DISSERTATION

ON

ASSESS AND COMPARE THE FACTORS INFLUENCING THE INCIDENCE OF ANEMIA AMONG VEGETARIAN AND NON- VEGETARIAN ADULTS IN A SELECTED URBAN AREA - CHOOLAI, CHENNAI.

M.Sc. (NURSING) DEGREE EXAMINATION

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CERTIFICATE

This is to certify that this dissertation titled, **"A STUDY TO ASSESS AND COMPARE THE FACTORS INFLUENCING THE INCIDENCE OF ANEMIA AMONG VEGETARIAN AND NON- VEGETARIAN ADULTS IN A SELECTED URBAN AREA - CHOOLAI, CHENNAI"** is a bona fide work done by Mrs. P.SHOBIGA, College Of Nursing, Madras Medical College, Chennai – 600003, submitted to The TamilNadu Dr. M.G.R. Medical University, Chennai is in partial fulfillment of the requirement for the award of the Degree Of Master Of Science In Nursing, Branch – IV, Community Health Nursing, under our guidance and supervision during the academic period from 2010- 2012.

Dr. R. Lakshmi,M.Sc(N) Ph.D.,   **Dr. V. Kanagasabai M.D.,**
Principal,   Dean,
College Of Nursing,   Madras Medical College,
Madras Medical College,   Chennai – 600 003.
Chennai- 600 003.

ASSESS AND COMPARE THE FACTORS INFLUENCING THE INCIDENCE OF ANEMIA AMONG VEGETARIAN AND NON-VEGETARIAN ADULTS IN A SELECTED URBAN AREA CHOOLAI, CHENNAI.

Approved by the Dissertation Committee On: _____

CLINICAL SPECIALITY GUIDE

Mrs. P.Sornam, M.Sc(N)., _____
Reader in Nursing, , College of Nursing ,
Madras Medical College,Chennai-3.

MEDICAL EXPERTS

Dr. A.K.Rajendran, MD,DPH., _____
Director,
Institute of Community Medicine,
Madras Medical College,Chennai-600 003.

Dr.P. Kalaiselvi, MBBS., _____
Zonal officer,
Pulianthope Zone,
Corporation of Chennai,
Chennai -- 600 012.

STATISTICAL GUIDE
                                    ____
Mr.A.Vengatesan, M.Sc.,M.Phil, PGDCA.,(Ph.D) _____
Lecturer in statistics, Department of statistics,
Madras Medical College, Chennai-03.

A Dissertation submitted to

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI.600 032.

In partial fulfillment of the requirement for the degree of

MASTER OF SCIENCE IN NURSING
APRIL – 2012.

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ABSTRACT

A study was conducted to assess and compare the factors influencing the incidence of anemia among vegetarian and non-vegetarian adults at Choolai, Chennai. Nutritional anemia is a serious worldwide problem of public health concern. Nutritional anemia is always a preventable as well as a treatable problem, but the prevalence of this disease is never reduced in the world. The study was conducted on 100 anemic adults among them 50 were vegetarian anemic adults and 50 were non- vegetarian adults. The sampling technique used for this study is Simple Random Sampling and samples were selected by using the lottery method. The data was collected through the structured interview schedule. Collected data were analyzed using descriptive and inferential statistics, using Pearson Chi-Square test.

The findings of the study revealed factors that influence the incidence of anemia was dietary pattern related, cooking practices related and those related to inhibition of iron absorption. Both the vegetarian and non- vegetarian adults are affected by these factors. Among the vegetarian anemic adults the inhibitory factors are found to be most important factor and another finding was that the intake of Vitamin C is much less. Among the non- vegetarian anemic adults intake of meat, liver, fish and other non-vegetarian food items rich in iron was considerably less and also the intake of inhibitory factors are more. Thus the study reveals that the dietary factors play a vital role in the occurrence of anemia among the vegetarian and non- vegetarian adults. Thus, this study emphasizes that following proper selection of foods, planned healthy eating, avoiding the factors that inhibit the absorption of iron, adopting healthy cooking practices to avoid loss of nutrients while cooking and actual behavior change in an individual.

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INTRODUCTION

"In every community there is work to be done.

In every heart there is power to do it"

--- Marianne Williamson

Nutritional Anemia is a serious problem of public health concern throughout the world. The term 'Anemia' usually refers to a condition in which blood has 'lower than normal' number of red blood cells. Nutritional anemia is always a preventable as well as a treatable problem, but the prevalence of this disease is never reduced in the world. This particular nature of anemia makes it gain unique importance.

The most common type of nutritional anemia is 'Iron deficiency anemia'. Among the global population, anemia, which is mainly the result of iron deficiency, afflicts an estimated two billion people and primarily affects women. Its prevalence in developing countries is disproportionately high. According to WHO estimates, India is one of the countries in the world that has the highest prevalence of anemia. In India the prevalence of anemia is almost universal.

Data from the 'District Household Survey- 2004' revealed that 98% of adolescent girls and 96% of pregnant women suffer from some form of anemia or the other. Also, the latest data from National Family Health Survey (NFHS) 3, 2005-2006, show that 70% in pregnant women and 24% in adult men suffer from anemia. Furthermore, the increasing trend of anemia in pregnant women and women of reproductive age as reflected by the comparison of NFHS 2 and 3 data is disturbing.

Dietetic and nutrition surveys in India reveal that 87 % of pregnant women suffer from anemia. According to the Nutrition Foundation of India, 90%of adolescent girls, women and children suffer from iron deficiency. Almost 20 % of maternal deaths are because of iron deficiency anemia and it is a contributory factor in 20 % more deaths.

Prevalence of anemia in India is high because of low dietary intake, poor availability of iron and chronic blood loss due to hook worm infestation, malaria etc. Every age group is vulnerable to iron-deficiency anemia. Among the factors influencing the incidence of nutritional anemia, dietary aspects play a vital role. Anemia is prevalent among the vegetarian and also the non- vegetarian people. The factors which influence the occurrence may differ or may be similar. A few studies show that vegetarians pose greater risk of having anemia compared to the non- vegetarians. According to the study conducted by Neelu Saluja et al. (2007)   among the vegetarians and non vegetarians for the prevalence of anemia, the anemic cases were significantly higher among the vegetarians (41.7%) as compared to non vegetarians (32.9%). Research has suggested that some vegetarians may absorb only 10 % of the iron in their diet while omnivores absorb about 18 %

M Nelson et al. 1993, reported that the proportion of girls having low hemoglobin levels was higher amongst vegetarians (25%) than non- vegetarians (9%). The recommended iron intake for vegetarians is 1.8 to 2 times that of non- vegetarians. Hallberg L et al (2002) in his study found that strict vegetarian mothers as well as their new born have greater incidence and risk of iron deficiency anemia.

Vegetarianism in India is much different from other parts of the world because it is strictly followed for the reasons of religious beliefs. The reasons for the higher risk of vegetarian population to contract anemia is analyzed as follows; Iron in foods occur in the two forms, haem Iron and non-haem iron. Approximately 60% of the iron in meat products is haem iron and all the iron in plant food is non-haem iron. The absorption by the body of the two types of iron differs. Absorption of haem iron ranges from 15 to 35% and is not significantly affected by diet. In contrast, 2% to 20% of non-haem in plant food is absorbed by the body. Absorption is significantly influenced by various food components. Due to the reduced absorption of non-haem iron in comparison to haem iron, the amount of stored iron of vegetarians is substantially lower than that of non-vegetarians.

The daily dietary requirements of iron vegetarians is 1.8 times greater than that of the non- vegetarians. This is a very important factor which strongly recommends properly and adequately planned diet to reduce the occurrence of anemia in vegetarians.

Baker S. J. (2004), in his study, explains that the incidence of iron deficiency anemia in India is much greater than the western countries, despite the fact that daily iron intake of the Indians is twice that of the Westerners. This apparent difference is attributed to consumption of predominantly cereal based diet rich in phytates, oxalates, phosphates, fiber and other inhibitors of iron absorption by the majority of Indians who practice vegetarianism on account of religion or poverty.

Naturally the food items taken by the vegetarians are rich in dietary fiber, which is high in phytates that inhibits the absorption of non- haem iron. Bioavailability of food iron is strongly influenced by enhancers and inhibitors in the diet. Iron absorption can vary from 1% to 40%, depending on the mix of enhancers and inhibitors in the meal. Therefore, the adequacy - i.e. bioavailability of iron in usual diets can be improved by altering meal patterns to favor enhancers, lower inhibitors, or both.

Enhancers of iron absorption include: haem iron, present in meat, poultry, fish, and seafood; ascorbic acid or vitamin C, present in fruits, juices, potatoes and some other tubers, and other vegetables such as green leaves, cauliflower, and cabbage; and some fermented or germinated food and condiments, such as sauerkraut and soy sauce.

Inhibitors of iron absorption include: phytates, present in cereal bran, cereal grains, high-extraction flour, legumes, nuts, and seeds; food with high inositol content; iron-binding phenolic compounds (tannins); foods that contain the most potent inhibitors resistant to the influence of enhancers include tea, coffee, cocoa, herbal infusions in general, certain spices (e.g. oregano), and some vegetables; and calcium, particularly from milk and milk products.

Sigenburg D (1991) explains in his study the role of ascorbic acid in iron metabolism is manifold. It reduces iron to ferrous form which is then absorbed, lowers

the Ph level which is conducive to iron absorption, reverses the inhibitory effect of phytate, oxalate, phosphate etc., and also forms the chelate with iron for absorption.

Overcooking vegetables may destroy vitamins and minerals. For example about 35 percent of vitamin C is lost on boiling for ten minutes .Water soluble vitamins like vitamin B is lost if water used for cooking is thrown away.

Sharma D.C. (1997), in his study, concludes that vegetarian parturient women had significantly lower hemoglobin, serum iron and transferrin saturation in comparison to the non- vegetarian counterparts. In the study conducted by Verma M. et al (2002), on prevalence of anemia, it was observed that more vegetarians (65.9%) were anemic compared to non- vegetarians (38%).

Research has shown that frequent eating of fast food leads to high consumption rates of energy, total fat, saturated fat, and sodium and low consumption rates of vitamin A, vitamin C, milk, fruits, and vegetables. Vitamin A helps to mobilize iron from its storage sites and so the deficiency of Vitamin A limits the body's ability to use the stored iron.

A 2007 study in Brazil showed that cooking tomato sauce in an iron skillet increases the amount of iron content in the sauce and also increased the iron status among the teen aged and young adult lacto-ovo-vegetarians. Cooking foods in cast iron pans can increase iron consumption.

NEED FOR THE STUDY

Anemia continues to be a major public health problem worldwide, particularly among females of reproductive age in developing countries. World Health Organization (1992) estimates of anemia prevalence averaged 56% with a range of 35-75% depending on geographic location. Prevalence of anemia is much alarming in the developing countries like India. The pressure that the nutritional anemia poses on the public is great.

The economic and social progress over the last few decades has been tremendous and remarkable in India. However, the people in this fast world lack time to concentrate on healthy eating practices which are the basis for healthy living. To be honest, the prime medicine for the treatment of nutritional anemia is food.

Anemia is to be considered as a major health problem in the community because, in the adults, it contributes to low work productivity and has a negative impact on the economy. The major consequences of anemia include poor pregnancy outcome, impaired physical and cognitive development, and increased risk of morbidity in children and reduced work productivity in adults. Anemia contributes to 20% of all maternal deaths. Anemia reduces the work capacity of individual and entire population, bringing serious economic consequences and obstacles to national development.

Li R. et al (1993) conducted a study to compare the non-anemic women with the anemic female workers in China. Anemic women were 15% less efficient in performing their work. They spent 6% less energy on their out-of-work activities, had 4% lower maximal work capacity, and had 12% lower overall productivity, as compared to levels achieved after anemia was corrected by iron treatment for 4 months.

Lack of awareness, especially regarding the cause of the disease, is one of the main reasons of preponderance of anemia. The diet related factors include the food pattern that may be vegetarian or non vegetarian, inhibition of iron absorption and cooking practices. Understanding the correlation between the factors would be beneficial.

As a community health nurse, the investigator had the chance to work at the primary center at Choolai Health Post. During her work period it was identified that a major proportion of the general population were anemic; this motivated the researcher to intrude in this particular area of importance. She focused her interest towards the diet related factors. She directed her attention in identifying the factors influencing the incidence of anemia among the vegetarian and non vegetarian adults. The analysis of the factors influencing the incidence of anemia will provide some valuable information that would be useful in the future community health practice.

STATEMENT OF THE PROBLEM

Assess and compare the factors influencing the incidence of anemia among vegetarian and non-vegetarian adults at Choolai, Chennai.

OBJECTIVES OF THE STUDY

1. To assess the factors influencing the incidence of anemia among vegetarians.
2. To assess the factors influencing the incidence of anemia among non-vegetarians.
3. To compare the factors influencing the incidence of anemia among vegetarians and non- vegetarians.
4. To associate the factors influencing the incidence of anemia among vegetarians with selected demographic variables.
5. To associate the factors influencing the incidence of anemia among non-vegetarians with selected demographic variables.

HYPOTHESIS

1. There is a significant difference between the factors influencing incidence of anemia among the vegetarian and non- vegetarian adults.

2. There is a significant association between the factors influencing the incidence of anemia among the vegetarian and non- vegetarian adults.

OPERATIONAL DEFINTION

ADULT:

Adult includes both male and female anemic vegetarian and non- vegetarian with in the age group of 20- 60 years.

VEGETARIAN

Vegetarian is a person who eats only vegetables, plant based diets, milk and milk products.

NON-VEGETARIAN

Non-Vegetarian is a person who eats both plant based foods and animal based foods.

ANEMIA

Hemoglobin level less than 12mg/dl.

ASSUMPTIONS

The dietary pattern is the important factor which contributes to the incidence of anemia among vegetarian and non- vegetarian adults.

DELIMITATIONS

1.   The data collection procedure was done by structured interview schedule.

2.   The study period is for one month only.

CHAPTER- II
REVIEW OF LITERATURE

The review of literature is a critical summary of research on a topic of interest, often prepared to put a research problem in context **(Polit 2004).** A literature review is a critical and in-depth evaluation of the previous related research. It is a summary and synopsis of a particular area of research. An extensive review of the literature was done to gain insight and to gather maximum information for laying the foundation of the study**.** A good review of literature expands upon the reasons behind selecting a particular research.

According to Cooper H. (1988), "a literature review uses as its database reports of primary or original scholarship, and does not report new primary scholarship itself. The primary reports used in the literature may be verbal, but in the vast majority of cases reports are written documents. The types of scholarship may be empirical, theoretical, critical/ analytic or methodological in nature. Second a literature review seeks to describe, summarize, evaluate, clarify and or/ integrate the content of primary reports"

This chapter presents the review of literature and conceptual framework which guided the study.

This chapter is divided into two parts.

PART I: LITERATURE RELATED TO STUDY

PART II: CONCEPTUAL FRAMEWORK

PART-I: LITERATURE RELATED TO STUDY

LITERATURE RELATED TO ANEMIA

Hercberg S. et al (2003), conducted a study in nutritional anemia and identified the following results. Iron deficiency anemia, Folic acid deficiency anemia, Vitamin B12 deficiency anemia other possible causes of nutritional anemia and the contribution of nutritional factors to causes of anemia. Nutritional anemia, the most widespread nutritional disorder in the world, affects mainly the developing countries and to a lesser extent developed nations. It is estimated that 500 million to 1billion individuals in the world are affected by nutritional anemia.

