

Research Reach

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RESEARCH REACH

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PREVENTION OF IRON DEFICIENCY ANEMIA THROUGH FOOD BASED APPROACH

Rajeswari M and Subbulakshmi G

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Iron Deficiency Anemia (IDA) is a problem of serious public health significance with its impact on psychological and physical development, behavior and work performance. Iron deficiency occurs mainly due to inadequate iron intake and reduced bioavailability of dietary iron and when prolonged leads to IDA. Though the treatment of anemia by medicinal iron supplementation is technically simple and most effective, it can only be used as a short-term strategy due to its exorbitant cost. On the other hand, food based approaches like food fortification and dietary diversification may well offer the most practical means to prevent anemia, in those who are on the borderline and thus lower the prevalence rates.

Iron Deficiency Anemia (IDA), often diagnosed by subnormal number of RBCs / cu.mm, subnormal amount of haemoglobin in 100ml of blood or sub normal volume of packed red blood cells / 100ml of blood¹ is the most prevalent nutritional problem in the world today. Iron deficiency occurs when an insufficient amount of iron is absorbed to meet the body's requirements and long term iron deficiency leads to IDA². WHO in 1992 reported anemia prevalence rates to be 2 billions accounting to 35% of world population³. Today, with an estimated world population of > 6135 millions⁴, the assumed rates of IDA could be more alarming, but due to dearth of regular and uniform data, it is difficult to compare and measure the increasing prevalence rates in different age groups in different places.

In developing countries like India, the scenario is even more dismal. As a consequence of the World Summit for children (New York, 1990), Ending Hidden Hunger Conference (Montreal, 1991) and International Conference on Nutrition (Rome, 1992), the Government of India (GOI) in the year 1993, adopted the National Nutrition Policy and committed to work for the reduction of IDA in non pregnant and non lactating women by 33% and in pregnant women by 25% of 1990 levels, by the year 2000 or at least by 2010⁵. Despite the efforts taken by the GOI, anemia prevalence was found to be 47-87% in pregnant and lactating women, 14 to 90% in school children and 56% in children under five years in the year 1996⁶. According to NFHS survey 1998-1999, the prevalence of anemia among women aged between 15 to 49 years was 51.8 % with 45.7% in urban and 53.9% in rural areas⁷. Unfortunately, reaching the national goal of combating anemia seems to be far from the destination even today.

History of anemia

Anemia is not a present day problem, but its history dates back to the nineteenth century. Until then the unspecified anemia was known as chlorosis or the sickness referring to the extreme pallor that characterized severe cases. For centuries chlorosis or green sickness was attributed to unrequited passion. The pale olive complexion due to chlorosis was even portrayed by the medieval Dutch painters in portraits of young women⁸. In pre historic populations the distribution of anemia equaled or surpassed that is found in today's world. There was a general increase in anemia through time ranging from a few extremely rare occurrences in the Paleolithic⁹ to the Mesolithic¹⁰ to more common occurrence in the Neolithic¹¹ and the Bronze Age¹². Interestingly this was even more frequent in prehistoric American southwestern Pueblos¹³. During the previous century 'Chlorosis',

now virtually unknown, was known to be common in nubile girls¹⁴. Prehistoric study is possible because anemia is identifiable in skeletal material by a cranial deformation called 'Porotic hyperostosis' (also known as *Crabia orbitalia*, when the orbits are affected). More recent and conclusive studies confirm the link between porotic hyperostosis and acquired anemia resulting from chronic bleeding or from an infection that will lead to a state of anemia^{15,16} or from an iron deficient diet.

Causes, Symptoms and Functional consequences of anemia

Anemia may be caused not only by a deficiency in the of iron in the diet but can also be due to deficiencies of other vitamins like folic acid and B12, malaria, hookworm infections and congenital haemolytic factors which result in sickle cell anemia and thalassaemias. IDA brings debilitating health consequences, which affect the society in terms of productivity and economy. Older generations in India identified symptoms of anemia as paleness in the face, eyes, and lips and treated with indigenous available foods. The general symptoms of anemia in humans are general fatigue, lassitude, breathlessness, giddiness, dimness of vision, headache, pallor of the skin, palpitation, anorexia & dyspepsia, tingling sensation in the fingers and toes, mouth ulcers and impaired resistance to infection¹⁷. Besides, in infants and children, the symptoms include impaired motor development and coordination, impaired language development and scholastic achievement, psychological and behavioral effects like inattention, fatigue, insecurity etc and also decreased physical activity^{18,19,20}. In adults of both sexes IDA results in decreased physical work and earning capacity and decreased resistance^{21,22}, and in pregnant women, there is increased maternal and fetal morbidity, mortality and increased risk of low birth weight.

Iron intake and absorption

Iron is present in food in both inorganic (ferric and ferrous) and organic (mostly heme) forms. Heme iron is derived primarily from the haemoglobin and myoglobin of flesh foods such as meats, fish and poultry. About 40 percent of iron from these foods is in the heme form while the rest is non-heme iron. Other sources of non-heme iron include eggs and plant foods such as beans, cereals, nuts, fruits and vegetables and water from some iron pipes, tube wells and iron containers²³. In developed countries, the intake of iron is linked to energy intake and a typical diet contains about 6mg iron/1000 Kcal while in developing countries it is estimated as 15-30mg per day^{24,25}. A greater proportion of this iron is likely to be contaminant iron, which may be poorly absorbed. The intakes of iron in different countries are given in Table I.

TABLE I. ESTIMATES OF IRON INTAKE IN DIFFERENT COUNTRIES²⁵

Country	Iron intake (mg / day)
Bangladesh	23.4
Philippines	11.0
Latin America	16.2
India	
Children	10-17
Adult women	23-30
Adult men	28-35

Heme iron contributes only about 10 to 15 % of the total iron intake (1 to 3 mg / day) in diets in developing countries due to negligible consumption of meats and meat products and as much as 50% in countries like Argentina and New Zealand where the meat is consumed extensively^{26,27}. According to NNMB (1997) the iron intake of rural population lie between 90-99 % of the RDA. The intake data both from NNMB surveys and other community-based experience clearly brings out the fact that iron intake is adequate when compared to RDA. This picture however seems contradictory to the prevalent status of anemia and poses the question on bioavailability of iron from rural Indian dietaries.

TABLE 2. STATEWISE INTAKE OF IRON (RURAL AREAS) ²⁸

States	Intake of iron (% RDA)
Andhra Pradesh	95
Gujarat	98
Karnataka	>RDA
Kerala	90
Madhya Pradesh	99
Maharashtra	>RDA
Orissa	99
Tamilnadu	72
Uttar Pradesh	>RDA
West Bengal	99
Pooled	98

Bioavailability of iron

A factor just as important as the total iron content of the diet is the bioavailability, which means the amount of iron absorbed. The iron effectively absorbed by the body varies considerably depending on a number of factors as explained below:

Source of iron: Heme iron is highly bioavailable (15-35%) because it is absorbed intact within the porphyrin ring and is therefore not exposed to the inhibitory ligands present in the diet. In contrast, only 2-20% of non-heme iron is absorbed from foods as it enters an exchange pool, which is subjected to the effects of endogenous and exogenous promotary and inhibitory ligands^{29,23}.

Valence state of iron: Both ferrous and ferric form of iron is readily soluble under the acidic conditions of the stomach. With the increase of pH in the small intestine, where most iron absorption takes place, ferric iron is not soluble and thus is less well absorbed²³.

Dietary factors affecting iron bioavailability:

Enhancers:

Ascorbic acid: In developing countries, where flesh food intake is low, ascorbic acid is the single most enhancer of iron absorption. Adding as little as 50 mg of ascorbic acid to a meal, whether in pure form or through vegetables or fruits (for example: an orange / a lemon / 100g cabbage / 200g amaranth) will double iron absorption³⁰. Ascorbic acid exerts its enhancing effects by: a. promoting acid conditions within the stomach which facilitates efficient solubilization of dietary iron, b. reducing ferric iron to better absorbed ferrous form, c. forming chelates with iron in the stomach

and d. maintaining the solubility of non heme iron in the alkaline environment of the small intestine (which counteracts the inhibitory effect of dietary ligands such as phytates and tannins)³¹.

Meat, fish and poultry: These are doubly valuable as they contribute to rich amounts of haem iron and also enhance non-heme iron absorption. The mechanism by which meat, fish and poultry enhance iron absorption is not clear, but may involve the release of cysteine³², cysteine containing peptides and other peptide digestion products³³ or the interaction of non-heme iron with the carboxyl groups of amino acids³⁴. Quantitatively about 1 to 1.5 g of meat is equivalent to 1 mg ascorbic acid in its ability to promote non-heme iron absorption from a mixed meal³⁰.

Other organic acids: Organic acids such as citric acid, malic acid, tartaric acid and lactic acid also enhance iron absorption^{35, 36, 37}. The geometric mean absorption from a rice meal increases significantly with the addition of 1g citric acid (by 3 fold) 1g L-malic acid (by 2-fold) and 1g tartaric acid (by 2 to 3 fold)³⁶. Lactic acid has been identified as the factor promoting iron absorption from sorghum and maize derived beers³⁸. Succinic acid increases iron absorption from pharmaceutical iron preparations such as ferrous sulfate³⁹ and iron absorption is enhanced by 35% when 150mg of succinic acid is added to a standard hamburger meal^{40, 41}.

Sugars: Sugars such as fructose and lactose⁴² but not glucose or galactose⁴³ have some enhancing effect on iron absorption. Sorbitol (12mg sorbitol/mg iron) doubled iron absorption from pharmaceutical preparations of ferrous sulfate⁴⁴. Mannitol and xylose also promote iron absorption from oral iron preparations⁴⁵.

Processed foods: Food processing such as soaking and fermentation may enhance iron availability. Prolonged storage of canned foods may release iron from some cans and increase the iron absorbed in absolute terms. Heating foods and storing cooked foods can destroy ascorbic acid and subsequently decrease iron absorption⁴⁶.

Inhibitors: Various inhibitors of iron absorption include phytates, polyphenols including tannins, oxalates, dietary protein and calcium. Iron in legumes such as soybeans, black beans, lentils, mung beans and split peas is very poorly absorbed (less than 2%) and the factors involved may be phytates and tannins^{47, 48}. Polyphenols such as tannins in tea, coffee and certain vegetables bind non heme iron to form insoluble iron-tannate complexes that are poorly absorbed^{49, 50}. Iron absorption from bread is reduced to 1/3 rd and from a vegetable soup to 1/4th when served with tea compared with water⁵⁰. Similarly iron oxalate complexes also are insoluble although this may be compensated to some extent by the presence of ascorbic acid. Addition of 1 g calcium oxalate to cabbage reduces iron absorption by 61%. Iron absorption is poor from spinach and beetroot greens due to high oxalate contents and good from beetroot, which is free from anti nutrients⁵⁶.

Calcium: Though several studies suggest that calcium iron interaction is complex, it is usually stated that calcium impairs iron absorption. The addition of calcium phosphate reduces the absorption of non-heme iron from a mixed meal by 50% whereas calcium alone does not⁵¹. The inhibitory effect of calcium appears to be dose related up to 300mg calcium, after which there is little additional inhibition. Consuming calcium and iron rich foods at different meals can protect the iron absorption⁵².

Dietary protein: Several plant foods having high protein content including soybeans and nuts significantly inhibit non heme iron absorption^{53, 54, 55, 56}. In vitro studies suggest that high molecular weight peptides may be involved in this inhibitory effect³³.

Host factors:

Iron deficient individuals absorb iron more efficiently than those who are iron replete, thus the relation is inversely proportional. Iron deficient individuals (those with no iron stores, but not anemic) usually absorb more than 40% of the reference dose (consisting of 3mg iron as ferrous ascorbate)⁴¹. Several micronutrient deficiencies like vitamin A, B1, B12, folic acid and zinc can

affect iron absorption or utilization. The bioavailability of non-heme dietary or supplementary iron nearly doubles during pregnancy in response to increased iron requirements and probably may increase during growth spurt of adolescence also⁵⁷. Various acute and chronic conditions, parasitic infections may affect severely the absorption of iron.

Bioavailability of heme iron:

Heme iron absorption is neither influenced by iron status of the individual nor by the dietetic constituents such as phytates, tannins and ascorbic acid. However, consuming calcium rich foods like milk, cheese can impair heme iron absorption from a meal⁵². Baking and prolonged frying of meat products can reduce heme iron absorption by 40%²⁷.

