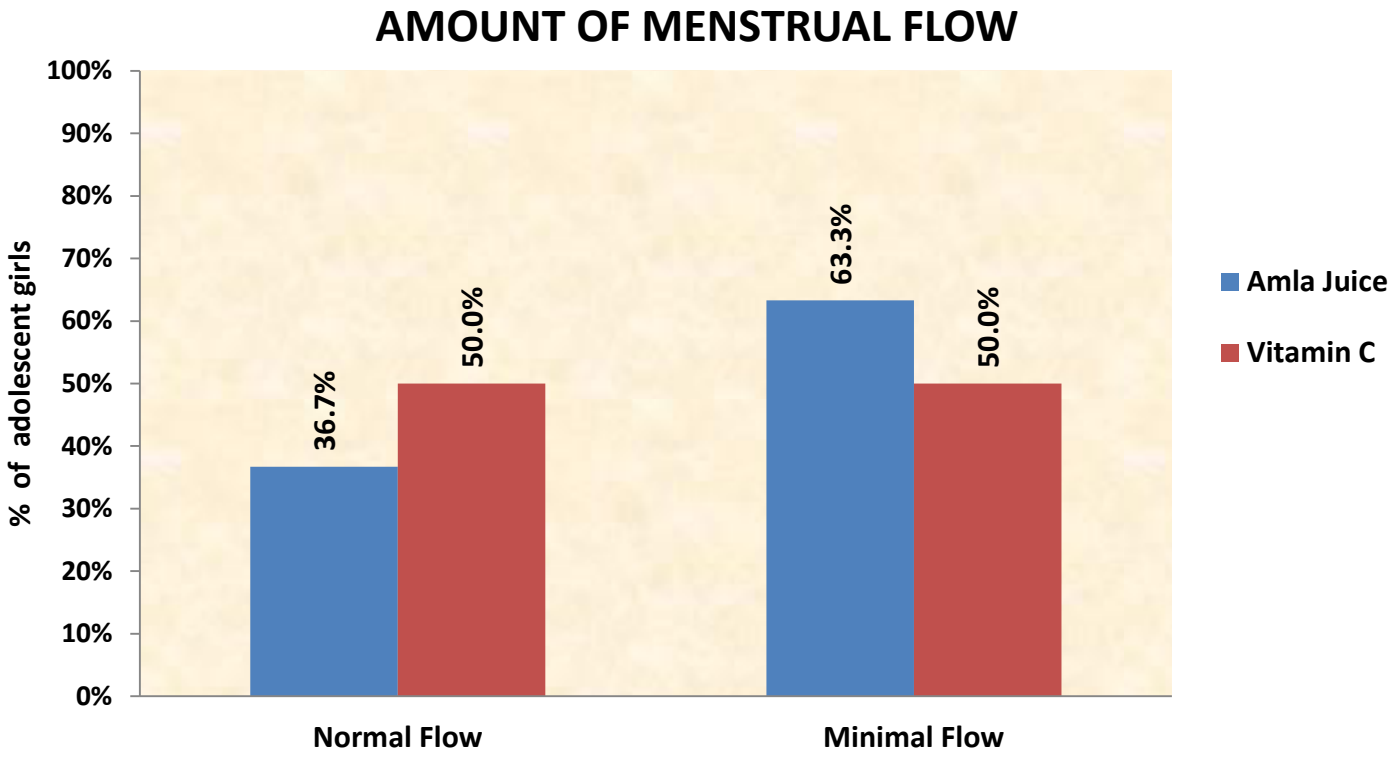


Fig. 4.13. Amount of menstrual flow wise distribution of study participants in both the groups.

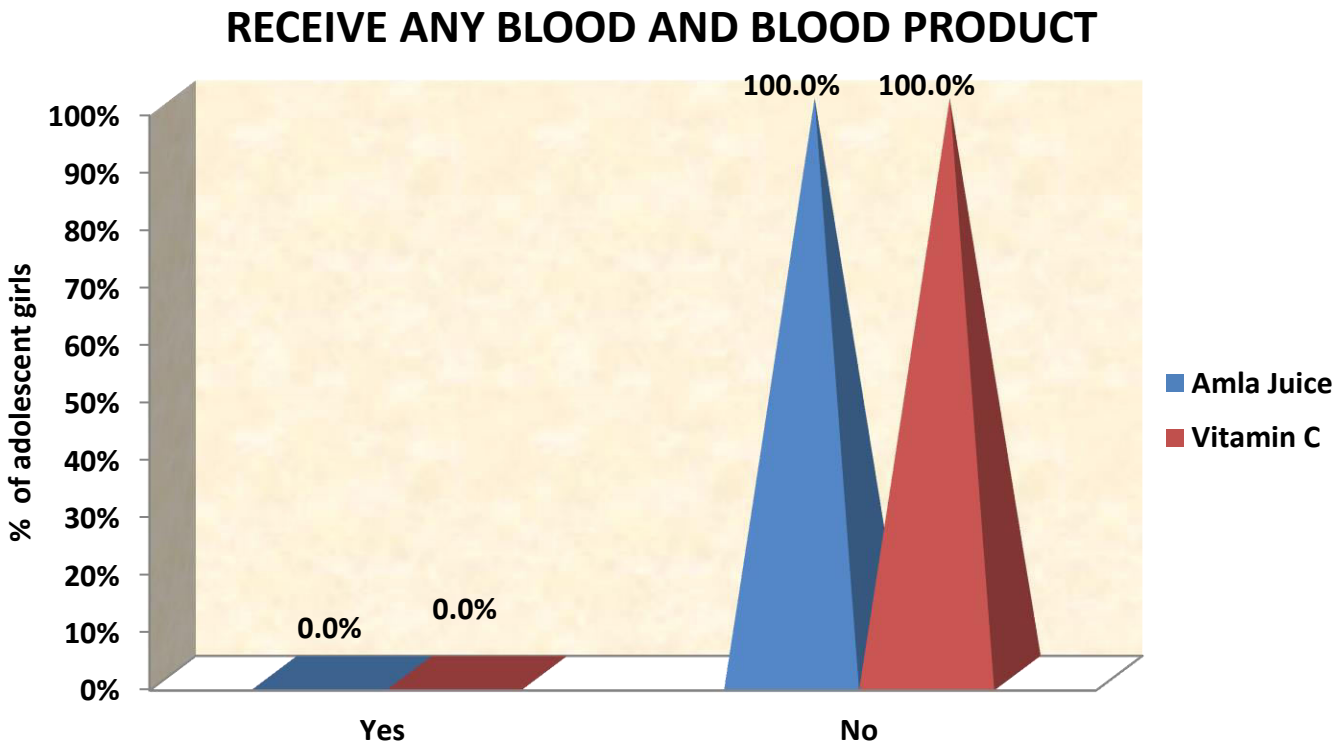


Fig. 4.14. Receive any blood and blood product wise distribution of study participants in both the groups.