Mc Lean et al (2005), conducted a study on worldwide prevalence of anemia; the survey covered 48.8% of the global population, 76.1% of preschool children, 69.0% of pregnant women and 73.5% of the non- pregnant women. It is estimated that global anemia prevalence is 24.8% affecting 1.62 billion people.

Sikosana P.L. et al (2001), in his study identified that the overall prevalence of iron deficiency anemia was 24.1% of the study sample. Of that 17.7% of preschool children had iron deficiency anemia, 33% of pregnant women, 29.6% of lactating women and 16.5% of adult males had iron deficiency anemia.

LITERATURE RELATED TO DIETARY FACTORS

Neelu Saluja et al (2007), conducted a study on the prevalence of anemia and to identify the factors associated. The result showed that anemic cases were significantly higher (417%) in vegetarians as compared to non vegetarians (32.9%) It was observed that anemia was significantly higher (p<0.001)

Baines .S. et al (2007), conducted a study to compare the socio-demographic characteristics, health status and health services use of vegetarians, semi vegetarians and non vegetarians. Results show that low iron levels and menstrual symptoms common among vegetarian and semi vegetarian where compared to non vegetarians (P < 0.001)

Venderley A.M., et al (2006), explained that the potential adverse effect of a vegetarian diet on iron status is based on bioavailability of iron from plant foods rather than the amount of total iron present in the diet.

Harrey J (2005), conducted a study which revealed that the non vegetarian (Poultry / fish) diets were associated with higher iron stores than the lacto – ova – vegetarians diets

Waldman A (2004), conducted a study in dietary iron in take and iron status of German female vegans, results show that in all 40% of the young women and 12% of the old women were considered iron deficient based on either serum ferritin levels of <12ng /ml

Carolin (2004),study shows that proteins are complex organic nitrogenous compounds. They are composed of carbon, hydrogen, oxygen, nitrogen, sulphur in varying amounts. Some proteins also contain Phosphorous and Iron and occasionally other elements. Protein is necessary for synthesis of hemoglobin.

Belachew. T. (2004) conducted a study among adolescent girls (6-18 yrs of age) from the slums of Ahamadabad city. The percentage of anemic adolescent girls were 61.45% it is found that those anemic adolescent girls were having lack of consumption of green leafy vegetables in their diet leading to lower availability of dietary iron.

Antony (2007), study revealed that vegetarians who avoid all animal products may have a slightly higher risk for deficiencies in iron and some B vitamins. Although dried beans and green vegetables often contain iron, it is less easily absorbed from plants than from meat

Gibson (2003), conducted a study on the association between red and processed meat consumption and iron intakes and status among adult women who ate least meat had three time the risk of low iron intake compared to high consumers of red processed meat. Men who ate no red processed meat also had a higher risk of low iron intake.

Ball MJ (1999), conducted study on dietary intake and iron status of vegetarian women. Mean serum ferritin concentrations were significantly lower in vegetarians than in omnivores. However, similar numbers of vegetarians (18%) and omnivores (13%) had serum ferritin concentrations (12 micro / l) which is a value often used as an indicator of low iron stores.

Verma et al (1998), in his study has identified the prevalence of anemia among primary school children of Punjab. It was observed that more vegetarians (65-69%) were anemic as compared to non vegetarians (38%)

Helman et al (1987), this study assessed the biochemical status of a number of vitamins and iron in a group of new vegetarians. Values were compared with a group of omnivores of similar age Satisfactory to high levels of serum folate vitamin E and riboflavin were found and all were significantly higher in vegetarians than omnivores. Thiamin status was satisfactorily lower in vegetarians. New vegetarian women appear to be at particular risk of developing low iron stores.

LITERATURE RELATED TO FACTORS INHIBITING IRON ABSORPTION

Sandberg AS (2008) investigated the effect of calcium on iron absorption in 126 human subjects. Addition of calcium chloride to wheat rolls significantly reduced iron absorption. Doses between 40 and 600 mg Ca were studied. The inhibition was clearly dose related up to 300mg Ca. Calcium added to the dough when making the rolls reduced phytate degradation during fermentation and baking. Calcium also had a direct close-related inhibiting effect on iron absorption, noted by adding calcium to the rolls after they had been baked instead of to the dough. Iron absorption was reduced by 50- 60% at doses of 300- 600mg Ca. Giving 165 mg Ca as milk, cheese, or calcium chloride reduced absorption by 50- 60% . The same amount of calcium also significantly reduced haem iron absorption, suggesting that the effect of calcium is related to the mucosal transfer of iron.

Sandrine Bertrais etal (2008) conducted a study to identify the relationship between iron status and dietary fruit and vegetables based on their vitamin C and fiber

content. The objective was to assess the relation between dietary fruits, vegetables, and juices (FVJ) according to their vitamin C and fiber contents and serum ferritin and hemoglobin concentrations. A total of 4358 subjects, aged 35–60 years, of the Supplementation with Antioxidant Vitamins and Minerals cohort were selected. Subjects had completed at least six 24-h-dietary records over 2 years. The relation between serum ferritin and hemoglobin, measured at inclusion, and dietary FVJ according to their vitamin C and fiber contents was assessed by multiple regression analysis. In premenopausal women, serum ferritin was positively associated with intakes of fiber-poor FVJ (up to 10% higher serum ferritin in the third tertile compared with the first tertile). In the whole sample, hemoglobin was positively associated with fruits, vitamin C–rich FVJ, FVJ ascorbic acid, and fiber-poor FVJ categories (up to 1.5 g/L higher hemoglobin concentration).

Pashanth Thankachan (2007) conducted a study on iron absorption in young women:the interaction of iron status with the influence of tea and ascorbic acid. The study was conducted by evaluating the influence of the iron status of young women on iron status of young women on iron absorption from a rice meal with or without tea or ascorbic acid. 2 groups of 10 subjects with iron deficiency anemia and 10 subjects who were iron replete were taken as control subjects. In study 1, the reference rice meal was fed alone or with 1 or 2 cups of black tea. In study 2, the reference rice meal was fed alone or with ascorbic acid. The consumption of 1or 2 cups of tea decreased iron absorption in the control subjects by 49% (P<0.05) or 66% (P<0.01), respectively, and in the IDA group by 59% or 67% (P< 0.001 both), respectively. Ascorbic acid increased iron absorption by 270% or 343%, respectively, in control subjects and by 291%or 350%, respectively, in subjects with iron deficiency anemia (P< 0.001).

Manju B Reddy (2007) conducted a study to identify the Effect of ascorbic acid intake on non haem-iron absorption from a complete diet. Iron absorption from a complete diet was measured during 3 separate dietary periods in 12 subjects by having the subjects ingest a labeled wheat roll with every meal for 5 d. The diet was freely chosen for the first dietary period and was then altered to maximally decrease or increase the dietary intake of vitamin C during the second and third periods. There was significant

difference in mean iron absorption among the 3 dietary periods and a range of mean daily intakes of dietary vitamin C of 51–247 mg/d. When absorption values were adjusted for differences in iron status and the 3 absorption periods were pooled, multiple regression analysis indicated that iron absorption correlated with ascorbic acid ($P = 0.0005$).

Reddy MB and Cook JD (2005) conducted a study to identify the effect of calcium intake on non- haem iron absorption from a complete diet. In this study the non-haem iron absorption was measured in14 healthy volunteers during the periods in which the diet was freely chosen or modified to decrease or increase dietary calcium intake maximally. The diet was labeled during each 5- d period by including with each of the two meals of the day a small bread roll tagged extrinsically with radio iron. Carefully maintained dietary records indicated that 69- 78% of the daily iron intake was labeled by this method. The basal calcium intake of 684mg/dl varied from 280 to 1281mg/dl when calcium intake was reduced or increased, respectively. Significant relation was observed between non- haem iron absorption and dietary factors known to influence iron absorption. Thus the study concluded that calcium intake had significant influence on non- heme iron absorption from varied diet.

Lopez (2004) study shows that iron is an essential trace element in human nutrition and its deficiency is a world nutritional problem. Due to the high prevalence of anemia in developing countries it is necessary to maintain a suitable iron intake through diet in order to achieve an appropriate status of this element in the body. For this reason accurate knowledge of iron availability of foods is essential in order to plan intervention strategies that improve deficient situations of this nutrient. Non heme iron availability is conditioned by several dietary factors such as like phytic acid, ascorbic acid.

Virendar et al (2004) conducted a study among adolescent girls in Ahamadabad city found that theses adolescent girls were taking tea or coffee after consumption of food which predisposed anemia. There is tannin present in tea which hinders the absorption of iron.

Nair et al (2002) conducted repeated surveys which show that the magnitude of nutritional anemia is of public health concern in India. In India increased cereals and

millets form the bulk of the dietary intake and are major sources of non- haem iron. It is now well established that iron bioavailability from habitual Indian diets is low due to high phytates and low ascorbic acid.

Temme (2000) conducted a study which shows that iron deficiency anemia to a great extent is caused by iron absorption from the diet. Several factors can influence absorption of iron. Absorption enhancing factors are ascorbic acid, meat, fish and poultry inhibiting factors are tea, coffee, fibre and calcium.

Bothwell (1998) identified that about one-quarter of the iron in haem proteins is absorbed regardless of the other components in the diet, while non haem iron absorption is subject to the interplay of the promoting and the inhibiting substances in the diet. Thus diet rich in enhancers of non-haem iron absorption , chiefly meat and ascorbic acid while diets in which inhibitors, such as polyphenols and phytates predominate are poor sources of iron.

Dutta (1998) in his study concludes that Indian women consume more carbohydrate in the diet in the form of rice. The carbohydrate contains high phosphates and phytic acid, which results in the formation of insoluble iron thereby the absorption of iron present in diet.

LITERATURE RELATED TO COOKING PRACTICES.

Mustapha R.A. et al (2010) conducted a study to evaluate the effect of cooking utensils on iron content. Results show that the cooking utensils reduced or increased the level of iron in some of the food samples. The Iron content of the food sample cooked in cast Iron pot is increased when compared to the sample of all staple foods cooked in clay and stainless steel pot. Good iron cooking utensil will go a long way to conserve iron loss during cooking and thereby reducing iron deficiency anemia among the various vulnerable groups in the population.

Wei Sheng (2007) conducted a study to identify the changes of vitamins and mineral retention factors in vegetables cooked by different methods. Study the effect on the retention factors of vitamin and mineral in vegetables cooked by different methods, to

provide reference for evaluation of diet's nutrition. Vegetables were selected and cooked by different methods, such as frying, braising, boiling, deep frying and steaming, according to local tradition and custom. Meanwhile, weights of the vegetables before and after cooking were recorded. Respectively vitamin and mineral contents in every sample were analyzed with the national standard methods. The retention factor value of vitamin C was higher during braising than that of during frying, boiling, deep frying and steaming. The retention factor values of thiamin, riboflavin, vitamin B6 and niacin more loss during boiling and frying than those during other methods. The retention factors of every mineral were more lost only during boiling.

Geerling et al (2003) has done a study by using the iron and aluminium cooking pots for cooking foods to determine their effect on consumer's hemoglobin status of rural adults Malawian with malaria infection. Results shows that mean hemoglobin change was significantly increased after six weeks of consumption of foods from the iron pots.

Swaminathan (2001) suggested the amount of nutrient that diffuses into solution can be limited by keeping the surface area of the food small. This is achieved by leaving the food whole or in large pieces, shortens the time of cooking, avoid changing the water in which food is cooked, avoid washing the vegetables after cutting, avoid over cooking and removing excess water from cooked food.

Ghosh Shanthi et al (1996) in their study explains that heat accelerates chemical reaction and cause considerable vitamin C destruction. The shorter the cooking time the less is the destruction of vitamin C. Quick heating of raw vegetables by putting them in rapidly boiling water results in less chemical loss of vitamins than does slow heat . Mild heating of protein increases its digestibility. Over heating of protein reduces its nutritive value.

Latunda Dada (1993) in his study found that processes of blanching and squeeze washing of vegetables caused significant losses of iron which are common among Nigeria household food handlers.

PART-II

CONCEPTUAL FRAMEWORK

A conceptual framework is the underpinning of a study including an overall rational and conceptual definition of the concept. It broadly presents an understanding of the phenomenon of interest. It also reflects the assumption and philosophic view of the model serve as a springboard for generating research hypothesis. (Polit, Becker. 2009)

Conceptual framework deals with the abstraction or concepts that are assembled by virtue of their relevance to a common theme. Conceptualization is a process of forming ideas which utilized and forms conceptual framework for development of research design. It helps the researchers by giving direction to go about the entire research.

The present study aims to determine the factors that influence the incidence of anemia among the vegetarian and non- vegetarian adults, at Choolai. The investigator adopted modified Rosenstocks (1974) Health Belief Model as the basis for the current study. This theory was first introduced by Lewin and Becker. This model addresses the relationship between the person's belief and behaviour and it allows analysis of an individual's decision making.

It allows the analysis of an individual's decision making. It addresses the relationship between a person's knowledge, attitude and his behaviour. It provides a way of understanding on how the people behave in relation to their health. This model considers an individual's perception of the susceptibility to ill effects on his health, demographic and modifying factors which will lead him to take recommended action towards the cessation of that behavior.

This model explains the concept in three major components.

Individual Perception

The view of susceptibility to disease and the individual's recognition that due to self ignorance about their dietary practices, cooking practices, lack of awareness regarding the factors causing the disease, lifestyle and cultural practices.

Modifying Factors

The contributing factors are the demographic variables, dietary pattern, cooking practices and factors enhancing the iron absorption.

Likelihood of Action

The health promoting activity based on the individual's perception about the benefits and perceived barriers.

Perceived Benefits

The individual benefits depends on the appropriate selection of foods rich in iron , avoiding the inhibition factors related to iron absorption, adopting healthy cooking practices, behavior change in the nutritional aspects.

Perceived Barriers

The perceived barriers are self hesitation, inconvenience to change, lack of time, lack of self interest and cultural belief.

INDIVIDUAL PERCEPTION	MODIFYING FACTORS	LIKELIHOOD OF ACTION

Self Ignorance Regarding
 Dietary Practices
 Cooking Practices

Lack of Awareness Regarding
 Cause of Disease

Lifestyle Practices

Cultural Practices

Demographic Variables

Factors Related To Dietary Pattern

Factors Related To Inhibition Of Iron Absorption

Factors Related To Cooking Practices

PERCEIVED BENEFITS

Appropriate Selection
of Foods rich in iron

Avoiding The Inhibition Factors

Adopting Appropriate
Cooking Practices

Behaviour Change
In Nutritional Aspects

PERCEIVED BARRIERS

Self Hesitation

Inconvenience To Change

Cultural Belief

CUES TO ACTION

Mass Media, Health Education
By The Health Professional,

Information Given By Relatives & Friends

FIGURE - I : CONCEPTUAL FRAME WORK BASED ON MODIFIED ROSENSTOCKS (1974) HEALTH BELIEF MODEL

CHAPTER – III
METHODOLOGY

This Chapter deals with the brief description of the steps which were undertaken by the investigator for the study. This includes the research approach, research design, variables, study setting, population, sampling technique, and sample size, description of the tool, content validity, ethical issues, pilot study, data collection procedure and plan for data analysis.