In the light of above discussion on dietary factors affecting iron bio availability, it can be deduced that though the intake is near to or more than the RDA, the bioavailability of iron from Indian dietaries is only 5 to 10 %. Based on this, NNMB²⁸ computed the actual intake of iron as 23.6 mg from its pooled data, which seems to be deficient to the tune of about 15%. The factors like low dietary intakes, poor availability from the diets and high prevalence rates of anemia in India have profound economic implications, as anemia affects the productivity of individuals. Therefore its prevention with a focus on 'at risk' groups is the prime need of the hour.

Treatment and prevention of IDA

The two basic approaches for the treatment and prevention of IDA are supplementation with medicinal iron and food based approach.

Iron supplementation

In clinical practice the most effective treatment of choice for IDA is the oral administration of ferrous fumarate, gluconate or sulfate, liquid syrups and parenteral administration for patients who are completely intolerant of iron. Only the most severe cases (Hb<3g/dl) call for a blood transfusion⁵⁸. Though medicinal iron supplementation has advantages as an effective measure for anemia treatment, it is also constrained by the gastro intestinal side effects, which result in poor compliance with the treatment. The side effects of iron supplementation are epigastric discomfort, nausea, vomiting, constipation and diarrhoea. The frequency of occurrence of the side effects is directly related to the dose of iron⁵⁸.

Food Based approach

The world Declaration on Nutrition proclaimed by heads of nearly 160 nations at the International Conference on Nutrition held in Rome (1990) said that Food based approaches are the most effective way to address the micronutrient deficiencies like iron. The most sustainable, potentially long lasting measures are the food fortification and dietary diversification or dietary improvement.

Food fortification

Fortification of widely consumed foods with iron is the backbone of IDA control in many countries. Commercial food fortification is particularly appealing especially when appropriate food vehicle is selected, high coverage will be assured without requiring a change in the eating habits of the consumer. Some of the examples of fortification in India are iron and iodine added to salt,

vitamin A to sugar, milk and milk products and edible oils, iron and folic acid to wheat flour etc. The vehicles used in other countries for different micro nutrients are fats like margarine, butter, bread, wheat flour, dairy products, spices and condiments, sauces and water. Food fortification can become a widely accepted and effective long-term approach in combating IDA, provided a proper vehicle is chosen and is stringently monitored for its safety, toxicity and distribution to the target groups.

Dietary Diversification

Dietary diversification mainly aims at increasing the bioavailability of iron from foods, increasing the access and consumption of iron rich foods, identifying locally available sources of iron, reviewing traditional dietary practices and orienting towards traditional habits and traditional foods rich in iron.

Enhancing the bioavailability of iron ingested by promoting the intake of iron enhancers including heme iron or reducing inhibitors like tannins, phytates and oxalates in the diets is an important strategy for dietary modification. A further strategy is to encourage the use of a number of household processing methods like germination, malting and fermentation which enhance iron absorption by increasing the vitamin C content and by lowering the tannin and phytic acid content or both^{59,60,61}. There may be some foods naturally bioavailable, containing not only good amounts of iron but also enhancers and less amounts of inhibitors. But they are frequently under utilized by the people due to lack of nutritional knowledge. A list of such commonly consumed foods through out India is presented in Table 3. The foods are chosen on the basis of high iron, folic acid and ascorbic acid and low oxalate, phytate and tannic acid contents⁶². Some having low iron contents are also listed because of their better bioavailability due to either high ascorbic acid content or negligible antinutrient contents.

Many indigenous foods, herbs or medical plants are believed to be good for IDA. Unfortunately, the effectiveness of many of these, remain uninvestigated except for few. According to Bhavaprakasha Nighantu (Shaka Varga, Shlok 63-64) Punjabis believe that *Karela* (bitter gourd) is laxative and controls anemia⁶³. Again for hundreds of years, beetroot has been used as a folk remedy for anemia. Similarly, a powder made from pumpkin, sunflower and sesame seeds ground in equal proportion also believed as a home remedy for anemia⁶⁴. Fenugreek seed is yet another important food, proved to be good for anemia. Ayurvedic literature also recommends the use of the seeds in the treatment of anemia^{65,66,67}. Studies on rats have shown that a diet with milk and fenugreek seed ash diet fed to rats for a period of 6 months, increased haemoglobin concentration from 12.3 to 16.1 (g%) and RBC count from 9.7 to 10.7⁶⁸.

Table 4 shows a list of foods, with their classical description of the form and combinations with which they are used for anemia. These foods have been widely used as home remedies, folk remedies and as tribal medicine for anemia. Therefore, an attempt has been made to analyze the contents of iron, folic acid, vitamin C, oxalates and phytates, which can provide a possible explanation for their use for anemia. Likewise, the various medicinal plants, their parts used and doses for treatment of anemia are also listed in Table 5. These herbs are effectively being used for the treatment of anemia for many years but need to be scientifically proved. Therefore, research in these areas is the need of the hour, as the use of natural foods and herbs in the prevention (if not cure) with no associated side effects will be a great boon for creating a healthy, alert and productive population in the future.

Foods avoided for anemia

Some foods may cause anemia due to their inhibitory effect on iron absorption and some for unknown reasons. Tea, coffee and vegetables such as spinach, green and brown lentils, beetroot greens have high poly phenol content and low bioavailability³⁶. Therefore excessive and long-term consumption need to be restricted. Areca nut is known to reduce the red blood cells but yet to be investigated. Excessive nitrate consumption through tap water, nitrate fertilizer containing vegetables like spinach and cured meats, may cause a rare and fatal form of anemia called 'blue baby syndrome'. As the nitrate ferments in the baby's stomach, it is converted into nitrite, which reacts with haemoglobin limiting its capacity to carry oxygen⁷⁸.

Cost analysis

A case study in the year 1995 estimates the annual cost of providing iron and folic acid supplements to the 'at risk' populations, to be Rs. 4.40 / beneficiary, through the PHC (Public Health Care) unit, consisting of 9,900 beneficiaries⁷⁹. The intervention costs of delivery of ferrous sulfate tablets through the community or village based health care was estimated by Lenin (1986) to be \$2-\$3 (Approx. Rs 80-120) per beneficiary, depending on population density and the other services provided by the same health workers⁸⁰. But today the cost reported in 1986 has no meaning as the same would have escalated and also the exchange rate. World bank (1993) also has estimated the cost effectiveness of iron supplementation in pregnant women as US \$13 (Rs 400) / DALY (Disability Adjusted Life Years) saved and US \$800 (Rs 2,500) / death averted⁸¹.

The cost of iron supplementation needs to be compared with that of food fortification and dietary diversification. No studies are available on the cost effectiveness of dietary modification and community education. However, Lenin (1986) estimates that the cost/person/year in a large scale program of fortification with iron is about US\$ 0.20 to 0.30 (Rs 6 to 9)⁸⁰ and according to World Bank estimations (1993), it is US\$4 (Rs 120) / Daly and US \$ 2000 / death averted⁸¹. The current analysis of cost proves that the food fortification and dietary improvement are the sustainable, cost effective and long term interventions which shift attention away from the medical to food-based solution.

Conclusion

Dietary approach along with food fortification can be adopted as the best method for preventing IDA. However, being a long-term approach requires relatively a long time to achieve concrete results as it involves specific behavioral change with regards to foods, which can be brought about through strong communication programs. Public health measures like improving general social conditions involving personal hygiene and environmental sanitation of the affected population also will have a positive impact in improving the situation of anemia.

TABLE 3. FOLIC ACID, ASCORBIC ACID, OXALATE AND PHYTATE CONTENTS IN IRON RICH FOODS (per 100g of edible portion)

Foods	Iron (mg)	Folic acid (ug)	Vitamin C (mg)	Oxalates (mg)	Phytates (mg)
Bajra	8.0	45.5	0	1	141
Jowar	4.1	20.0	0	10	172
Ragi	3.9	18.3	0	0	209
Rice (Raw milled)	0.7	8.0	0	3	83
Wheat vermicelli	2.0	-	0	0	151
Mothbeans	9.5	-	2	0	25
Peas (green)	1.5	-	9	14	55
A. paniculatus	18.4	-	81	-	-
Cabbage	0.8	23	124	3	3
Mint	15.6	114	27	33	4
Manathakkali	20.5	-	11	-	-
Parsley	17.9	-	281	-	-
Bitter gourd	2.0	96	-	0	4
Radish(White)	0.	-	15	9	0
Onion	6.3	16	24	480	11
Coconut (dry)	78.0	17	7	-	-
Guava	0.3	-	212	0	4
Jack fruit	0.6	-	7	14	15
Watermelon	7.9	-	1	27	17
Papaya (ripe)	0.5	-	57	1	4

TABLE 4. FOODS BELIEVED TO PREVENT/CURE ANEMIA

Food item	Dosage and form prescribed	Possible reason/s for the usage
Ash gourd ⁶⁹	As a delicious sweet prepared from the fruit pulp and sugar syrup	Un known
Celery leaves ⁶⁹	Juice in combination with carrot juice	High iron content, high ascorbic acid content, low amounts of oxalates and <i>phytates</i>
Bengalgram leaves ⁷⁰	1 tb sp. of fresh juice of leaves with honey	High iron content

Lettuce ⁷⁰	-	Good amounts of iron and vitamin C.
Onions ⁶⁹	Easily assimilable iron	Good amounts of ascorbic acid and folic acid, negligible amounts of oxalates and phytates
Carrot ⁷¹	2 tb sps. of carrot juice with 2 tb honey for few days	Good amounts of ascorbic acid and folic acid, negligible amounts of oxalates and phytates
Drumstick ⁷¹	2 cups of fresh leaves fried in ghee for 3 minutes with ½ tsp. of black pepper powder should be taken with chapattis or steamed rice for 40 days.	High amount of ascorbic acid
Turmeric ⁷²	Powder at a dose of 250mg to 1g /day	High amount of iron and folic acid
Black sesame seeds ⁷⁰	An emulsion prepared by grinding, straining and soaking in warm water, should be mixed with a cup of milk and sweetened with jaggery	High amounts of folic acid and moderate amounts of iron
Sunflower seeds ⁷⁰	Flour	Fair amount of iron
Amla ⁷²	Dried powder at a dose of 250mg-1g/day	Very rich source of ascorbic acid
Apple ⁷⁰	Freshly prepared juice	Negligible amounts of oxalates and phytates
Dry apricot ⁷⁰	-	Fair amounts of iron and ascorbic acid
Almond ⁷⁰	-	Fair amounts of iron
Mango(unripe) ⁷⁰	-	Fair amounts of ascorbic acid and negligible amounts of oxalates and phytates

Raisings ⁷⁰	-	Good amounts of iron
Pomegranate ⁷²	Decoction / powder of fruit rind(250-500mg)/root bark/fruit as such	Good amounts of vitamin C and negligible amounts of oxalates and phytates
Ripe tomato fruit ⁷³	-	Good amounts of vitamin C and folic acid and negligible amounts of oxalates and phytates
Saffron flower (stigma) ⁷⁰	Milk decoction/powder (100-250mg)	Un known
Honey ⁷⁰	-	Rich source of iron
Spirulina ⁶⁴	-	Rich source of folic acid, B 12 and iron
Molasses ⁶⁴	-	A tb sp of black strap Molasses supplies as much Iron as that of 9 eggs

TABLE 5. HERBS BELIEVED TO PREVENT /CURE ANEMIA

Herb / Medicinal plant	Dosage and form prescribed
Chicory(<i>Chichorium intybus</i>) ⁶⁹	Effective in combination with celery and Parsley
Dill(<i>Anethum sowa</i>) ⁶⁹	60g of decoction of fresh leaves mixed with a tea spoon of parsley juice
Gokulakanta ⁶⁹	60g of root is boiled in ½ lt. of water for 20-30 minutes in a closed vessel. About 30-60 ml of this preparation is given 2 or 3 times daily
Hog weed ⁶⁹	Root
Worm wood (<i>Artemisia absinthum</i>) ⁶⁹	A small dose of 0.75 to 1.25 deci grams

Dronapushpi (<i>Leucas aspera</i>) ⁷¹	1 tsp. Of equal quantities of ground leaves of dronapushpi, keezhanelli and karsilanganni with butter milk in the morning hour
Guggul(<i>Commiphora mukul</i>) ⁷¹	1/4 th tsp of leaf powder along with honey and lime juice on an empty stomach in the morning
Mandukaparni(<i>Centella asiatica</i>) ⁷⁴	½ tsp leaf juice with 1 tsp honey for 1 month
Vasaka(<i>Adhathoda vasica</i>) ⁷¹	½ cup of boiled leaves(1 tb sp. Of leaves boiled in 2 cups of water till reduced to 1 cup) along with 1 tb sp. Honey twice a day for 40 days
Rose(<i>Rose centifolia</i>) ⁷¹	Strained juice of boiled 6 tsp. Of crushed fennel seeds and red rose petals in 1 and ½ cups water
Thanduleeyalea leaves ⁷⁵	-
Lotus peel tea ⁷⁵	Fresh or dry peels with raw milk
Bilwa(<i>Aegle marmelous correa</i>) ⁷⁵	-
Myrrh(<i>Commiphora myrrh</i>) ⁷²	Resin infusion or powder 250mg to 1 g
Yellowdock (<i>Rumex crispus</i>) ⁷²	Root helps in the release of stored iron from the liver in to the blood stream
Bhringaraj (<i>Eclipta alba</i>) ⁷²	Whole plant
Fo-Ti (<i>Polygonum multiforum</i>) ⁷²	Processed root
Rehmannia glutinosa) ⁷²	Root
Dang gui (<i>Angelica sinensis</i>) ^{76,77}	Useful when taken between 7 to 21 days of the menstrual cycle to rebuild the blood after menstruation. It is not recommended during pregnancy.