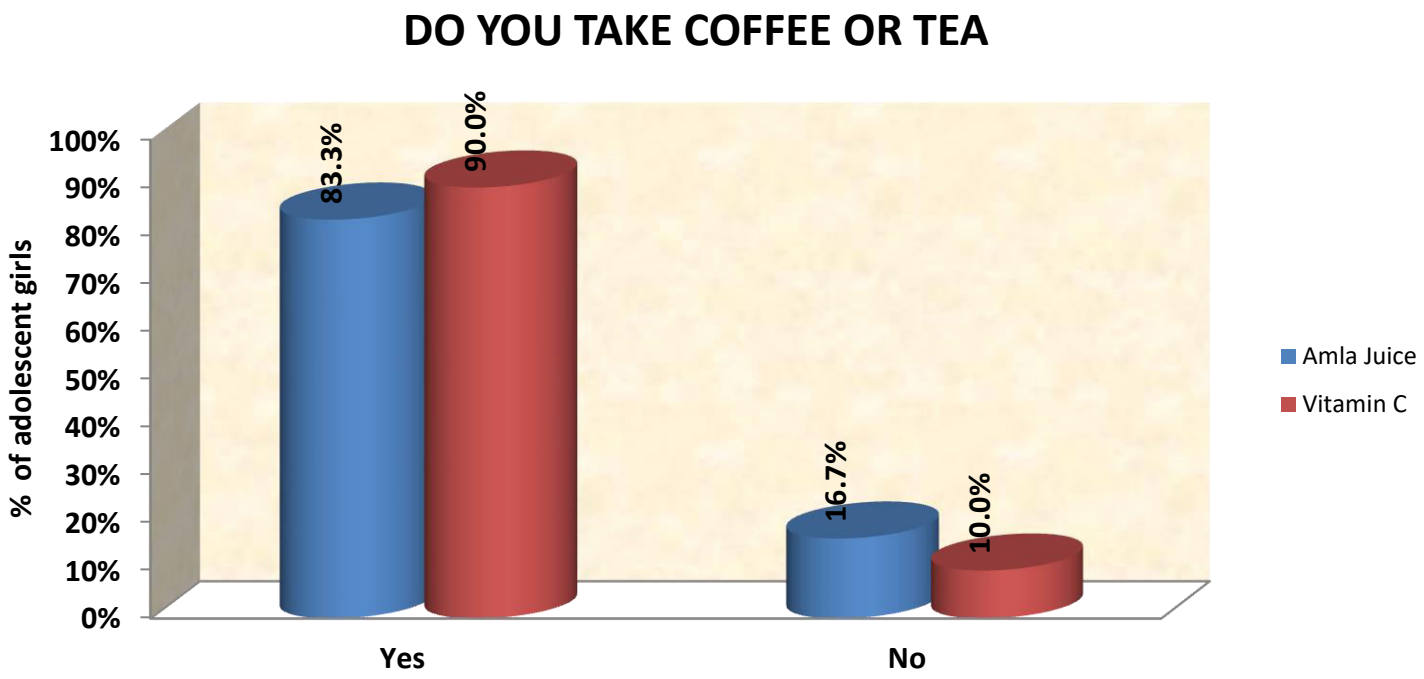


Fig. 4.15. Box plot showing the adolescent girls was habits coffee or tea.

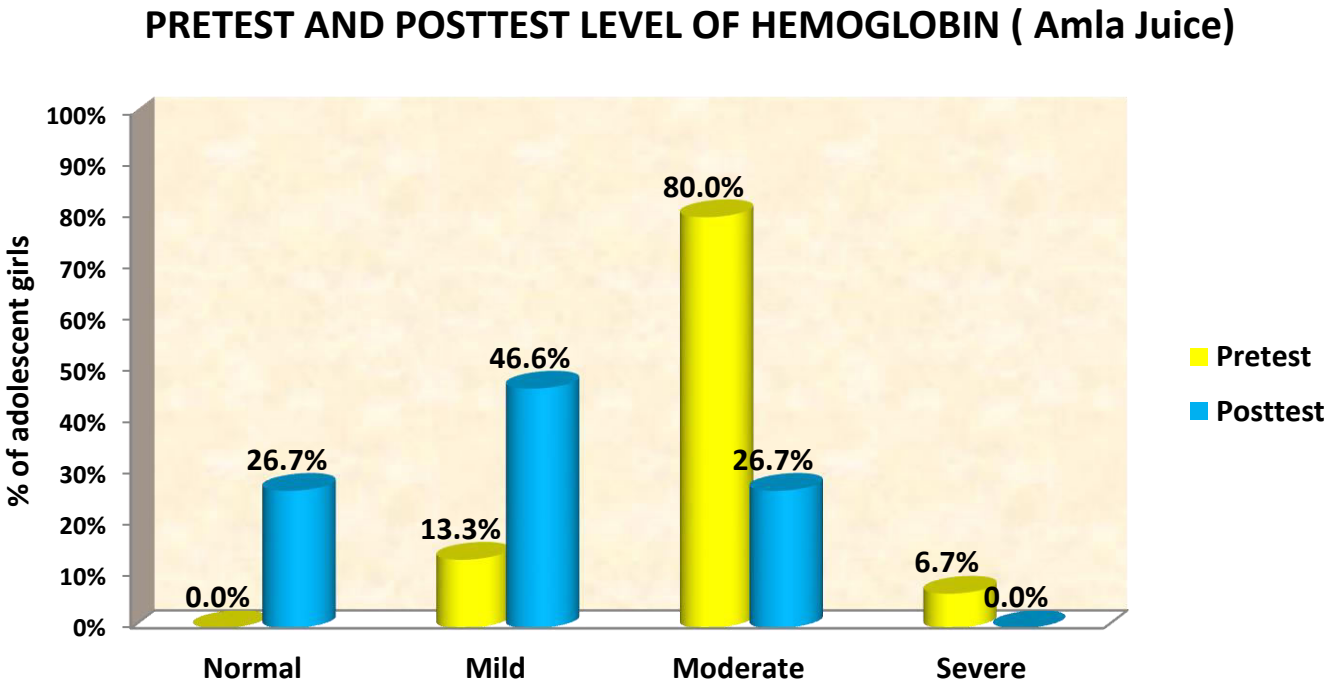


Fig. 4.16. Pretest and post-test level of hemoglobin of experimental group. I (amla juice)