RESEARCH APPROACH

The investigator has employed Quantitative research approach for this study. Quantitative research approach refers to the systematic empirical investigation of social phenomena via statistical, mathematical or computational techniques. The objective of quantitative research is to test the theories and/ or hypotheses pertaining to phenomenon. Thus the researcher felt that quantitative research approach is appropriate for the present study.

RESEARCH DESIGN

The research designs are concerned with turning the research question into a testing project. The best design depends on the research questions. The research design has been considered as a blueprint for research, dealing with at least four problems: what questions to study, what data are relevant, what data to collect, and how to analyze the results.

The research design selected for this study is Descriptive Research Design. It describes the data and characteristics about the population or phenomenon being studied.

SETTINGS OF THE STUDY

This study was conducted in the Urban area (Choolai). Choolai belongs to the North Zone of Chennai Corporation. There is an Urban Health Post in this area. Choolai

has 4 wards covering a total population of 36744. Totally there are 16 streets in Choolai area. Among these 16 streets 4 streets were selected using lottery method to conduct the present study.

POPULATION

The population is defined as the set of individual or objects having some common characteristics. All the individuals or objects within a certain population usually have a common, binding characteristic or trait. For the study the population comprises of the vegetarian and non-vegetarian adults residing at Choolai, Chennai.

TABLE -1: STUDY POPULATION DETAILS

S. No.	Name of the street	No. of vegetarian Adults	Non-vegetarian Adults
1	A.P. ROAD	117	265
2	V.V.KOIL LANE	72	132
3	ANDIYAPPAN STREET	102	195
4	ALANDUR SUBRAMANI STREET	87	100
	TOTAL	378	692

SAMPLE

A sample is a subset of a population that is used to represent the entire group as a whole. The sample for the present study comprised of anemic vegetarian and non-vegetarian adults who have met the inclusion criteria.

SAMPLE SIZE

The sample size for the main study is 100 anemic adults of whom 50 are vegetarian adults and 50 are non- vegetarian adults.

SAMPLING TECHNIQUE

Sampling is concerned with the selection of a subset of individuals from within a population to estimate characteristics of the whole population. In the present study simple random sampling is being employed. Simple random sampling is the best method for ensuring that a sample is representative of the larger population.

The sample consists of total number of 100 anemic clients, 50 are vegetarian adults and 50 are non- vegetarian adults. In the Choolai area the following streets are selected as setting area.

1. V.V.Koil Lane
2. Andiappan Street.
3. Alandur Subramanian Street
4. A.P. Road

The sampling technique used for this study is Simple Random Sampling and samples were selected by using the lottery method.

CRITERIA FOR SAMPLE SELECTION:

Inclusion Criteria

Inclusion criteria are a set of conditions that must be in order to participate in a study.

1. Adults from the age group 20 years to 60 years.

2. Both sexes are included.

3. Clients who are anemic.(Hemoglobin less than 12mg/dl)

4. Clients who are willing to participate.

Exclusion Criteria

Exclusion criteria are the standards used to determine whether a person may or may not be allowed to participate in the research study.

1. Mothers who are in antenatal period.

2. Mothers who are in the postnatal period.

3. Clients who were included in the pilot study.

VARIABLES

Variables are concepts that usually have more than one value. The variables discussed in the present study were;

Independent variable

The independent variable is varied or manipulated by the researcher. An independent variable is the presumed cause. The factors influencing like;

1. Factors related to nutrition

2. Factors related to inhibition of iron absorption.

3. Factors related to cooking practices.

Dependent variable

The dependent variable is the presumed effect. The dependent variable in the present study is nutritional anemia.

DEVELOPMENT OF THE INSTRUMENT

A structured interview schedule was prepared by the investigator to assess the factors influencing the incidence of anemia among vegetarian and non vegetarian adults. The structured interview schedule was developed based on the objectives of the study. Various sources of literature and opinions from the subject experts are obtained to

ascertain the effectiveness and to bring about the correct items in the questionnaire. All these helped in the ultimate development of the tool.

DESCRIPTION OF THE TOOL

The instrument used for data collection was a structured interview. This was developed based on the objectives of the study and through review of literature.

Part I   :   It consists of demographic data which includes age, gender, type of family, food pattern, occupation, family income per month, religion, educational status, source of information regarding anemia and nutritional status.

Part II   :   It consists of the anemia assessment scale which includes hemoglobin level, capillary refill, signs of pallor, fatigue and shortness of breath.

Part III   :   It consists of structured interview schedule with multiple choice questions which are prepared to assess the factors influencing incidence of anemia. It consists of 21 questions fewer than 3 sub divisions.

TABLE 2: NUMBER OF QUESTIONS

S. No	Factors	No. of Questions
1.	Factor related to nutrition	10
2.	Factors inhibiting the absorption of iron	6
3.	Factors related to cooking practices	5
	TOTAL	21

TESTING OF TOOL

Content Validity

The content validity of the tool was obtained from the experts specialized in community health nursing. Suggestions were considered and modifications of the tool were done according to the opinion of the experts. Finally the tool was certified valid to conduct the study.

Reliability

After pilot study, reliability of the tool was assessed by using Test retest method. Reliability correlation coefficient value is 0.82. This correlation coefficient is very high and it is good tool to assess and compare the factors influencing the incidence of anemia among vegetarian and non-vegetarian adults at Choolai, Chennai.

PILOT STUDY

A pilot study was conducted in the month of March from 21.03.2011 to 25.03.2011 for one week, at Aryamuthu Masthri Street, Choolai. Time of data collection was 8am to 4pm. Each structured interview schedule took 20 to 25 minutes. 10% of the main study population is included in the pilot study based on the inclusion criteria. A sample size of 10 anemic clients were studied, among them 5 were vegetarian adults and 5 were non vegetarian adults. Practicability and feasibility of the instrument was checked. No difficulty was faced by the investigator while conducting the study and all the clients cooperated well with the investigator.

DATA COLLECTION PROCEDURE

Data collection is a planned, systematic collection of reliable and valid evidence. Data collection should be systematic and meticulous. The purpose of gathering is to transform them into information in order to identify variable, measure variables, describe behavior and obtain empirical evidence.

Formal approval was obtained from the Zonal Officer. The data collection procedure was done for 4weeks (29.08.2011 to 29.09.2011) in the month of September 2011.The investigator got permission from the medical officer of Choolai Health Post. The investigator visited one street per day and the clients were selected based on the inclusion criteria. The samples for the study were identified by observing the clinical signs and when there are signs of anemia, then the clients anemic status was confirmed by checking the Hemoglobin levels by Hemoglobinometer. Convenient and flexible timings were ensured before starting the data collection procedure. Initial rapport was established and the purpose of study was explained to the subjects and then the interview was conducted among them.

PLAN FOR DATA ANALYSIS

The data obtained were analyzed in terms of objectives of the study using descriptive and inferential statistics.

Descriptive Statistics

Mean and Standard Deviation were used to assess the factors influencing the incidence of anemia among the vegetarian and non vegetarian adults. Frequency and percentage were used to analyze the demographic variables of the subjects.

Inferential Statistics

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. $P < 0.05$ was considered statistically significant. All statistical tests are two tailed tests.

ETHICAL CONSIDERATIONS:

Permission was obtained from the Zonal Officer of the Pulianthope Zone. The study was approved and ethical clearance was given by the ethical committee of the Madras Medical College. Subjects who fulfilled the inclusion criteria were given an explanation about the study and were asked about the willingness to participate in the study. Anonymity and confidentiality of the subjects were maintained.

SCHEMATIC REPRESENTATION OF THE REAEARCH DESIGN

TARGET POPULATION (ADULTS BOTH VEGETARIAN & NON- VEGETARIAN)

ACCESSIBLE POPULATION(VEGETARIAN & NON- VEGETARIAN ADULTS IN THE CHOOLAI AREA)

SIMPLE RANDOM SAMPLING

SAMPLE SIZE 100

50 VEGETARIAN ANEMIC ADULTS   50 NON-VEGETARIAN ANEMIC ADULTS

STRUCTURED INTERVIEW SCHEDULE

DATA COLLECTION

ANALYSIS & INTERPRETATION

DESCRIPTIVE & INFERENTIAL STATISTICS

FINDINGS

REPORTING
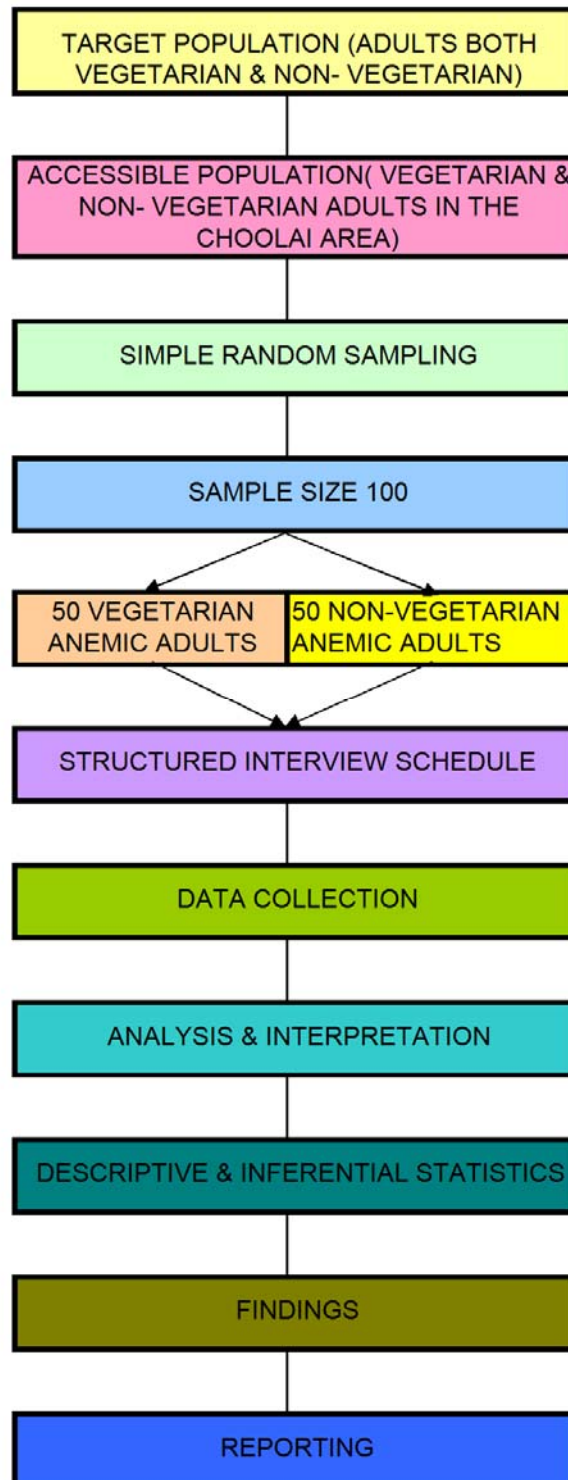
CHAPTER IV

DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and interpretation of the data collected from 100 anemic adults by assessing the factors influencing the incidence of anemia among the vegetarian and non- vegetarian adults. The analysis and interpretation was based on the data collected through the structured questionnaire. The data was organized, tabulated, analyzed and interpreted by using descriptive and inferential statistics.

Statistical analysis is a method of rendering quantitative information and clients meaning and intelligible form of research data. It is the process of organizing and synthesizing the data so as to answer research questions and to test the hypothesis.

PRESENTATION OF THE DATA

In this chapter findings are summarized, analyzed and presented under the following major sections.

SECTION I: Demographic characteristics of the anemic vegetarian and non- vegetarian adults.

SECTION II: Factors influencing incidence of anemia among the vegetarian adults.

SECTION III: Factors influencing incidence of anemia among non- vegetarian adults.

SECTION IV: Comparison of factors influencing the incidence of anemia among vegetarian and non- vegetarian adults.

SECTION V: Association of the factors influencing incidence of anemia among vegetarian adults with selected demographic variables.

SECTION VI: Association of the factors influencing the incidence of anemia among the non- vegetarian adults with the selected demographic variables.

SECTION - I

1. PERCENTAGE DISTRIBUTION OF DEMOGRAPHIC VARIABLES

Table 3: Demographic Profile

Demographic Variables		ADULTS WITH ANEMIA			
		Vegetarian		Non Vegetarian	
		N	%	N	%
Age	20 -30 yrs	13	26.0%	15	30.0%
	31 -40 yrs	12	24.0%	10	20.0%
	41 -50 yrs	12	24.0%	11	22.0%
	51 -60 yrs	13	26.0%	14	28.0%
Gender	Male	25	50.0%	25	50.0%
	Female	25	50.0%	25	50.0%
Type of family	Nuclear family	35	70.0%	30	60.0%
	Joint family	15	30.0%	20	40.0%
Food pattern	vegetarian	50	100.0%	0	0.0%
	Non vegetarian	0	0.0%	50	100.0%
Occupation	Unemployed	12	24.0%	14	28.0%
	Skilled workers	13	26.0%	15	30.0%
	Unskilled workers	25	50.0%	18	36.0%
	Professional	0	0.0%	3	6.0%
Income	Rs.6570- 8750	26	52.0%	20	40.0%
	Rs.4380- 6560	24	48.0%	21	42.0%
	Rs.2628- 4370	0	0.0%	9	18.0%
Religion	Hindu	50	100.0%	24	48.0%
	Christian	0	0.0%	15	30.0%
	Muslim	0	0.0%	11	22.0%
Education	Non formal	0	0.0%	8	16.0%
	Primary	9	18.0%	17	34.0%
	Secondary	20	40.0%	21	42.0%
	Higher secondary	18	36.0%	4	8.0%
	Graduate	3	6.0%	0	0.0%
Source of information	Relatives	14	28.0%	9	18.0%
	Mass media	3	6.0%	5	10.0%
	Health professional	22	44.0%	24	48.0%
	None	11	22.0%	12	24.0%
Nutritional status based on BMI	Normal	28	56.0%	32	64.0%
	Under nourished	22	44.0%	18	36.0%

Table 3 shows that 26% of the vegetarian anemic adults and 30% of the non-vegetarian anemic adults participated in the study belong to the age group 20 to 30 years. Among the vegetarian and non- vegetarian adults male (25) and female (25) respondents belong to equal proportion respectively. Higher proportion of the respondents comes from nuclear family among both vegetarian (70%) and non- vegetarian adults (60%) respectively.

Equal proportion of the vegetarian (50) and non vegetarian (50)adults were selected for the study. Half (50%) of the respondents among the vegetarians and about one third (36%) of the non- vegetarians were unskilled workers. 52% and 40% of vegetarian and non- vegetarian anemic adults respectively belong to the income group of Rs. 6570-8750 per month.

All (100%) the vegetarian adults belong to Hinduism whereas nearly half (48%) of the respondents belong to Hinduism among non- vegetarian adults. Majority of the study participants among vegetarian adults (40%) and among the non- vegetarian adults (42%) have completed their education.