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EFFECT OF GERMINATION ON THE FATTY ACID PROFILE OF LEGUMES

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Legumes have long been used for their therapeutic potentials but their use, as a source of essential fatty acids remains unstudied. The present investigation was carried out to study the effect of germination and duration of germination on the fatty acid profile of legumes. Assessment of the nutritional composition and fatty acid profile of legumes on germination for 12 and 24 hours was done. The study revealed that legumes on germination are not only potential source of linoleic and alfa linolenic acids but also long chain polyunsaturated fatty acids (LCPUFAs) like Eicosapentanoic acid (EPA) and Docosahexanoic acid (DHA) thought to be available only from fish oils till date.

The change in the dietary pattern today has reduced the intake of essential fatty acids and has led to the increased incidence of degenerative diseases like heart disease, arthritis and cancer. It is emphasised that diet should provide less saturated fatty acids and cholesterol, adequate amounts of n-6 and n-3 fatty acids and antioxidants. The consumption of n-6 fatty acid increases at the expense of n-3 fatty acid (Leaf and Weber, 1998). The current recommended ratio of n-6 to n-3 is 5:1 – 10:1. This ratio can be achieved by using low levels of n-6, combinations of oils and regular consumption of foods containing high amounts of n-3 and also by consuming fish once or twice a week. Since vegetarians do not consume fish it is essential to increase the n-3 fatty acid intake by using plant sources like green leafy vegetables and to tap new sources of n-3 fatty acids.

Legumes being used regularly in Indian diets and having known that they provide a number of active principles –vegetable protein, non-starch polysaccharides, PUFA, saponins, plant sterols, isoflavones etc. that have a therapeutic effect (Shutler et al, 1987) and the limited data on the fatty acid profile of legumes after germination prompted the present study. The study was primarily undertaken to evaluate the n-3 fatty acid content of legumes on germination and the feasibility of incorporating in the diets to reduce the difference in the disturbed ratio of n-6 / n-3 fatty acids.

Materials and Methods

Alfalfa (*Medicago sativa*), Moth beans (*Phaseolus aconitifolius*, Jacq), Green gram (*Phaseolus aureus* Roxb), Horse gram (*Dolichos biflorus*), Cowpea (*Vigna catjang* variety red, variety white) and Lentil (*Lens esculenta*) used in the present study were obtained locally. The samples of legumes were soaked in water for a period of 12 hours. One lot was allowed to germinate for a period of 12 hours and the other was allowed to germinate for 24 hours. Crude Fat was extracted by petroleum spirit (BP 40-60°C) and estimated by Soxhlet apparatus. While microkjeldal method was used for the determination of proteins (N \times 6.25), ash, moisture, and crude fibre were determined by AOAC (1990) methods and carbohydrates by difference. Fatty Acids were extracted using methanolic hydrochloric acid and hexane. The fatty acid methyl esters were analysed on Shimadzu GC14B Gas Chromatography using 0.530 mm BP1 column with 1.0-micron inner diameter. Standard fatty acids were obtained from Sigma, USA.

Results and Discussion

The legumes were analysed for their proximate composition (Table 1). The moisture content was reduced as the germination time increased from 12 hours to 24 hours. The percent moisture reduction was similar in all the legumes processed. Mahdy and Sebaiy (1982) also reported a decrease in moisture on germination of fenugreek. The carbohydrate, protein and fat content decreased as the germination time increased and there was a marked increase in the fibre content. Similar decrease in carbohydrates occurred during germination of groundnuts (Beavers, 1968), millet (Opoku et al, 1983 and Akubor and Obiebuna, 1999) and sorghum (Chavan and Kadam, 1989). The fat and carbohydrate were probably oxidized for energy needs of the germinating legumes. The increase in crude fibre content of legumes on germination may be attributed to the synthesis of more shoots and rootlets (Meyer et al, 1973). The ash content showed variable patterns

TABLE 1. PERCENTAGE COMPOSITION OF NUTRIENTS IN GERMINATED LEGUMES.

Legume	Germination time (hrs)	Moisture (g).	Fat (g).	Protein (g)	Carbo Hydrates (g)	Ash (g)	Crude Fibre(g)
Alfalfa	12	64.3	0.40	14.0	19.6	1.72	3.1
	24	64.3	0.60	15.7	17.7	1.70	3.2
Mothbean	12	52.8	0.44	12.4	33.0	1.42	4.0
	24	52.7	0.23	9.7	36.0	1.40	4.1
Mung	12	43.9	1.85	14.7	38.0	1.60	3.5
	24	43.8	0.70	10.0	43.9	1.56	3.5
Horsegram	12	52.5	0.29	12.1	34.6	0.57	2.2
	24	52.5	0.24	11.9	27.8	1.12	3.1
Lentil	12	53.7	0.15	10.9	43.4	1.05	2.3
	24	46.6	0.07	10.4	41.1	1.30	3.6
Cowpea (White)	12	54.0	0.63	12.4	33.8	1.60	3.0
	24	53.8	0.55	10.1	30.3	1.90	3.4
Cowpea (Red)	12	55.6	0.18	12.4	30.3	1.56	2.6
	24	54.7	0.16	11.0	29.4	1.53	3.2

The increase in protein content of alfalfa legumes is well comparable with that of other studies. Germination of alfalfa for 7 days produced 17% increase in the protein content (Lopez et al, 1990). According to El Mahdy and El Sabaiy (1992) the rise could be attributed to the increase in non-protein nitrogen.

The fat content of legumes showed considerable variation. The total fat content showed marked decrease on germination for 24 hours as compared to 12 hours. The decrease could be because of the increased moisture content. The fat content of alfalfa increased reasonably and is similar to the results obtained by Dahliwal and Aggarwal (1999) in soybean. The fatty acid composition of total fat of germinated legumes (Table 2) indicates a marked increase in the n-3 fatty acid with the increase in germination time. There is also a significant reduction in the fat content, saturated fatty acids and linoleic acid content of mung, lentil, moth bean, cowpea and alfalfa. Thus,

alfalfa legume is a potential source of essential fatty acids and the values are similar to those reported by Rezuovukin et al (1996).

TABLE 2. FATTY ACID PROFILES OF GERMINATED LEGUMES (g/100g)

Legume	Germn Time	Saturated Fat	L A	ALNA	MUFA	EPA	DHA	Others	n-6/n-3
Alfalfa	12	0.10	0.03	0.20	00	00	00	0.03	1:7
	24	0.09	0.2	0.46	00	00	00	0.02	1:2.3
Moth beans	12	0.23	0.11	0.06	00	00	00	0.03	1:0.5
	24	0.05	0.08	0.02	00	00	00	0.07	1:0.3
Mung	12	1.16	0.13	0.53	00	00	00	0.01	1:4
	24	0.45	0.009	0.23	00	00	00	0.00	1:25
Horse gram	12	0.28	00	00	0.0017	00	0.006	00	
	24	0.07	0.035	0.12	00	00	0.01	0.01	1:4
Lentil	12	0.00	0.0006	0.15	00	00	00	0.001	1:25
	24	0.01	0.006	0.014	00	0.013	0.016	0.005	1:7
Cowpea White	12	0.38	00	00	0.07	0.16	00	00	
	24	0.16	0.105	0.13	00	0.09	0.02	0.046	1:2.3
Cowpea Red	12	0.17	00	00	00	00	00	00	
	24	0.09	0.011	0.03	00	0.004	0.0001	0.008	1:3.4

Plant sources are rich in α linolenic acids, precursors of n-3 LCPUFAs while EPA and DHA, which are readily assimilated by the human body, are mostly available from animal sources and algae. Apart from the marked increase in the linolenic acid, cowpea white, cowpea red, lentil and horse gram showed a remarkable change in fatty acid profile by formation of EPA and DHA. Legumes like alfalfa, mung, and lentil showed an extremely high ratio of n-3 fatty acids.

Conclusion

The present study reveals that legumes can be a potential source of essential fatty acid. Incorporation of germinated legumes can help to increase n-3 content in the diet. Legumes sprouts can be a part of the diet in the form of salads. These being rich in n-3 fatty acids and cholesterol free, could be used as good substitutes for fish. This will certainly help to keep the degenerative diseases like cardiac diseases, inflammatory diseases and behavioral disorders at bay.

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EFFECT OF ORGANIC AND INORGANIC FARMING ON PHYSICAL CHARACTERISTICS AND CONSTITUENTS OF SELECTED CROPS.

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The physical characteristics, germination capacity and nutrient content of different varieties of green Gram and paddy grown by organic and chemical fertilizer based farming method were analysed. To determine the effect of two farming methods, the analysis of viability (germination capacity), macro and micronutrient analysis was carried out. The type of farming did not show any effect on the macronutrient content of the samples but the elemental analysis showed that organically grown green gram had a consistently higher concentration of almost all trace elements except Zinc and copper. Organically grown paddy had lower concentration of Na, Fe along with lower concentration of Zn and Cu as compared to chemically grown samples.

India is basically an agrarian society. Farming methods are based on seasons, prevailing system and crops that could be grown during different seasons. The increasing population put considerable pressure on the land and other natural resources. In response to this increased demand agriculture was made intensive with increased emphasis on fertilizers, pesticides and hybrid seeds etc (Bajaj 1996). People have now begun to express doubts about the sustainability of such exploitative practices, its high cost and its safety due to the presence of chemical residues, leading to the concept of Organic agriculture which has caught the attention of farmers and consumers. There is now worldwide demand for organically grown foods which commands a premium in export markets (Santaram and Subba Rao 1996).

Organic agriculture is a production system which avoids or largely excludes the use of synthetically compounded fertilizer, pesticides, growth regulators and live stock feed additives (Lampkin 1990). This system relies on crop rotation, crop residues, animal manures, Green manures, off farm organic wastes and aspects of biological pest control to maintain soil productivity and to supply plant nutrients and to control insects, weeds and other pests. Organic agriculture is not only leading the way to viable alternatives to modern development models but it is also the solution to global environment problems (Gadhia and Gadhia 1995). Till today there is no substantial basis for claiming that plants grown with only organic fertilizer have a greater nutrient content than those grown by conventional methods. The present study therefore is carried out to determine the difference in nutrient content and germination capacity in foods, grown organically as compared to chemically grown foods.

Materials and Methods

Samples were collected directly from the local farmers except the chemical varieties of Green gram, which had been collected from the local market. Samples with known harvesting season from the two different farming methods were paired according to their similar physical characteristics (average length and width, length / width ratio and weight / volume ratio) in the absence of exact identical varieties from two different farming methods (Table 1). Samples selected from organic farming mostly included crop rotation, crop residues, animal manure and composting while those from the chemical farming used agrochemicals that include N₂, P and K to sustain the food production and used pesticides to control both weeds and pests.

TABLE 1. LIST OF SAMPLES.

