Research Reach

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RESEARCH REACH

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EDITORIAL

This January 2008 issue of Research Reach brings to you the findings of Home Science research carried out by scholars across several universities in India-Rajasthan, Bangalore, Mumbai, Kurukshetra and Jaipur. An attempt has been made to provide an interesting blend of articles from areas of nutrition, textiles and extension education. Combating nutritional deficits in diets continues to be one of the priority areas of nutritional research. Attempts are constantly being made to popularize domestic practices that would enhance the nutritional value of peoples' diet. The paper by Kaur & Kochar that examines the incorporation of sprouted pulses in food preparations and the paper by Goyle & Saxena that looks at promoting the use of iodized salt to combat Iodine deficiency are both examples of such application oriented research. With increasing incidences of diet related health disorders, improved therapeutic dietetic practices become the need of the hour. Such dietary recommendations need periodic assessment of their efficacy. The paper by Thakkar et al on "the effect of classic ketogenic diet on the nutritional status of children suffering from epilepsy" is one such attempt at evaluation of current medical nutritional therapies. Women empowerment is a primary focus in many rural extension activities. The paper by Revanna et al examines the effect of one such extension project (WYTEP) on the level of empowerment in a sample of farm women from the Mandya district of Karnataka. The textile research scenario is dominated by attempts at developing export oriented garments and furnishings using traditional fabrics and eco-friendly natural dyes. The paper by Kashyap R looks at the acceptability of prototypes of home furnishings created on Kota Doria, a famous hand woven fabric of Rajasthan. As always this issue also includes a section on the list of thesis titles from the post graduate departments of one Home Science institute. The list this time comprises of the topics covered by the college of Home Science, Nirmala Niketan, Mumbai during the academic year 2006-2007.

Chief Editor
Dr. Malathi Sivaramakrishan

INSTRUCTIONS TO THE AUTHORS

Home Science Research Journal is devoted to original Research and Development in all branches of Home Science. It is a bi-annual publication from the Research Centre of College of Home Science, Nirmala Niketan, 49, New Marine Lines, Mumbai – 400020.

The format of the journal includes:

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JOURNAL OF HOME SCIENCE

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RESEARCH PAPERS

FOOD SCIENCE AND NUTRITION

TEXTILES AND CLOTHING

EFFECT OF CLASSIC KETOGENIC DIET ON THE NUTRITIONAL STATUS OF CHILDREN SUFFERING FROM EPILEPSY

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25 children suffering from epilepsy aged between 1-12 years were selected and divided into 2 groups as Group I (on normal diet) and Group II (on CKD). Clinical, dietary, anthropometrical and biochemical parameters were assessed. The type and severity of the epilepsy varied among the groups. Average daily nutrient intake of the subjects did not meet the RDAs. Inspite of being on a diet high in fat and low in carbohydrates, anthropometrical and biochemical parameters of the Group II children were found to be within normal limits. Nutritional status of the children was not found to be optimum and children showed delayed growth, which could be attributed to the severity of the physiological disorder, epilepsy and the effect of CKD. Thus it can be concluded that CKD has an effect on the nutritional status of the children.

KEY WORDS: CKD- Classic Ketogenic Diet, FFQ-Food Frequency Questionnaire, CBC-Complete Blood Count, HDL-High Density Lipoproteins, LDL- Low Density Lipoprotein, RDA-Recommended Dietary Allowance.

The word epilepsy is derived from Greek and means, "to seize upon". It is a condition in which seizures tend to recur chronically because of a persistent and possibly progressive structural or physiological abnormality of brain tissue (Desai 1986). Children and adolescents with epilepsy and adults with childhood onset epilepsy are often reported to have social maladjustment, including poor perceived health and fitness, more frequent behaviour problems and higher rates of social isolation (Mitchell 1999). Thus an effective treatment to control seizures would be fundamental to improve overall outcome in childhood epilepsy (Wheless 1999).

There has been more than a doubling of the medications available for treating epilepsy; although efficient they may offer advantages along with some adverse effects (Diaz-arrastia, Agostini, and VanNess 2002). The shortcomings of antiepileptic drug therapy and epilepsy surgery have allowed alternative treatments to emerge.

The Classic Ketogenic Diet has proved to be an effective alternative treatment for children suffering from intractable epilepsy (Wheless 1999). The CKD is high in fat and low in carbohydrate and protein concentrations, reversing the usual fat to carbohydrate ratio of food intake. It is intended to produce a state of ketosis from the incomplete metabolism of fats into ketone bodies (acetone, acetoacetic acid, Beta-hydroxybutyrate). The exact mechanism by which the diet reduces seizures is unknown, but ketone bodies may possess

direct anticonvulsant activity, (Wheless 1995 In: McGhee and Katyal 2001) or the diet may lead to alterations in acid-base balance, electrolyte distribution and/ or lipid concentrations (McGhee and Katyal 2001).

The diet has been reported to be safe and effective for many patients with severe, drug resistant epilepsy. Wheless and Ashwal (1999) reported that CKD has been effective in controlling seizures and been able to reduce the dosage of antiepileptic drugs (drug dosage decreased or drug withdrawn), resulting in child being more alert, with improved cognition and exhibiting better behaviour.

MATERIALS AND METHODS:

The subjects for the study were selected using purposive sampling technique from Shushrusha Hospital, Dadar and Dr. Nathan's Clinic, Dadar and Kudtarkar Hospital at Thane. A total of 25 children upto 12 years of age suffering from epilepsy were selected. The subjects were classified into 2 groups as Group I (those who were on a normal diet, n=8) and Group II (those who were on CKD, n=17).

Information on clinical signs and symptoms, types and duration of seizures, health related problems etc. of the subjects was obtained from parent's observation and hospital records. Dietary information was obtained using FFQ and 3-days dietary recall method. Anthropometrical measurements i.e. height, weight, head circumference; chest circumference, mid-arm circumference and triceps skin fold thickness of the subjects were recorded using standard techniques. Biochemical parameters including CBC, lipid profile (cholesterol, triglycerides, HDL, LDL), uric acid, total proteins, and albumin were analysed at Dr. Phadke's Pathology Lab. and Infertility Centre Pvt Ltd, Dadar.

RESULTS AND DISCUSSION:

Epilepsy is a disease, which affects both sexes, and occurs nearly in all age groups. Prevalence of epilepsy was found to be slightly higher in males among the groups. There was no relation found with the occurrence of epilepsy and the income of the family. Epilepsy had changed lives of subjects and the people around them in terms of quality because of the physical challenges faced by them because of frequent occurrence of seizures. Few of the subjects from Group II were totally dependent on others and had minimal physical activity.

Clinical symptoms and Drug intake-

Assessment of the type and severity of epilepsy in the subjects showed presence of different types of epilepsy along with the difference in the symptoms, frequency and duration of the seizures.

The type of epilepsy, which dominated in Group I, was Primarily Generalized Tonic Clonic (PGTC) whereas Myoclonic jerks and Secondarily Generalized Tonic Clonic

(SGTC) were found to be common among the subjects of Group II. Severity of the epilepsy was evaluated from the frequency and duration of seizures per day. The frequency of seizures in Group II was more (50 - 100 seizures / month) due to which they were put on CKD.

When the occurrence of seizures / attacks was compared, 100% of Group I and 70 % (n = 12) of Group II had few seizures / attacks (1 - 10) whereas 23% (n=4) of Group II had 10-40 seizures / attacks. More than 40 seizures / attacks were found to be occurring only in 1 subject in Group II. The duration of seizures varied from less than 10 seconds to 5 minutes in both the groups.

All the subjects involved in the study were on antiepileptic drugs including Valparin, Tegretol, Epilex, Dialex etc which were found to cause side effects like drowsiness, vitamin deficiency and may be one of the causes for delayed cognitive development in the subjects. The drug type and the dosage varied according to the type and severity of the seizures. CKD being a restrictive diet, may impose vitamin and mineral deficiencies, the reason for which the subjects from Group II were prescribed higher dosage of multi-vitamin and mineral supplements.

Dietary information:

Dietary data obtained reflected that most of the subjects were non-vegetarian whereas few were vegetarian and ovo-vegetarian. 87% (n=7) of the subjects from Group I and 88.2% (n=15) of Group II had good appetite. There were few subjects who had to be fed by their mothers whereas few who tried eating with the spoon on their own. Most of the subjects of Group II needed to be engaged in some kind of fun activity while eating in order to finish the measured amount of food given. Since CKD is a diet rich in fat, many of them had problem in finishing the entire meal. Food (CKD) for Group II had to be prepared separately. Among the subjects in Group I, most of them had a habit of eating outside (once / twice a week) whereas subjects of Group II, being on CKD, eating outside or eating foods other than planned was completely restricted. Food intake of the subjects did not alter on the day when seizures occurred with an exception of 1 subject in Group II who was found to eat less comparatively on the day of attack.

The most common and frequently experienced health problems observed were fatigue and constipation and few from Group II had occasional nausea, which can be attributed to the increased ketones and the high amount of fat in the CKD.

Average energy and protein intake of Group I was compared to the RDAs (ICMR 1992) according to age and body weight (Table 1). The energy intake of the subjects did not meet the recommended allowances expect for 1 girl in the age group of 1-3 years. The protein intake of Group I subjects in the age group of 1-3 years was more than RDA whereas

children in the age group 0f 9-12 years were found to consume lower amount of protein than the RDA.

Table 1: Average energy and Protein intake in Group I

Energy (Kcal)			Protein (g/kg)		
Age (Years)	Requirement	Intake	Age (Years)	Requirement	Intake
1-3					
B	1287	1058 (n=2)	1-3	1.69	2.6 (n=3)
G	1193	1200 (n=1)			
4-6					
B	1752	1200 (n=1)	4-8	1.53	1.89 (n=3)
G	1630	-----			
7-9					
B	2075	1800 (n=1)	9-12	1.47	0.89 (n=2)
G	1833	1600 (n=1)			
10-12					
B	2194	-----			
G	1965	1537 (n=2)			

Average intake of visible fat by the subjects of Group I was compared to suggested intakes (ICMR 1992) Results showed an increased consumption, almost double the amount suggested for the age groups as shown in Table 2 given below.

Table.2: Average fat intake of Group I

Age group	Suggested Intake of visible fat (g/day)	Intake (g/day)
Young Children	25	44 (n=6)
Older Children	22	42 (n=2)

Thus an imbalanced intake of macronutrients was observed in subjects of Group I, which could be due to lack of knowledge about the ideal diet for children among their parents.

CKD is a mathematically calculated and doctor supervised diet hence the nutrient consumption of Group II subjects could not be compared to RDAs. Dietary allowances for Group II were calculated according to the CKD protocol (60 – 70 Kcal / kg / IBW and 1 –

1.8 g / kg body weight of protein). However the average daily consumption of nutrients of the subjects were compared amongst the groups and were as shown below in the Table no. 3

Table 3: Average nutrient consumption of the subjects.

	Energy (Kcal)	CHO (g)	Protein (g)	Fat (g)	Fluid (ml)
Group I (n = 8)	1287	178.65	36.41	46.93	1000
Group II (n=17)	1276	25.51	23.25	120.35	1200

The amount of energy (Kcal) consumed by both the groups was approximately same. The CKD consisted of approximately 70% to 90% of energy from fat, with the remaining energy from protein and carbohydrate (Christian Liu et al 2003). Anecdotal evidence has suggested weight gain may hinder service control. Energy may therefore be restricted to 75% of RDA. Dietary protein may be used for energy and gluconeogenesis therefore may not be sufficient to support growth (Williams et al 2002). In CKD, the usual CHO: fat ratio is reversed, which was obvious from the data shown in the table above.