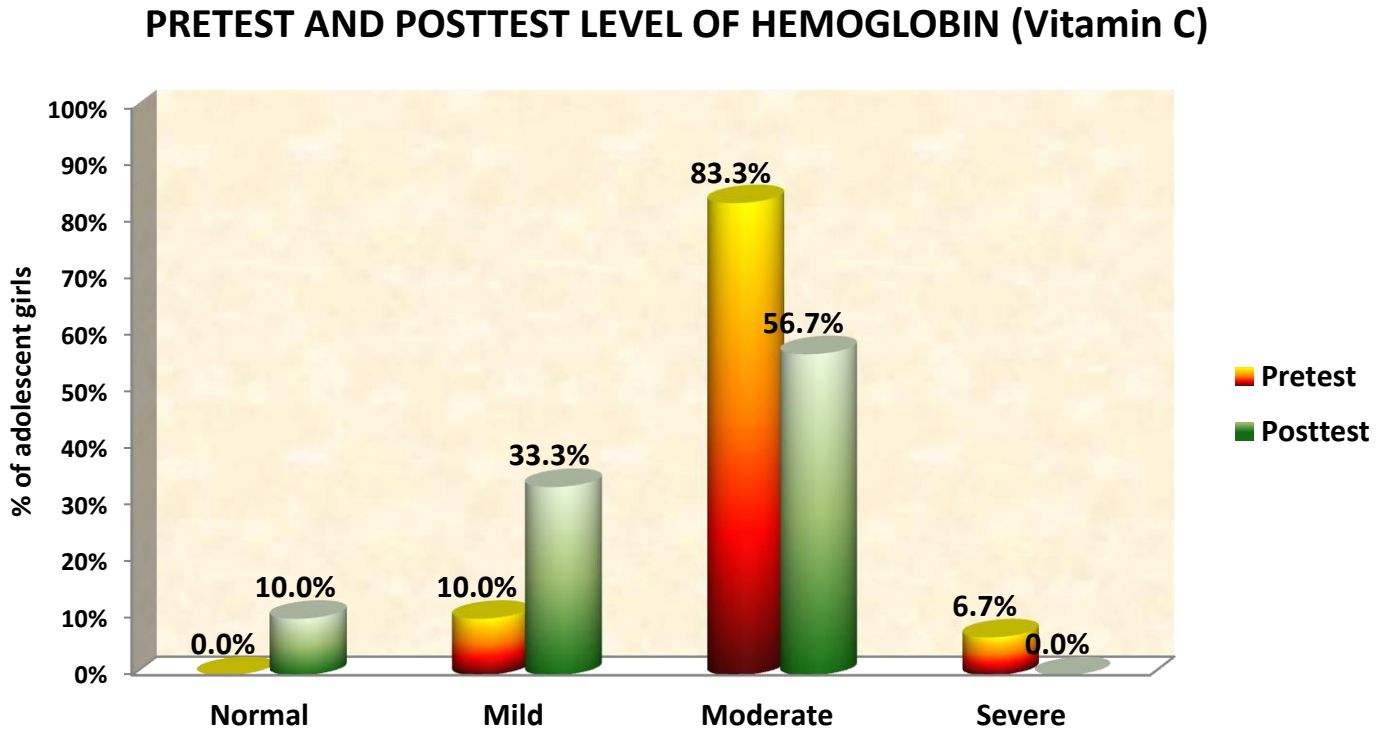


Fig. 4.17. Pretest and post-test level of hemoglobin of experimental group. II (tablet vitamin C).