Health professional is the source of information regarding iron rich foods for 44% of vegetarian adults and 48% of non- vegetarian adults. About more than half percentage (56%) of the vegetarian and two- third (64%) proportion of the non- vegetarian have normal nutritional status.

2. DISTRIBUTION OF SAMPLES ACCORDING TO ANEMIA ASSESSMENT SCALE

Table- 4: Anemia Assessment Scale

Anemia Assessment Scale		**ADULTS WITH ANEMIA**			
		Vegetarian		*Non Vegetarian*	
		N	**%**	**N**	**%**
Value of Hb in blood	6 -8 mg/dl	9	18.0%	6	12.0%
	8 -10 mg/dl	28	56.0%	21	42.0%
	10 -12 mg/dl	13	26.0%	23	46.0%
Minutes of capillary refilling	< 2 minutes	10	20.0%	32	64.0%
	3 minutes	29	58.0%	18	36.0%
	4 minutes	11	22.0%	0	0.0%
Signs of pallor	Conjunctiva	50	100.0%	50	100.0%
Do you feel fatigue or tired	Yes	28	56.0%	9	18.0%
	No	22	44.0%	41	82.0%
How often do you feel fatigue	Always	18	36.0%	3	6.0%
	Occasionally	32	64.0%	47	94.0%

Table 4 depicts that among vegetarian respondents more than half (56%) of them have 8- 10 mg/dl hemoglobin while 46 % of the non- vegetarians have 10- 12 mg/dl. 58% of the vegetarians took 3 minutes for capillary refill whereas two third (64%) of the non- vegetarians take less than 2 minutes for capillary refill. All (100%) the vegetarian and non- vegetarian respondents have pale conjunctiva. One third (36%) of the vegetarians and only 6% of the non- vegetarians always feel fatigue.

Figure-3: Distribution of Vegetarian and Non Vegetarian Adults According To Their Level of Hemoglobin
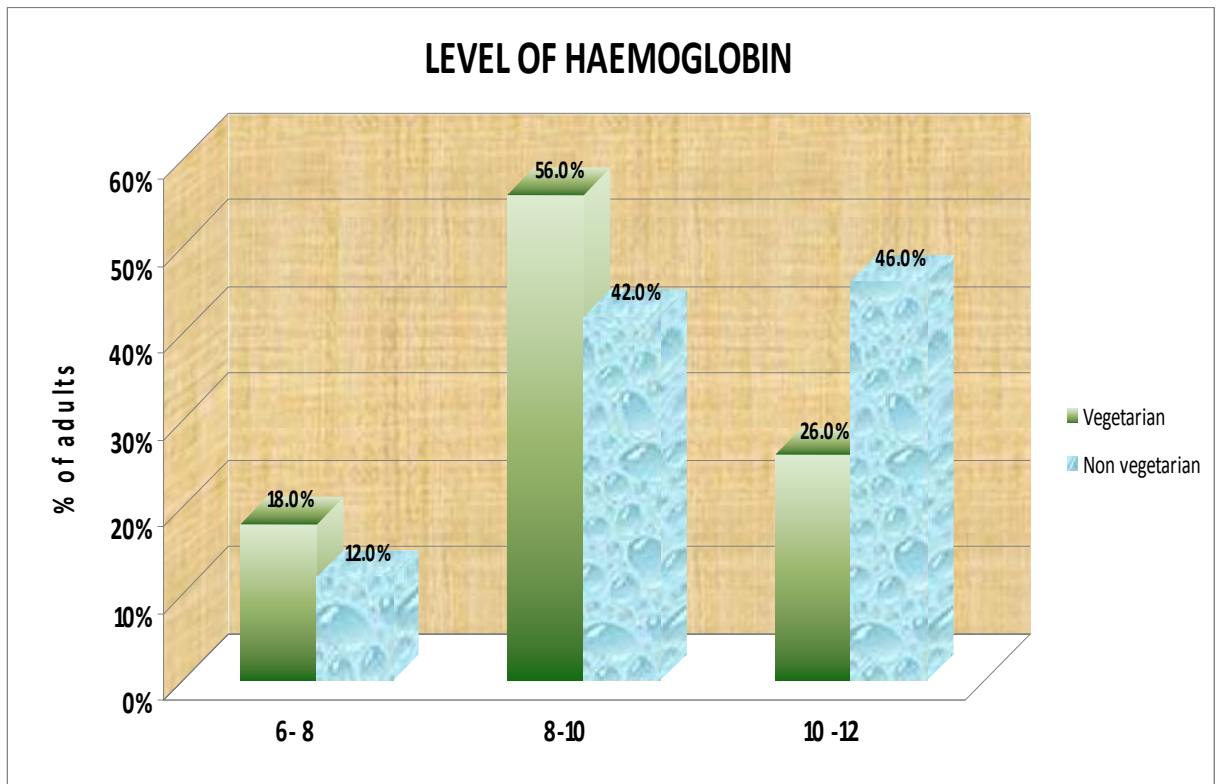
Figure 3 depicts that among vegetarian respondents more than half (56%) of them have 8- 10 mg/dl of hemoglobin while 46 % of the non- vegetarian have 10- 12 mg/dl.

Figure- 4: Distribution of Vegetarian and Non Vegetarian Adults According To Their Minutes of Capillary Refilling
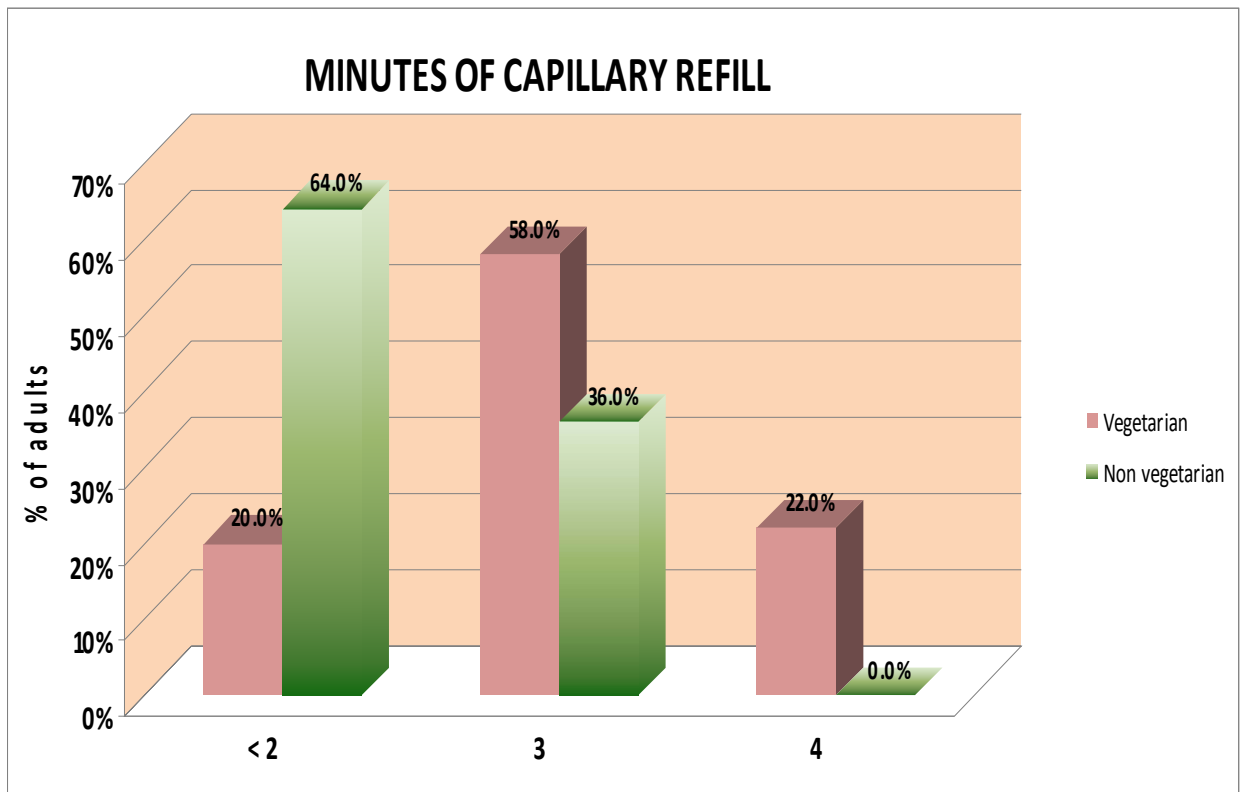
Figure 4 defines that 58% of the vegetarians took 3 minutes for the capillary refilling whereas two third (64%) of the non- vegetarian adults take less than 2 minutes for capillary refilling.

SECTION- II

ANALYSIS OF FACTORS INFLUENCING INCIDENCE OF ANEMIA AMONG VEGETARIAN ADULTS

Table – 5: Factors Related To Dietary Pattern (Vegetarian Adults)

Factors related to vegetarian dietary pattern		N	%
Intake of green leafy vegetables	Daily	44	88.0%
	3 -5 times a week	6	12.0%
Intake of sprouted cereals	1 -2 times a week	2	4.0%
	Occasionally	48	96.0%
Intake of vitamin rich foods	1 -2 times a week	3	6.0%
	Occasionally	47	94.0%
Intake of legumes	3 -5 times a week	40	80.0%
	1 -2 times a week	10	20.0%
Intake of dried fruits	Occasionally	50	100.0%
Intake of roasted nuts	1 -2 times a week	10	20.0%
	Occasionally	40	80.0%

From Table 5 we infer that a higher percentage of the vegetarian anemic adults (88%) have the habit of taking green leafy vegetables daily. A majority (80%) of them take legumes 3 to 5 times a week. An increased percentage (96%) takes sprouted cereals occasionally. Majority (92%) of the vegetarian respondents take vitamin C rich foods occasionally. More than three fourth (80%) of them take roasted nuts occasionally. All of them take dried fruits occasionally.

Table- 6: Factors Related To Inhibition of Iron Absorption (Vegetarian Adults)

Factors Related To Inhibition Of Iron Absorption		*Vegetarian*	
		N	%
Habit of taking coffee/tea with meals	Rarely	13	26.00%
	Most often	34	68.00%
	Always	3	6.00%
Habit of drinking milk in a day	2 times	17	34.00%
	1 time	27	54.00%
	Occasionally	6	12.00%
Habit of taking curd with meals	Daily	43	86.00%
	3 -5 times week	4	8.00%
	1 -2 times a week	3	6.00%
Intake fiber rich diet	3 -5 times a week	3	84.00%
	1 -2 times a week	5	10.00%
	Occasionally	42	6.00%
Habit of taking junk food	Never	9	18.00%
	Rarely	21	42.00%
	Most often	20	40.00%
Habit of taking carbonated drinks	Never	2	4.00%
	Rarely	45	90.00%
	Most often	3	6.00%

Table 6 explains that a majority (68%) of the vegetarian adults take coffee/tea with meals. More than half (54%) of them take milk once daily. Higher proportions (86%) of the vegetarian respondents have the habit of taking curd daily. Higher percentage (84%) of them takes fiber rich food 3- 5 times weekly. More than one third (40%) of the vegetarian adults take junk food most often.

Table 7: Factors Related To Cooking Practices
(Vegetarian Adults)

Factors Related To Cooking Practices		N	%
Habit of over cooking vegetables	Never	11	22.00%
	Rarely	27	54.00%
	Most often	12	24.00%
Use of iron vessels for cooking	Never	34	68.00%
	Rarely	11	22.00%
	Most often	5	10.00%
Discarding excess water from cooked vegetables	Never	32	64.00%
	Rarely	18	36.00%
Use of more quantity of water for cooking vegetables	Never	8	16.00%
	Rarely	9	18.00%
	Most often	30	60.00%
	Always	3	6.00%
Washing vegetables after cutting	Never	9	18.00%
	Rarely	18	36.00%
	Most often	23	46.00%

Table 7 presents that nearly two third (60%) of the vegetarian adults have the habit of using large quantity of water for cooking vegetables. 23 of them out of 50 have the practice of washing the vegetables after cutting. Majority (68%) of them never use iron vessels for cooking.

SECTION- III

ANALYSIS OF FACTORS INFLUENCING INCIDENCE OF ANEMIA AMONG NON-VEGETARIAN ADULTS

Table 8: Factors Related To Dietary Pattern
(Non-Vegetarian Adults)

Factors Related To Dietary Pattern		N	%
Intake of green leafy vegetables	Daily	6	12.0%
	3 -5 times a week	23	46.0%
	1 -2 times a week	21	42.0%
Intake of sprouted cereals	1 -2 times a week	1	2.0%
	Occasionally	49	98.0%
Intake of vitamin C rich foods	1 -2 times a week	4	8.0%
	Occasionally	46	92.0%
Intake of legumes	3 -5 times a week	7	14.0%
	1 -2 times a week	18	36.0%
	Occasionally	25	50.0%
Intake of dried fruits	Occasionally	50	100.0%
Intake of roasted nuts	1 -2 times a week	5	10.0%
	Occasionally	45	90.0%
Intake of fish in diet	Daily	16	32.0%
	3 -5 times a week	22	44.0%
	1 -2 times a week	4	8.0%
	Occasionally	8	16.0%
Intake of red meat	Daily	24	48.0%
	3 -5 times a week	16	32.0%
	Occasionally	10	20.0%
Intake of eggs	Daily	14	28.0%
	3 -5 times a week	11	22.0%
	1 -2 times a week	12	24.0%
	Occasionally	13	26.0%
Intake of liver	Occasionally	50	100.0%

Table 8 explains that 46% of the non-vegetarians take green leafy vegetables 3- 5 times weekly. More than three fourths (80%) of them take red meat 1-2 times a week. More than half (56%) of the non-vegetarians take fish occasionally. Majority of them take sprouted cereals,Vitamin C rich foods, legumes, dried fruits and roasted nuts occasionally.

Table –9: Factors Related To Inhibition of Iron Absorption
(Non-Vegetarian Adults)

Factors Related To Inhibition Of Iron Absorption		N	%
Habit of taking coffee/tea with meals	Never	3	6.00%
	Rarely	10	20.00%
	Most often	19	38.00%
	Always	18	76.00%
Habit of drinking milk in a day	2 times	6	12.00%
	1 time	20	40.00%
	Occasionally	24	48.00%
Habit of taking curd with meals	Daily	14	28.00%
	3 -5 times a week	16	32.00%
	1 -2 times a week	14	28.00%
	Occasionally	6	12.00%
Intake of fiber rich diet	3 -5 times a week	27	54.00%
	1 -2 times a week	12	24.00%
	Occasionally	11	22.00%
Habit of taking junk food	Never	11	22.00%
	Rarely	20	40.00%
	Most often	19	38.00%
Habit of taking carbonated drinks	Never	5	10.00%
	Rarely	36	72.00%
	Most often	9	18.00%

Table 9 exhibits that three fourths (76%) of the non vegetarian respondents take coffee/ tea with meals. More than half (54%) of them eat fiber rich foods 3- 5 times weekly. One third (38%) of the non- vegetarian adults take junk foods most often.