Consumption of carbohydrates by Group I was found to be 7 times more whereas protein intake was 1.5 times more than that of Group II. Amount of fat consumed by Group I was less as compared to Group II, wherein a high amount of fat was required for the effectiveness of the CKD. Amount of fluid consumed (water + other liquids) was approximately same for both the groups. Fluid was restricted in the subjects on CKD for avoiding any change in the ketosis; however, fluid intake could be increased if Calcium Oxalate stones are present.

Anthropometrical information:

Average weight of the subjects in Group II of age group of 1 – 3 years and 9-12 years were found to be lower than the standard values whereas weight of the subjects of Group I of age group 4-8 years did not meet the standards. Despite the intake of nutrients being poor, weight of the subjects did not alter much but were not up to the required standards. Increased weight of subjects of Group II would not be desirable since on CKD an increase in weight has found to hinder seizure control.

Table 4: Average weight and height of the subjects

	1-3 years		4-8 years		9-12 years	
	B	G	B	G	B	G
Weight (kg)						
Standard	12.15	11.55	21.00	20.00	32.17	33.35
Group I	13.05 (n=2)	12.00 (n=1)	17.00 (n=2)	19.00 (n=1)	–	45.00 (n=2)
Group II	10.16 (n=2)	10.12 (n=3)	21.12 (n=6)	17.00 (n=5)	24.30 (n=1)	–
Height (inches)						
Standard	84.75	83.57	115.52	114.32	139.17	140.12
Group I	74.00 (n=2)	87.50 (n=1)	107.00 (n=2)	111.00 (n=1)	–	151.00 (n=2)
Group II	93.00 (n=2)	79.62 (n=3)	113.75 (n=6)	110.05 (n=4)	122.00 (n=1)	–

Average height of the subjects of both the groups was also found to be lower than the standards except for 2 in Group II and 2 in Group I whose average values for height were slightly higher. Average values of the circumference measurements i.e. mid arm circumference (MAC), chest circumference, and skin fold thickness (SFT) of the subjects of Group I were comparatively higher than Group II, reflecting slower and delayed growth. This could be because of the restricted dietary allowances as per CKD's protocol. However these values were not compared to standards because of the unavailability of Indian standards for circumference measurements.

Table .5: Circumference measurements of the subjects

Subjects	MAC (cm)	Head Circumference (cm)	Chest Circumference (cm)	SFT (mm)
Group – I (n=8)	18.10	48.50	56.20	17.50
Group II (n=17)	16.30	49.92	51.90	17.30

Biochemical Parameters

Among the biochemical parameters (Table 6) average serum uric acid value, which is an indicator of tissue breakdown, along with total proteins, albumin, and globulin of subjects of Group II was found to be higher compared to Group I. However the values were within normal limits.

CKD is a diet which is high in fat, which involves risks for diseases like hypercholesterolemia and other vascular diseases and other health problems, therefore it is necessary to keep a check on the lipid profile. However the values of the lipid profile in subjects were within normal limits, thus did not pose any risk to their health.

Average values of lipid profile, which includes triglycerides, total cholesterol and LDL levels of Group II were also higher than those of Group I whereas HDL (good cholesterol) values were lower compared to Group I.

Table 6 Average values of biochemical parameters of the subjects

Parameters	Normal values	Group I	Group II
S.Uric acid mg/ dl	3.4- 7.5	4.2	4.7
Total proteins g/ dl	6.5- 8.5	6.9	7.1
Albumin g/ dl	3.5- 5.0	3.1	4.0
Globulin g/ dl	1.5- 3.5	2.9	3.1
A:G ratio	0.9- 2.0	1.3	1.3
Triglycerides mg/ dl	30- 170	73.6	91.1
Cholesterol mg/ dl	130- 230	156.5	163.3
HDL mg/ dl	30- 70	44.3	43.7
LDLmg/ dl	100- 150	97.3	104.2

SUMMARY AND CONCLUSION:

Children in Group II were suffering from severe epilepsy with higher frequency of seizures hence were put on CKD, higher dosage of antiepileptic drugs and multivitamin and mineral supplements. There was an imbalance in the intake of macronutrients in Group I and Group II subjects that could be attributed to lack of nutritional awareness and dietary counselling among the parents and due to the strict protocol of CKD respectively. The imbalanced macronutrient consumption along with the disease condition might have resulted in the poor anthropometric measurements of the children in both the groups. The higher serum protein and lipid profile of Group II children could be due to high fat intake through CKD, which may pose health risk in later life. Thus it may be concluded that CKD has an effect on the nutritional status of children suffering from epilepsy and a need for providing diet counselling for the parents of children suffering from epilepsy was strongly felt.

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EFFECT OF USE OF IODISED SALT ON THE URINARY IODINE LEVELS, AND OF EDUCATION ON KNOWLEDGE OF SCHOOL CHILDREN (10-13 YEARS)

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The present study was planned with the objective of determining the iodine status of school children (n=109, 10-13 years) and enhancing their awareness levels with regards to iodine deficiency disorders. Iodine deficiency was determined through urinary iodine levels. Education was provided through lectures and participatory activities. Effect of education on knowledge was assessed with the help of a short questionnaire. Eighteen percent children were found to be mildly iodine deficient. These children moved to the normal category with distribution of iodised salt to meet with their families' requirements for one month. Children enthusiastically participated in all the educational activities. The education session improved the knowledge scores of the children, significantly.

KEY WORDS: iodised salt, Iodine Deficiency disorder; goitre, urinary iodine levels, awareness regarding IDD

In India, about 200 million people are at the risk of Iodine Deficiency Disorders (IDD) and 70 million suffer from Goitre and other iodine deficiency disorders (IDD and Nutrition Cell 1998).

Urinary iodine levels have been used as one of the methods to assess iodine deficiency. The studies conducted in three districts of Rajasthan viz., Bharatpur, Udaipur and Bikaner revealed that on the basis of urinary iodine excretion of less than 10 mcg/dl, about 8 to 30 % of children had iodine deficiency (Bhardwaj et al 1997, Kapil et al 2003, Pradhan and Choudhry 2003).

Although the ban on use and sale of non-iodised salt is still existent in Rajasthan, about 45% of the population with low standard of living index consumed non - iodized salt and 20% consumed salt containing iodine at 7 ppm (NFHS 2001). In some of the other studies, it was observed that about 15-44 % of the population was consuming salt with no iodine or less than 15 ppm iodine (Bhardwaj et al 1997, Kapil et al 2003, Pradhan and Choudhry 2003).

Iodisation of salt is a long term and sustainable low cost solution that will ensure that iodine reaches the entire population and is ingested on a regular basis. Fortification of salt with iodine has been extremely successful in eliminating iodine deficiency in the

developed world. The salt has been accepted as the most suitable medium for the introduction of iodine into our diets (Salt Department 1994).

A review of literature suggests that iodine deficiency on the basis of urinary iodine excretion exists in children aged 6-12 years. Moreover, a majority of families from low-income group consume salt with no or inadequate levels of iodine. Hence, this study was planned to determine the extent of iodine deficiency in school going children coming from low socio economic group on the basis of urinary iodine levels and to determine the iodine content of salt samples consumed by them in their homes. Education has shown to have a positive impact on the knowledge of different population groups. Therefore, the present study was an attempt to determine the effect of use of iodised salt on urinary iodine, and of education on knowledge.

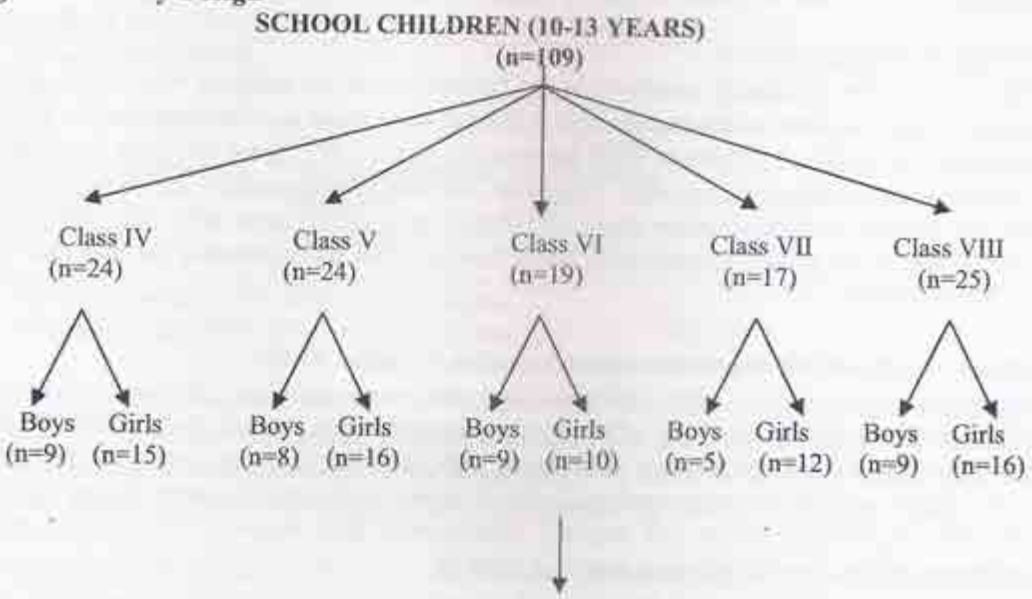
MATERIALS AND METHODS:

A Government school in the walled city of Jaipur catering to low-income group of children was purposively selected for data collection. Hundred and nine school children comprising both boys and girls between the ages of 10-13 years studying in classes IV to VIII constituted the sample for the study.

The study was conducted in three phases as shown in Figure 1. At pre-intervention demographic data were collected and urine and salt samples were analysed for their iodine contents. In addition, knowledge of school children on IDD was also assessed using a short questionnaire touching upon the various aspects of IDD pertaining to iodine, causes and effects of iodine deficiency, requirement of iodine, and iodised salt. Intervention was made through two lectures on IDD (one in the beginning of intervention and the other after 15 days), participatory activities in the classes and distribution of iodised salt packets and booklets on IDD to school children. Iodised salt packets to meet with the families' requirement for one month were distributed to iodine deficient and borderline normal children. At post-intervention, urinary iodine levels were estimated and knowledge testing was also carried out.

Urine samples were collected in labeled wide mouthed screw capped plastic bottles for the assay of the urinary iodine levels. Bottles were stored in the freezer till analysis. The method of Dunn et al (1993) using Sandell Kolthoff reaction was followed for the estimation of iodine in urine samples. The children were asked to get salt samples from their homes in labeled self locking sachets. Iodine content in salt samples was estimated using Spot Testing Kit (Salt Commissioner 1997).

Figure 1: Study Design



PRE-INTERVENTION

- Profile of the school children
- Analysis of urinary iodine levels through Sandell-Kolthoff reaction method
- Analysis of salt samples for iodine content by Spot Testing Kit
- Knowledge testing on IDD using a short questionnaire

INTERVENTION

- Distribution of iodised salt packets to children
- Two Lectures on IDD using posters and flip charts with a gap of 15 days
- Participatory activities related to IDD for children in classes
- Distribution of booklets on IDD to the children

POST-INTERVENTION

- Analysis of urinary iodine levels through Sandell - Kolthoff reaction method
- Knowledge testing on IDD using a short questionnaire

RESULTS AND DISCUSSION:

Profile of school children:

The total number of family members in the households of the subjects were 6.9 ± 2.43, of which 2. 9 ± 1.4 were adults and the rest 4.0 ± 1.8 were children. The heads of the families to which the children belonged were engaged in small jobs. Some of them were tailors, construction workers, electricians, vegetable vendors, compounders, cobblers, jewelers, drivers or they worked in some shops as helpers or in government jobs. The women also contributed to the family's earnings in some families. The mean monthly income was Rs.3470 ± 1288.