Samples analysed	Variety & collection area	Sample Type
Green gram (Whole)	Umargaon -Gujarat Sindol - Karnataka Mumbai- Maharashtra	Organic Organic Chemical
Paddy	Nawabi Kolam-Umargaon-Gujrat Lal Kada Umargaon-Gujarat Basmati- Parvel, Maharashtra BaptalaBPT-superfine-hyderabad-andhra Saroo Nakra- W Bengal Boro Chhatrish -W Bengal Lal Swarna - W. Bengal	Organic organic Organic Organic Chemical Chemical Chemical

It included thousand grain weights, weight: Volume ratio, weight loss due to presence of damage, discoloured or immature grains was calculated in %. Moisture content was estimated by hot air-oven method, viability (germination capacity) by using a moistened filter paper and keeping the grains for 5 days to determine average total germination of 5 replications. Length: width ratio was obtained by measuring length and width of the sample grains using micrometer horizontally and vertically. Ten readings were taken following the method given in the ISI handbook of Food analysis. The most abundant macro nutrient, starch was estimated after acid hydrolysis by Spectro photometric method at 630 nm (Yoshida et al. 1970). The fat content of the sample was estimated by using Soxhlet method to obtain values for total fat (AOAC method). Determination of crude protein content was carried out by Micro Kjeldahl methods (Jacobs 1958). The total dietary fibre value of the entire sample was calculated using the following formula:

$$\text{Dietary fibre} = \frac{100 - (\% \text{CHO} + \% \text{Protein} + \% \text{Fat} + \% \text{Moisture})}{\text{Weight of the sample}} \times 100$$

Elemental analysis of the samples was carried out by Inductive Coupled Plasma –OES method (ICP-OES). About 20 trace elements were estimated in the samples prepared after subjecting to wet digestion. The sample on being burnt in plasma emits its characteristic radiation at different wavelengths, which subsequently detected and analysed by the optics and computer in the ICP-instrument. The results were expressed as comparison of the percentage of organically grown foods having more or less of each element as compared with the chemically grown foods.

Results and Discussion

The weight loss due to the presence of damaged, discolored or immature grains, calculated in percentages was found to be lesser in the chemically grown variety in general by about 0.7% in Green Gram, 1% in Paddy except for one pair sample i.e. Nawabi Kolam (Org. Paddy) had lesser

weight loss (6.6%) as compared to Boro Chhatrish (Chemically grown Paddy). This may indicate that the chemical farming gives better protection for the crops than organic farming.

TABLE NO. 2 GERMINATION CHARACTERISTICS

Org. variety	Organic sample		Chem. Samples		Chem. varieties
Green Gram	V	M	V	M	Green Gram
Umergao	100	7.7	96	11.5	Market sample
Sindol	68	10.3			
Paddy					
Nawabi	84	9.5	40	11.2	Boro Chatrish
Kolam					
Basmati	92	10.5	100	14.3	Saroo Nakra
Bapatla	44	113.4			
Lal Kada	96	10.9		12.1	Lal Swarna

The moisture content of the samples was found to be related to the viability (germination capacity) of the food grains. It was seen that in general, when the moisture (M) content was low, the viability (V) of the sample was better. For eg. In organic Omergaon Green gram, when moisture(M) is 7.7 the viability(V) is 100 % but when moisture goes high in sindol variety to 10.3%, the viability goes down to 68 %. It may be concluded that the germination characteristics are related more to moisture content than the type of farming. The macronutrient content of both the types of samples was found to be similar. Similar macronutrient concentration (starch, crude protein, total fat and total dietary fibre) for both varieties of green gram (whole) and Paddy indicated that the type of farming did not have a significant effect on their concentrations as can be seen from the table-3. This observation is supported by the report of the expert panel of the Institute of Food technologists who reported that the type of fertilizer does not affect the concentration of the protein, fat and Carbohydrate.

Organic Green gram samples had a consistently higher concentration of almost all trace elements except Zn and Cu. (G-1 to G-5). The same result for Zn and Cu was obtained also in the case of Paddy samples. Zn ranged from 2.5 - 18.45 % higher and Cu ranged from 10.3- 46.3% higher in the chemical varieties. The organic paddy samples showed lower concentration for most of the trace elements like Ca, Fe, P, Cr, Mg and Mn along with Cu, and Zn, with the exception of Sodium (37.4%-65.7%), Potassium (2.2% -4.7%) and sulphur (8.95%-54.9%) which are higher in Organic sample. This may be due to input through chemical fertilizers in the chemically grown samples. It was unexpected to find a higher concentration of Al and Ni in the organic samples of Paddy which require further investigation.

TABLE 3. MACRONUTRIENT CONTENT OF GREEN GRAM (WHOLE) AND PADDY

Green Gram	Protein (gm%)	Starch (gm%)	Fat (gm%)	Fibre (gm%)
Organic	16.97- 20.49	44.26- 56.11	02.31- 03.60	14.31-26.25
Chemically grown	17.22	45.33	02.12	23.83
Reported value	24.00	56.70	1.30	-
Paddy				
Organic	4.09 -7.75	53.56-66.02	2.4-5.0	14.31-26.65
Chemically grown	5.29-7.91	50.65-57.43	3.07-5.60	21.56-25.42
Reported value	7.50	76.7	1.0	-

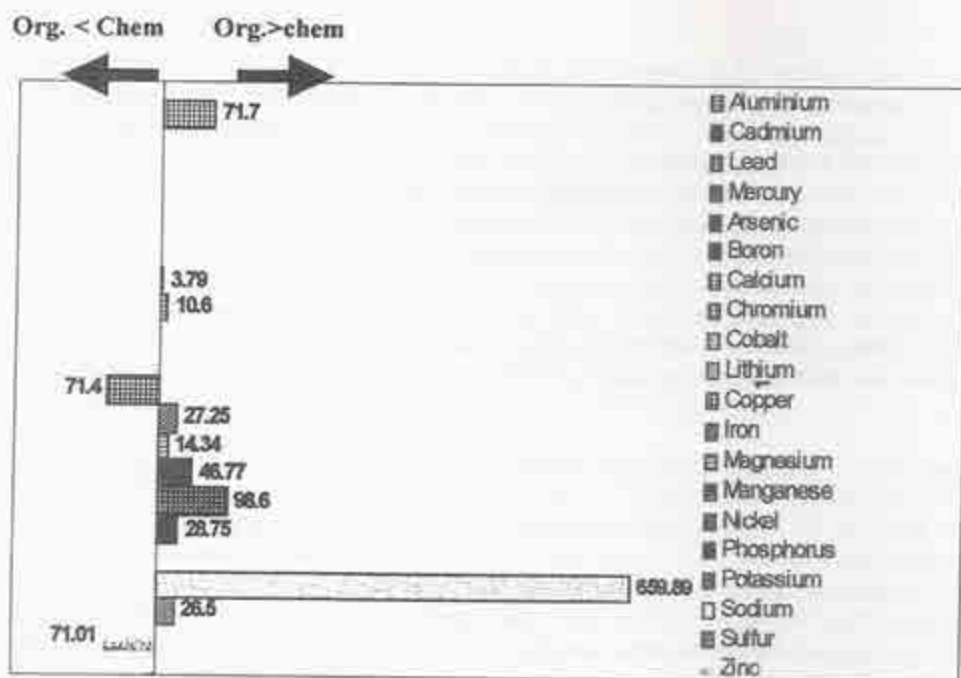


Fig. 1. Percent difference between Umargaon Green Gram (org.) and Green Gram of Chem. varieties

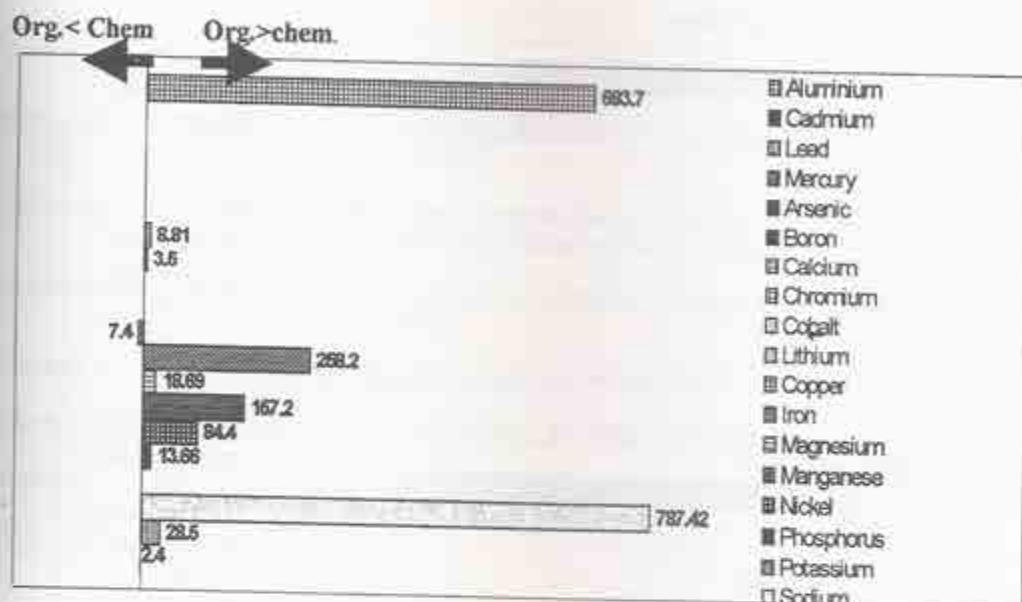


Fig. 2. Percent difference between Sindol Green Gram (org.) as compared to Green Gram (Chem.) varieties

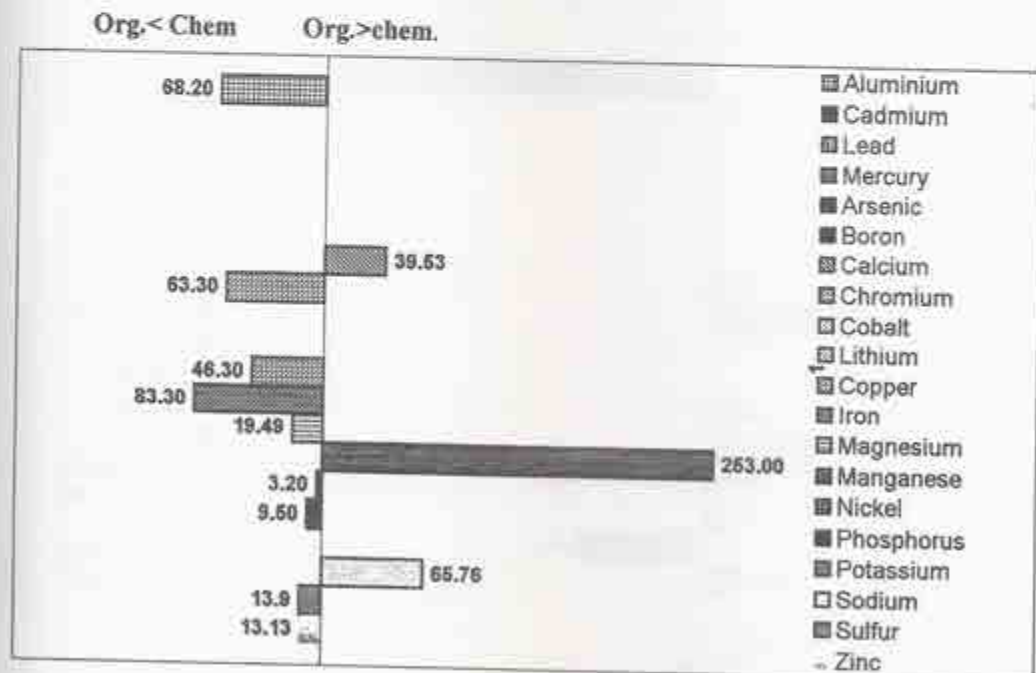


Fig. 3. Percent difference between Nawabi Kolam (org.) and Boro Chatrish (Chem.) varieties