Table –10: Factors Related To Cooking Practices
(Non- Vegetarian Adults)

Factors Related To Cooking Practices		N	%
Habit of over cooking vegetables	Never	14	28.00%
	Rarely	27	54.00%
	Most often	9	18.00%
Use of iron vessels for cooking	Never	31	62.00%
	Rarely	14	28.00%
	Most often	5	10.00%
Discarding excess water from cooked vegetables	Never	34	68.00%
	Rarely	16	32.00%
Use of more quantity of water for cooking vegetables	Never	15	30.00%
	Rarely	18	36.00%
	Most often	15	30.00%
	Always	2	4.00%
Washing vegetables after cutting	Never	18	36.00%
	Rarely	19	38.00%
	Most often	13	26.00%

Table 10 shows that majority (62%) of the non vegetarian respondents never use iron vessels for cooking. Nearly one third (30%) of them have the practices of discarding the water used for cooking vegetables.

SECTION – IV

COMPARISON OF FACTORS INFLUENCING ANEMIA AMONG VEGETARIAN AND NON VEGETARIAN ADULTS.

Figure- 5: Factors Related To Dietary Pattern
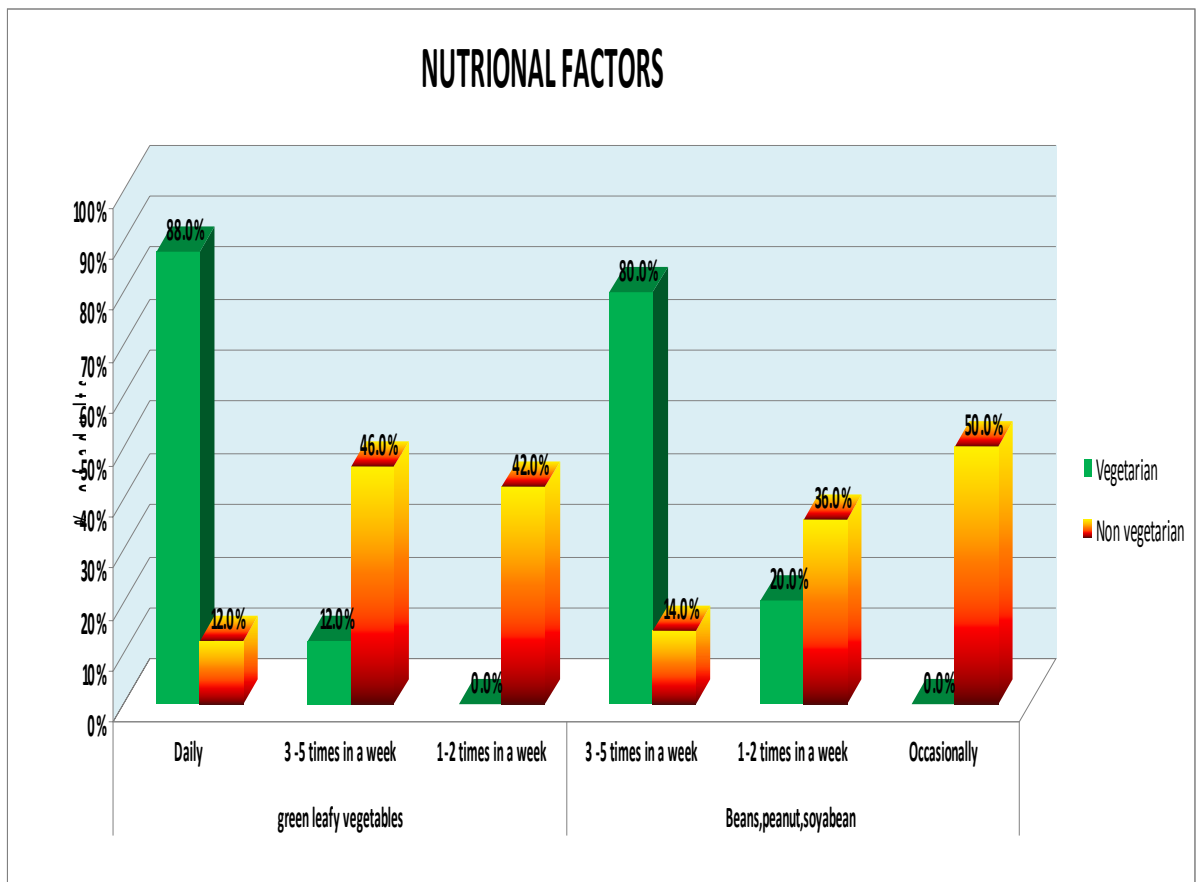
Figure 5 reveals that higher percentage (88%) of the vegetarian anemic adults eat green leafy vegetables whereas only 12% of the non- vegetarian adults eat green leafy vegetables daily (P=0.001). Majority (80%) of the vegetarian adults and only 14% the non- vegetarian take legumes 3- 5 times weekly (P= 0.00). Both the findings are statistically significant. This shows that the intake of iron rich diet is much higher in the vegetarian adults.

Table 11: Factors Related To Inhibition Of absorption Of Iron among Vegetarians and Non Vegetarians

Factors Related To Inhibition Of Iron Absorption		Group				Pearson chi square test
		Vegetarian		Non vegetarian		
		Count	%	Count	%	
Intake of coffee/tea with meals	Never	0	0.0%	3	6.0%	χ2=18.35 P=0.001*** DF=2
	Rarely	13	26.0%	10	20.0%	
	Most often	34	68.0%	19	38.0%	
	Always	3	6.0%	18	36.0%	
Intake of milk in a day	2 times	17	34.0%	6	12.0%	χ2=17.10 P=0.001*** DF=2
	1 time	27	54.0%	20	40.0%	
	Occasionally	6	12.0%	24	48.0%	
Intake of curd	Daily	43	86.0%	14	28.0%	χ2=35.07 P=0.001*** DF=2
	3 -5 times a week	4	8.0%	16	32.0%	
	1 -2 times a week	3	6.0%	14	28.0%	
	Occasionally	0	0.0%	6	12.0%	
Intake of fiber rich diet	Daily	27	54.0%	0	0.0%	χ2=76.65 P=0.001*** DF=2
	3 -5 times a week	12	24.0%	3	6.0%	
	1 -2 times a week	11	22.0%	5	10.0%	
	Occasionally	0	0.0%	42	84.0%	
Intake of junk food	Never	9	18.0%	11	22.0%	χ2=0.25 P=0.85 DF=2
	Rarely	21	42.0%	20	40.0%	
	Most often	20	40.0%	19	38.0%	
Intake of carbonated drinks	Never	2	4.0%	5	10.0%	χ2=5.28 P=0.07 DF=2
	Rarely	45	90.0%	36	72.0%	
	Most often	3	6.0%	9	18.0%	

Table 11 analyses the significant differences between vegetarian and non vegetarian adults in taking coffee/tea with meals, drinking milk in a day and taking fiber rich diet. Majority (68%) of the vegetarian adults take coffee/ tea with meals most often while among non vegetarian adults only 38% of them take coffee/ tea with meals. (P= 0.001)

Among vegetarian adults more than half (54%) of them have the habit of taking milk at least once a day while only 40% of the non- vegetarians take milk once a day. This is significant in the study. (P= 0.001)

Majority of the vegetarian respondents have a daily intake of curd with meals whereas only 28% of the non- vegetarian adults take curd daily with diet. (P= 0.001)

More than half (54%)of the vegetarian adults take fiber rich foods 3-5 times a week while none of the non-vegetarians eat fiber rich diet 3-5 times weekly. (P= 0.001).

Thus the above findings show that the vegetarian adults take an increased amount of the foods that inhibit the absorption of the non-haem iron than the non- vegetarian adults.

Figure 6: Comparison of Factors Related To Cooking Practices between Vegetarian and Non Vegetarian
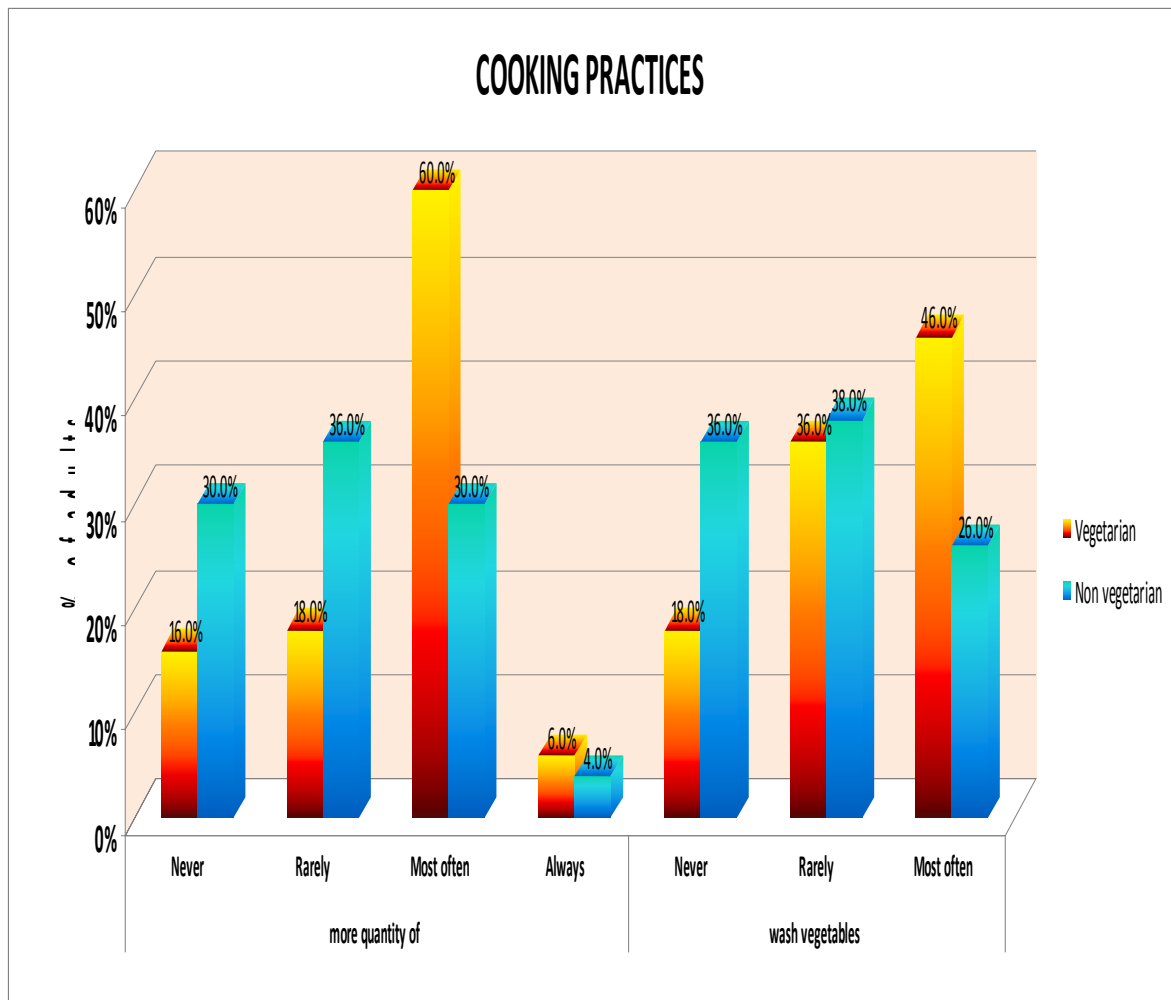
Figure 6 explains that majority (60%) of the vegetarian adults and 30% of the non- vegetarian adults most often use more quantity of water for cooking vegetables (P=0.01). A higher proportion (46%) of the vegetarian respondents and 26% of the non-vegetarian respondents most often wash the vegetables after cutting them (P=0.05). This is statistically significant.

SECTION- V

ASSOCIATION OF THE FACTORS INFLUENCING INCIDENCE OF ANEMIA WITH SELECTED DEMOGRAPHIC VARIABLES AMONG VEGETARIAN ADULTS

Figure- 7: Association between Factors Influencing the Incidence of Anemia and Age (Vegetarian Adults)
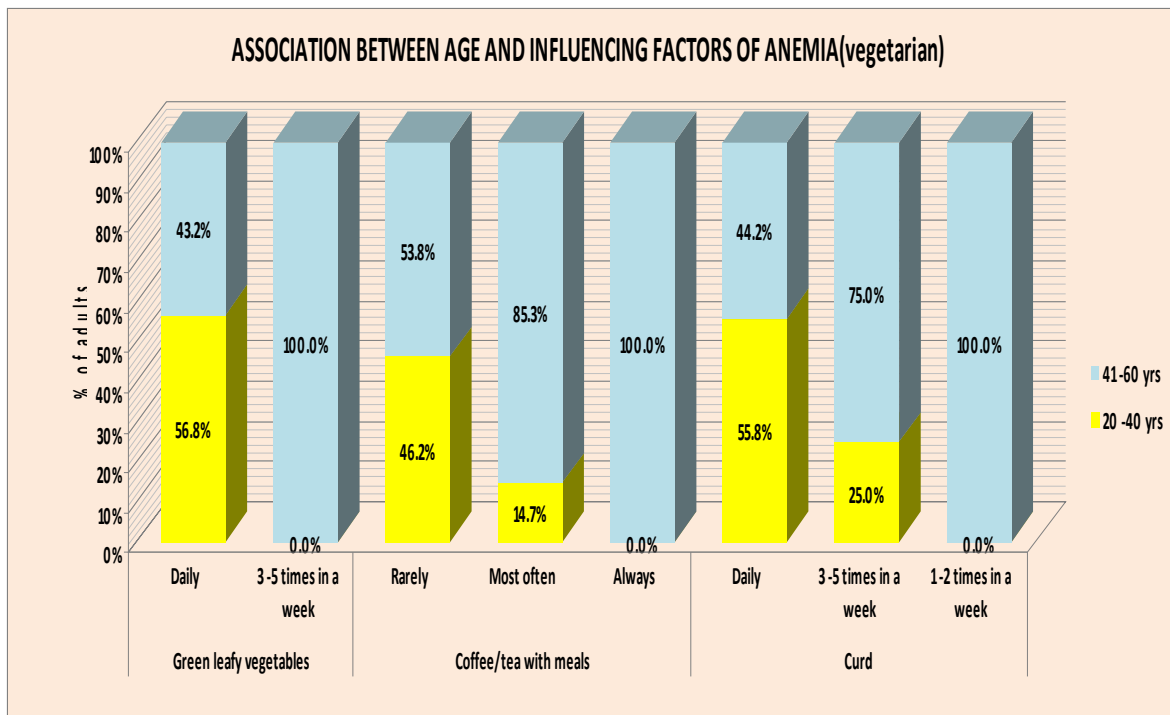
Figure 7 depicts that higher percentage of vegetarian adults of the age group of 20-40 years take green leafy vegetables (P= 0.01) and majority of them take curd daily (P=0.05). Vegetarian adults of the age group 40-60 years always take coffee/tea with food (P=0.02). These findings are statistically significant.