Effect of iodised salt supplementation on urinary iodine levels:

Hundred urine samples were collected from the study subjects. The rest of the nine subjects remained absent from school during the collection period. Out of the 100 urine samples analysed, the proportion of children with ≥10 mcg/dl and between 5.0-9.9 mcg/dl were 82.0% and 18.0%, respectively (Table 1). None of the children were in the moderate (2.0-4.9 mcg/dl) and severe (<2 mcg/dl) categories of IDD severity. The median urinary iodine excretion level of subjects was 15.1 mcg/dl.

TABLE 1: frequency distribution of children on the basis of severity of iodine deficiency disorders

Urinary iodine (mcg/dl)	IDD severity	Frequency distribution (n=100)
≥10	Normal	82 (82.00)
5.0 –9.9	Mild deficiency	18 (18.00)
2.0 –4.9	Moderate deficiency	-
<2	Severe deficiency	-

Figures in parentheses denote percentages.

Out of 100 subjects, 22 children who had urinary iodine excretion levels less than and equal to 10 mcg/dl were selected for salt supplementation. Each subject was provided with iodised salt to take care of one month's family's salt requirement. After a period of one month of supplementation, the urine samples were collected again from the 22 subjects for determination of urinary iodine levels. After supplementation, it was observed that there was an increase in the mean urinary levels from 8.39± 1.62 mcg/dl to 16.14±3.18 mcg/dl (Table 2). The increase was 92.37% and was significant.

TABLE 2: percent increase in urinary iodine levels of children on supplementation with iodised salt

Urinary iodine levels (n=22)			Independent t-test value
Pre Supplementation (mcg/dl)	Post Supplementation (mcg/dl)	Percent increase	Pre vs Post Supplementation
8.39 ± 1.62	16.14± 3.18	92.37	10.20*

Figures in parentheses denote percentages.
*Significant at 0.05% level of significance.

Moreover, it was observed that the 18 children who were previously in mild deficiency category, in a period of one month's supplementation had moved to the normal category. It is also expected that education sessions would motivate them to consume iodised salt and that they would continue to use iodised salt and maintain their improved iodine status.

The prevalence of iodine deficiency in the Bikaner district of Rajasthan was estimated in a 1995 pilot project involving 527 children 6-12 years of age recruited from three high schools. According to urinary analysis, 3% of children had severe iodine deficiency (urinary excretion under 2 mcg/dl), 9% had moderate iodine deficiency (2.0-4.9 mcg/dl), 18% had mild deficiency (5.0-9.9 mcg/dl) and the remaining 70% of the children had about adequate iodine levels (10 mcg/dl and above) (Bhardwaj et al 1997).

Iodine deficiency disorders in urban areas of Udaipur district, Rajasthan was assessed by Pradhan and Choudhry (2003). Analysis of three hundred casual urine samples revealed that 0.3, 0.7 and 7.3 % of the children had deficient urinary iodine excretion at the levels of <2, 2-4.9 and 5.0-9.9 mcg/dl, respectively. In a similar study conducted in district Bharatpur of Rajasthan by Kapil et al (2003), the proportions of children with <2.0, 2.0-4.9, 5.0-9.9, ≥10 mcg/dl and more were 1.1, 1.1, 7.8 and 90%, respectively.

In the studies conducted in some districts of Rajasthan (Bhardwaj et al 1997, Kapil et al 2003, Pradhan and Choudhry 2003), it was therefore, noticed that about 70-92% of the children were in the normal iodine category. Urinary iodine levels have been used to determine the extent of iodine deficiency in some other parts of our country. The results have indicated that 27-60% of the studied population suffered from varying degrees of iodine deficiency (Kapil et al 1996, Chandra et al 1997, Chandra et al 1999, Kapil et al 2000, Bhasin et al 2001, Kapil et al 2003). In the present study, it was observed that 82 % of the children were in the normal category with urinary iodine levels greater than and equal to 10 mcg/dl and rest 18.0% were in the mild iodine deficiency category. None of the children suffered from moderate and severe deficiencies. The subjects of the present study were school children living in a big city who are aware of the use of iodised salt. However, 18% of the children did have mild deficiency on the basis of urinary iodine

excretion. Hence, in Jaipur city too, in order to eliminate iodine deficiency disorders, there is a need to monitor iodine content of salt regularly so that the entire population of the city consumes adequately iodised salt. Another point that favors the population of Rajasthan is that the Government has banned the sale of non-iodised salt. It is now desirable that this small segment of the population which is not consuming iodised salt is made aware of the use of iodised salt and the adverse effects of iodine deficiency disorders.

Iodine content of salt samples:

Estimation of salt samples for iodine content revealed that about 18% of salt samples consumed by children in their homes had nil iodine content, 15% had 7 ppm of iodine, 30% had 15 ppm iodine content and 37% of the salt samples had equal to or more than 30 ppm of iodine (Table 3).

TABLE 3: number of children using salt containing different amounts of iodine

Iodine content	Number of children (n=109)
Nil	20 (18.35)
7 ppm	16 (14.67)
15 ppm	33(30.27)
>30 ppm	40 (36.70)

Figures in parentheses denote percentages.

In Rajasthan, 52.4% of families have been consuming salt with either no iodine or less than 15 ppm of iodine (NFHS 2001). In the three districts surveyed: Bikaner, Udaipur and Bharatpur, the situation was no better (Bhardwaj et al 1997, Kapil et al 2003, Pradhan and Choudhry 2003) despite the existing ban on use of non-iodised salt. About 15-44 % of the studied population was still consuming inadequate levels of iodine in salt. In the present study, this percentage was 33 taking the adequate level of iodine in salt as 15 ppm.

Lectures and participatory activities:

Intervention was provided through a lecture touching upon the various aspects of iodine deficiency disorders, use of iodised salt and correct storage practices. Posters, danglers and charts on IDD were also used as support to the lecture. Participatory activities were also organized for generating awareness amongst the children. Lecture was repeated again after a gap of 15 days.

In activity 1 'which brand is iodised', the children were shown a number of brands of salt viz., Bhaskar, Surya, Tata, Nirma Shudh, Ankur, open un-powdered and open salt (unpacked). These salt packets were collected from the areas where the children resided. The logo of "smiling sun" on iodised salt packets was identified and shown to the children. Each packet was opened and a teaspoonful of salt was placed on previously cut white paper. Drops of reagents from the Spot Testing Kit were placed on the salt and the

attention of children was drawn to the colour change. The children were also encouraged to take salt from the packets and identify the presence of iodine from colour change.

In activity 2 'is my salt iodised', the children were asked to get salt samples from their homes in small sachets provided to them. Testing of salt was first demonstrated to the children. The children were then motivated to test their salt samples with the help of Spot Testing Kits. By participating in this activity children learned whether the salt that they were using at home contained iodine or not. The children enthusiastically participated in both the activities.

A kit comprising 5 booklets/pamphlets on IDD obtained from the Salt Department, Government of India, Jaipur and IDD Cell, Swasthaya Bhawan, Jaipur, were also distributed to the children.

Effect of education on knowledge scores:

The knowledge of the children was tested on various aspects of IDD before and after providing education to them. Each correct response was given a score and the whole questionnaire was marked out of 35 marks. The mean total knowledge scores at pre and post education were compared. The mean knowledge score at pre education was 14.73 ± 4.66, which increased to 21.90 ± 4.29 at post education (Table 4). It became clear that the education sessions had made a significant impact on the knowledge scores. Such education sessions should be organized by the school authorities to increase the awareness levels of children on such pertinent issues.

TABLE 4: mean total knowledge scores and independent t-test values for comparison between pre and post education total knowledge scores

Mean Total Scores (Maximum score=35)		Independent t-test value
Pre education scores (n=109)	Post education scores (n=109)	Pre vs Post education scores
14.73 ± 4.66	21.90 ± 4.29	11.82*

NS: Non- significant

**Significant at 0.05% level of significance.*

CONCLUSION:

Eighteen percent school going children (10-13 years) were found to be mildly iodine deficient. Provision of iodised salt to iodine deficient children improved their iodine status. Education through lectures and participatory activities improved the knowledge scores of the children, significantly.

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EFFECT OF DOMESTIC PROCESSING ON THE RETENTION OF VITAMIN C IN FOOD PREPARATIONS DEVELOPED BY INCORPORATING SPROUTED PULSES

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Sprouted pulses are a very good source of vitamin C which is essential for the synthesis of collagen, metabolism of tyrosine, in bone formation, electron transport and it also acts as an antioxidant. In view of this, the present study was undertaken to prepare various commonly consumed food preparations namely *chat, parantha, pulao and tikki* by incorporating, separately, sprouted Moth beans (*Phaseolus Aconitifolius*), sprouted Red lobia (*Vigna sinensis*) and sprouted Mung beans (*Phaseolus radiatus*) using different methods of cooking. A panel of ten judges, using the seven point Hopkin's scale did organoleptic evaluation of these preparations. The most accepted level of incorporation of sprouted pulses for *tikki, stuffed parantha, pulao* and *chat* were 5 per cent, 20 per cent, 30 per cent and 35 per cent respectively. Analysis of the data for overall acceptability showed that judges were highly consistent in awarding the scores for mung beans *chat*, moth beans *pulao*, moth beans *tikki* and mung beans stuffed *parantha* . The effect of different methods of cooking on the retention of vitamin-C in these food preparations was also determined. Retention of vitamin-C was found significantly ($P \leq 0.01$) maximum in preparations prepared by pressure cooking (*chat*) followed by boiling (*pulao*) and shallow fat frying (stuffed *parantha*). Significantly lowest retention of vitamin-C was found in those food preparations (*tikki*) which were prepared by deep fat frying method.

KEY WORDS: Chat, Germinated pulses, Parantha, Pulao, Tikki.

Vitamin C is -considered by many to be a wonder drug which imparts to its user superior health, increased stamina, superior mental prowess, resistance to infection and the suppression of malignant diseases. Vitamin C has been reported to soothe the nerves, prevent cancer, control blood pressure, avert heart attack and delay aging (Gaby et al., 1991).

Dry pulses which form an integral part of the average Indian diet are rich sources of carbohydrates and proteins but have little or no vitamin C (Gopalan et al., 2000). However, the vitamin C content of dry pulses can be improved to a large extent by sprouting (Swaminanthan, 2003). In India, pulses are not consumed in the sprouted state. Even if sprouted pulses are consumed, it is very rare and in small amounts. Moreover, when sprouted pulses are consumed, they are mostly in the cooked form and vitamin C formed

during sprouting is destroyed at high temperatures used in different methods of cooking, since, vitamin C is most susceptible to heating temperatures (Erdman and Klein, 1982). Thus, the present study aims at incorporating -sprouted pulses in commonly consumed food preparations and determining the retention of vitamin C in the developed preparations i.e. *chat, stuffed parantha, pulao* and *tikki.*

MATERIALS AND METHODS:

Three whole pulses (Table 1) namely Moth beans, Red lobia and Mung beans were selected for the present study because these are most popularly consumed by all the sections of the society in India.