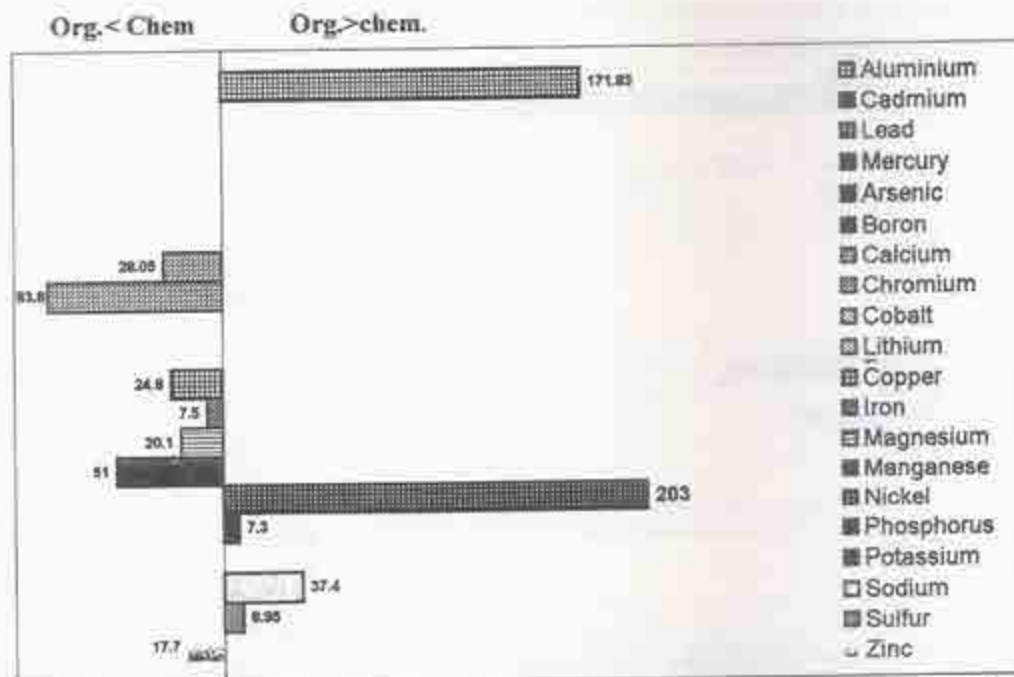


Fig. 4. Percent difference between Bapatla (BPT-Superfine) Saroo akra (Chem.) varieties

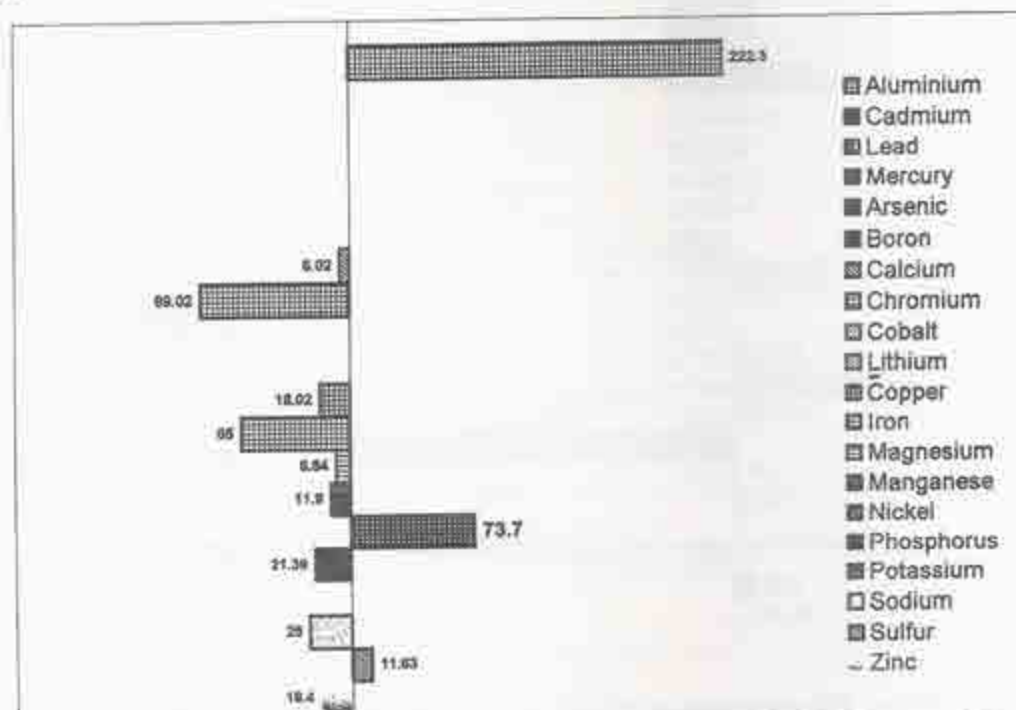


Fig. 5. Percent difference between Lal Kada (Org) as compared to Lal Sawarna (Chem)

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STRESSORS, COPING STRATEGIES AND EXTENT OF COPING IN PEDIATRIC PATIENTS (7-12 YEARS) WITH CHRONIC KIDNEY DISEASE (CKD) AND THEIR PARENTS

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Malfunctioning of the kidneys can result in tremendous physical and psychological repercussions for the patient as well as the family. The present study focused on the stressors, coping strategies and extent of coping in chronic kidney disease pediatric patients and their parents. The sample consisted of 60 participants; 30 chronic kidney disease pediatric patients (7-12 years) and 30 parents, one of each patient. The study employed the interview method and made use of a schedule and a coping inventory for both patients and parents. The schedule examined the stresses and coping strategies in various areas, both for the patients (e.g. physical symptoms, medication, hospitalization, relationships) and the parents (e.g. finance, occupation, sex relations, role changes). The inventory assessed, on a 4-point rating scale, the extent of coping of patients on three subscales (generation of hope, enhancement of self-esteem, maintenance of socio-emotional well-being) and of the parents, on 5 subscales (containment of uncomfortable feelings, generation of hope, enhancement of self-esteem, maintenance of relationships, maintenance of a sense of well-being). Higher scores were indicative of better coping. The maximum number of patients reported being stressed by physical symptoms (100%), food restrictions, (90%) medication (83.3%) and school-related issues (80%). They were most bothered by their physical symptoms, hospitalization, food restrictions and medication. Overall, they exhibited a moderate degree of coping effectiveness. The maximum number of parents reported being stressed by the physical symptoms (96.6%), medication (96.6%), food restrictions (83.3%) and hospitalization (80%) in relation to their children and financial problems in relation to themselves (86.6%). They were most bothered by their child's physical symptoms and their own financial problems overall, they exhibited a high level of coping effectiveness. Based on the findings of the current study, guidelines for intervention strategies to reduce stress and enhance coping for the patients and their families were chalked out.

Increase in life expectancy, life style, dietary habits, occupational and environmental stresses along with many other factors have led to a four-fold increase in the occurrence of chronic disease in the 20th century. The prevalence of chronic renal disease, in particular, has increased dramatically (Patterson 1988). Malfunctioning of the kidneys can result in physical and psychological repercussions for the individual. These repercussions are greater in cases where the patient is a child and the disease, a chronic one (Graham 1991).

Physical symptoms such as painful urination, swelling or puffiness of the face, loss of energy and weakness are an inevitable part of chronic kidney diseases [CKD] (Garella and Mattern 1987). As dietary and other restrictions are a part of living of pediatric nephrology patients, misery, withdrawal, anger and anxiety are normal reactions (Davis et al. 1988). The medication taken may encroach upon the privacy of the child (Patterson 1988). The presence of strangers in the ward and the sight of surgical instruments may prove to be stressful for children who are hospitalized (Faulkner 1992). Also, dialysis can be frightening to young patients, who often perceive the dialysis machine as a monster (Stapleton 1986). Alterations in physical appearance are a special source of anguish to the patient (Korsch 1978). Poor academic achievement and school maladjustment have been found in children with renal disease (Fukunishi and Honda 1995). Finally, the illness can also

cause a change in behaviour patterns such as irritability and anxiety and adversely affect the mastery of developmental tasks (Patterson 1988).

Illness affects not only the individual, but the family as well. The burden of care for families looking after children with CKD can be considerable (Watson 1995). Concerns of control and possible non-compliance with the diet regimen surface and can become a focus of parent-child conflict (Canam 1993). Owing to the physical appearance of their child with CKD, for most families, it is, more often than not, socially isolating (Krenner and Adelman 1988). Management of a chronic illness can become financially draining (Patterson 1988). Decline in sexual activity may compound existing strains in the marital relationship produced by the chronically ill child's dependency (Taylor 1995). The roles, relations and responsibilities of the family must often be changed to accommodate the needs of the chronically ill child (Miller 1992).

A virtual absence of Indian research served as an impetus for the current study which examined the stressors and coping strategies and assessed the extent of coping of chronic kidney disease pediatric patients and their families.

Material and Methods

Sample

The total sample consisted of 60 participants, 30 pediatric patients with chronic renal disease between the ages of 7 and 12 years, attending a public hospital in Mumbai and 30 parents, one of each patient (i.e. either father or mother). Only those patients who had completed ≥ 1 year post diagnosis were considered for the study. Patients who belonged to a single parent family were excluded from the study. Twenty-two boys and 8 girls constituted the sample. (Mean age: 10.47 years). They belonged to various diagnostic categories. The majority had an idiopathic nephrotic syndrome (23). The other categories were chronic renal failure (3), obstructive uropathy (2), SLE (1), VUR (1). Most had been on treatment for a period between 2 to 9 years. Fourteen fathers and 16 mothers constituted the sample (Mean age: 37.03 years). Half of the participants were employed. The majority were Hindus and had a monthly family income of Rs.2, 000/- to Rs.5, 000/-.

Measurement

The study, which employed the interview method, included a schedule and an inventory. The schedule examined the stresses and coping strategies and had two parts A and B. Part A of the schedule for patients covered a wide range of areas: physical symptoms, food restrictions, hospitalisation, physical appearance, school life, relationship with family members, etc. Part A of the schedule for parents included the same areas as that of the patient and five additional ones, namely, financial impact, occupational impact, sexual relations, role and relationship changes and self-behaviour patterns. For each area, the patients and parents were asked whether they experienced stress, and if so, the nature of the stress and the method of coping with the same. In Part B, the participants were presented with a similar list of areas, each of which had to be rated on a 4-point scale for the extent to which it bothered them. Higher scores indicated a greater degree of botheration.

Two coping inventories, based on Miller's (1986) criteria for coping effectiveness were employed to assess the extent of coping with the stresses, one relevant for patients and one, for

parents. The patients inventory assessed on a 4-point scale the extent of coping in 3 dimensions : generation of hope, enhancement of self-esteem and maintenance of socio-emotional well-being. The parents inventory similarly assessed, on a 4-point scale, the extent of coping in 5 dimensions: containment of uncomfortable feelings, generation of hope, enhancement of self-esteem, maintenance of relationships and maintenance of a sense of well-being. Higher scores were indicative of greater coping effectiveness.

Results and Discussion

Patient Data

All patients expressed stress regarding the physical symptoms of their illness. More of them reported swelling (76.6%), fatigue (66.6%) and pain (56.6%) as causing problems. A substantial number of patients also experienced stress in relation to food restrictions (90%) and fluid recommendations (66.6%). Craving for food sold on carts e.g. bhel, vada pav, (73.3%), feeling tempted to eat when someone else ate (53.3%), dislike of less or no salt in the food (53.3%), desire for more water (50%) and a craving for aerated drinks (43.3%) were the stresses reported. Regarding medication, 83.3% reported experiencing stress and the sources of the stress were having to take bitter tasting medicines (40%), too many medicines (30%) and the experience of weakness perceived as a side effect of the medication (26.6%). Hospitalisation was stressful to 70% of the patients. Not liking the hospital food (60%), being confined to the bed (56.6%), being unable to sleep properly (43.3%) and having strangers around oneself (40%) were the problems associated with hospitalisation.

A little more than half of the patients (57%) were stressed by their physical appearance (shortness of stature and puffiness of face) and reported that they experienced embarrassment (23.3%), anger (20%) and sadness (20%) in relation to these physical attributes. School-related issues were stressful for 80% of the patients. More children were concerned about staying absent from school for many days (53.3%) and some (33.3%), about their inability to concentrate at school. The taunting of friends (46.6%) and impatience of teachers (33.3%), in particular, troubled them. In relation to the changes in recreational life, less than half of the patients (46.6%) experienced stress (particularly those who had an active recreational life prior to the illness) and reported feeling sad (30%) and bored (23.3%). Regarding the relationship with family members, 56.6% of the patients felt stressed with the behaviour of siblings (46.6%), namely, a lack of understanding, quarrelsome behaviour and a superior attitude. A little more than half of the patients (53.3%) indicated that they were bothered by changes in their behavioural patterns, particularly that of anxiety (53.3%), irritability (53.3%) and a more demanding behaviour (46.7%).

Regarding the extent of botheration (Table 1), patients were most bothered by their physical symptoms, food restrictions, medications and hospitalisation.