Figure- 12: Association between Factors Influencing the Incidence of

Anemia and Gender (Vegetarian Adults)

Factors		Gender				Total	Pearson chi square test
		Male		Female			
		n	%	n	%		
Intake of legumes	3 -5 times a week	24	60.0%	16	40.0%	40	χ2=8.0 P=0.01** DF=1
	1 -2 times a week	1	10.0%	9	90.0%	10	
Intake of coffee/tea with meals	Rarely	4	30.8%	9	69.2%	13	χ2=5.04 P=0.02* DF=2
	Most often	18	52.9%	16	47.1%	34	
	Always	3	100%	0	0.0%	3	
Intake of milk in a day	2 times	1	5.9%	16	94.1%	17	χ2=20.16P =0.001*** DF=2
	1 time	20	74.1%	7	25.9%	27	
	Occasionally	4	66.7%	2	33.3%	6	
Intake fiber rich diet	3 -5 times a week	8	88.9%	1	11.1%	9	χ2=9.18 P=0.01** DF=2
	1 -2 times a week	10	55.6%	8	44.4%	18	
	Occasionally	7	30.4%	16	69.6%	23	

Table 12 describes the association between the incidence of anemia and gender among the vegetarian anemic adults. The findings reveal that among the females the intake of legumes are more compared to the males (P=0.01). Among the males the inhibition of iron absorption factors such as the intake of coffee/ tea with meals is significantly high (P=0.02). Intake of fiber rich diet more among the females (P=0.01) and intake of milk is also statistically significant (P=0.001).

SECTION-IV

ASSOCIATION OF FACTORS INFLUENCING INCIDENCE OF ANEMIA AMONG NON- VEGETARIAN ADULTS WITH SELECTED DEMOGRAPHIC VARIABLES

Figure 8: Association between Influencing the Incidence of Anemia and Age (Non Vegetarian Adults)
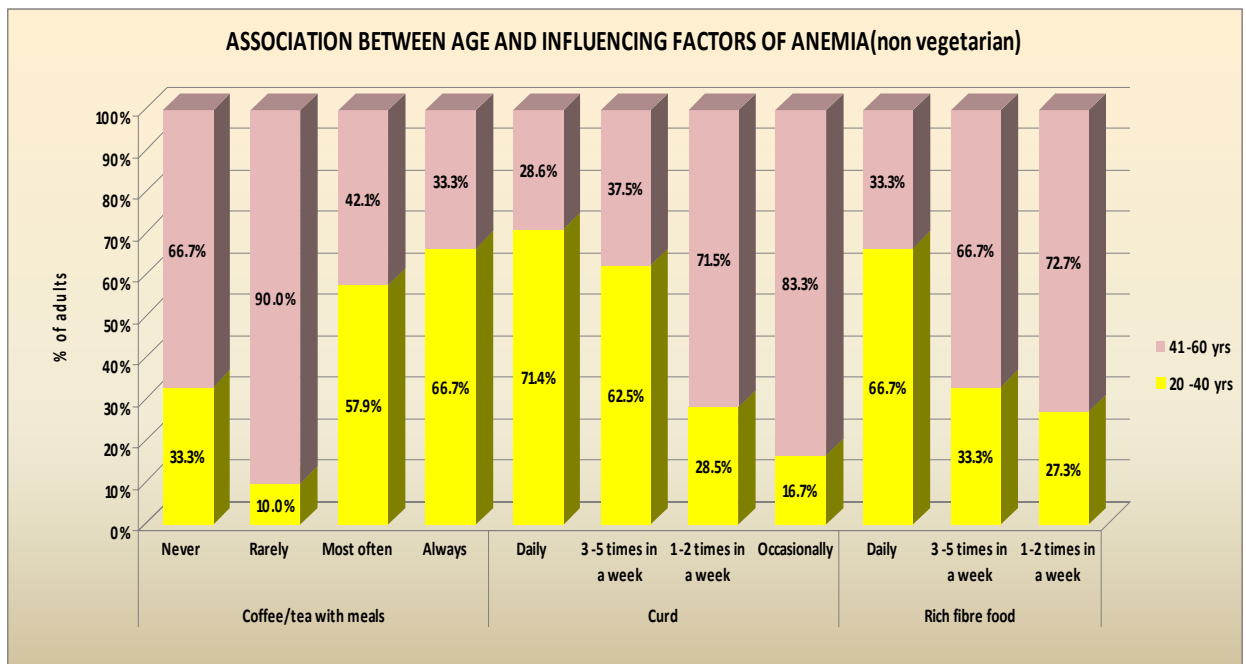
Figure 8 describes the significant differences between 20-40 and 40-60 years non-vegetarian on taking, coffee/tea with meals, taking curd and taking fiber rich diet. More than two- third (66.7%) and nearly three- fourths (71.4%) of the non vegetarian adults between the age group of 20- 40 yrs have the habit of always taking coffee/tea with meals (P=0. 03)and take curd daily (0.03) respectively. The non-vegetarian respondents between the age group of 41- 60 years taking fiber rich diet 3-5 times a week.(P= 0.03)

Figure 13: Association between Factors Influencing the Incidence of Anemia and Age (Non Vegetarian)

| Factors | | Gender | | | | Total | Pearson chi square test |
| | | Female | | Male | | | |
		N	%	N	%		
Intake of green leafy vegetables	Daily	5	83.3%	1	16.7%	6	χ2=6.88P=0.03* DF=1
	3 -5 times a week	12	52.1%	9	47.9%	23	
	1 -2 times a week	6	28.6%	15	71.4%	21	
Intake of legumes	3 -5 times a week	6	85.7%	1	14.3%	7	χ2=7.48P=0.02* DF=1
	1 -2 times a week	5	27.7%	13	72.3%	18	
		14	56.0%	11	44.0%	25	
Intake of coffee/tea	Never	2	33.3%	4	66.7%	6	χ2=8.03P=0.02* DF=1
	Most often	6	30.0%	14	70.0%	20	
	Always	17	70.8%	7	29.2%	24	
Intake of fiber rich diet	Daily	14	51.9%	13	48.1%	27	χ2=7.49P=0.02* DF=1
	3 -5 times a week	9	75.0%	3	25.0%	12	
	1 -2 times a week	2	18.2%	9	81.2%	11	

Table 13 describes the association between the incidence of anemia and gender among the non- vegetarian anemic adults. The findings reveal that among the females the intake of green leafy vegetables and legumes are more when compared to the males (P=0.03) & (P=0.02). Among the males the inhibition of iron absorption factors such as the intake of coffee/tea with meals is significantly high (P=0.02) and the intake of fiber rich diet is more among the females (P=0.02).

CHAPTER- V
DISCUSSION

Over one third of the world's population suffers from anemia, mostly iron deficiency anemia. India continues to be one of the countries with very high prevalence. National Family Health Survey (NFHS) 3 reveals the prevalence of anemia to be 70% in pregnant women and 24% in adult men.

Nutritional anemia has always proved to be a menace in public health. In spite of the preventive and treatment measures taken by the Government, anemia is largely prevalent in the country. The factors related to dietary aspects play a vital role in the incidence of anemia. Anemia is prevalent among both vegetarian and non vegetarian adults. The factors that influence the incidence of anemia among them might look similar but this detailed study and analysis brings out that they are distinct and varied.

The identification of the factors influencing the incidence of anemia among vegetarians and non- vegetarians is beneficial in this busy and dynamic world. This area of research has aimed at finding out the dietary factors which are the reasons for the incidence of anemia among the vegetarian and the non- vegetarian adults to make future plans on the education of the nutritional aspects of food and behavioral aspects of eating related to the prevention of anemia.

DEMOGRAPHIC FINDINGS

The present study reveals that 26% of the vegetarian anemic adults and 30% of the non-vegetarian anemic adults who participated in the study belong to the age group 20 to 30 years. A higher proportion (70%) and (60%) of the respondents among both vegetarian and non vegetarian adults respectively, come from nuclear families.

Half (50%) of the respondents among the vegetarians and about one third (36%) of the non- vegetarians are unskilled workers. 52% and 40% of vegetarian and non-

vegetarian anemic adults respectively belong to the income group of Rs.6570-8750 per month.

All (100%) the vegetarian adults belong to Hinduism whereas nearly half (48%) of the respondents belong to Hinduism among non- vegetarian adults.

About more than half the percentage (56%) of the vegetarian and two- thirds (64%) proportion of the non- vegetarians have normal nutritional status.

THE FIRST OBJECTIVE OF THE STUDY IS TO ASSESS THE FACTORS INFLUENCING INCIDENCE OF ANEMIA AMONG VEGETARIAN ADULTS

Higher percentage 88% of the vegetarian anemic adults has the habit of taking green leafy vegetables daily. Majority (80%) of them take legumes 3 to 5 times a week. The findings show that the vegetarian adults have a good intake of vegetables and legumes which are rich in non-haem iron.

Majority (68%) of the vegetarian adults take coffee/tea with meals. **Virendar et al (2004)** conducted a study among adolescent girls in Ahamadabad city found that adolescent girls take tea or coffee after consumption of food which predisposed anemia. Tannin present in tea hinders the absorption of iron.

More than half (54%) of them have milk once daily. A comparatively higher proportion (86%) of the vegetarian respondents has the habit of taking curd daily. **Linda (2002)** showed that the intake of iron and calcium together decreases the absorption of iron. Iron is best absorbed in the acid medium.

A higher percentage (84%) of them takes fiber rich foods 3- 5 times weekly. **Dutta (1998),** in his study concludes that Indian women consume more carbohydrates in the diet in the form of rice. Carbohydrate contains high phosphates and phytic acid, which results in the formation of insoluble iron thereby the absorption of iron present in the diet, is distorted.

Majority (92%) of the vegetarian respondents take vitamin C rich foods occasionally. This shows that the vegetarian adults do not concentrate on the intake of vitamin C which is essential for the absorption of iron. Manju B Reddy (2007) conducted a study to identify the Effect of ascorbic acid intake on non haem iron absorption from a complete diet. When absorption values were adjusted for differences in iron status and the 3 absorption periods were pooled, multiple regression analysis indicated that iron absorption correlated with ascorbic acid ($P = 0.0005$). Found that the absorption of non-haem iron requires vitamin C.

Though the vegetarian adults take iron rich foods, the intake of factors that inhibit the absorption of the non- haem iron is proved to be very high among them. The iron absorption factor like vitamin C is much less among the vegetarian

Nearly two third (60%) of the vegetarian adults have the habit of using large quantity of water for cooking vegetables. 23 of them out of 50 had the practice of washing the vegetables after cutting.

THE SECOND OBJECTIVE OF THE STUDY IS TO ASSESS THE FACTORS INFLUENCING INCIDENCE OF ANEMIA AMONG THE NON- VEGETARIAN ADULTS.

More than three fourths (80%) of them take red meat 1-2 times a week. More than half (56%) of the vegetarians take fish occasionally. **Temme (2000)** conducted a study which shows that iron deficiency anemia to a great extent is caused by iron absorption from the diet. Several factors can influence absorption of iron. Absorption enhancing factors are ascorbic acid, meat, fish and poultry

Three fourths (76%) of the non vegetarian respondents take coffee/ tea with meals.

Majority (62%) of the non vegetarian respondents never use iron vessels for cooking. **Mustapha R.A. et al (2010),** conducted a study to evaluate the effect of cooking utensils on iron content. Results show that the cooking utensils reduced or increased the level of iron in some of the food samples. The Iron content of the food sample cooked in cast Iron pot is increased when compared to the sample of all staple

foods cooked in clay and stainless steel pot. Good iron cooking utensil will go a long way to conserve iron loss during cooking and thereby reducing the iron deficiency anemia among the various vulnerable groups in the population.

THE THIRD OBJECTIVE OF THE STUDY IS TO COMPARE THE FACTORS INFLUENCING THE INCIDENCE OF ANEMIA AMONG VEGETARIAN AND NON- VEGETARIAN ADULTS.

A higher percentage (88%) of the vegetarian anemic adults eats green leafy vegetables, whereas only 12% of the non- vegetarian adults eat green leafy vegetables. A majority (80%) of the vegetarian adults and only 14% of the non- vegetarians take legumes 3- 5 times weekly.

Two- thirds (68%) of the vegetarian adults take coffee/ tea with meals most often while among non vegetarian adults only 38% of them take coffee/ tea with meals. **Bothwell (1998)** identified that about one-quarter of the iron in haem proteins is absorbed regardless of the other components in the diet, while non haem iron absorption is subject to the interplay of the promoting and the inhibiting substances in the diet. Thus enhancers of non-haem iron absorption are chiefly meat and ascorbic acid, while diets in which inhibitors, such as polyphenols and phytates predominate are poor sources of iron.

Among vegetarian adults more than half (54%) of them have the habit of taking milk at least once in a day while only 40% of the non- vegetarians take milk once in a day. This is significant in the study. Majority of the vegetarian respondents take curd with meals daily whereas only 28% of the non- vegetarian adults take curd daily with diet.

More than half (54%)of the vegetarian adults take fiber rich foods 3to5 times a week while none of the non-vegetarians eat fiber rich diet 3-5 times weekly. **Nair et al (2002)** conducted repeated surveys which show that the magnitude of nutritional anemia is of public health concern in India. In India increased cereals and millets form the bulk of the dietary intake and are major sources of non- haem iron. It is now well established that iron bioavailability from habitual Indian diets is low due to high phytates and low ascorbic acid.

Majority (60%) of the vegetarian adults and 30% of the non- vegetarian adults most often use more quantity of water for cooking vegetables (P=0.01). Higher proportion (46%) of the vegetarian respondents and 26% of the non- vegetarian respondents most often wash the vegetables after cutting them (P=0.05). This is statistically significant.

Thus the findings reveal that the vegetarian adults have the habit of taking green leafy vegetables which is a good practice but the intake of foods that inhibit iron absorption is high, that is observed to be an important factor that influence the incidence of anemia. Another important factor identified is the minimal importance given to the intake of Vitamin C in the diet.

THE FOURTH OBJECTIVE OF THE PRESENT STUDY IS TO ASSOCIATE THE FACTORS INFLUENCING THE INCIDENCE OF ANEMIA AMONG VEGETARIAN ADULTS WITH SELECTED DEMOGRAPHIC VARIABLES.

Nearly three- fourths (71.4%) of the non vegetarian adults between the age group of 20- 40 yrs have the habit of always taking coffee/ tea with meals . **Hurrell et al** identified that all beverages reduced iron absorption depending on the content of total polyphenols, with the inhibition of black tea the greatest at 79–94%. Amounts of only 20 mg polyphenols from black tea per meal reduced iron absorption by as much as 66%.This is because of the higher content of galloyl esters in black tea.

The non-vegetarian respondents between the age group of 41- 60 years taking fiber rich diet 3-5 times a week. More than half percentage (56.8%) of the vegetarian respondents under the age group of 20- 40 years and 43.2% under the age group of 40- 60 years take green leafy vegetables daily.

THE FIFTH OBJECTIVE OF THE STUDY IS TO ASSOCIATE THE FACTORS INFLUENCING THE INCIDENCE OF ANEMIA AMONG NON-VEGETARIAN ADULTS WITH SELECTED DEMOGRAPHIC VARIABLES.

More than two- third (66.7%) and nearly three- fourth (71.4%) of the non vegetarian adults between the age group of 20- 40 yrs have the habit of always taking coffee/ tea with meals and take curd daily respectively. The non-vegetarian respondents between the age group of 41- 60 years taking fiber rich diet 3-5 times a week.

M BRUNE studied regarding calcium: effect of different amounts on nonheme- and heme-iron absorption in humans. Results showed that effect of calcium is related to the mucosal transfer of iron. The observed marked inhibitory effect on iron absorption of calcium in amounts frequently encountered in normal meals has important nutritional implications.