TABLE 1: Common Indian and botanical name of studied pulses

Sr.no.	Name of Sample	Common Indian Name	*Botanical Name
1.	Moth Beans	Moth	*Phaseolus Aconitifolius Jacq*
2.	Mung Beans	Mung	*Phaseolus radiatus*
3.	Red Lobia	Lobia	*Vigna sinensis*

* Sundraraj DD and Thulasidas G, (1980)

The pulses under study were purchased in bulk from the local market of Kurukshetra (Haryana), India and were sprouted by the method of Ganesh (1995) and Sharma (2000). These sprouted pulses were incorporated in *tikki, parantha, pulao* and *chat* which were prepared by the procedure of Ganesh (1995), applying different cooking methods viz. deep fat frying, shallow fat frying, boiling and pressure cooking. These methods of cooking were selected because they are the methods commonly used in homes for cooking. For different preparations, different levels of incorporation i.e., between 5-40 per cent of sprouted pulses were tried. Organoleptic evaluation of all these developed preparations was conducted by a panel of ten judges using Hopkin's seven point scale (Hopkins, 1950). The recipes adjudged best by the judges were selected for determining the retention of vitamin C. The vitamin C content of raw pulses, sprouted pulses and in different developed food preparations were determined by the method of Foe and Kurther (1943).

STATISTICAL ANALYSIS:

The interpretation of the data so obtained was done by Analysis of Variance (ANOVA) test (Panse and Sukhatme, 1985). Level of significance was accepted at $P \leq 0.01$.

RESULTS AND DISCUSSION:

In the present study, vitamin C content of the selected raw pulses varied from 0.81(red lobia) to 2.25 (moth beans) mg per cent (Table-2). Results revealed that vitamin C content was found to be more in all the three pulses i.e., moth beans, mung beans and red

lobia than that reported by Gopalan et al., 2000. The differences in vitamin C content may be attributed to the species (Kuti and Kuti, 1999), variety of samples (Achinewhu and Hart, 1994), season (Vanderslice and Higgs, 1991), rainfall, manure used, different stages of maturity, storage method and length of storage (Nogueira et al., 1978).

Table 2: Vitamin C content of raw and sprouted pulses

Sr. no	Name of Sample	Vitamin-C content (mg/100g)			Increase in Vitamin-C Content	
		Raw		Sprouted	Actual Increase (mg/100g)	Per Cent Increase
		*ICMR Values	Estimated value			
1.	Moth Beans	2.00	2.25	11.63	9.38	416.88
2.	Mung Beans	0.00	0.91	12.66	11.75	1291.20
3.	Red Lobia	0.00	0.81	8.37	7.56	933.33

*Nutritive Value of Indian Foods By Gopalan et al(2000).

On sprouting, the vitamin C content of pulses increased significantly ($P \leq 0.01$), compared to raw values and varied from 8.37(red lobia) to 12.66(mung beans) mg per cent (Fig.-1). The per cent increase in vitamin C content was found to vary from 416.88(moth beans) to 1291.20 (mung beans). The findings of the present study are comparable with the reports of Chattopadhyay and Banerjee, 1953; Badshah, 1992 and Kavas and Nehir, 1992.

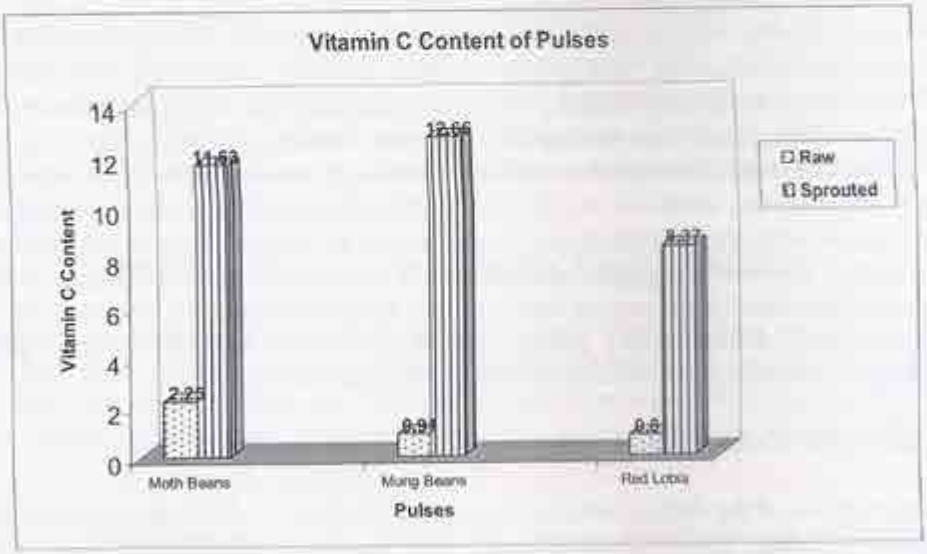

Fig 1: Vitamin C content of pulses

The sensory evaluation of the food preparations made with incorporation of sprouted pulses revealed that all the food products developed were organoleptically acceptable - with incorporation of sprouted pulses from different sources but at different levels. It has also been noticed that when the level of incorporation of sprouted pulses increased or

decreased beyond the accepted levels in any developed preparation, the mean scores for organoleptic evaluation for appearance, colour, texture, taste, flavour and overall acceptability decreased (Table-3).

TABLE 3: Sensory evaluation of different food preparations prepared with incorporation of sprouted pulses of moth beans, mung beans and red lobia.

Food Preparations								
Name	a*	b*	Appearance	Colour	Texture	Taste	Flavour	c*
Tikki	Moth Beans	**5**	6.70±.458	5.60±0.96	5.60±1.20	6.30±0.78	5.50±0.48	5.94±0.46
		10	6.55±0.55	5.55±0.91	5.50±1.11	6.10±0.65	5.45±0.31	5.83±0.32
	Mung beans	**5**	6.20±0.60	5.00 ±1.26	6.50±0.67	5.20±0.74	5.70 ±0.90	5.70±0.74
		10	6.10 ±0.51	4.95 ±1.10	6.35 ±0.55	5.00 ±0.71	5.52 ±0.84	5.58±0.67
	Red lobia	**5**	6.20±0.60	5.80 ±0.74	5.60 ±0.80	6.10 ±0.74	5.30 ±0.87	5.80±0.81
		10	6.15 ±0.55	5.70±0.78	5.40±0.63	5.95 ±0.51	5.10 ±0.81	5.68±0.71
Stuffed Parantha	Moth beans	15	5.75 ±0.81	5.71 ±0.88	5.40±0.95	5.15 ±0.72	4.60 ±0.99	5.32±0.88
		20	5.90 ±0.94	5.90±0.94	5.60 ±1.02	5.40 ±0.91	5.00±1.26	5.56±1.00
		25	5.70 ±0.85	5.60 ±0.89	5.30 ±0.84	5.20 ±0.87	4.70 ±1.07	5.30±0.89
	Mung beans	15	5.95 ±0.51	5.40±0.35	5.30±0.80	5.60 ±0.68	5.10±0.82	5.47±0.73
		20	6.10 ±0.53	5.50 ±0.48	5.50 ±1.11	5.90±0.70	5.40±0.92	5.78±0.81
		25	5.90 ±0.35	5.35 ±0.26	5.25 ±1.00	5.55 ±0.73	5.00±0.85	5.41±0.75
	Red lobia	15	5.20 ±0.89	5.45 ±0.93	5.40 ±1.00	5.40 ±0.78	4.55±0.72	5.21±0.78
		20	5.50 ±1.02	5.60 ±1.02	5.60±1.12	5.70±0.90	4.80±0.74	5.44±0.98
		25	5.15 ±0.81	5.30 ±0.97	5.15 ±1.02	5.25±0.83	4.60±0.67	5.09±0.65
Pulao	Moth beans	25	6.25 ±0.42	6.10 ±0.52	5.90 ±0.61	5.45 ±0.52	4.85±0.78	5.51±0.67
		30	6.50 ±0.50	6.30 ±0.64	6.20 ±0.74	5.70±0.64	5.10±0.83	5.96±0.87
		35	6.30 ±0.47	6.00 ±0.58	5.95 ±0.75	5.35 ±0.53	4.70±0.80	5.66±0.58
	Mung beans	25	5.30 ±0.98	5.00 ±0.75	5.00 ±0.41	5.00 ±0.52	6.00±0.45	5.50±0.62
		30	5.40 ±1.11	5.10±0.83	5.20 ±0.46	5.40 ±0.66	6.10±0.74	5.72±0.70
		35	5.25 ±1.00	4.85 ±0.78	4.85±0.38	5.10 ±0.45	5.80±0.67	5.39±0.54
	Red lobia	25	6.45 ±0.31	6.00 ±0.55	5.55 ±0.95	5.80 ±0.62	4.90±0.55	5.74±0.61
		30	6.60?±0.48	6.10 ±0.70	5.70±1.10	6.10 ±0.70	5.10±0.70	5.92±0.76
		35	6.30±0.45	5.80 ±0.62	5.35 ±0.81	5.70 ±0.68	4.80±0.41	5.35±0.58
Chat	Moth beans	30	6.60 ±0.31	6.30 ±0.34	6.20 ±0.71	6.70 ±0.35	6.00±0.45	6.54±0.56
		35	6.80 ±0.40	6.60±0.48	6.40 ±0.74	6.70 ±0.45	6.20±0.60	6.57±0.79
		40	6.35 ±0.38	6.10 ±0.41	6.00±0.67	6.55 ±0.31	5.80±0.51	6.16±0.73
	Mung beans	30	6.45 ±0.31	5.90 ±0.45	4.80±1.00	5.10 ±0.89	5.30±0.25	5.41±0.78
		35	6.60±0.40	6.20±0.60	5.10 ±1.08	5.30 ±1.18	5.50±0.48	6.76±0.81
		40	6.20±0.47	5.85 ±0.52	4.65±0.91	4.85 ±0.76	5.10±0.38	5.33±0.76
	Red lobia	30	5.65 ±0.68	5.90±0.61	5.70±0.86	6.10 ±0.67	6.10±0.32	5.89±0.54
		35	5.90 ±0.70	6.20 ±0.74	6.10 ±0.94	6.30 ±0.78	6.40±0.48	6.34±0.62
		40	5.50 ±0.55	6.00±0.65	5.85 ±0.77	5.90 ±0.45	5.90±0.45	5.83±0.51

a* Sprouted Pulses Incorporated

b* Level of Incorporation %

c* Overall Acceptability

The most acceptable level of incorporation of sprouted pulses (Fig.-2) for stuffed *parantha* was 20 per cent. The best acceptable level of incorporation of sprouted pulses in pulao was more than stuffed *parantha* i.e., 30 per cent. *Chat* was most acceptable at 35 per cent level of incorporation and had the highest level among all the preparations. For *tikki*, the most acceptable level of incorporation was minimum i.e., 5 per cent. Analysis of data for organoleptic evaluation of the food preparations showed that the overall acceptability scores awarded by the panel of judges for sprouted stuffed *parantha* were ranging from 5.44±0.98 (in red lobia stuffed *parantha*) to 5.78±0.81 (in mung beans stuffed *parantha*). The best scores for overall acceptability for *pulao* were ranging from 5.72±0.70 (in mung beans *pulao*) to 5.96±0.87 (in moth beans *pulao*). In *tikki*, the overall acceptability scores were 5.70±0.74 (mung beans *tikki*) to 5.94±0.46 (in moth beans *tikki*). The overall organoleptic scores for *chat* were maximum among all the developed preparations and the respective scores for overall acceptability were 6.34± 0.62 (in red lobia *chat*) and 6.76±0.81 (in mung beans *chat*) respectively.