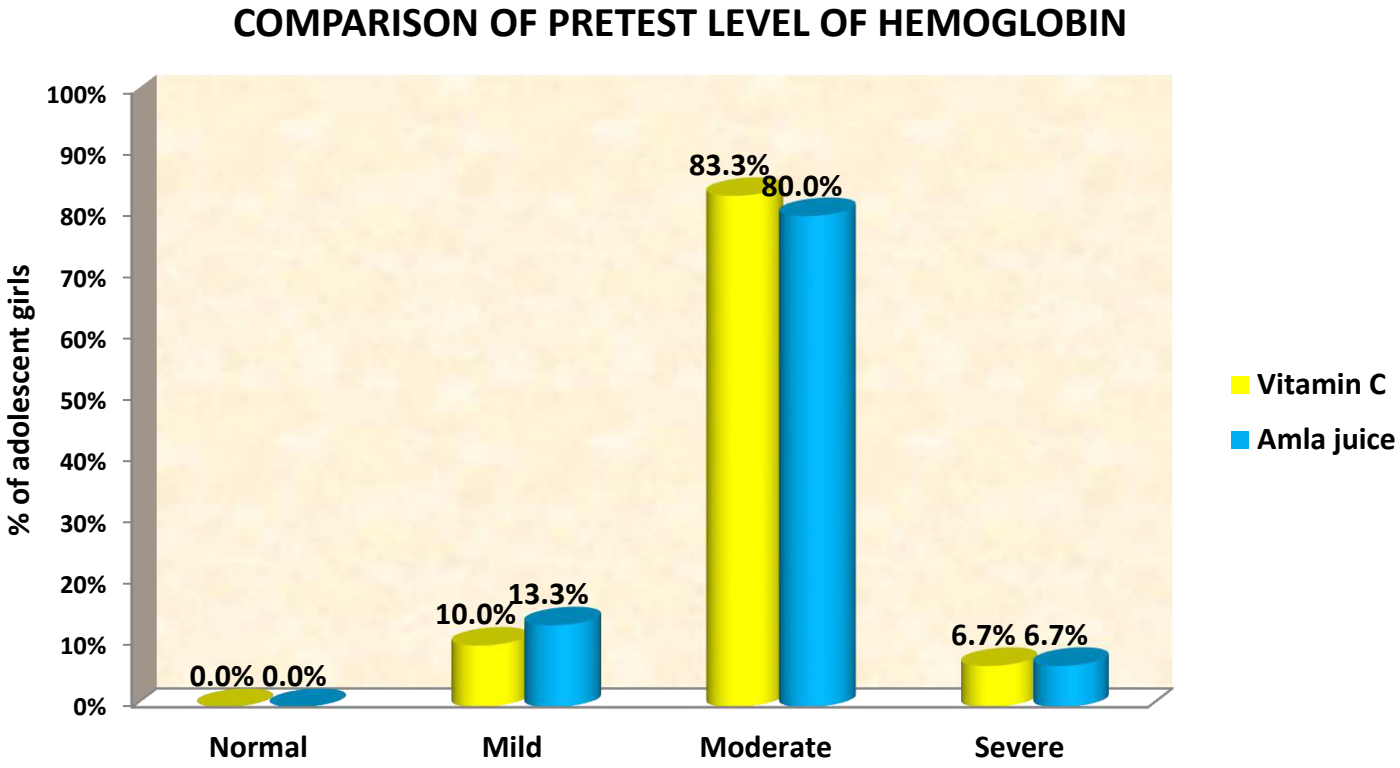


Fig. 4.18. Comparison of pre-test level of hemoglobin in both the groups

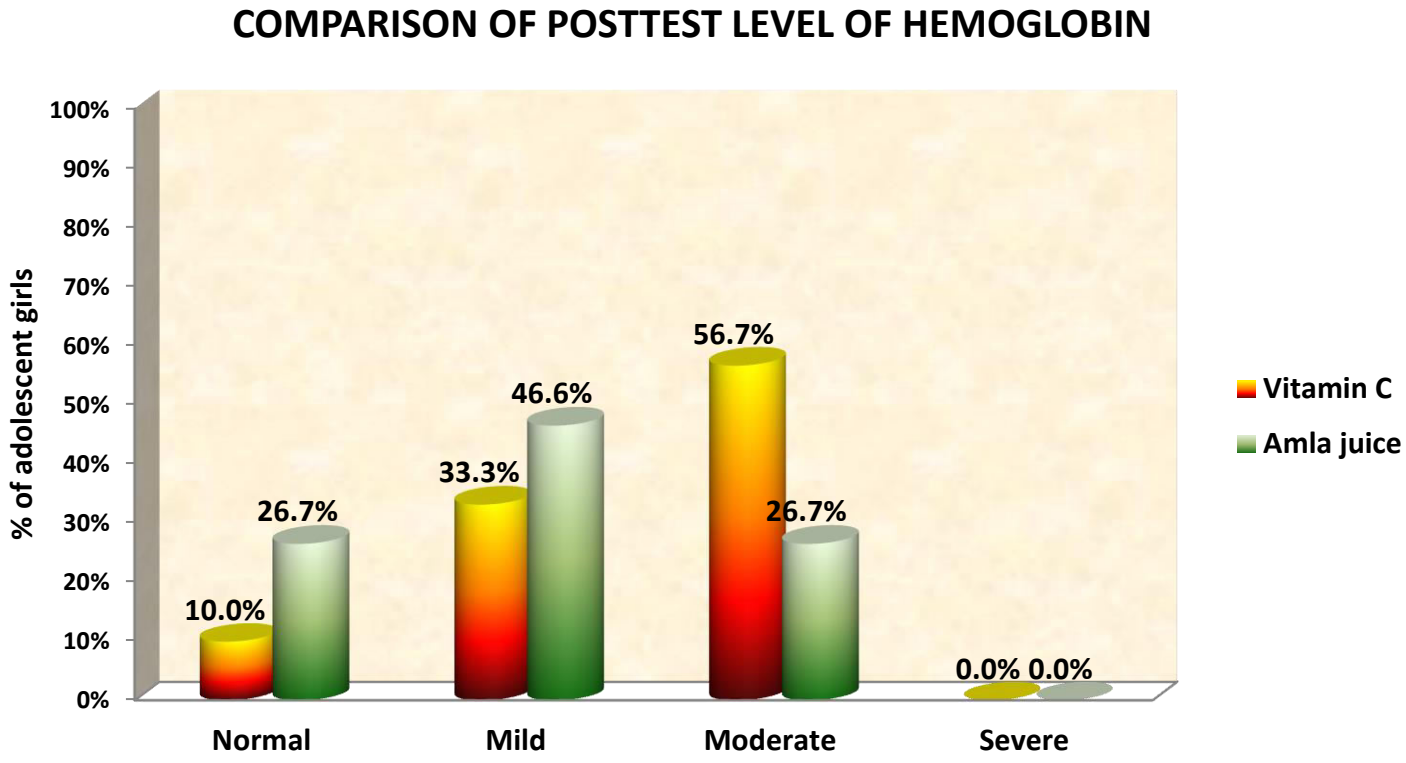


Fig. 4.19. Comparison of post-test level of hemoglobin in both the groups

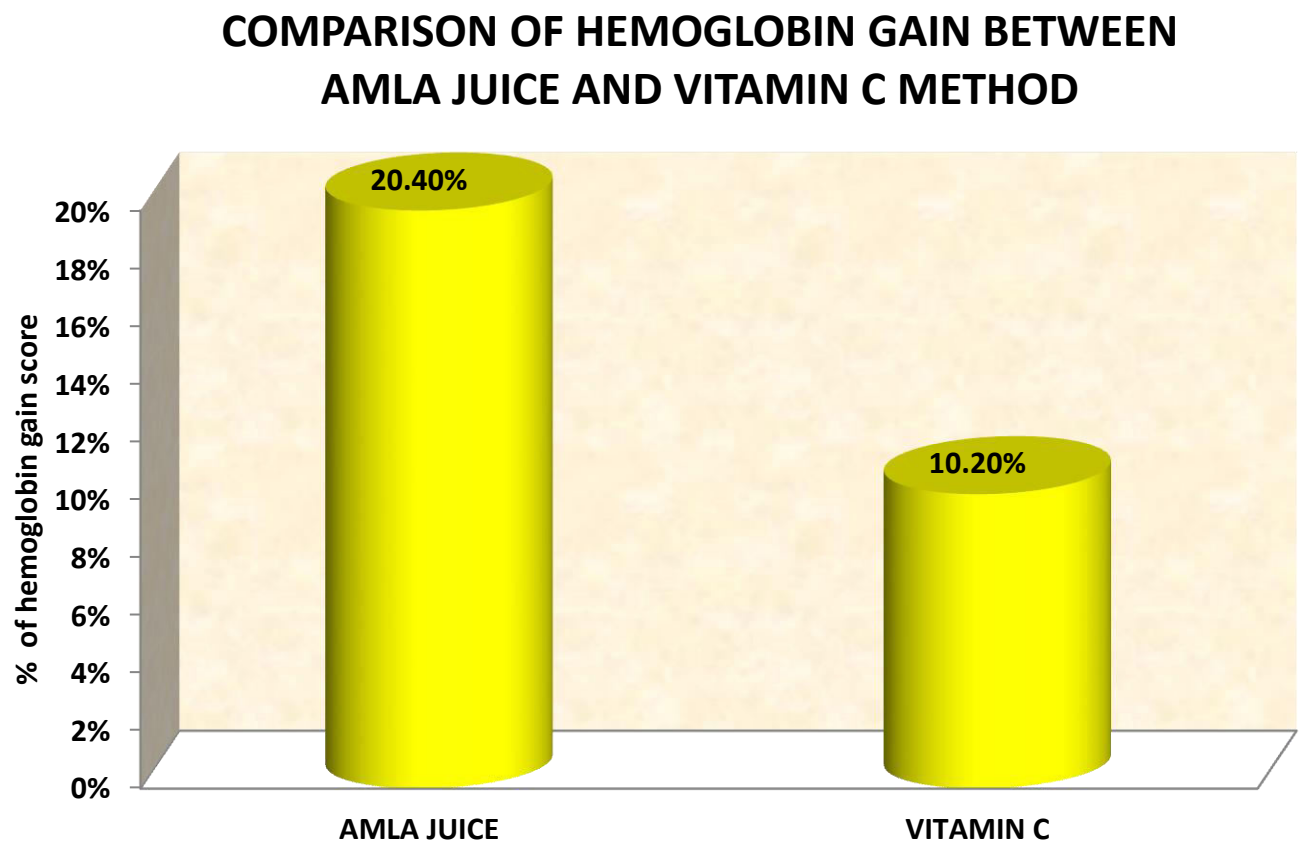


Fig. 4.20. Comparison of hemoglobin gain between amla juice and vitamin c both the groups (amla juice, tablet vitamin C).

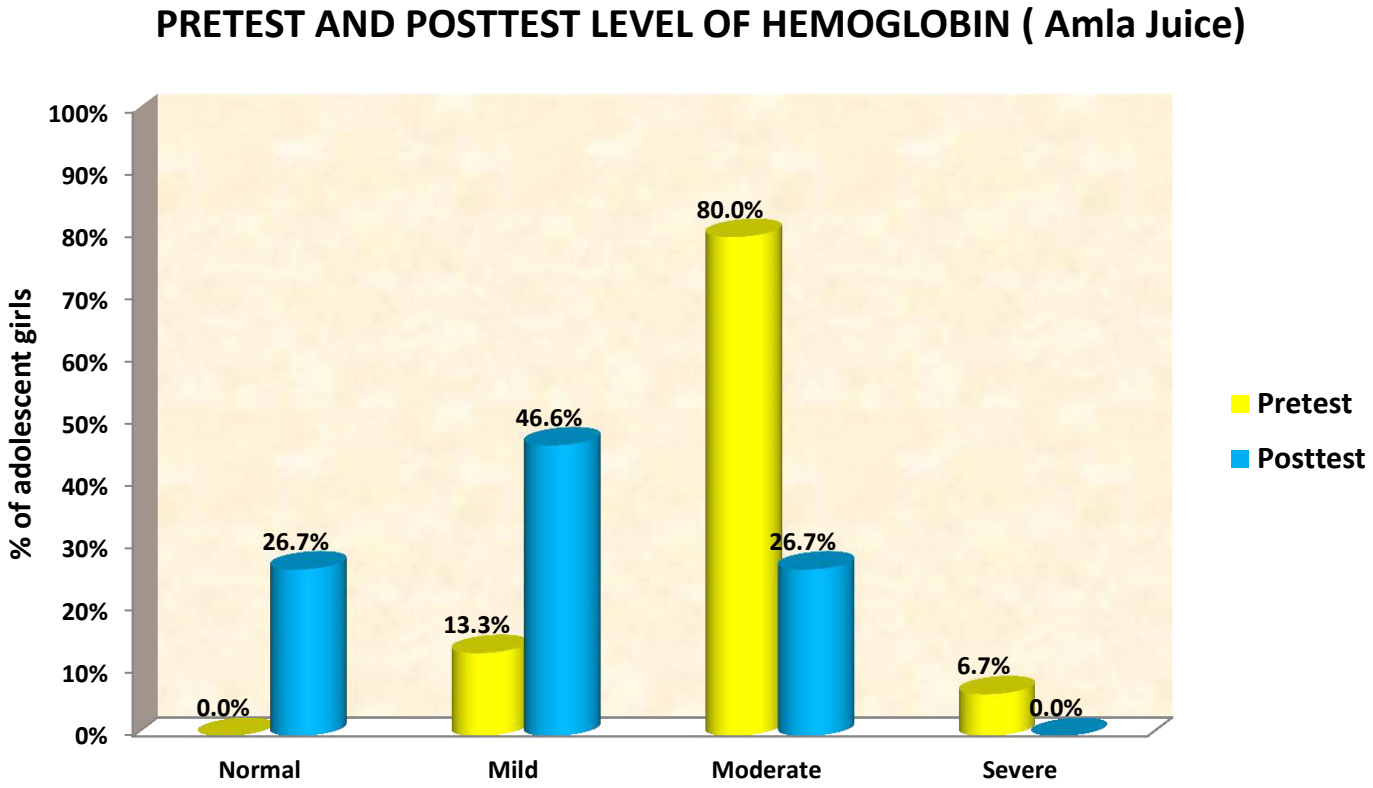


Fig. 4.21. Pre -test and post -test mean hemoglobin value of amla juice of adolescent girls.