The association between the incidence of anemia and gender among the non-vegetarian anemic adults. The findings reveal that among the females the intake of green leafy vegetables and legumes are more when compared to the males (P=0.03) & (P=0.02). Among the males the inhibition of iron absorption factors such as the intake of coffee/tea with meals is significantly high (P=0.02) and the intake of fiber rich diet is more among the females (P=0.02).

CHAPTER – VI

SUMMARY, CONCLUSION AND RECOMMENDATIONS

In this chapter the summary of the study, the implications for nursing practice, nursing education, nursing research and recommendations are presented.

Anemia, which is mainly the result of iron deficiency, afflicts an estimated two billion people worldwide and it primarily affects women. . In India, the prevalence of anemia is almost universal. This study was carried out to determine the factors influencing the incidence of anemia among the vegetarian and non vegetarian adults.

A formal permission was obtained from the medical officers from Choolai to conduct the study. The data was collected with the help of the structured questionnaire method for a period of four weeks from 29.08.2011 to 29.09.2011. The samples were selected by simple random sampling technique using lottery method based on the inclusion criteria. It took about 30 minutes to collect the data from each sample.

The conceptual framework developed for this study was modified Rosen stock's Health belief Model. This model helped the investigator in approaching the problem of incidence of anemia among the vegetarian and non- vegetarian adults. The review of related literature facilitated the investigator in the preparation of the conceptual model, tool and methodology of the study. A descriptive survey approach was utilized to achieve the overall purpose.

A pilot study was conducted in the month of March from 21.03.2011 to 25.03.2011 for one week. Practicability and feasibility of the instrument was checked. No difficulty was faced by the investigator while conducting the study and all the clients cooperated well with the investigator.

Then the main study was conducted on 100 anemic adults among them 50 were vegetarian anemic adults and 50 were non- vegetarian adults. The data was collected through the structured interview schedule.

The investigator found that the dietary factors, factors related to inhibition of the iron absorption and cooking practices lead to the anemia among the study respondents.

MAJOR FINDINGS OF THE STUDY

❖ Higher proportion (70%) and (60%) of the respondents comes from nuclear family among both vegetarian and non vegetarian adults respectively.

❖ Half (50%) of the respondents among the vegetarians and about one third (36%) of the non- vegetarians are unskilled workers

❖ 52% and 40% of vegetarian and non- vegetarian anemic adults respectively belong to the income group of Rs. 6570-8750 per month.

❖ All (100%) the vegetarian adults belong to Hinduism whereas nearly half (48%) of the respondents belong to Hinduism among non- vegetarian adults.

❖ About more than half percentage (56%) of the vegetarian and two- third (64%) proportion of the non- vegetarian have normal nutritional status.

❖ More than three fourth (80%) of them take red meat 1-2 times a week. More than half (56%) of the vegetarians take fish occasionally.

❖ A higher percentage (88%) of the vegetarian anemic adults eats green leafy vegetables whereas only 12% of the non- vegetarian adults eat green leafy vegetables.

❖ Majority (80%) of the vegetarian adults and only 14% the non- vegetarians take legumes 3- 5 times weekly.

❖ Two- thirds (68%) of the vegetarian adults take coffee/ tea with meals most often while among non vegetarian adults, only 38% of them take coffee/ tea with meals.

❖ Among vegetarian adults more than half (54%) of them have the habit of taking milk at least once in a day while only 40% of the non- vegetarians take milk once in a day.

❖ Majority of the vegetarian respondents take curd everyday with meals whereas only 28% of the non- vegetarian adults take curd daily with diet.

❖ More than half (54%)of the vegetarian adults take fiber rich foods 3-5 times a week while none of the non-vegetarians eat fiber rich diet 3-5 times weekly.

❖ Nearly three- fourths (71.4%) of the non vegetarian adults between the age group of 20- 40 yrs have the habit of always taking coffee/ tea with meals.

NURSING IMPLICATIONS

The findings of the study have certain implications for the Nursing Service, Nursing Education, Nursing Administration and Nursing Research.

NURSING SERVICE

❖ The community health nurse working with the anemic clients should provide door step help and information for the public, identify the needs of the population and help them to maintain good health.

❖ The community health nurse should provide health education on the promotion of healthy eating practices and cooking practices among the public.

❖ The community health nurse should provide information regarding anemia and its prevention.

❖ Anemia screening programmes should be conducted frequently in the area.

❖ Vegetarian adults should be educated regarding the importance of properly planned diet to avoid anemia.

NURSING ADMINISTRATION

❖ The health administration of nursing at the national, state, district, institutional and local level should focus their attention on making the public conscious about the prevention of anemia

❖ The nurse administrator should take an active role in planning, organizing and implementing the control programme specific to a single disease.

❖ The nurse administrator should arrange training and appropriate facilities to frequently conduct screening programmes to identify the prevalence of anemia.

❖ The nurse administrator should motivate the students to learn the skill of testing the level of hemoglobin for all the people in the community at their residence.

NURSING EDUCATION

❖ Education regarding the promotion of nutritional care to be intensified, considering the ever- increasing prevalence of diet related chronic diseases.

❖ The students should learn the skill of testing the level of hemoglobin for all the people in the community at their residence.

NURSING RESEARCH

❖ The present study provides an insight over the factors which lead to the incidence of anemia among the vegetarian and non- vegetarian adults which is helpful in the evidence based activity in the future.

❖ Nursing researcher can encourage the community health nurses to apply the research findings in educating the public regarding the prevention of anemia.

RECOMMENDATIONS

❖ A comparative study is to be conducted among the rural and urban population

❖ A similar study may be done with a larger population.

❖ A similar study can be conducted at various areas in Chennai

❖ A study can be conducted to assess the knowledge regarding the factors influencing the incidence of anemia among the vegetarian and non- vegetarian adults.

❖ A study can be conducted to assess the factors influencing incidence of anemia among the adolescent girls.

CONCLUSION

The factors related to the incidence of anemia among the vegetarian and non-vegetarian adults was focused in this study was towards the dietary aspects. The promotion of good nutritional care has to be intensified, considering the ever increasing prevalence of diet related chronic disease like anemia. The promotion of healthy eating usually focuses on providing education on nutritional aspects of food, the behavioral aspects of cooking and eating. Thus, this study emphasizes that following proper selection of foods, planned healthy eating, avoiding the factors that inhibit the absorption of iron, adopting healthy cooking practices to avoid loss of nutrients while cooking and actual behaviour change in an individual.

BIBLIOGRAPHY

BOOKS

1. Allender, Spradely. (2004), **Community Health Nursing**, Fifth Edition. Lippincott.

2. Basavanthappa.B.T. (1998). **Community Health Nursing**. First Edition. Jaypee Brothers. New Delhi.

3. Burns N, Grove SK. (2001). **The practice of Nursing Research**. 4th Ed. Philadelphia: WB Saunders Publication.

4. Clark Mary. (1999). **Community Health Nursing Handbook**. First Edition. Appleton and Lange. USA.

5. George B. Julia, **Nursing Theories- The base for professional Nursing Practice,** 3rd ed. Norwalk, Appleton and Lange.

6. Gupta,S.P. (1991), **Statistical methods**. New Delhi: Sultan Chand Publication.

7. Jarvis Linda. (1985). **Community Health Nursing- Keeping The Public Healthy.** Second Edition.

8. Marica Stanhope Lancaster, (1992), **Community Health Nursing**, London, Mosby

9. Polit DF, Hungler BP. (1998**). Nursing Research: Principles and Methods**. Philadelphia: JB Lippincott Company.

10. Polit. F.D. and Beck C.T. (2004), **Nursing Research: Principles and Method,** Philadelphia, Lippincott Williams and Wilkins.

11. Potter A.P. Perry G.A. (2003). **Basic Nursing Essentials For Practice**. St. Louis, Mosby.

12. Treece JW, Treece EW. (1982). **Elements of Research in Nursing** 3rd Ed. St. Louis: Mosby.

JOURNALS

1. Anderson BM, (2002): **The Iron Status Of Long- Term Vegetarian Women**. American Journal of Clinical Nutrition 34: 1042-1048.

2. Baines S (2007): **How does the Health and Well- being of Young Australian Vegetarian and Semi- vegetarian women Compare with Non- vegetarians? Public Health Nutrition.** May; 10(5):436-42.

3. Bhaskaram P. **Immunobiology of mild micronutrient deficiencies**. Br J Nutr 2001; 85:S75-80.

4. Chaturvedi S, **Nutrient intake amongst adolescent girls belonging to poor socio-economic group of rural area of Rajasthan.** Indian Pediatr 1998; 33: 197-201.

5. Cheng YJ (1991): **Iron in Food: Effect of Continued use in Iron Cookware. Journal of Food Sciences**. 56(2): 584-585.

6. Craig WJ (2010): **Nutrition Concerns and Health Effects of Vegetarian Diets. Nutrition Clinical Practice.** December; 25(6):613-20.

7. Davidsson L. **Approaches to improve iron bioavailability from complementary foods.** J Nutr 2003; 133:1560S-2S.

8. Geerling, P.P., (2003): **Effects of Hemoglobin on the use iron cooking pots in rural Malawian household in an area with high malaria prevalence: a randomized trial**. J of trop Med. Int. Health 8(4):310-315.

9. Haas JD, Brownlie T 4th**. Iron deficiency and reduced work capacity: a critical review of the research to determine a causal relationship**. J Nutr 2001; 131:691S-6S.

10. Hallberg L (2001**): Bioavailability of dietary iron in man. Annual Review of Nutrition** 1: 123-147.

11. Hallberg L**, Iorn absorption from the whole diet in men: how effective is the regulation of iron absorption?** Am J Clin Nutr 1997; 66:347-56.

12. Harvey LJ (2005): **Impact of Diet on Iron Deficiency among Women in UK. British Journal of Nutrition**. October; 94(4):557-64.

13. Helman AD (2003): **Vitamin and iron status in new vegetarians. American Journal of Clinical Nutrition** 45:785-789.

14. Hercberg S (2001): **Iron Deficiency. Public Health Nutrition**. April; 4(28):537-45

15. Hinnerdal B (2009): **Soybean Ferritin: Implications for Iron Status of Vegetarians. American Journal of Clinical Nutrition**. May; 89(5):1680S- 1685S.

16. Kennedy, G. et al, (2003): **The Scourge of "Hidden Hunger". Global dimension of micronutrient deficiencies. Food Nutrition and Agriculture**. No 32, pp 8-14.

17. Killip S (2007): **Iron Deficiency Anemia. American Family Physician**. March1; 75(5):671-8.

18. Kwok T (2002): **Independent effect of Vitamin B12 Deficiency on Hematological Status in older Chinese Vegetarian Women**. American Journal of Hematology. July; 70(3):186-90.

19. Latham MC. **Human nutrition in the developing world**: FAO, 1997: 147-55.

20. Latta D and Liebman M (2004): Iron **and zinc status of vegetarian and non vegetarian males**. Nutr Rep Int 30:141-149.

21. Lee Y (2011): **The Nutritional Status of Iron, Folate and Vitamin B12 of Buddhist Vegetarians.**

22. Mangels AR (2009): **Position of the American Dietetic Association: Vegetarian Diets.** Journal of American Dietetic Association. July; 109(7): 1266-82.

23. Miller JL (2008): **Individualized Treatment for Iron Deficiency Anemia in Adults.** American Journal of Medicine. November: 112(1):201-7.

24. Miret S, Simpson RJ, McKie AT. **Physiology and molecular biology of dietary iron absorption.** Annu Rev Nutr 2003; 23:283-301.

25. Mustapha RA (2010): **Effect of Cooking Utensils on Iron Content of Four Staple Foods in Nigeria:** Journal of Research in National Development. June 8(1): 456-67.

26. Rossander L**. Absorption of iron from breakfast meals**. Am J of Clin Nutr; 32: 2484-9.

27. Uzel C **Absorption of heme iron**. Semin Hematol 1998; 35:27-34.

28. Venderley AM (2006): **Vegetarian Diets: Nutritional Considerations in Athletes.** Sports Medicine; 36(4):293-305.

29. Verma M, Chhatwal J, Karu G**. Prevalence of anaemia among urban school children of Punjab.** Indian Pediatr 1998; 35: 1181-6.

30. Waldmann A (2004): **Dietary Iron Status of German Female Vegans: Results of the German Vegan Study.** Annual Nutrition Metabolism 48(2): 103-8.

31. World Health Organization. Nutrition anemia**: report of a WHO scientific group.** Geneva: WHO, 1968.

32. Yen CE (2008): **Dietary intake and Nutritional Status of Vegetarian and Omnivorous Preschool Children and their Parents in Taiwan.** Nutrition Res. July; 28(7):430-6.

NET SOURCES

1. http://www.globalforumhealth.

2. http://www.pubmed.org

3. http://www.health gov/dietaryguidelines

4. http://www.pyramid.gov

5. http://www.medline.com

6. http://www.statehealthfacts.org

7. http://www.who.com

8. http://www.google.com

9. http://www.yahoo.com

10. http://www.sciencedirect.com

11. http://www.anemia.org.