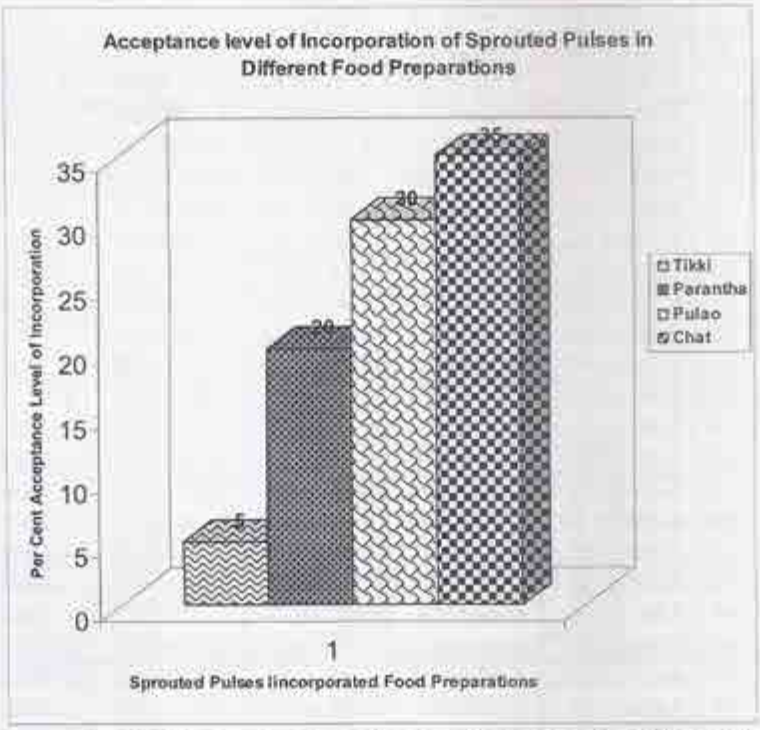

Fig. 2: Acceptance level of incorporation of sprouted pulses in different food preparations

Statistical analysis for overall acceptability showed that judges were highly consistent in awarding the scores (Table-3) for mung beans *chat* (6.76±0.81), moth beans *pulao* (5.96±0.87), moth beans *tikki* (5.94±0.46) and mung beans stuffed *parantha* (5.78±0.81).

Table-4 showed that cooking had adverse effect on the retention of vitamin C content (Rahman Abdel, 1983). On cooking, vitamin C formed during sprouting is destroyed to a large extent, losses generally varying with the methods of cooking (Yadav and Sehgal, 1995, 1997). However, irrespective of the source of sprouted pulses incorporated for the preparation of different products, the values for the percentage retention of vitamin C from all the sprouted pulses with in the same cooking method as well as in the same preparations were similar and the difference was also found to be non - significant.

TABLE 4: Retention of vitamin C in different food preparations prepared with incorporating sprouted pulses using different methods of cooking

Sr. no	Method of Processing	Sprouted Pulses Incorporated Food Preparations			Content of Vitamin-C (mg/100g)		Retention of Vitamin-C in Food Preparations	
		Name	Pulse Incorporated	Level of Incorporation (%)	Raw	Cooked	Per cent	Mean per cent
1.	Deep Fat Frying	*Tikki*	Moth Beans Mung Beans Red Lobia	5	11.63 12.66 8.37	3.875 4.58 3.06	33.32 36.17 36.59	35.36[a]
2.	Shallow Fat Frying	*Stuffed Parantha*	Moth Beans Mung Beans Red Lobia	20	11.63 12.66 8.37	6.12 7.54 5.00	52.62 59.55 59.74	57.30[b]
3.	Boiling	*Pulao*	Moth Beans Mung Beans Red Lobia	30	11.63 *12.66* 8.37	7.75 *7.63* 5.81	66.64 *67.26* 69.41	*65.43*[c]
4.	Pressure Cooking	*Chat*	Moth Beans Mung Beans Red Lobia	35	11.63 12.66 8.37	10.00 10.50 6.94	85.98 82.93 82.91	83.94[d]

The figures bearing different superscripts with in mean per cent column differ significantly ($P \leq 0.01$) from each other.

Analysis of the data further revealed that (Table-4) significantly ($P \leq 0.01$) maximum retention of vitamin C was found in those preparations prepared by pressure cooking i.e., *chat*. The retention of vitamin C in these preparations varied from 82.91 (in red lobia sprouted *chat*) to 85.98 (in moth beans sprouted *chat*) with mean per cent retention value of 83.94. In contrast to pressure cooking, the deep fat fried food preparations i.e., *tikki* prepared by incorporating different sprouted pulses (moth beans, red lobia and mung beans), had retained significantly ($P \leq 0.01$) minimum amount of vitamin C content. The figures for the retention of vitamin C in *tikki* were ranging from 33.32 (in moth beans *tikki*) to 36.59 (in red lobia *tikki*) with mean per cent retention of 35.36.

Intermediate content of vitamin C were retained in food preparations prepared by the methods of boiling (sprouted Moth beans, Red lobia and Mung beans *pulao*) followed by shallow fat frying (sprouted Moth beans, Red lobia and Mung beans stuffed *parantha*). The per cent retention of vitamin C in boiled food preparations ranged from 66.64 (in moth beans *pulao*) to 69.41 (in red lobia *pulao*) with the mean per cent retention of 65.43 and in shallow fat fried food preparations the figures varied from 52.62 (in moth beans stuffed *parantha*) to 59.74 (in red lobia stuffed *parantha*) with average per cent retention value of 57.30. The findings of the present study are comparable with the reports of Sood and Bhat 1974, Rahman Abdel 1983, Abdel-Kader, 1990; Mosha et al.,1995; Nursal & Yucecan 2000; Sood and Malhotra, 2002 and Kaur and Kochar, 2005.

Results of the present study revealed that cooking had a destructive effect on the vitamin C content. Pressure cooking was the method which resulted in least destruction or maximum retention of vitamin C, followed by boiling and shallow fat frying. Deep fat frying was the method which resulted in maximum destruction of vitamin C on cooking (Fig.-3).

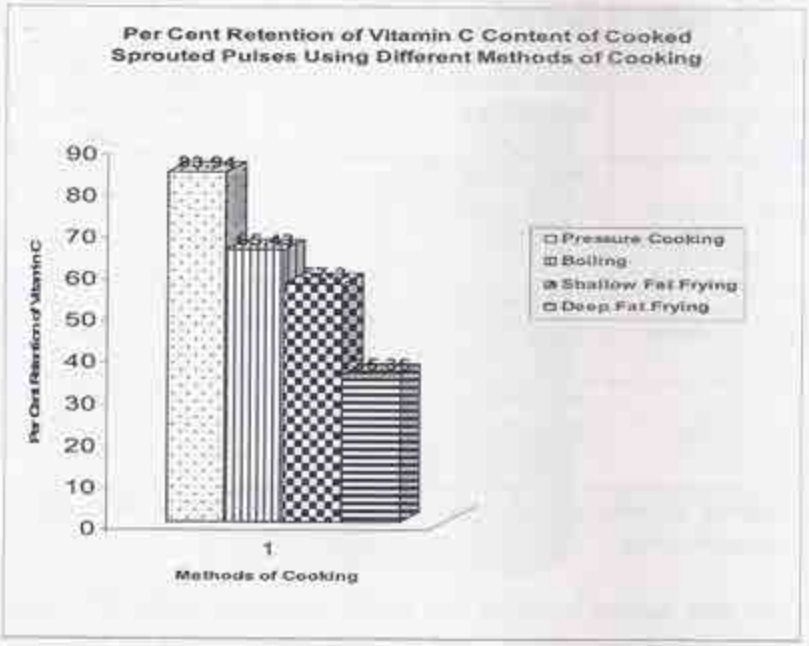

Fig. 3: Per cent retention of vitamin C content of cooked sprouted pulses using different methods of cooking.

CONCLUSION

Vitamin C content of dry pulses (Moth beans, Red lobia and Mung beans) increased enormously (416.88% to 1291.20%) on sprouting. Various commonly consumed food preparations namely *tikki*, stuffed *parantha, pulao*, and *chat* prepared with incorporating sprouted pulses at 5, 20, 30 and 35 per cent level, respectively were found to be acceptable by a panel of ten judges. Retention of vitamin C was found significantly ($P \leq 0.01$) maximum in sprouted *chat* preparations prepared by pressure cooking followed by boiling (sprouted *pulao*) and shallow fat frying preparations (sprouted stuffed *parantha)*. Significantly ($P \leq 0.01$) lowest retention of vitamin C was found in the food preparations prepared by deep fat frying method (sprouted *tikki*).

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INFLUENCE OF WYTEP ON EMPOWERMENT OF FARM WOMEN

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Women and Youth Training Extension Project (WYTEP) is a comprehensive development programme for women that has been implemented by the state of Karnataka under the assistance of the Denmark Government. This project involving farm women in agricultural development, has been in operation from 1982. A study was conducted on farm women of Women Youth Training Extension Project (WYTEP) beneficiary (200) and non-beneficiary (100) to evaluate the difference in empowerment level between the two groups. Empowerment level of WYTEP beneficiary farm woman was higher than non-beneficiary farm women with the overall empowerment score ranging between 122-207 and 85-193 respectively. The mean score of overall empowerment of beneficiary group was 176.86 as against 122.02 in non-beneficiary group. Hence, WYTEP programme has contributed to improvement in the level of empowerment of farm women.

KEY WORDS: WYTEP, Empowerment, Agricultural, Training, Farm women

Rural women in India constitute 77 per cent of the female population (Anita Jhamtani, 1995). They share abundant responsibilities and perform a wide spectrum of duties in running the family, maintaining the household activities like rearing, feeding, attending to farm labour, domestic animals etc. Even then they suffer from being both economically and socially invisible. Hence enhancing women's productivity is an important strategy for improving the welfare of the 60 million Indian households living below the poverty line (Dwarkakanth, 1999).

Empowering farm women with economically productive and viable work will enhance their contribution to rural development. Empowerment is a process of awareness and capacity building leading to greater participation to greater decision making power and transformative action. It strengthens their innate ability through acquiring knowledge, power and experience (Ponnarasu, 2004). For years, women in rural India have remained cut off from the country's developmental issues. The government and NGO organizations are making an effort to provide educational awareness about different aspects of life and impart appropriative training skill on agricultural and its allied aspects to the farm women through WYTEP. Any programme implemented on a large scale in a community needs an impact assessment and this research work in that direction gives an idea about the efficacy of the training programme and the results may be communicated for further course of action.

MATERIALS AND METHODS

The study was carried out with 300 respondents (200 WYTEP beneficiary farm women and 100 non-beneficiary) sampled randomly from 14 villages in 7 taluks of Mandya district of Karnataka state during 2003-04.

The data collection was carried out by personal interview using schedules. The schedule consisted of two parts. Part – I dealt with items on socio-economic and psychological characteristics of farm women, while part–II included the process and product dimension of empowerment (Mangasri, 1999)

Empowerment has been conceptualized in terms of process (psychological) and product (actual or real change in power) empowerment and combining both of these components is the overall empowerment. The standardization scale developed by Mangasri (1999) was used in the study to measure the empowerment of farm women.