A wide variety of coping strategies were employed by the patients. They generally engaged in activities to distract themselves (when experiencing physical symptoms or when hospitalised), ignored treatment recommendations or protested against the same (with respect to food and fluid restriction and medication), cried (when taking injections or in relation to undesirable changes in physical appearance), prayed (to ease the pain of physical symptoms or injections, to obtain help with school-related issues) and became aggressive (when classmates teased them or siblings quarreled with them). Regarding the extent of coping (Table 2), the patients exhibited a

moderate degree of coping effectiveness. Coping was moderate in the areas of generation of hope and enhancement of self-esteem but relatively higher in the area of socio-emotional well-being.

Parent Data

Most of the parents (96.6%) were stressed by the physical symptoms of their children (fatigue, pain, swelling) and felt scared (43.3%), helpless (33.3%) and sad (30%) in relation to the same. Many parents (83.3%) reported being stressed by the food restrictions for their children and faced difficulties in terms of the regulation of their child's diet (66.6%) and adjustment of other family members to the changed family diet (33.3%). Again, 43.3% faced problems in terms of regulating their child's fluid intake. An overwhelming number of parents (96.6%) experienced stress in relation to their child's medications. Many parents (70%), felt troubled due to the side-effects of medicines (weakness, swelling etc) and some felt sad as the child had to take several medicines (30%) and impatient as the child took the medications after a long delay (23.3%).

Hospitalisation of the child was a stressful experience for 80% of the parents. More parents reported that they faced problems in terms of household chores getting neglected or them being taken over by others in the family (50%), reaching late or feeling tired at work (46.6%) and the child missing out on school work (46.6%). Stress in relation to their child's physical appearance was reported by 53% of the parents. Parents felt embarrassed (37.6%), as others stared at the child and annoyed (26.6%) as people asked unnecessary questions about the child or made unfavourable comparisons between the patient and other children. Many (63.3%) were bothered about the undesirable changes in their child's behaviour, namely, getting irritated/ angry faster /more often (30%). With respect to the child's school life, 77% of the parents were stressed and indicated feeling angry (40%) with the child's schoolmates and teachers for not understanding their children and anxious (36.6%) regarding whether their child would pass the examination.

Regarding financial implications, 86.6% experienced stress and reported difficulties with respect to repayment of loans (66.6%) and having no savings left (73.3%). All those who were employed reported stress in their occupational life and mentioned lowered level of concentration (50%) and decreased amount of stamina (40%) as the sources of stress. Very few (13.3%) were stressed by changes in their recreational life and these felt sad as they had no opportunity to go out with friends or lost friends as they couldn't keep in touch with them. Stress in the sex-life was indicated by 46.6%, with decreased /cessation of sexual intimacy (40%) and lack of privacy (26.6%), being the problems mentioned. Regarding role and relationship changes, 63.3% reported stress. More of the parents experienced problems in relation to shouldering new responsibilities (43.3%) and a greater number of responsibilities (26.6%) and not feeling adequate in performing these responsibilities (30%). Spending less time with the spouse (30%) and neglecting other children (30%), also troubled them. Finally, 80% of the parents felt stressed by changes in their own behaviour pattern, namely, becoming very anxious (36.6%) and short-tempered (30%).

Regarding the extent of botheration (Table 3), parents were most bothered about the physical symptoms of their child and the financial implications.

A wide variety of coping strategies were employed by the parents. They generally approached the medical authorities for help (when the child complained of physical symptoms or they observed side-effects of medication), sought help and support from friends, relatives and family members (shared responsibilities with family members to ease the burden of household chores, borrowed money from relatives and friends), disciplined the child through authoritative

methods such as forcing the child or beating him / her or more democratic methods such as reasoning with or rewarding the child (while dealing with the child's refusal to eat recommended food or with angry stubborn behaviour of the child), prayed to God for help (when others reacted negatively to the physical appearance of the child, to handle additional roles and responsibilities brought about by their child's illness) and got resigned to the situation (with respect to child's absence from school, reduction in recreational life, impoverished sex life and changes in roles/relationships and behavioural patterns).

Regarding the extent of coping (Table 4), the parents exhibited a high level of coping effectiveness. Coping was moderate in the areas of containment of negative feelings and maintenance of a sense of well-being but relatively higher in the areas of generation of hope, enhancement of self-esteem and maintenance of relationships.

The patients were most stressed by their physical symptoms, food restrictions, medication and hospitalization. Physical symptoms represent a deterioration in condition, which in turn has several implications attached to it such as hospitalization, a stricter diet regimen and so forth. Many of the chronic renal diseases and nephrotic syndrome, in particular, tend to have a rather unpredictable course which can add to the anxiety of the patient (Korsch 1978). Stapleton (1986) has asserted that eating is a pleasurable experience, which not only satisfies the hunger, but, is a form of oral gratification. As such, food restrictions for CKD pediatric patients could have been frustrating. Also, salt forms a basic inseparable condiment in the food preparation of most people. Given that a majority of the patients had to follow a salt-restricted diet, it is understandable why they found this aspect particularly bothersome. Medications can encroach on the privacy of the child (Patterson 1988). Again, it is a constant reminder of the child's abnormality (Pless and Nolan 1991). Moreover, since many of the parents were illiterate, it became the child's duty to keep track of the type of medicine and the timings for taking them, indeed an awesome responsibility for young children. Also, the side effects of medicines (weakness) may have been interfering with daily functioning. The separation from home, toys and familiar objects, the introduction of new activities, experiences and people in combination with physical discomfort could have all contributed to making hospitalization a stressful experience for the patient.

A wide variety of coping strategies were employed by the patients, some effective and some, ineffective. Engaging in activities to distract one's self can help the child to defocus on pain and discomfort. Ignoring food and fluid restrictions can be dangerous, as toxic substances can build up in the blood stream and become deleterious to the well being of the patient. Crying, may on the one hand, give vent to the emotion, which triggered it: sadness, anger, etc. On the other hand, persistent crying can sustain a negative mood and elicit an attitude of pessimism. Becoming aggressive to deal with conflicting situations with classmates / peers / siblings does not resolve problems and indeed can elicit retaliatory behaviour or distance the child from those around. Praying can help the child to attain peace, solace and comfort.

The patients showed a moderate degree of coping effectiveness. Considering the impact of CKD on all vital areas of a child's life, the findings are gratifying. Tentative reasons can be offered for the same. Initially, the impact of the disease is likely to be quite severe. However, with the passage of time, perhaps the individual gets accustomed to many aspects (symptoms, treatment) associated with it and the adversity lessens. For most children in the current study, some years had elapsed since the diagnosis and commencement of treatment. Also, children in the middle/late childhood period, as compared to younger or older children, tend to be better patients to the care-

taking establishment as well as to themselves (Patterson 1988). The emotional support from family members is very important to good adjustment, coping and adherence with treatment regimen (Borrow 1985). In the current study, the patients must have felt secure in the nest of warmth provided by family members. Hope was moderate in nature. Although the illness could have acted as an obstacle to having high expectations, the patients may have harboured hopes of rising above their situation. In the words of Kübler-Ross (1969), hope can pull the person through the most trying circumstances and experiences. Many patients reported that they were teased by peers, stared at by strangers and often not understood by teachers / relatives. All these factors can definitely take a toll on the developing sense of self-worth. On the other hand, perhaps the unconditional acceptance and the deep caring and love shown by family members could have helped them experience a sense of adequacy contributing to a moderate degree of self-esteem. Patients exhibited a high level of coping in the area of socio-emotional well-being. Many of the patients reported that they expressed their feelings openly and honestly and that they perceived more meaningful relationships since their illness. A healthy social and emotional life definitely contributes to a sense of well-being (Eisler 1990).

Parents were most bothered by the physical symptoms of their child and their financial condition. Given that their children were being subject to adverse symptoms such as swelling, body pain, weakness, it is understandable why the parents in the current study should feel particularly harrowed. Management of chronic illness can be financially draining due to periodic requirements in the form of medication, special equipment, nutritional care, surgeries, traveling to and fro from the hospital and hospitalization. In addition, most of the parents in the current study belonged to the lower socio-economic strata of society, which explains why they experienced financial problems as particularly bothersome.

A wide variety of coping strategies were used by the parents, some of which were effective and some, ineffective. Approaching medical authorities for help is a logical and rational course of action as they are professionals, trained and equipped to address medical issues and concerns. Seeking help and support (physical, emotional, financial) from friends and relatives is again an effective strategy. Opening up and expressing concerns to someone close could definitely serve as a destressor (Edwards and Davis 1977). Obtaining assistance from others, when one is keyed up, can certainly ease the situation. Disciplining children, using authority force or aggression, can only provoke rebellious behaviour and trigger a resentful attitude in children. On the other hand, the practice of rewarding children for adherence to the treatment recommendations (diet, medications), is appropriate and based on sound psychological principles of behaviour modification. Belief in God and prayer could provide one with inner strength and courage to deal with the illness of one's child. Getting resigned to the situation is negative, in the sense that it promotes passivity and a reluctance to rise above the situation and accept it as a challenge.

The parents, on the whole, exhibited a high degree of coping effectiveness, which is commendable in view of the circumstances that they had to deal with. Unconditional love and acceptance of their children, social support and prayer could have helped them tide over difficult circumstances. Also, it is important to keep in mind that many of the patients belonged to the lower socio-economic strata of society. Accustomed to dealing with daily hardships, they may have perceived their children's disease and its implications as just one more challenge to cope with. The strong conviction that their child would recover could have helped them to keep their hope alive. Their hidden potentials and strength, which perhaps rose to the surface during their child's illness, could have helped to enhance their self-esteem. Their ability to seek and gracefully accept help

from others perhaps enabled them to maintain good relationships with those around them. Since parents are developmentally more resourceful than children, this could have accounted for their greater degree of coping effectiveness as compared with their children.

Conclusions

Although, quite a few patients and their parents were experiencing stress in several areas, their coping effectiveness seemed to have been fairly good. However, it's important to note, that since the duration of some of the chronic kidney diseases is several years, helping patients and parents to cope with long-term stresses is a worthwhile objective. Also, in view of the fact that a few patients and parents were not coping effectively overall, and some others were not coping effectively in specific areas, intervention programs for these individuals would be relevant.

Some guidelines for intervention are as follows:

1. Information about the illness should be periodically provided in a simple, clear, non-technical, jargon-free fashion
2. Self-control strategies in relation to food and fluid intake can be taught to the patients
3. Preparation for hospitalisation can be undertaken
4. Tips on how to economise and capitalise on funding schemes can be provided
5. Instruction on how to challenge dysfunctional thoughts to deal with negative emotionality can be imparted
6. The importance of communicating about the illness to others can be conveyed.
7. The ability to conquer the illness and reach one's potential can be emphasized.

TABLE 1. MEANS AND STANDARD DEVIATIONS ON PATIENTS' EXTENT OF BOTHERATION (N=30)

Area	Mean	SD
Physical Symptom	2.33	0.61
Food Restrictions	2.17	0.87
Fluid Recommendations	1.13	0.94
Medications	2.10	0.80
Hospitalisation	2.20	0.41
Physical Appearance	1.83	0.99
School Life	1.80	1.00
Recreational/Social Life	1.37	1.00
Relationships	1.47	0.86
Behaviour Pattern	1.93	0.58

TABLE 2. MEANS AND STANDARD DEVIATIONS ON THE PATIENTS' COPING INVENTORY (N=30)

Inventory	Range	Mean	SD
Entire Scale	0-75	42.53	11.57
Sub-scales			
1. Generation of hope	0-15	8.60	3.74
2. Enhancement of self-esteem	0-15	7.87	3.27
3. Maintenance of socioemotional well-being	0-45	26.07	6.47

TABLE 3. MEANS AND STANDARD DEVIATIONS ON PARENTS' EXTENT OF BOTHERATION (N=30)

Area (related to child)	Mean	SD
Physical symptoms	2.27	0.83
Food Restrictions	1.87	0.86
Fluid Recommendations	0.90	0.80
Medications	1.57	0.77
Hospitalisation	1.97	1.03
Physical Appearance	1.77	0.86
Behaviour Pattern (child)	1.73	0.83
Area (related to parent/family)		
Financial	2.27	0.74
Occupational	1.97	1.10
Recreational/Social	0.87	0.57
Sexual	1.20	0.85
Roles & Responsibilities	1.50	0.68
Relationships	1.80	0.81
Behaviour pattern	1.30	0.88

TABLE 4: MEANS AND STANDARD DEVIATIONS ON THE PARENTS' COPING INVENTORY (N=30)

Inventory	Range	Mean	SD
Entire Scale	0-90	60.87	13.57
Sub-scales			
1. Containment of uncomfortable feelings	0-18	10.87	2.91
2. Generation of hope	0-18	13.77	3.22
3. Enhancement of self-esteem	0-18	13.03	3.39
4. Maintenance of relationships	0-18	12.30	3.44
5. Maintenance of a sense of well	0-18	10.90	3.42

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EVALUATION OF ASSESSMENT, RECORDING AND REPORTING OF CHILDREN'S PERFORMANCE IN SENIOR KINDERGARTEN IN MUMBAI

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The aim of the present study was to examine the assessment, recording and reporting of children's performance in Senior Kindergarten and evaluate them for their appropriateness. Methods such as interview, content analysis etc. were used to obtain data. Twenty teachers of Senior Kindergarten from 20 different schools in Mumbai were interviewed and asked for a copy of their stated curriculum. The report cards and the remarks written by the teacher in the report cards were analyzed. An evaluation tool was created with the help of experts and the schools were rated for their appropriateness in assessment, recording and reporting. The data revealed that the stated curriculum of most schools gave a detailed description of only the academic subjects, which were taught in class. The examination method was the predominant method through which children were assessed and the teacher was the primary assessor. Most schools maintained only background information records and attendance records and met with the parents on an average once in three months. The report cards of a majority of schools focused only on language and cognitive development. Most of the schools received a low rating on appropriateness for assessment, recording and reporting.