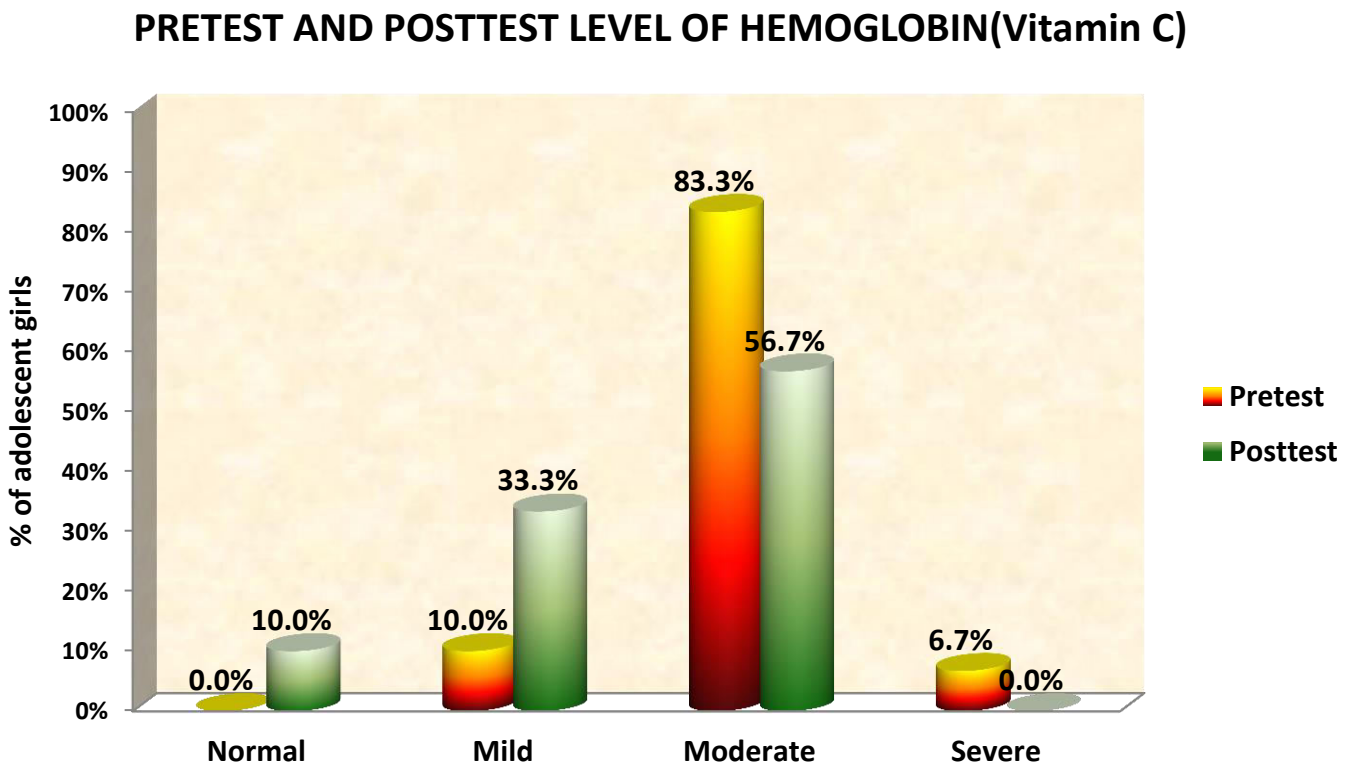


Fig. 4.21. Pre -test and post -test mean hemoglobin value of tablet vitamin C group of adolescent girls.

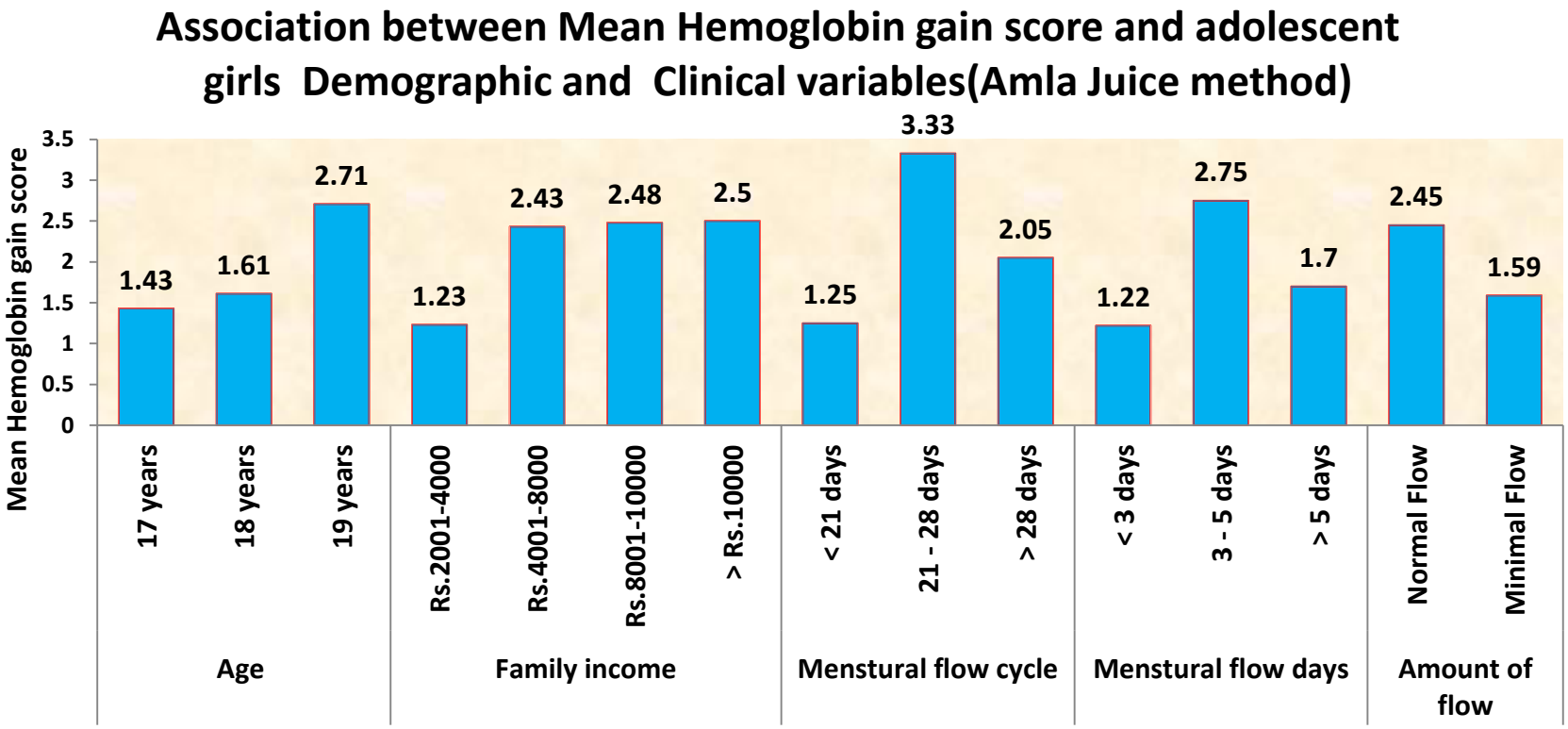


Fig. 4.22. Association between mean hemoglobin gain score and adolescent girls demographic and clinical variables in experimental group I (amla juice).