Empowerment score was obtained by aggregating the scores on process and product dimensions. The women were classified based on mean and S.D as follows

Category	Criteria
Low	Below (Mean – ½ SD)
Medium	Between (Mean± ½ SD)
High	Above (Mean ±½ SD

(Snedecor,G.W and Cochran, W.G 1967)

The items selected and scoring procedure for process and product empowerment are given below:

Components/ Dimensions	No of statements	Scale type	Scoring pattern	Total score range
Process empowerment				
1. Critical consciousness	6	Three point continuum	1,2,3	
2. Transformation in attitudes	5	"	"	
3. Role perception	4	"	"	30-90
4. Attitude towards collectivism	4	"	"	
5. Self perception	6	"	"	
6. Desire for control	5	"	"	
Product empowerment				
1. Managerial competencies a) Situational analyzing skills b) Planning skills c) Leadership skills d) Decision making skills e) Communication skills	Situations 2 " " " " 6 items	3 response categories " " " "	1,2,3	
2. Decision making power	15	3 point continuum	1,2,3	51-153
3. Reduction in drudgery	Seven items	"	"	
Accessing information and resources	Nine items	"	"	
5. Critical awareness	Six items	2 response categories	1,2,3	

Overall empowerment (process empowerment + product empowerment score range 81-243)

RESULTS AND DISCUSSION

Empowerment level of farm women was measured in terms of process (psychological) empowerment, product empowerment and overall empowerment and results are presented below.

Process Empowerment

The data presented in Fig 1 reveals that 42.50 per cent of the farm women of beneficiary group had high process empowerment as against only 28 per cent in non-beneficiary group. There were about 40 per cent farm women of non beneficiary with medium and 32 per cent with low process empowerment as against 27.5 per cent and 30 per cent in beneficiary farm women group respectively.

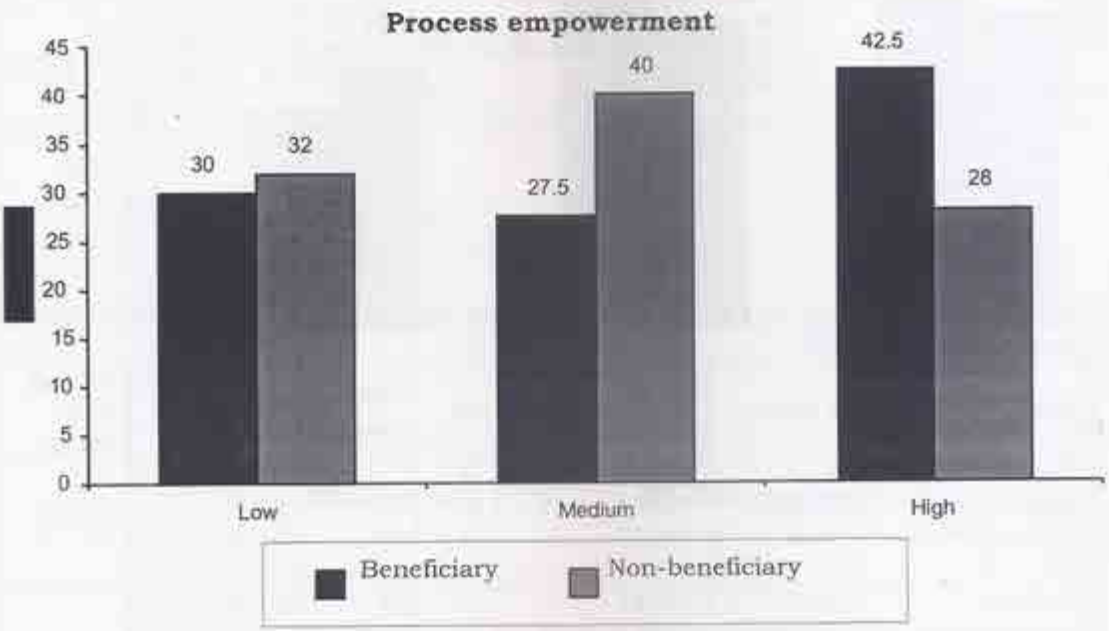

Fig 1: Distribution of farm women of beneficiary and non-beneficiary based on their level of empowerment

The mean score of process empowerment of beneficiary group was 67.14 (Table 1) as against 44.44 among non-beneficially farm women. (Table 2) Almost similar findings have been reported by Sarada (2001) who found that, 38.30 and 31.70 per cent of the self help group women beneficiaries had high to medium process empowerment. It may be because of their (beneficiary) changed attitudes and increased critical consciousness in the changing scenario over a period of time after undergoing various training programmes.

Table 1: Distribution of Farm Women (beneficiary) based on their level of empowerment (n=200)

Class	Category	Score	No.	Per cent	Mean score	Overall score range
Process empowerment Mean=67.14 SD =8.88	Low Medium High	<62.7 62.7 to 71.58 >71.58	60 55 85	30 27.5 42.50	55.95 66.07 75.74	44–79
Product empowerment Mean=109.71 SD=14.54	Low Medium High	<102.44 102.44 to 116.98 >116.98	51 75 74	25.50 37.50 37.0	90.42 108.13 124.56	72–127
Overall Empowerment Mean=176.86 SD=22.76	Low Medium High	<165.48 165.48 to 188.24 >188.24	65 53 82	32.50 26.50 41.0	150.01 175.05 199.30	122–207

Table 2: Distribution of Farm Women in (Non beneficiary) based on their level of empowerment (n=100)

Class	Category	Score	No.	Per cent	Mean score	Overall score range
Process empowerment Mean=44.44 SD =7.50	Low Medium High	<40.69 40.69 to 48.19 >48.19	32 40 28	32 40 28	37.28 43.37 54.14	30 –72
Product empowerment Mean=77.78 SD=12.34	Low Medium High	<71.61 71.61 to 83.95 >83.95	30 35 35	30 35 35	63.60 77.14 90.57	55 –121
Overall Empowerment Mean=122.02 SD=19.03	Low Medium High	<112.51 112.51 – 131.53 >131.53	30 41 29	30 41 29	101.16 121.60 144.86	85 –193

Product Empowerment

It was evident from Fig 2 that almost equal per cent (37.0 and 37.5%) of the farm women of the beneficiary group belonged to the category of high and medium product empowerment as against 35 per cent among non-beneficiary group. About 25.50 per cent belong to the category of low product empowerment in beneficiary group and 30 per cent in non-beneficiary group.

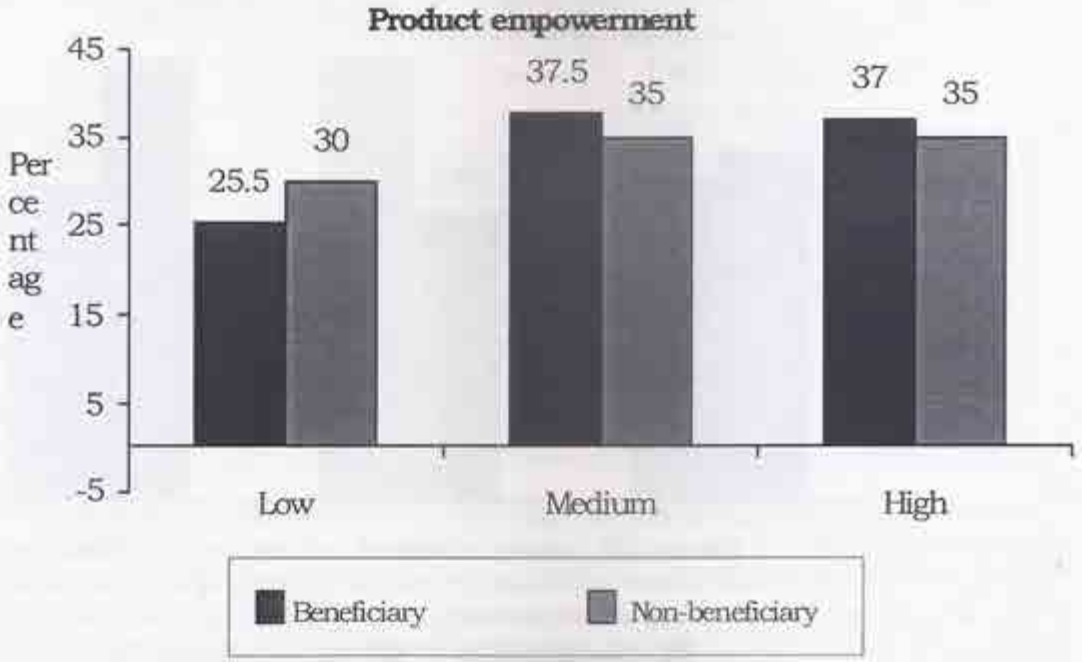

Fig 2: Distribution of farm women of beneficiary and non-beneficiary based on their level of empowerment

The mean score of product empowerment of beneficiary group was 109.71 (Table 1) as against 77.78 in non-beneficiary group (Table 2).

Over all Empowerment

About 41 per cent and significantly less (29 per cent) of farm women of beneficiary and non beneficiary groups belonged to the category of high overall empowerment. There were 41 per cent medium and 30 per cent low overall empowerment in the non-beneficiary group as against 26.50 per cent and 32.50 per cent in the beneficiary group (Fig 3).

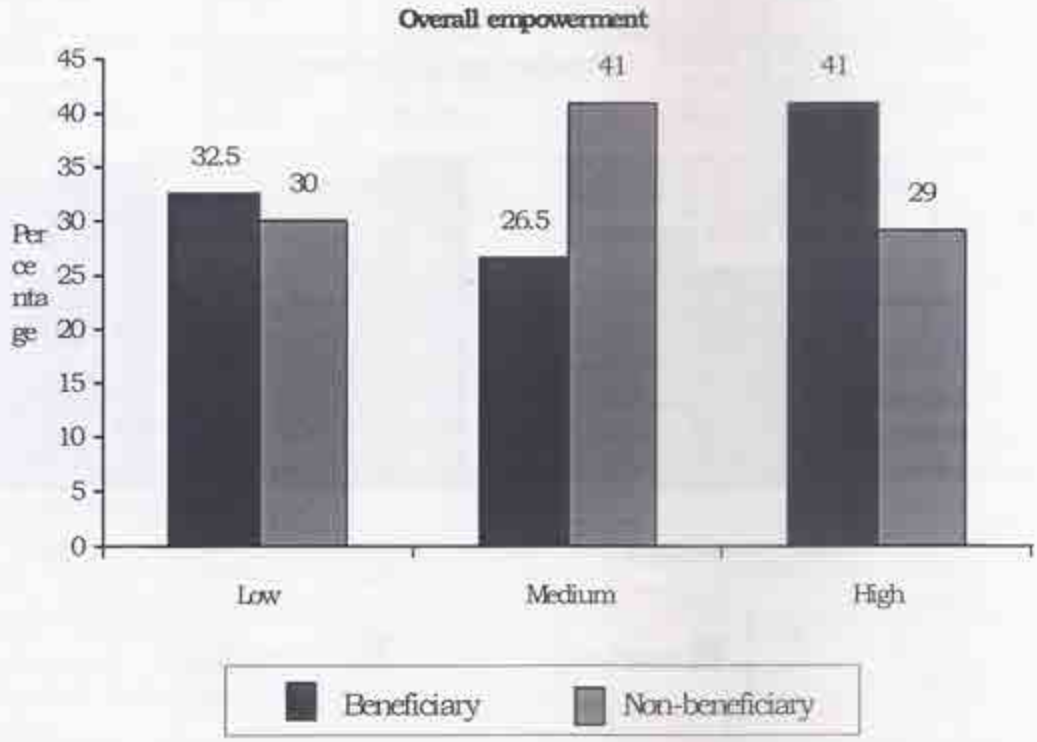

Fig 3: Distribution of farm women of beneficiary and non-beneficiary based on overall empowerment

The mean score of overall empowerment of beneficiary group was 176.86 (Table 1) as against 122.02 (Table 2) in non-beneficiary group.