In the course of the last three decades, preschool education has assumed tremendous significance not only in India, but the world over as an essential intervention for the overall development of the child (Kaul 1991). High quality preschool education serves two main purposes - it provides a strong foundation for the overall development of the child and prepares the child for the demands of primary schooling. In preschool education, assessment is often the base of a child's existence (Kulkarni 1991). It influences a host of activities ranging from "evaluation" of the child to determine his entrance into preschool and every subsequent promotion thereafter, to planning activities for the child and bringing about changes in the program itself. The kind of assessment done also has an impact on the child as well as the parents. It impacts the child by shaping the study habits, general and academic self-concepts and affecting his self-efficacy, self-adjustment and academic motivation. Assessment of the child also effects the teacher's perception of the child and may consequently alter her teaching strategies (Rodrigues 2000). For the parents, the assessment may often be a cause of undue anxiety and stress.

While studying assessment of children, three interrelated dimensions are important - the assessment of the child's performance itself, the recording of the performance and the reporting of the child's performance with each of them having their unique uses. Assessment, a primary tool for guidance and placement, helps to identify the child's strengths and weaknesses and helps to set realistic goals for the child (Gordon and Browne 1989). Recording provides evidence and documentation of the child's learning and progress (Helm et al. 1997). It also serves as a guide for planning the types of experiences each child needs by finding out the child's strengths and weaknesses (Decker and Decker 1980). Reporting seeks to involve parents in their child's development (Weldin and Tumarkin 1999).

It has been re-emphasised that continuous evaluation of children is better than examinations and tests. Assessment should be comprehensive, informal and should be built into classwork through systematic observation of children's play and other activities such as informal testing so that it does not become an extra task for the teacher. (Kulkarni 1991; Kaul 1991; Verma 1993). However, very few studies that have been conducted in India on assessment also contradict these recommendations. According to Venkatesh (2001) more than half the preschools surveyed had formal evaluation by way of examinations and class tests.) A survey of preschools in North Bombay by Menon (1988) revealed that 80% of the attached preschools had monthly evaluations in terms of oral and written examinations while 90% of the nonattached preschools had flexible informal assessment conducted on a yearly basis. But the Baroda study showed that out of 45 preschools only 13 preschools had kept records of the child. Out of the 13 schools, in only seven schools the records were discussed with the parents. Also 17 preschools had parent teacher meetings (Verma 1966). In view of the scant attention paid to assessment, the current study focused on the assessment, recording and reporting of children's performance, currently followed in Senior Kindergarten and evaluated them for their appropriateness.

Materials and Methods

The study was conducted in three stages. In the first stage, stratified random sampling was done and 20 English medium schools affiliated to the SSC board were selected from three zones in Mumbai (7 schools from the north zone, 6 schools from the central zone and 7 schools from the South Zone). From each of these 20 schools, one teacher of Senior Kindergarten who had at least three years of teaching experience and had a minimum qualification of either a diploma in ECCE or a Bachelors Degree in Home Science (Human development) or a B.Ed degree was selected and interviewed. In the second stage, the teachers were asked for a copy of the stated curriculum of Senior Kindergarten and the report cards. The report cards of ten students were randomly selected and the remarks written by the teacher in the remarks column were analyzed. In the third stage, five experts in the field of early childhood education were interviewed to find out how assessment, recording and reporting of children's performance should be done in Senior Kindergarten. Based on the responses obtained by the experts and available literature a scale was constructed to evaluate the appropriateness of assessment, recording and reporting of the child's performance and the twenty schools were assigned a rating on the scale.

For eliciting the opinions of the teachers and the experts about assessment, recording and reporting of children's performance, the interview method was utilised. The interview schedule consisted of 85 questions for the teachers and 24 questions for the experts. For evaluating the report card and the remarks, content analysis was done with the help of a self-constructed and administered questionnaire, which consisted of two parts. The first part dealt with the report card and consisted of 35 questions. The second part dealt with the remarks written by the teacher and consisted of 9 questions. The scale for evaluating the appropriateness of assessment, recording and reporting consisted of 225 items (the reliability coefficient 'Cronbach's alpha' was .72 for assessment, .64 for recording and .63 for reporting). Information obtained from the interview with the teacher, the analysis of the report card, remarks written by the teacher and the examination of the curriculum were used to assign scores to each school. For each of the three areas based on the scores received, schools were given an appropriateness rating on a four point rating scale where 1 indicated 'Not at all appropriate', 2 indicated 'A little appropriate', 3 indicated 'Moderately appropriate' and 4 indicated 'Very appropriate'. Higher scores in each area were indicative of better appropriateness.

Results and Discussion

The class strength of Senior Kindergarten ranged from 25 to 82 students per class. Out of the 20 teachers, 16 teachers had a diploma in ECE while 4 teachers had a BEd degree. The number of years the teachers had worked in the school ranged from 4 years to 32 years.

Curriculum: Since assessment is often based on the curriculum, the schools were asked for a copy of the curriculum of Senior Kindergarten to examine the various areas of development included. While the National Policy on Education (1986) states that no teaching of the 3Rs should be done at this preprimary level, it was seen that the stated curriculum of most schools focused only on the academic aspect of development, where the content of all the subjects taught in class (like Maths and Language) was explicitly explained. Physical development was included in the curriculum of only eight schools and in nine schools music and movement were included. None of the schools mentioned activities for socio-emotional development in the curriculum. The curriculum is what happens in class and hence should not only include goals which have to be achieved in the various areas of development – social skills, communication, academic skills, gross and fine motor development, but also learning opportunities for each of them (Leeper and Day 1984). The curriculum also impacts the type of assessment, which is carried out (Catron and Allen 1993). When the stress is only on the 3Rs, the methodology also becomes more and more formal with a greater emphasis on the tests or examinations for assessment (Kaul 1991).

Assessment: Only five schools followed an informal system of continuous assessment where observation of children's behaviour and their performance in class work were the predominant methods of assessing the child. Fifteen schools followed a formal system of assessment, where an examination was the predominant method through which children were assessed. Six of these fifteen schools, held examinations as many as four times a year. These examinations affected the children in different ways. For example in six schools, the teachers stated that the children fell sick during exams and some children opted for tuitions to enable them to cope with the perils of the examinations. Making assessment a one time affair through examinations also often separates teaching and evaluation and hence it has been recommended that teaching and evaluation should go hand in hand and no separate time should be allotted for assessment. It is desirable that assessment should be done throughout the year in an ongoing informal manner where the child is unaware that he is being assessed. (Catron and Allen 1968).

In all 20 schools, the teacher was the primary assessor of the children while in six schools the supervisor and in one school the principal was also involved. According to NAEYC & NAECS / SDE (1991) and Grossman and Keyes (1985) the teacher should be the primary assessor of the children. This is because the teacher is in close contact with the children and is directly involved in the teaching learning process. The teacher should be mainly concerned with planning and implementing activities for the children to support and encourage them in their overall development. However, the teacher played this type of role in only five schools. In the remaining 15 schools the teacher's role was mostly limited to setting the examination papers and correcting them. Out of the 13 schools, which had integrated classrooms, in only six schools a counselor or a special educator was available to do the assessment of the children with special needs. It is imperative that besides the class teacher a special educator be there to assess these children because often the teacher doesn't have the required qualification or training. Further the current strength of the class doesn't permit the teacher to give adequate attention to these children.

With respect to the method of assessment, in fifteen schools examinations were used, in five schools regular class work and in 12 schools observation was used as a method of assessment. However, out of the 12 schools in only six schools written records about the observation were maintained. It is extremely important that the observation of the child be recorded in a systematic manner because otherwise the teacher may not be able to remember detailed information about all the children, especially when the class strength is as high as 50-60 students. Besides this, if observation is not recorded systematically, personal bias of the teacher may affect memory and the teacher may remember selective or even false information about the child. It is desirable that multiple methods be used to get information about the child. (Dutta 2001) since each method assesses only limited areas of development. Examinations provide information only about the academic area of development, worksheets about conceptual as well as fine motor development and observation about social emotional and physical development. Thus, the use of a combination of methods of assessment such as observation and worksheets provide information about a holistic picture of the child in all areas of development.

Schools should assess all aspects of development – physical, social, emotional, language and cognitive development. While all 20 schools assessed cognitive and language development, only 13 schools assessed socio-emotional development and ten schools physical development. In physical development while it is imperative that the height and weight of the child be noted, it is disheartening to note that this practice was followed in only two schools. Socio- emotional development mainly revolves around the skills of social interaction and interpersonal relationships, which provide the basis for socialization of the student. Thus aspects of behaviour such as cooperation, independence, responsibility, ability to adjust to change, initiative and social awareness, should be assessed (Muralidharan 1991). While independence was assessed in eight schools and cooperation in four schools, of grave concern is the finding that aspects such as ability to adjust to change, initiative and social awareness, which are crucial to the development of a preschool child, were not assessed in any school. Looking at the match between the specific areas of development which were assessed and which were mentioned in the curriculum, while ten schools assessed physical development, it was mentioned in the curriculum of only two schools. Although socio-emotional development was assessed in as many as 13 schools, it was not part of the stated curriculum in any of the schools. It is very essential that whatever is being assessed be stated in the curriculum explicitly. Assessment of the child depends on the inputs the child receives which are often mentioned in the curriculum. It is thus desirable that only the areas of development for which inputs are being provided be assessed.

Eleven schools used the assessment to communicate the children's progress to the parents. Assessment is an effective tool in parent - staff communication as it provides evidence of developmental progress (Decker and Decker 1980). It was heartening to know that three schools used assessment to identify the potential of the students and encourage them to participate in various activities. However, it was equally disheartening to know that schools still used assessment to detain children in class when it is against the principle of non-detention as per the National Policy of Education (1986). Detaining a child at such a young age may often cause damage to the self-esteem of the child who may feel inferior to his classmates since he has to repeat the class.

Recording: In all the 20 schools, records on attendance and background information about the child were maintained. The background information records covered basic information about the child like the child's name, the residential address, the parents' occupation and their office address, the religion of the child. Observation records were maintained in only six schools and only three

schools filled in these at least once in three months. While four schools used a checklist format to maintain the record, two schools used an anecdotal format. Medical records about the child were maintained only in seven schools. Out of these, in four schools information was filled in by the doctor based on a medical checkup, in two schools by the parent and in one school by the teacher herself. Fifteen schools also maintained a mark sheet to record the academic performance of the child.

At the end of the year, in twelve schools records of the child's performance were deposited in the general office while in two schools the records were passed on to the teacher of the first standard. It was commendable that in 17 schools no person had access to the records about the child's development and performance since the information often tends to be confidential and of a personal nature. It may also bias the teacher of first standard if she has access to the records. In these 17 schools the records were checked by either the supervisor or the principal to see if they were regularly completed by the teacher. The records should be checked at least once in every three months. It is heartening to know that in this study this basic requirement was fulfilled in eleven schools.

Reporting: In all 20 schools, the teacher did the reporting of the child's performance to the parent. In 11 schools parents were given information only about the academic performance of the child. This finding is consistent with the findings of Verma (1966) who found that most of the information discussed in parent teacher meetings was in relation to teaching the 3 Rs to the children.