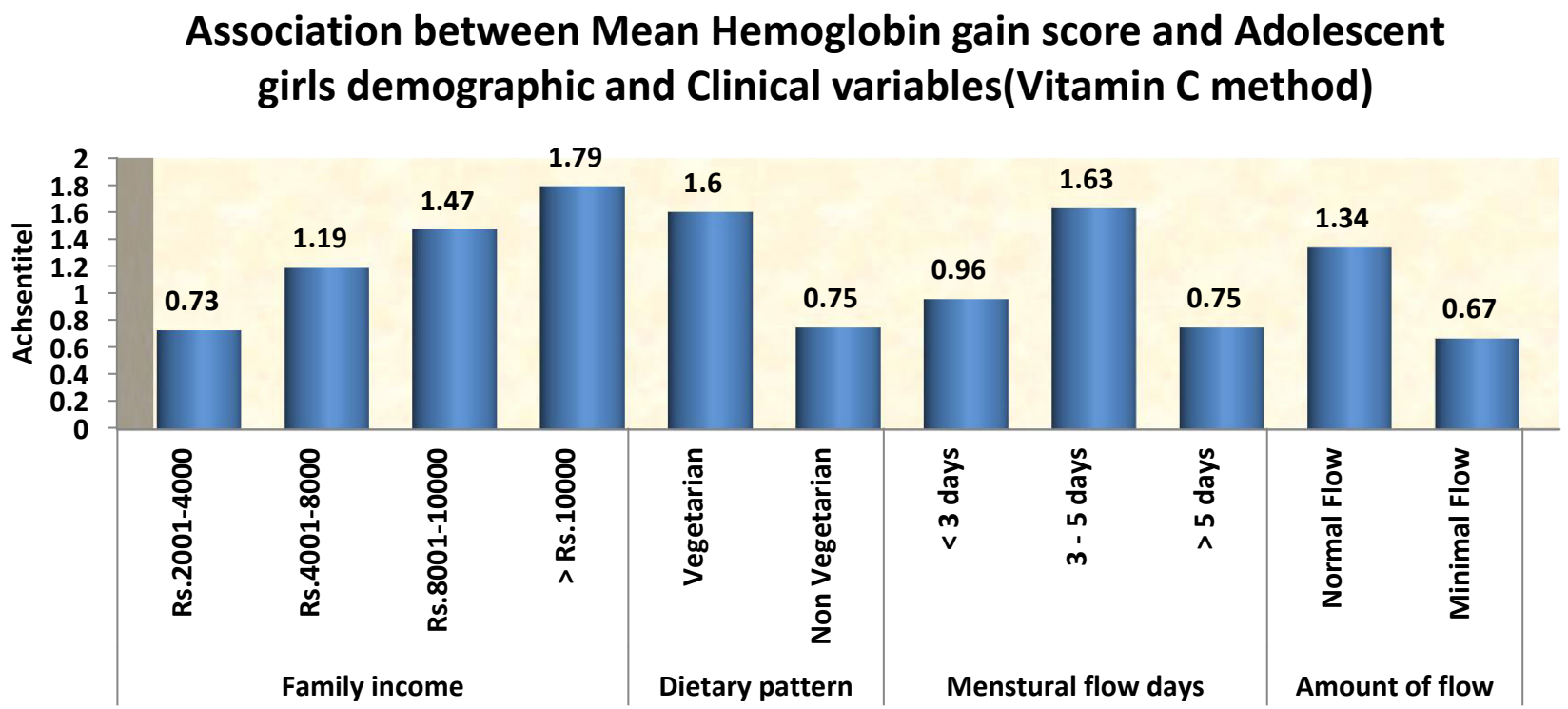


Fig. 4.23. Association between mean hemoglobin gain score and adolescent girls demographic and clinical variables in experimental group II (tablet vitamin c).

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PRETEST	DEMOGRAPHIC VARIABLES						CLINICAL VARIABLES								
Group II	**Age**	**EDU**	**AN**	**DP**	**TOF**	**NCF**	**HT**	**WT**	**BMI**	**AM**	**FOM**	**F**	**AOMF**	**RB**	**C/T**
s.no 1	b	a	c	b	a	b	c	c	d	a	c	b	a	b	a
2	b	b	c	b	a	c	d	c	b	a	b	b	a	b	a
3	b	c	b	b	b	c	d	b	b	a	a	b	b	b	a
4	b	b	c	b	b	c	c	b	b	a	b	a	a	b	a
5	c	b	b	b	b	c	c	a	a	a	b	a	b	b	b
6	c	b	d	b	a	b	d	d	e	a	c	c	a	b	a
7	b	a	b	b	b	c	c	c	d	a	c	b	b	b	a
8	b	a	b	b	b	c	b	b	d	a	c	c	a	b	a
9	c	b	b	b	a	d	c	c	e	a	c	b	b	b	a
10	c	b	b	a	b	b	b	a	a	a	a	a	b	b	a
11	c	a	d	b	a	c	c	d	e	a	c	c	a	b	a
12	a	a	b	b	a	b	c	c	d	a	a	b	a	b	a
13	a	a	b	b	a	b	c	c	e	a	b	a	b	b	a
14	c	b	b	b	a	b	c	c	e	a	c	b	a	b	a
15	b	b	e	b	a	a	c	b	a	a	a	a	b	b	a
16	c	b	b	b	a	d	d	c	d	a	c	a	b	b	a
17	c	b	c	b	a	b	c	c	d	a	a	b	b	b	a
18	b	b	c	b	a	b	b	c	e	a	c	c	a	b	a
19	b	b	c	a	a	b	d	c	c	a	b	b	b	b	a
20	b	b	c	a	a	b	d	c	b	a	c	c	a	b	a
21	a	c	c	a	a	b	b	b	d	a	c	c	b	b	a
22	b	b	b	a	a	b	d	c	c	a	b	b	b	b	a
23	b	a	b	a	a	b	b	b	c	a	a	a	b	b	a
24	a	b	b	a	a	b	c	c	e	a	c	c	a	b	a
25	a	b	b	a	b	b	d	c	c	a	c	a	b	b	a
26	a	b	b	a	b	b	b	c	e	a	c	c	a	b	a
27	a	b	b	a	b	b	d	d	d	a	c	c	a	b	a
28	a	b	c	b	b	b	c	c	d	a	c	c	a	b	a
29	b	b	b	b	a	b	d	c	c	a	c	b	b	b	a
30	c	c	b	b	a	b	c	b	c	a	c	c	a	b	a