The level of empowerment of farm women of both groups indicated in Table 3 shows that the process and overall empowerment in low, medium and high category was significantly different between the groups whereas it was non significant with product empowerment.

Table 3: Level of empowerment of farm women (overall)

Class	Category	Study groups				Combined (n=300)		X^2 value
		Beneficiary (n=200)		Non-beneficiary (n=100)				
		No.	%	No.	%	No.	%	
Process empowerment	Low	60	30	32	32	92	30.66	9.052*
	Medium	55	27.5	40	40	95	31.66	
	High	85	42.50	28	28	113	37.66	
Product empowerment	Low	51	25.50	30	30	81	27.00	1.160^{NS}
	Medium	75	37.50	35	35	110	36.66	
	High	74	37.0	35	35	109	36.33	
Overall empowerment	Low	65	32.50	30	30	95	31.66	9.901*
	Medium	53	26.50	41	41	94	31.33	
	High	82	41.0	29	29	111	37.00	

* Significant at 5%
NS: Non-significant

It is indicating that even though the women are psychologically empowered their real empowerment level was low in both the groups. The possible reasons for this may be the patriarchal society where the women are regarded as weaker section and the managerial competencies, decision making power, reduction in drudgery, assessing information and critical awareness of farm women were found to be low because of the lack of general media exposure, low level of education and lack of recognition

Distribution of farm women of both the groups based on their level of empowerment revealed that 30.66 per cent, 31.66 per cent and 37.66 respectively had process empowerment of low medium and high category and 27 per cent 36.66 per cent and 36.33 per cent had product empowerment and the overall empowerment of low medium and high category was 31.66 per cent, 32.33 per cent and 37 per cent respectively (Fig 4)

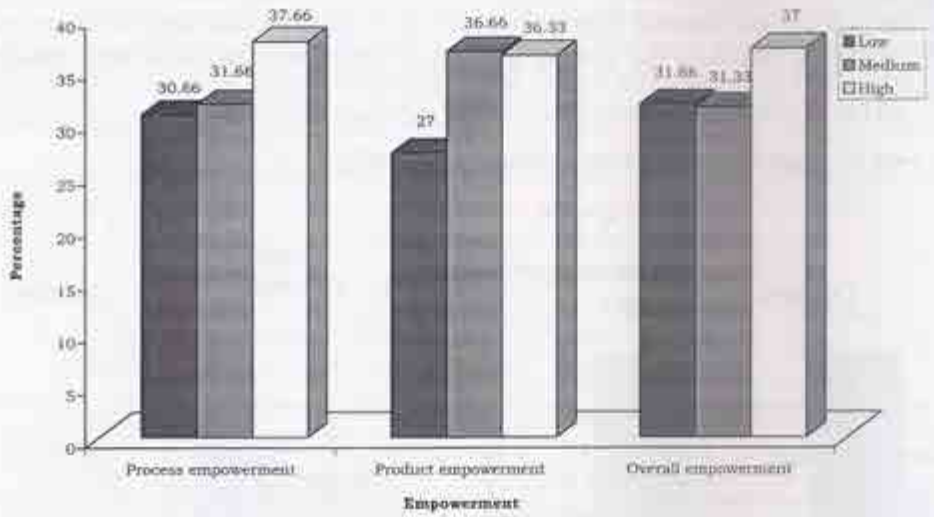

Fig 2. Distribution of farm women (overall) based on their level of empowerment

CONCLUSION

The findings of the study revealed that the empowerment level of WYTEP beneficiary farm women was higher than non beneficiary farm women with the overall empowerment score range between 122-207 and 85-193 respectively. However in order to gain substantial changes in their socio-economic conditions and level of empowerment, the WYTEP project may have to be continued for some more years.

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KOTA DORIA: A NEW PERSPECTIVE IN HOME FURNISHINGS

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The handloom fabrics of India are famous the world over from ancient times. Kota Doria is a famous, fine hand woven fabric of Rajasthan and it is hypothesized that there is a great export potential for Kota Doria in home furnishings. Keeping this in view new designs in Kota Doria with natural dyes were developed for home furnishings. The present study aimed to find the acceptability of Kota Doria fabric in home furnishings created with natural dyes through block printing. It was found that prototypes of home furnishings created in Kota Doria were appreciated. The study has made an effort in identifying the contribution that can be made in the revival of Kota Doria through home furnishings in the international market.

KEY WORDS: Kota Doria, home furnishing, natural dyes, block printing and prototypes

India is one of the oldest textile centers of the world. Indian hand woven fabrics or handlooms, as they have been popularly known for centuries, reflect the multicultural aspects of India. Of all the arts and crafts in India, handlooms have a glorious tradition of creativity and craftsmanship dating back to the Vedic period, nourished by the highly skilled and innovative artisans and weavers of India. Indian weavers transfer their creative spirit and aesthetic skills from generation to generation. India has a rich heritage of skills in complicated weaving, exquisite individualistic dyeing and printing (Agnihotri,1989). Despite the onslaught of modernity, the great Indian handloom tradition of intricate and excellent craftsmanship continues to the present day. In fact, in recent years, the uniqueness of handloom is drawing increasing attention from the greatest of designers across the globe (Sahiba).

Fine muslin and exquisite hand-woven textiles of India have been instrumental in the opening of the trade routes between the West and the Orient (Chersey, 2004). Handlooms continue to contribute significantly to the Indian export economy. Even today, more than 125 countries import natural and manmade Indian handloom fabrics, ready to use garments, made-ups, accessories and other textile products worth US $ 550 million annually (Nair, 2005). Sophistication and high quality standards of Indian handlooms testify the fact that India's handloom export is highly appreciated in West European and North American markets. From the prevailing market indicators, it is evident that in the quota free world, major trade in textiles and clothing products would be made ups. And the made-up segment is considered to be amongst the most potential areas of future growth in

home textiles, according to the TEXPROCIL. It is commonly being perceived that in a quota free world, home textile products will drive growth in textile exports (Gupta, 2003). The future of this sector continues to remain bright especially since the government policy continues to be in favor of the decentralized sector in this industry (Vaghela, 2006).
Indian hand woven fabrics have been inspiring the interior designers the world over. Known for their aesthetic appeal and multi-utility aspects, handloom fabrics are widely applied in home furnishing, decorative household products and utility articles besides, clothing and fashion accessories. India has inherent strength in producing high quality home textiles and it has been accepted in the world market India has emerged as a major exporter of Home Furnishing and its presence is increasingly being felt by the major importing countries around the globe (Roongtta, 2005).

Kota Doria is the name given to saris woven in Kaithoon. It is a fine fabric woven with two types of yarn: the thick yarn of 80 counts and finer yarns of 120 counts (Kothari, 1995). All over the world, there is growing desire amongst people to dress their homes with appeal and contemporary furnishings. According to Bhargava the demand for ethnic and contemporary home textiles can be easily fulfilled by Kota Doria because of its advantage over other fabrics not only in terms of volume, but also value addition because Kota Doria fabric is comparatively cheap.

Be it, the traditional cotton handloom or natural dyed or hand block printing, India is today a leading country supplying the finest of home furnishing fabrics to the international buyers globally. To cater to the market demand at national and international level there has been a need for a relatively easy but effective method of printing. With the increase in demand for ethnic printed designs on the fabrics, both in India and abroad, block printing has become popular not only because of the simple process but also because it can create such sensational prints. According to Amre the products when made using natural dyes are also ideally suited to meet the requirements of the environmentally conscious consumer.

Ethnic designs for hand block printing particularly with eco-friendly dyes have been in vogue in the western countries. And Jaipur is well known internationally for the ethnic block printed fabrics with the natural based dyes. The major centers of dyeing and printing are Bagru and Sanganer. These cities have remained as centres of historical prominence for dyeing and printing. Bagru, situated at a distance of 30 kilometers and Sanganer at a distance of 15Km from Jaipur, have their own place in the use of hand block prints and eco-friendly vegetable dyes.

Keeping the above points in mind, the following objectives were framed:
1. To develop designs in Kota Doria fabric for home furnishing products and articles
2. To find the consumer acceptability of home furnishing items thus created.
3. To assess the future prospects of home furnishing in export oriented units.

METHODOLOGY

1. Selection of Design

Designs each of curtain, bed cover with cushion covers, table cover, wall hanging and lamp shades were developed manually on the design sheets after studying the current trends in home furnishings. Six designs were created for each category.

For the selection of designs a panel of 10 judges (exporters) who were dealing in Home furnishings was selected randomly to evaluate the best two designs under each for developing the prototype. The judges were given the rating performa. The main criteria for selection of design were suitability of use on Kota Doria, layout of the design and suitability of colour in relation to its background.

Acceptability of the design was calculated with the following formula -

$$\text{Acceptable design} = \frac{\text{Acceptability of design}}{\text{Number of Judges}} \times 100$$

The best two designs were selected on the basis of the scores obtained.

2. Development of Selected Designs into the final articles

Two prototypes each of curtain, single bed cover with cushion cover, table cover, wall hanging and lamp shade were prepared. The following process was carried out for preparing the home furnishings on Kota Doria fabric.

Scouring: For scouring 3-4 ml of Turkey red oil and 15 gms washing soda were mixed with water. The cloth was soaked for 10-15 minutes in this scouring bath, then rinsed thoroughly in running water and dried in sunlight.

Mordanting: Harda was used as a mordanting agent. This contains Tannic acid which acts as a fixing agent for natural dyes. For 20 m fabric 300 gms Harda powder was taken in 5-6 litre water. The fabric was dipped in this solution for 15 minutes. It was taken out and squeezed and dried in the open. The fabric turns ocher in colour. Excess Harda powder deposited on the surface of the cloth was removed by beating, resulting in better printing.

Printing: The printing was carried using the designs approved by the panel of judges. It was done using natural colours in the colour ranges -Red, Brown and Black colour.

Colours were obtained from the following sources:

(a) Red - Alizarin (powder form)
(b) Black - Obtained by horse shoe (liquid form)
(c) Brown - Kaccha katha (powder form)

Preparation of printing paste

(a) **Red colour:** In a copper vessel the Alizarin powder 10 gm was dissolved in 2 liters of water. This extract was mixed with the gum. The mixture was boiled for 15 minutes. It was then cooled to normal temperature and printed on Harda treated cloth.

(b) **Black colour:** Black colour was prepared by dipping 20 Kg of horse shoe, 750 gms of Jaggery in 20 liters of cold water. The mixture was kept in closed mud pot for approximately one month. The solution decanted from this mixture was mixed with gum for printing.

(c) **Brown colour:** 20 gms of Kaccha katha (powder form) was dissolved in 2 liters of water and mixed with gum extract in required concentration for printing.

Thickening paste: Thickening paste was prepared by dissolving 50 gms of Tamarind Kernal powder in 1 liter of water and boiling it for 15 minutes with constant stirring.