12. http://www.nhlbi.nib.gov

13. http://www.irondisorders.org

QUESTIONNAIRE
PART – I
DEMOGRAPHIC PROFILE

1. Age in years
   a) 20-25   [   ]
   b) 26-30   [   ]
   c) 31-35   [   ]
   d) 36-40   [   ]
   e) Above 40   [   ]

2. Gender
   a) Male   [   ]
   b) Female   [   ]

3. Type of family
   a) Nuclear   [   ]
   b) Joint family   [   ]

4. Food pattern
   a) Vegetarian   [   ]
   b) Non – Vegetarian   [   ]

5. Occupation of the participant
   a) Unemployed   [   ]
   b) Skilled worker   [   ]
   c) Unskilled worker   [   ]
   d) Professional   [   ]

6. Family Income per month(Rupees)

    a) >17520   [   ]

    b) 8760- 17515   [   ]

    c) 6570- 8750   [   ]

    d) 4380- 6560   [   ]

    e) 2628- 4370   [   ]

    f) 885-2620   [   ]

    g) <876   [   ]

7. Religion

    a) Hindu   [   ]

    b) Christian   [   ]

    c) Muslim   [   ]

    d) Others   [   ]

8. Educational status

    a) Non – Formal Education   [   ]

    b) Primary Education   [   ]

    c) Secondary Education   [   ]

    d) Higher Secondary Education   [   ]

    e) Graduate   [   ]

9. Acquired source of information on rich foods

    a) Relatives   [   ]

    b) Friends   [   ]

    c) Mass media   [   ]

    d) Health professional   [   ]

    e) None   [   ]

10. Nutritional status according to BMI

    a) Normal   [   ]

    b) Under Nourished   [   ]

    c) Obese   [   ]

    d) Morbidly Obese   [   ]

PART- II

ANEMIA ASSESSMENT SCALE

1. Value of hemoglobin in the blood
   a) 6- 8 mg/dl   [   ]
   b) 8- 10 mg/dl   [   ]
   c) 10- 12 mg/dl   [   ]

2. Minutes of capillary refill
   a) < 2   [   ]
   b) 3   [   ]
   c) 4   [   ]

3. Signs of pallor
   a) Palms   [   ]
   b) Conjunctiva   [   ]
   c) Nail beds   [   ]
   d) Lips   [   ]
   e) Gums   [   ]

4. How often do you feel fatigue or tired?
   a) Always   [   ]
   b) Occasionally   [   ]
   c) Never   [   ]

5. Do you feel fatigue or tired?
   a) Yes   [   ]
   b) No   [   ]
   If yes

   When do you have shortness of breath?
   a) While walking   [   ]
   b) Performing strenuous work   [   ]
   c) Occasionally   [   ]
   d) Always   [   ]

PART- III

A) FACTORS RELATED TO NUTRITION

A/1a .*Factors related to vegetarian dietary pattern*

1. How often do you take green leafy vegetables?

   a) Daily   [   ]

   b) 3-5 times in a week   [   ]

   c) 1-2 times in a week   [   ]

   d) Occasionally   [   ]

2. How often do you take sprouted cereals?

   a) Daily   [   ]

   b) 3-5 times in a week   [   ]

   c) 1-2 times in a week   [   ]

   d) Occasionally   [   ]

3. How often do you take any one of these citrus fruits like lemon, sweet lime, oranges etc?

   a) Daily   [   ]

   b) 3-5 times in a week   [   ]

   c) 1-2 times in a week   [   ]

   d) Occasionally   [   ]

4. How often do you take any one of these legumes like peanuts, beans, lentils, peas, soybeans in your diet?

   a) Daily   [   ]

   b) 3-5 times in a week   [   ]

   c) 1-2 times in a week   [   ]

   d) Occasionally   [   ]

5. How often do you take dried fruits?

    a) Daily   [   ]

    b) 3-5 times in a week   [   ]

    c) 1-2 times in a week   [   ]

    d) Occasionally   [   ]

6. How often do you take roasted nuts and seeds?

    a) Daily   [   ]

    b) 3-5 times in a week   [   ]

    c) 1-2 times in a week   [   ]

    d) Occasionally   [   ]

A/1a .*Factors related to Non- vegetarian dietary pattern*

1. How often do you include fish in your diet?

    a) Once in a week   [   ]

    b) Twice in a week   [   ]

    c) Thrice in a week   [   ]

    d) Occasionally   [   ]

2. How often do you take red meat?

    a) Once in a week   [   ]

    b) Twice in a week   [   ]

    c) Thrice in a week   [   ]

    d) Occasionally   [   ]

3. How often do you take eggs?
   a) Daily   [   ]
   b) 3-5 times in a week   [   ]
   c) 1-2 times in a week   [   ]
   d) Occasionally   [   ]

4. How often do you take liver?
   a) Once in a week   [   ]
   b) Twice in a week   [   ]
   c) Thrice in a week   [   ]
   d) Occasionally   [   ]

B) FACTORS INHIBITING IRON ABSORPTION

1. How often do you take coffee/ tea with meals?
   a) Never   [   ]
   b) Rarely   [   ]
   c) Most often   [   ]
   d) Always   [   ]

2. How often do you drink milk in a day?
   a) 3 times   [   ]
   b) 2 times   [   ]
   c) 1 time   [   ]
   d) Occasionally   [   ]

3. How often do you take curd?
   a) Daily   [   ]
   b) 3-5 times in a week   [   ]
   c) 1-2 times in a week   [   ]
   d) Occasionally   [   ]

4. How often do you take fiber rich diet?

    a) Daily   [   ]

    b) 3-5 times in a week   [   ]

    c) 1-2 times in a week   [   ]

    d) Occasionally   [   ]

5. How often do you take junk foods?

    a) Never   [   ]

    b) Rarely   [   ]

    c) Most often   [   ]

    d) Always   [   ]

6. How often do you take carbonated drinks?

    a) Never   [   ]

    b) Rarely   [   ]

    c) Most often   [   ]

    d) Always   [   ]

C) FACTORS RELATED TO COOKING PRACTICES

1. Do you have the practice of over cooking vegetables?

    a) Never   [   ]

    b) Rarely   [   ]

    c) Most often   [   ]

    d) Always   [   ]

2. Do you use iron vessels for cooking?

    a) Never   [   ]

    b) Rarely   [   ]

    c) Most often   [   ]

    d) Always   [   ]

3. Do you discard excess water from cooked vegetables?

    a) Never   [   ]

    b) Rarely   [   ]

    c) Always   [   ]

4. Do you use more quantity of water for cooking vegetables?

    a) Never   [   ]

    b) Rarely   [   ]

    c) Most often   [   ]

    d) Always   [   ]

5. Do you wash vegetables after cutting?

    a) Never   [   ]

    b) Rarely   [   ]

    c) Most often   [   ]

    d) Always   [   ]

Y¥YûUdLlThP úSoLôQp úLs®L°u ùRôÏl×
TÏ§ - I
®TWeLs VôÜm EeLû[Tt±VÕ ùR°YôL GÝRÜm
ùUô¯ Y¯ - Rªr

N¬Vô] ®ûPL°p (✔) ùNnVÜm

1) YVÕ
    A) 20 ØRp 30 YVÕ YûW   ( )
    B) 31 ØRp 40 YVÕ YûW   ( )
    C) 41 ØRp 50 YVÕ YûW   ( )
    D) 51 ØRp 60 YVÕ YûW   ( )

2) Tô-]m
    A) Bi   ( )
    B) ùTi   ( )

3) ÏÓmT YûL
    A) R²dÏÓmTm   ( )
    B) áhÓdÏÓmTm   ( )

4) EQÜ Øû\
    A) ûNYm   ( )
    B) AûNYm   ( )

5) T¦ ®YWm
    A) úYûX CpXôRYo   ( )
    C) ûL®û]Oo   ( )
    B) á- úYûX   ( )
    D) ùRô¯ p Õû\   ( )

6) UôR YÚUô]m
    A) ì. 17,520   ( )
    B) ì. 8,760 ØRp ì. 17,515 YûW   ( )
    C) ì. 6,570 ØRp ì. 8,750   ( )
    D) ì. 4380 ØRp 6560 YûW   ( )
    E) ì. 2628 ØRp ì. 4370 YûW **( )**
    F) ì. 885 YûW   ( )

7) URm
   A) CkÕ ( )
   B) ¡±vRYo ( )
   C) Øv-m ( )
   D) Ut\ûY Ï±l©PÜm _____

8) Lp®jRÏ§
   A) T¥dLôRYo ( )
   B) BWmTdLp® ( )
   C) EVo¨ûXdLp® ( )
   D) úUp ¨ûXdLp® ( )
   E) ThPIT¥l× ( )

9) CÚm× NjÕ ªÏkR EQÜ YûLLs Tt±V RLYpLs EeLÞdÏ ùLôÓlTÕ
   Vôo?
   A) E\®]oLs ( )
   B) SiToLs ( )
   C) FPLm ( )
   D) EPpSX T¦Vô[oLs ( )

10) EPp TÚU¨ûX
    A) N¬Vô] ¨ûX ( )
    B) ùU-kR ¨ûX ( )
    C) TÚU]ô] ¨ûX ( )
    D) ªLÜm TÚU]ô] ¨ûX ( )

TÏ§ - II
CWjR úNôûLûV T¬úNô§dÏm A[ÜúLôs

1) CWjRj§p aøúUô Ïú[ô©u A[Ü
   A) 6 ª.¡. ØRp 8 ª.¡. YûW ( )
   B) 8 ª.¡. ØRp 10 ª.¡. YûW ( )
   C) 10 ª.¡. ØRp 12 ª.¡. YûW ( )

2) Öi¦V CWjR ÏZônLs ¨Wm×m úSWm
   A) 2 ¨ªPeLs ( )
   B) 3 ¨ªPeLs ( )

C) 4 ¨ªPeLs   ( )

3)   ùY°o¨\ A±Ï±
     A) Es[eûL   ( )
     B) Li§û\   ( )
     C) SLeLs   ( )
     D) ERÓLs   ( )
     E) DßLs   ( )

4)   GlùTôÝùRpXôm EPp úNôoYôn EQoÅoLs
     A) GlùTôÝÕm   ( )
     B) GlùTôÝRôYÕ   ( )
     C) JÚ úTôÕm CpûX   ( )

5)   EeLÞdÏ êfÑ ®ÓY§p £WUm EiPô ?
     A) Bm   ( )
     B) CpûX   ( )

6)   Bm Gu\ôp GlùTôÝùRpXôm êfÑ®ÓY§p £WUm HtTÓ¡\Õ?
     A) SPdÏm ùTôÝÕ   ( )
     B) L¥]Uô] úYûX ùNnÙm ùTôÝÕ   ( )
     C) GlùTôÝRôYÕ   ( )
     C) GlùTôÝÕm   ( )

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TÏ§ - III
EQÜ NôokR LôW¦Ls
A) ûNY EQÜ Øû\«u LôW¦Ls

</div>

1)   GjRû] Øû\ TfûN LônL±Ls EiÅoLs ?
     A) §]Øm   ( )
     B) YôWj§p 3 ØRp 5 Øû\   ( )
     C) YôWj§p 1 ØRp 2 Øû\   ( )
     D) GlùTôÝRôYÕ   ( )

2)   GjRû] Øû\ Øû[Lh¥] Rô²VeLû[EiÅoLs ?
     A) §]Øm   ( )
     B) YôWj§p 3 ØRp 5 Øû\   ( )
     C) YôWj§p 1 ØRp 2 Øû\   ( )
     D) GlùTôÝRôYÕ   ( )

3)   GjRû] Øû\ ûYhPªu £ ¨û\kR TZYûLLs EiÀoLs ?
     A) §]Øm   ( )
     B) YôWj§p 3 ØRp 5 Øû\   ( )
     C) YôWj§p 1 ØRp 2 Øû\   ( )
     D) GlùTôÝRôYÕ

4)   GjRû] Øû\ T«ß YûLLs EiÀoLs ?
     A) §]Øm   ( )
     B) YôWj§p 3 ØRp 5 Øû\   ( )
     C) YôWj§p 1 ØRp 2 Øû\   ( )
     D) GlùTôÝRôYÕ   ( )

5)   GjRû] Øû\ EXokR TZeLs EiÀoLs ?
     A) §]Øm   ( )
     B) YôWj§p 3 ØRp 5 Øû\   ( )
     C) YôWj§p 1 ØRp 2 Øû\   ( )
     D) GlùTôÝRôYÕ   ( )

6)   GjRû] Øû\ YÚjR ®ûRLs (A) ùLôhûP YûLLs EiÀoLs ?
     A) §]Øm   ( )
     B) YôWj§p 3 ØRp 5 Øû\   ( )
     C) YôWj§p 1 ØRp 2 Øû\   ( )
     D) GlùTôÝRôYÕ   ( )

B) AûNY EQÜ Øû\«u LôW¦Ls

1)   GjRû] Øû\ Áu Nôl©ÓÅoLs ?
     A) YôWj§p JÚ Øû\   ( )
     B) YôWj§p CWiÓ Øû\   ( )
     C) YôWj§p êuß Øû\   ( )
     D) GlùTôÝRôYÕ   ( )

2)   GjRû] Øû\ UôªN YûLLs EQ®p úNolÀoLs ?
     A) YôWj§p JÚ Øû\   ( )
     B) YôWj§p CWiÓ Øû\   ( )
     C) YôWj§p êuß Øû\   ( )
     D) GlùTôÝRôYÕ   ( )

3)   GjRû] Øû\ ØhûP Nôl©ÓÅoLs ?
     A) §]Øm   ( )
     B) YôWj§p 3 ØRp 5 Øû\   ( )
     C) YôWj§p 1 ØRp 2 Øû\   ( )

D) GlùTôÝRôYÕ   ( )

4)   GjRû] Øû\ LpÄWp Nôl©ÓÅoLs ?
     A) YôWj§p JÚ Øû\   ( )
     B) YôWj§p CWiÓ Øû\   ( )
     C) YôWj§p êuß Øû\   ( )
     D) GlùTôÝRôYÕ   ( )

C) CÚm×NjÕ CWjRj§p E±gÑm RuûUûV RÓdÏm LôW¦Ls

1)   GjRû] Øû\ ÏZm© ApXÕ úR¿ûW EQÜPu úNojÕ ùLôsÅoLs?
     A) GlùTôÝÕm CpûX   ( )
     B) GlùTôÝRôYÕ   ( )
     C) A¥dL¥   ( )
     D) GlùTôÝÕm   ( )
2)   §]Øm GjRû] Øû\ Tôp Ï¥lÀoLs ?
     A) 3 Øû\   ( )
     B) 2 Øû\   ( )
     C) 1 Øû\   ( )
     D) GlùTôÝRôYÕ   ( )

3)   GjRû] Øû\ R«o Nôl©ÓÅoLs ?
     A) §]Øm   ( )
     B) YôWj§p 3 ØRp 5 Øû\   ( )
     C) YôWj§p 1 ØRp 2 Øû\   ( )
     D) GlùTôÝRôYÕ   ( )

4)   GjRû] Øû\ SôofNjÕ ªÏkR EQÜLs Nôl©ÓÅoLs ?
     A) §]Øm   ( )
     B) YôWj§p 3 ØRp 5 Øû\   ( )
     C) YôWj§p 1 ØRp 2 Øû\   ( )
     D) GlùTôÝRôYÕ   ( )

5)   GlùTôÝùRpRpXõm Lôtß Ht\lThP Ï°oTô]eLs Ï¥lÀoLs ?
     A) GlùTôÝÕm CpûX   ( )
     B) GlùTôÝRôYÕ   ( )
     C) A¥dL¥   ( )
     D) GlùTôÝÕm   ( )

6)   GlùTôÝùRpRpXõm ùSôßd¦l TiPeLs Nôl©ÓÅoLs ?

A) GlùTôÝÕm CpûX ( )
B) GlùTôÝRôYÕ ( )
C) A¥dL¥ ( )
D) GlùTôÝÕm ( )

D) NûUdÏm Øû\«]ôp HtTÓm LôW¦Ls

1) LônL±Lû[A§L úSWm NûUdÏm TZdLm EiPô ?
A) GlùTôÝÕm CpûX ( )
B) GlùTôÝRôYÕ ( )
C) A¥dL¥ ( )
D) GlùTôÝÕm ( )

2) CÚm× Tôj§WeLû[NûUdL ETúVô¡lÀoL[ô ?
A) GlùTôÝÕm CpûX ( )
B) GlùTôÝRôYÕ ( )
C) A¥dL¥ ( )
D) GlùTôÝÕm ( )

3) LônL±Lû[NûUjR ©u A§p Es[Ri½ûW Lû[kÕ ®ÓÅoLs ?
A) GlùTôÝÕm CpûX ( )
B) GlùTôÝRôYÕ ( )
C) A¥dL¥ ( )
D) GlùTôÝÕm ( )

4) LônL±Lû[NûUlTRtÏ A§LUô] Ri½o ETúVô¡lÀoL[ô?
A) GlùTôÝÕm CpûX ( )
B) GlùTôÝRôYÕ ( )
C) A¥dL¥ ( )
D) GlùTôÝÕm ( )

5) LônL±Lû[Sßd¡V ©u LÝÜÅoL[ô ?
A) GlùTôÝÕm CpûX ( )
B) GlùTôÝRôYÕ ( )
C) A¥dL¥ ( )
D) GlùTôÝÕm ( )