EXPERIMENTAL GROUP I															
S. No	Age	EDU	AN	DP	TOF	NCF	HT	WT	BMI	AM	FOM	F	AOMF	RB	C/T
1	b	a	d	b	b	c	d	c	d	a	b	b	a	b	a
2	b	a	c	b	a	c	d	e	a	a	a	b	b	b	a
3	b	a	e	a	a	b	c	d	e	a	c	b	b	b	a
4	b	a	b	b	a	b	b	b	d	a	c	a	b	b	a
5	b	a	c	b	a	b	b	b	c	a	c	b	b	b	a
6	b	a	b	b	b	c	d	b	a	a	c	c	a	b	a
7	b	a	d	b	a	c	c	a	a	a	c	a	b	b	a
8	b	a	b	b	b	b	c	c	e	a	c	b	b	b	a
9	b	a	c	a	b	c	b	b	b	a	b	b	a	b	a
10	b	a	e	b	a	a	b	b	e	a	c	b	b	b	a
11	b	a	b	b	b	b	d	d	e	a	c	c	b	b	b
12	b	a	c	b	a	c	d	d	e	a	c	b	b	b	a
13	b	b	b	b	a	b	b	c	e	a	c	b	b	b	b
14	b	a	c	a	b	b	b	b	b	a	c	b	b	b	a
15	b	a	b	b	b	c	d	b	b	a	b	b	b	b	b
16	b	a	c	a	b	b	c	b	c	a	b	c	b	b	a
17	c	b	b	b	a	c	c	c	e	a	b	c	a	b	b
18	c	b	c	b	b	b	c	b	c	a	c	b	a	b	a
19	c	b	c	b	a	c	c	c	e	a	c	b	b	b	a
20	c	b	c	a	a	b	c	d	e	a	b	c	a	b	a
21	c	b	c	b	a	b	c	d	e	a	c	c	b	b	a
22	c	b	c	b	a	b	b	b	b	a	c	c	a	b	a
23	c	b	b	b	a	b	c	b	c	a	b	b	a	b	a
24	c	b	c	b	c	c	c	b	b	a	c	c	a	b	a
25	c	b	c	b	a	b	b	c	e	a	c	c	a	b	b
26	c	b	b	b	a	b	d	b	a	a	c	a	b	b	b
27	c	b	b	b	a	b	c	c	e	a	c	a	b	b	a
28	c	b	c	b	a	b	c	d	e	a	c	b	b	b	a
29	c	b	b	b	a	b	d	b	a	a	c	a	b	b	a
30	c	b	c	b	b	c	c	c	d	a	b	a	a	b	a

Haemoglobin level experimental group I & II by Sahli's Method					
S. No	**Elemental Iron with Amla juice (Group I)**			**Elemental Iron with tablet Vitamin C (Group II)**	
	PRT Hb	**PST Hb**		**PRT Hb**	**PST Hb**
1	9	10		10	11
2	10	11		8	10
3	8.9	10		8	9
4	9	11		10	11
5	8.5	9.5		11	12
6	7	10		8	9
7	10	11		9	10
8	7	8.5		8	8.5
9	9	10		7.8	8.5
10	8.5	10.2		11	13
11	7	9		8	9.3
12	10	11		9	11
13	9	11		10	11.5
14	8	9		10	11
15	9	10		9	10
16	10	11		10	11.2
17	10	11		10	11.4
18	10	12		10.4	11
19	10	12.5		10	12
20	9	11.5		11	11
21	11	12.5		10	11.8
22	11	13		10	11
23	11	12		10	11.5
24	9	10		9	10
25	10	11		10	11
26	10	12		10	11
27	10	11		10	11.2
28	9	10		8	9
29	9.5	10		10	11
30	11	12		8	8.5

DEMOGRAPHIC VARIABLES PROFILE

PURPOSE

This proforma is used to assess the demographic variables of adolescent girls such as age, education, family income, food habits, types of family and number of children in the family.

INSTRUCTION

The researcher collects the following information from the participants by asking questions in the interview form. Please be frank and free in answering the following questions. It will be kept confidential and anonymity will be maintained.

Sample No:

1) Age in Years
   a) 13 years ☐
   b) 14 Years ☐
   c) 15 Years ☐
   d) 16 Years ☐
   e) 17 Years ☐

2) Educational status in standard
   a) School ☐
   b) College ☐

3) Family income per month in Rupees
   a) <2000 ☐
   b) 2001-4000 ☐
   c) 4001-8000 ☐
   d) 8001-10000 ☐
   e) >10000 ☐

4) Dietary Pattern
   a) Vegetarian ☐
   b) Non Vegetarian ☐

5) Type of Family
   a) Nuclear Family ☐
   b) Joint Family ☐

6) Number of children in the family
   a) One ☐
   b) Two ☐
   c) Three ☐
   d) More than three ☐

CLINICAL VARIABLE PROFORMA

PURPOSE

This proforma is used to measure the clinical variables such as hemoglobin level, frequency of menstrual cycle, days of menstrual flow.

INSTRUCTIONS

Please tick (✓) the appropriate option. Please be frank in answering the following questions number, 1 which will be filled by the investigator.

1) Weight in Kg
   a) 25-35 ☐
   b) 36-45 ☐
   c) 46-55 ☐
   d) 56-65 ☐

2) Height in cm
   a) 130-140 ☐
   b) 141-150 ☐
   c) 151-160 ☐
   d) 161-170 ☐

3) Body Mass Index
   a) <16.0 ☐
   b) 16.1-17.0 ☐
   c) 17.1-18.5 ☐
   d) 18.6-20 ☐
   e) 20.1-25.0 ☐

4) Hemoglobin level
   a) <7.5gm/dl (Severe) ☐
   b) 7.6-10.0gm/dl (Moderate) ☐
   c) 10.1-11.9gm/dl (Mild) ☐
   d) >12gm/dl (Normal) ☐

5) Age at Menarche
   a) 13-15 years ☐
   b) 16-18 years ☐

6) The frequency of your menstrual cycle
   a) <21 days ☐
   b) 21-28 days ☐
   c) >28 days ☐

7) Number of days of menstrual flow
   a) <3 days ☐
   b) 3-5 days ☐
   c) >5 days ☐

8) Amount of menstrual flow
   a) Normal Flow ☐
   b) Minimal Flow ☐
   c) Excessive Flow ☐

9) Did you receive any blood and blood products?
   a) Yes ☐
   b) No ☐

10) Do you take coffee or tea?
   a) Yes ☐
   b) No ☐

STATISTICAL ANALYSIS

Demographic variables in categorical/dichotomous were given in frequencies with their percentages.

Hb value was given in mean and standard deviation.

Similarities of demographic/clinical variables distribution between Amla juice and Vitamin C groups are analyzed using chi square test.

Difference between amla juice and vitamin C was analysed using student independent t-test.

Difference between mean pretest and posttest was analysed using student paired t-test and difference between frequencies of pretest and posttest was analysed using McNemar's test.

Association between Hb gain score and demographic variables were analysed using oneway ANOVA F-test /t- test.

Differences between pretest and posttest score was analysed using percentage with 95% CI and mean difference with 95% CI.

P<0.05 was considered statistically significant.

CHI-SQUARE TEST

The Chi square test is a non parametric test of proportions. It is used to test a hypothesis. If the ***association*** between two variables is to be tested this test is commonly used. It was introduced by Karl pearson.

The chi-square test is designed to examine whether a series of **observed** numbers in various categories of the data are consistent with the numbers **expected** in these categories on some specific hypothesis. (called null hypothesis)

The quantity of χ^2 describes the magnitude of discrepancy between theory and observation. With the help of χ^2test, we are in a position to know whether a given discrepancy between theory and observation may be attributed to chance or not.

The quantity of χ^2 is defined as:

$\chi^2 = \Sigma (O-E)^2 / E$

Σ (Observed frequency- expected frequency)^2/ Expected frequencies

Where O= observed frequencies

E = expected frequencies

Conditions of Chi-square test

1. There must be large number of observations (say >50)
2. All the observations must be independent
3. Values/categories on independent and dependent variables must be mutually exclusive and exhaustive.
4. The sample must be randomly drawn from the population.
5. Calculations must be based on actual numbers of observations and not on percentages, ratios, observed values etc)
6. When over all total is between 20 and 40, all expected values are at least 5

Arithmetic Mean

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

where $\sum_{i=1}^{n} x_i = x_1 + x_2 + x_3 + x_4 + ... + x_n$

Standard Deviation: A measure of the dispersion among the elements in a set of data. Standard deviation can be defined as follows:

$$s = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \overline{\mu})^2}{n - 1}}$$

Where: $\overline{\mu}$ is the mean, i is the index
n is the total number of data points
x_i represents a data point

Student t- test

It was introduced by **W.S. Gosset** in the year 1905 under the pen name '**student**' and it is popularly known as **t-test** or **t-distribution** or **student's distribution.** It is used when the sample is in small size and the population standard deviation is unknown. It is a symmetrical distribution similar in shape to the normal distribution and in fact it approaches the normal distribution as N, the sample size, increases.