Developing and fixing the color: Printed fabric was later dipped into the alum solution (alum + water) and dried. This process helps to fix the dye and increase the brilliance of the printed fabric. The printed fabric was washed in plain water to remove the thickening and to unfix the minerals from the fabric.
The printing process was done in Sonava printers, Sanganer, Jaipur.

Finishing: To give the finished look to the printed fabric, the fabric was treated with starch and was calendered.

Stitching: The approved home furnishing designed fabrics were stitched to find the acceptability in the export market.

3. Evaluating the Acceptability of Prototype

The Developed designs on home furnishings on Kota Doria fabric were evaluated by another ten set of exporters. Responses and preference was recorded carefully.
The following criteria were followed for rating the printed articles:

- Selection of motif/placement
- Colour combination
- Selection of block printing
- Overall appearance

Ranking: The data under each category was ranked on rating performa which had Good, Fair & Poor Scale. The scores are: Good: 3, Fair: 2, Poor: 1.

Acceptability Index

To assess the percentage acceptability of the design an acceptability index was set up using the following formula.

$$\text{Acceptability} = \frac{\text{Scores obtained for design}}{\text{Total scores}} \times 100$$

RESULTS AND DISCUSSION

Selection of designs

For the selection of designs the design sheets were shown to ten exporters to select two most appropriate designs each for curtain, bed covers with cushion cover, table cover, wall hanging and lamp shades.

Later, the judges were asked to evaluate the best two designs after the development of prototype for the export market. Table 1 lists the 2 best designs in each category of home furnishing that were selected by the panel of judges to be used for the development of prototype.

Development of prototype with block printing

Keeping the results in mind, prototypes suitable for curtain, bed cover with cushion cover, wall hanging and lamp shade were developed. Two best selected designs of each item were developed in natural dyes with block printing.

TABLE 1: Selected designs of all prototypes to be developed

Sr.No	Curtain	Bed cover with Cushion cover	Table Cover	Wall hanging	Lamp shade
1.	CD_2	BD_3	TD_3	WD_3	LD_2
2.	CD_3	BD_4	TD_4	WD_4	LD_4

Evaluation of block printed articles

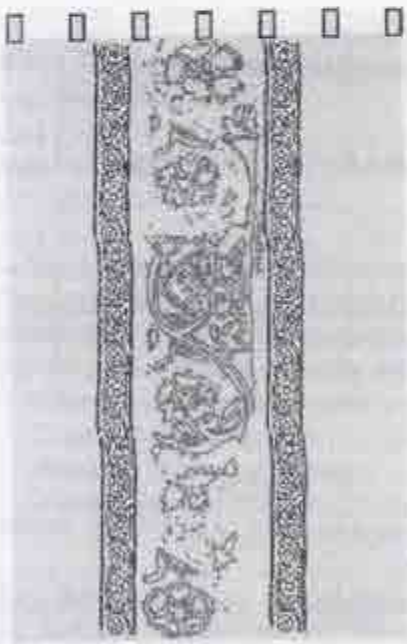
The prototypes developed for each of the categories were evaluated by another panel of judges to assess their ranking and acceptability

The acceptability of the printed articles was done by the use of the rating performa. The performa was developed based on a three point ranking scale which was given to the judges. The responses derived for each of the articles is coded and presented in the following tables.

TABLE 2: Mean scores for the two selected prototypes (CD2 and CD3) for curtains

S.No.	Criteria of evaluation	Mean Score	
		CD_2	CD_3
1.	Selection of motifs placement	28	23
2.	Colour combination	29	26
3.	Selection of block	27	21
4.	Over all appearance	29	26
	Total	110	96
	Percentage	**91.66%**	**81.66%**

According to Table 2 the Design code no. CD_2 was more appreciated (91.6%) than Design code no. CD_3 (81.6%). The table further indicates that Design code no. CD_2 had the highest score for all the four criteria of evaluation i.e. over all appearance, colour combination, selection of motif placement and selection of block print.

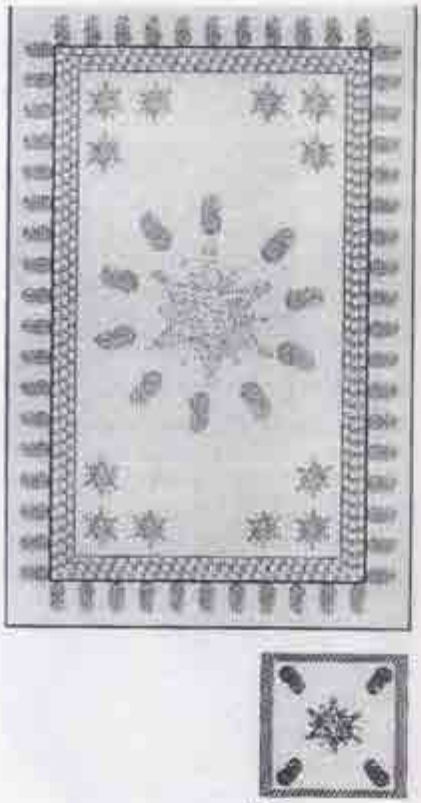


CD_2

CD_3

TABLE 3: Mean scores for the two selected prototypes (BD2 and BD3) for single bed cover with cushion cover

S. No.	Criteria of evaluation	Mean Score	
		BD_3	BD_4
1.	Selection of motifs placement	23	20
2.	Colour combination	18	21
3.	Selection of block	22	17
4.	Over all appearance	24	22
	Total	87	80
	Percentage	**72.50%**	**66.66%**



BD_3

BD_4

According to Table 3 the Design code no. BD_3 secured more points (72.5%) than Design code no. BD_4 (66.66%). The table further indicates that Design code no. BD_3 had got maximum points in over all appearance (24), followed by selection of motif placement (23), selection of block print (22) and colour combination (18).

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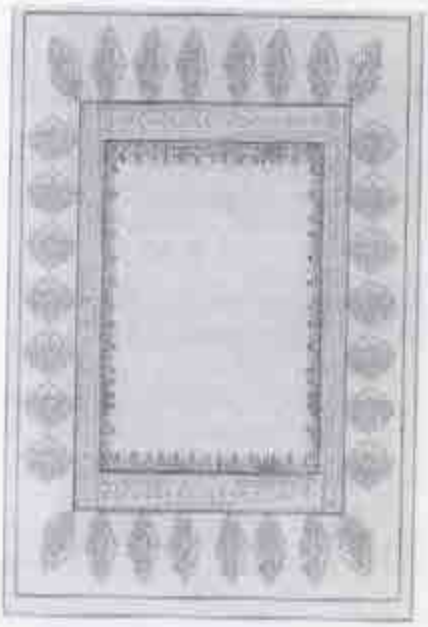
TABLE 4: Mean scores for the two selected prototypes (TD2 and TD3) for table cover

S.No.	Criteria of evaluation	Mean Score	
		TD_3	TD_4
1.	Selection of Motifs Placement	20	26
2.	Colour combination	21	27
3.	Selection of block	18	26
4.	Over all appearance	22	27
	Total	81	106
	Percentage	**67.5%**	**88.33%**

According to Table 4, the Design code no. TD_4 secured higher score (88.33%) than Design code no. TD_3 (67.5%). The table further indicates that Design code no. TD_4 had maximum scores in colour combination and over all appearance of design (27) followed by selection of motif placement (26) and selection of block print (26).



TD_3

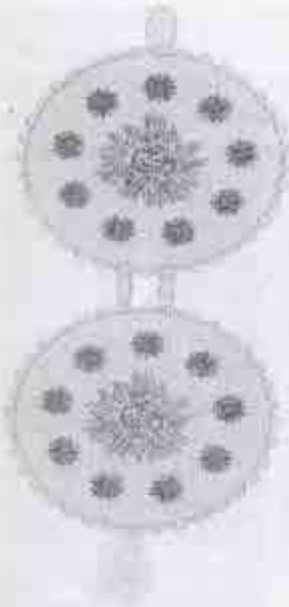
TD_4

TABLE 5: Mean scores for the two selected prototypes (WD2 and WD3) for wall hangings

S.No.	Criteria of evaluation	Mean Score	
		WD_3	WD_4
1.	Selection of motifs placement	18	21
2.	Colour combination	17	23
3.	Selection of block	20	22
4.	Over all appearance	21	21
	Total	76	90
	Percentage	**63.33%**	**75%**

According to Table 5 the Design code no.WD_4 secured higher points (75%) than Design code no. WD_3 (63.33%). The table further indicates that Design code no. WD_4 had greater score in durability of fabric for end use (23) followed by selection of print and selection of motif placement (22) and over all appearance (21).

WD_3

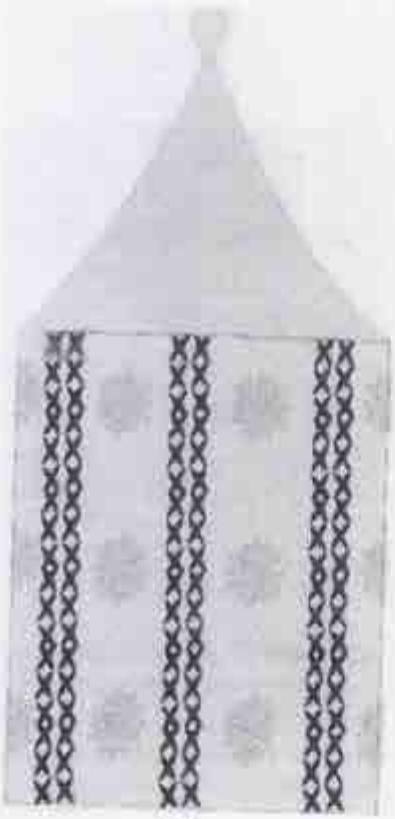


WD_4

Table No. 6 Mean scores for the two selected prototypes (LD2 and LD3) for lamp shades

S.No.	*Criteria of evaluation*	Mean Score	
		LD_2	LD_4
1.	Selection of Motifs Placement	17	27
2.	Colour combination	24	28
3.	Selection of block	23	25
4.	Over all appearance	24	28
	Total	88	108
	Percentage	**73.33%**	**90%**

According to Table 6 the Design code no. LD_4 secured higher points (90%) than Design code no.LD_2 (73.33%). The table further reveals that Design code no. LD_4 had obtained greater scores in colour combination and over all appearance (28) followed by selection of motif placement (27)and selection of block print (25).



LD_2

LD_4

TABLE 7: Summarizes the scores obtained for both the selected designs (Design 1 & Design 2) in each of the five categories

S.No.	*Items*	Mean Score (%)	
		Design 1	Design 2
1.	Curtain	91.66	81.66
2.	Bed cover with cushions	72.50	66.66
3.	Table cover	67.50	88.33
4.	Wall hanging	63.33	75
5.	Lamp shade	73.33	90

According to Table 7 the designs with the higher score were considered to be better accepted. It was found that curtains (91.66) were rated best for the samples developed in Kota Doria. This was followed by lamp shade (90), table cover (88.33), wall hanging (75) and single bed cover with cushion cover (72.5).

Hence it can be concluded that the use of Kota Doria handloom fabric in home furnishing with natural dyes commands a high potential for the export market for products like curtain, bed cover, table cover, wall hangings and lamp shade. People abroad frequently decorate their new homes with new furnishings. The frequency with which people seek short term home furnishings with better prices will definitely make the designed products very popular. India being the leading country for traditional handlooms can cater to the market demand at both national and international level with the new product range, in natural dyed and block printed Kota Doria home furnishing items.

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