It is recommended that the teachers meet the parents at least once in three months. As many as 12 schools fulfilled this minimum requirement. In all the 20 schools report cards and parent teacher meeting were used to communicate information while informal reporting was used in nine schools. In informal reporting, the parents could meet the teacher whenever they wanted to find out about the child's progress. Four schools had group parent teacher meetings while the remaining 16 schools conducted individual parent teacher meetings. All the 20 schools used report cards as a method of giving information about the child's performance to the parents. In five schools, the report card was sent home directly through the child. This did not allow interaction or scope for discussion with the parents about the performance of the child. It is also interesting to note that only in the report cards of ten schools was there space for the teachers to write their comments. The space for comments can be used by the teacher to write about other aspects of development, which may not be mentioned in the report card or can be used to highlight significant information about the child, either his strengths or his weaknesses. However, with the absence of such a place in the report card, the teacher may not be able to write such information down and will probably have to orally communicate such information, which sometimes she may forget to do. While in all the 20 schools information about cognitive and language development was mentioned in the report card, only in 13 schools socio-emotional development was reported and in only ten schools physical development.

Results of the evaluation of assessment, recording and reporting of the children's performance revealed that most of the schools fell in the 'little appropriate' category for assessment, recording and reporting (Table 1). Appropriateness of assessment was calculated separately for schools with and without integrated classrooms. Out of the 13 schools that had integrated classrooms, 11 schools fell into the 'little appropriate' category. For schools without integrated classrooms, out of the seven schools, five schools fell into the 'little appropriate' category. As far as appropriateness of recording is concerned, 15 schools fell into the 'little appropriate' category.

Appropriateness of schools for reporting was calculated separately for schools with a remark column in the report card and schools without a remarks column. Out of the 10 schools who had a remarks column in the report card, 6 fell in the 'moderately appropriate' category and out of the 10 schools who did not have a remarks column, 8 fell into the 'little appropriate category'.

TABLE 1. APPROPRIATENESS OF ASSESSMENT, RECORDING AND REPORTING OF CHILDREN'S PERFORMANCE (N = 20)

Appropriateness Level	No.
Assessment for schools with integrated learners	13
Not at all appropriate	0
A little appropriate	11
Moderately Appropriate	2
Very Appropriate	0
Assessment for schools without integrated learners	7
Not at all appropriate	0
A little appropriate	5
Moderately Appropriate	2
Very Appropriate	0
Records	20
Not at all appropriate	0
A little appropriate	15
Moderately Appropriate	5
Very Appropriate	0
Reporting in schools where remarks column is present in the report card	10
Not at all appropriate	0
A little appropriate	3
Moderately Appropriate	6
Very Appropriate	1
Reporting in schools where remarks column is not present in the report card	10
Not at all appropriate	0
A little appropriate	8
Moderately Appropriate	2
Very Appropriate	0

Conclusions

The findings indicate an urgent need to improve the quality of the assessment, recording and reporting of children's performance. Some guidelines for enhancing assessment include conducting informal assessment of the children using methods such as observation and worksheets and having an appropriate teacher student ratio. Besides this pre-service and in-service training can be given to

teachers to help them understand the importance of assessment. The quality of record keeping can be improved by maintaining a variety of records about the child – medical records, observation records, background information records. The supervisor or the principal should check these records once a month to ensure that they are being filled in appropriately and should be kept for a minimum period of 12 years. Reporting can be enhanced if parent teacher meetings be held at least once in three months and the report card provide information about all areas of development - physical, social, emotional and cognitive development.

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A STUDY OF THE MENTAL HEALTH AND LONELINESS AMONG AGED.

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The present study was conducted on aged males and females 70-80 years of age. Out of the total number of 100 aged persons selected randomly an equal number of aged male and female were selected. The two standardized questionnaires used, assessed the mental health and loneliness of the aged males and females. Mental health of the subjects was assessed through a self-made questionnaire which included six constituents like emotional stability, overall adjustment, self concept, autonomy, security-insecurity, and intelligence. Perceived loneliness was measured using Jha's scale. Results indicated significant differences on both variables. Males showed better mental health than females, while females showed greater loneliness. Further, better mental health and less loneliness among aged males than in aged females were observed. Loneliness is significantly related to emotional stability, overall adjustment, self-concept and intelligence among males. Loneliness is also significantly related to overall adjustment, autonomy and intelligence among females. A negative correlation between loneliness and mental health was also observed.

India is going through a revolution in its demographic, economic, social, cultural and psychological status. The population aged 60 + is increasing rapidly in the country. According to estimates by United Nations the projected population of India will be 1,445.6 million in 2025. This will be about 17.1 per cent of the total world population at that time. The population of elderly in India in the year 2025 will be 177.4 million about 15% of the world elderly population.

Mental health refers to the full harmonious functioning of the personality, as well as to the bio-psychological and spiritual well-being. It has positive aspects like originality, security, of satisfaction, hope, happiness, self actualization, self concept etc. and also has negative aspects like frustration, feeling of insecurity, emotional instability or neuroticism, depression, hopelessness. In old age apart from declining mental power, factors such as poor health, societal attitudes, loss of social status and economic problems, are but a few of the sources of anxiety, that have a telling effect on the physique of the aged. As a result of all these influences several psychosomatic conditions develop that aggravate the physical health of the individual. Havinghurst and Alberecht. (1991) concluded that satisfaction in life is generally recognized to be an important component in determining mental health. Some people grow old with a sense of fulfillment and gratitude, whereas others remain preoccupied with bitterness and self pity. There have been two general points of view to measure the psychological well being or successful aging of older people i.e. greater the extent of social participation the greater is the well being. The other view focuses upon the individual internal frame of reference, his own evaluation of his satisfaction and his happiness. Williams and Wood (1988) stated that there has been little recognition of how an elderly person's independence and scope for autonomy is affected by their relationship with care givers and by different living arrangements within the community. Peplau and Perlman (1982) explained loneliness as a subjective experience. People can be alone without being lonely that is in a crowd. Loneliness is one of the least satisfying, conceptualized phenomena and has been subsumed under depression and treated as if it was depression. Psychological factors and chronic disease play an important impact of mental illness among the aged. Lowenthal (1984) found that life long extreme

isolation in old age and physical illness seemed to be related to mental illness. This suggests that physical illness may precede and cause both relative isolation and mental illness in old age.

The isolation, anxiety, depression, mental morbidity and poor self concept are some of the psycho social problems associated with old age. Previous research indicated that poor mental health is accompanied with geriatric depression. In India around 4 million people aged 60 and above are said to be suffering from mental illness, and two thirds of these are diagnosed as depressed. Thus the present study aims at the relationship between loneliness and mental health among the aged..

Materials and Methods

Sample consisted of 100 subjects in the age group of 70-80 years selected from a total of 503 aged persons in different the areas as given in Table 1.

TABLE 1. SELECTION OF SAMPLES

Area	Total No.of Aged who fulfilled the selection criteria	Selected Sample
Balkeshwar	176	29
New Agra	144	24
Kamla Nagar	283	47
Total	503	100

Out of the 100 aged people selected 50 were males and 50 were females. The criteria for selection were : 1. Only those aged whose spouse was alive. 2. Of the two husband and wife, only one selected in the sample. Two standardized tools used to get information of loneliness and mental health. Percieved Loneliness was measured using the Scale suggested by Jha (1980). The scale consists of 36 items with five point rating scale. This tool is standardized and therefore reliable and valid. Mental Health was assessed by a self made questionnaire, the reliability of which was calculated to be 0.933 and its validity 0.966. The six constituents of mental health were - emotional stability, overall adjustment, autonomy, security / insecurity, self concept and intelligence.

Questions related to loneliness:

- (i) Do you want to live alone from your home environment?
- (ii) Do you not like to visit your friends home?
- (iii) Do you generally avoid going out and interacting with people?
- (iv) Do you avoid known persons or relatives?

Questions related to Mental Health:

Emotional Stability:

- (i) Do you get annoyed when somebody criticizes you?
- (ii) Do you get feared when somebody speaks in loud voice?

Overall Adjustment:

- (i) Do you fulfil your social responsibilities?
- (ii) Do you get close with new persons ?

Self Concept:

- (i) I feel that people like me most.
- (ii) My relatives praise my achievements.

After the selection they were contacted at their residence at a scheduled date and time for the purpose of data collection. They were taken in confidence and were convinced that their responses would be kept confidential.

Results and Discussion

Table 1 shows the scores obtained by aged males and female on mental health scale. There is a negligible difference in the mean values on mental health constituents like security / insecurity and Intelligence while on the other four constituents, that is emotional stability, overall adjustment, autonomy and self concept, the aged males have scored significantly higher than aged females. Aged males have greater autonomy than aged females, which is significant at .01 levels. The self-concept is also significant at .01 levels. The other two mental health constituents security / Insecurity & Intelligence show no significant difference among aged males and females. Thus it may be concluded that aged males are more emotionally stable, show greater autonomy and have a better self-concept and adjustment than females.

Table 1. Difference in the aged males and females on the six constituents of mental Health.

Mental health constituents	Males		Females		T value
	Mean	S.D.	Mean	S.D.	
Emotional stability	10.90	2.00	9.36	2.26	3.60*
Overall adjustment	25.34	4.56	22.84	4.57	2.86*
Autonomy	7.00	1.60	5.68	2.09	5.41**
Security/ Insecurity	9.56	1.85	9.08	1.83	1.30
Self concept	10.06	2.43	8.16	1.59	4.61**
Intelligence	18.34	3.98	18.52	3.69	0.23

Significant at .05 level

** Significant at .01 level.

Table 2 shows the scores of loneliness of the aged males and females indicating the presence of higher level of loneliness among females than in males, which is evident from higher mean value on loneliness. The obtained 't' value = 6.27 indicates a significant difference of .01 level. It confirms that there is a great gender differences relating to loneliness in old age.

TABLE 2. LONELINESS SCORES OF AGED MALES AND FEMALES.

Group	Mean	S.D.	't value'
Males	85.96	14.18	6.27**
Females	108.08	20.19	

** Significant at .01 level.

Table 3 . RELATIONSHIP BETWEEN LONELINESS AND MENTAL HEALTH AMONG AGED MALES AND FEMALES.

Loneliness as related to	Males 'r'	't' value	Females 'r'	't' value
Emotional stability	-.441	3.40**	-.255	1.83
Overall adjustment	-.356	2.64**	-.401	3.03***
Autonomy	-.183	1.29	-.467	3.66 **
Security/Insecurity	-.154	1.08	-.320	2.34*
Self concept	-.285	2.06*	-.085	0.59
Intelligence	-.469	3.68**	-.270	1.94

* Significant at .05 level ** Significant at .01 level

The perusal of the table shows that the correlation values for loneliness and mental health among aged males and females loneliness is significantly related to emotional stability, overall adjustment self concept and intelligence among males. Loneliness is also significantly related to overall adjustment, autonomy and intelligence among females. A trend of negative correlation is evident from all the correlation values. This indicates that with an increase the level of loneliness there is a fall in the level of mental health of the aged. Thus males have better mental health and less loneliness than females. These results are also supported by the study of Goins (1997) who stated that women rate their mental health as poor.

Overall, the results of this study suggest that of all the constituents of mental health, males are better on emotional stability, self-concept, autonomy and are more secure as compared to their females counterparts. Conetto et al, (1995) found that older women were rated higher on dimensions related to nurturance, while older men were rated higher on autonomy. In the present study, males have shown higher autonomy as supported by Conetto, et al (1995). On the other hand aged males show low level of loneliness. Similarly Baum (1982), also found that females feel more lonely than males. Patel, S. (1999) concluded that loneliness influences mental health of the aged. Elderly men experienced less loneliness than women thus indicating that loneliness in later life is influenced by gender.

Schulz and Moore (1984) concluded that lonely subjects feel more depressed and experienced more anxiety than subjects who were not lonely. Depression made the person lonelier. Similar results were obtained in study of loneliness by Week (1980), who found that loneliness or depression makes it difficult to entangle the casual influence of one on the other. The female subjects are more likely to spend a great part of the day within the household. The males on the other hand, has more out of family contacts which further is responsible for the lower scores on loneliness among male subjects.

Conclusion

Mental health of the aged males is better and they have lower level of loneliness than females.. The mental health and loneliness are related aspects; lonely subjects suffer from poor mental health, whereas subjects who are less lonely are likely to enjoy better mental health.

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