We can use this method to test the statistical significance difference between the means of two different groups.

In t test we examine the logic

$$t = \frac{\text{difference in sample means}}{\text{standard error of difference of sample means}}$$

when this ratio is small, we will conclude that the data are compatible with the hypothesis that both samples were drawn from a single population. When the ratio is large, we will conclude that it is unlikely that the samples were drawn from a single population and assert that the treatment produced an effect.

Independent t-test/ unpaired t-test

When we compare the means two independent sample groups, we can use the student independent t-test . It is obtained using the formula

When the difference between the means is divided by this standard error the result is *t*. Thus,

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\left(\frac{s_p^2}{n_1} + \frac{s_p^2}{n_2}\right)}}$$

s_p^2 is the pooled variance

$$s_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$$

The standard error of the difference between the means is

$$SE(\bar{x}_1 - \bar{x}_2) = \sqrt{\left(\frac{s_p^2}{n_1} + \frac{s_p^2}{n_2}\right)}$$

Where n_1 is the sample size of first sample
n_2 is the sample size of second sample
s_1 is the standard deviation of first sample
s_2 is the standard deviation of first sample
x_1 is the mean of first sample
x_2 is the mean of second sample

Paired / Matched /Dependent t-test

When we use same group of samples in the pretest and in post test then we can analyze the data using paired t-test using the following formula.

Find the mean of the differences, $\bar{d}$.

Find the standard deviation of the differences, SD.

Calculate the standard error of the mean $SE(\bar{d}) = SD/\sqrt{n}$

To calculate *t*, divide the mean of the differences by the standard error of the mean

$$t = \frac{\bar{d}}{SE(\bar{d})}$$

where

$\bar{d}$. Is the mean of the differences

SE is the standard deviation of the differences

N is the number of pairs

<u>ஒப்புதல் படிவம்</u>

ஆராய்ச்சி தலைப்பு : வளர் இளம் பெண்கள் இரத்த சோகையை இரும்பு சத்து மாத்திரையுடன் வைட்டம்னி சி, நெல்லிக்கனிச்சாறு கொடுத்தும் இரும்புச் சத்து மாத்திரையுடன் கொடுத்து கண்டறியும் ஆய்வு.

ஆய்வாளர் பெயர் : அ. இலட்சுமி தேவி

பங்கேற்பாளர் பெயர் :

தேதி :

வயது / பால் :

ஆய்வாளர் மேற்க்கொள்ளும் ஆராய்ச்சியில் பங்கேர்க்க யாருடைய கட்டாயம் இன்றி முழுமனத்துடன் சுயநினைவுடன் சம்மதிக்கிறேன்

ஆய்வாளர் மேர்க்கொள்ள போகும் பரிசோதனைகலை மிக தெளிவாக விளக்கிக்குறினார்.

எனக்கு விருப்பம் இல்லாத பச்சதில் ஆராய்ச்சியிலிருந்து எந்நேரமும் விலகலாம் என்பதையும் ஆய்வாளர் மூலமாக அறிந்துக் கொண்டேன்.

இந்த ஆராய்ச்சி ஒப்புதல் கடித்த்தில் உள்ளவிவரங்களை நன்கு புரிந்துகொண்டேன், எனது உரிமைகள் மற்றும் கடமைகள் ஆராய்ச்சியாளர் மூலம் அறிந்துக் கொண்டேன்

நான் ஆராய்ச்சியாளருடன் ஒத்துழைக்க சம்மதிக்கிறேன். எனக்கு ஏதேனும் உடல்நலக் குறைவு ஏற்பட்டால் ஆராய்ச்சியாளரிடம் தெரிவிப்பேன்.

நான் வேறு எந்த ஆராய்ச்சியிலும் தர்சமையம் இடம்பெறவில்லை என்பதையும் தெரிவித்துக்கொள்கிறேன்.

இந்த ஆராய்ச்சியின் தகவல்களை வெளியிட சம்மதிக்கிறேன். அப்படி வெளியிடும்போது என் அடையாளம் வெளிவராது என்பதை அறிவேன்.

எனக்கு இந்த ஒப்புதல் கடிதத்தின் நகல் கொடுக்கப்பட்டது.

ஆராய்ச்சியாளர் கையொப்போம் பங்கேற்பாளர் கையொப்போம்

தேதி: தேதி :

ஆராய்ச்சி □□□□□

வளர் இளம் பெண்கள் இரத்த சோகையை இரும்பு சத்து மாத்திரையுடன் வைட்டம்னி சி, நெல்லிக்கனிச்சாறு கொடுத்தும் இரும்புச் சத்து மாத்திரையுடன் கொடுத்து கண்டறியும் ஆய்வு.

உங்களை இந்த ஆய்வில் பங்கேற்க அழைக்கிறோம். நீங்கள் இந்த ஆய்வில் பங்கேற்கலாமா அல்லது வேண்டாமா என்பதை முடிவு செய்ய இந்த ஆவணத்தில் உள்ள தகவல் உதவியாக இருக்கும். உங்களுக்கு ஏதேனும் சந்தேகம் இருந்தால் நீங்கள் எங்களிடம் வெளிபடையாக கேட்கலாம்.

எங்களுடைய அடிப்படை தகுதிகளில் நீங்கள் திருப்தியாக இருப்பதால் உங்களை இந்த ஆய்வில் பங்கேற்க அழைக்கின்றோம்.

ஆராய்வின் நோக்கம் மற்றும் செயல்பாடு:

வளர் இளம் பெண்களுக்கு நெல்லிசிச் சாறுடன் இரும்புச் சத்து மாத்திரை கொடுத்து இரத்தத்தில் உள்ள ஹீமோகுளோபின் அளவை அதிகரிப்பதே இந்த ஆய்வின் நோக்கம் ஆகும்,

ஆராய்ச்சியாளர் நெல்லிச் சாறை கொடுப்பதற்கு முன் வளர் இளம் பெண்களின் ஹீமோகுளோபின் அளவை அளவிடுவார்,

100 மிலி நெல்லிச் சாறுடன் இரும்புச் சத்து மாத்திரை 30 நாட்களுக்கு இரவு உணவிற்கு பிறகு 45 நிமிடம் கழித்து வளர் இளம் பெண்களுக்குக் கொடுக்கப்படும், 7 வது நாள் மீண்டும் ஹீமோகுளோபின் அளவு பரிசோதிக்கப்படும்,

இதன் மூலம் ஹீமோகுளோபின் அளவை அதிகரிக்கலாம், இந்த ஆய்வில் உங்கள் பெயர், வயது, இருப்பிடம், உணவு முறை பற்றிய தகவல்களை பெற்றுக் கொள்வோம்,

சில தகவல்கள் உங்களிடம் பெறப்படும்:

உங்களுக்கு உங்களுடைய தகவல்களை இரகசியமாக வைத்துக் கொள்ளும் உரிமை உண்டு, நீங்கள் இந்த ஆய்வில் கையொப்பமிடுவதால் நீங்கள் உங்களுடைய தகவல்களை ஆய்வு குழு மற்றும் நிறுவனத்திடம் காட்ட வேண்டும், இந்த ஆராய்ச்சியின் தகவல்களை ஆராய்சி கூட்டத்தில் வெளியிடப்பட்டாலும் உங்களுடைய அடையாளங்கள் காட்டபடமாட்டாது,

ஆராய்ச்சியாளரின் கையொப்பம் பங்கேற்ப்பாளரின் கையொப்பம்

தேதி தேதி.