Research Reach

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Editorial

Home Science as a field is an umbrella that covers a range of subjects and related research. In our last issue, Dr Saraswathi reviewed the types of research conducted in Foods, Nutrition and Dietetics. In the second part of her review of research in Home Science Higher Education, she has focused on research in Home Science Education and Extension Education and points to the major areas of research in this specialisation. The two research papers from the field of Human Development have focused on children who are Intellectually Challenged or have Attention Deficit Hyperactivity Disorder. The use of Neuro-feedback training as one of the methods to manage ADHD has been discussed. The third paper presents the postural analysis of women construction workers by Owako Working Posture Assessment System and has identified the strain exerted on them which could lead to severe musculo-skeletal disorders.

There are three short Research Notes included in this issue. It includes one which discusses the poor growth pattern and prevalence of malnutrition in the tribal children of Thrissur District of Kerala. The second research note talks about the nutrition and fitness level of Physical Education Teachers in Mumbai. The last research note discusses the level of awareness and environmentally-sustainable practices of hosiery industries in Ludhiana.

We are grateful to Dr Bruno Kistner for his support towards the publication of this issue.

Dr G Subbulakshmi
Chief Editor

Upcoming event:

The Research Centre and the Department of Foods, Nutrition and Dietetics of College of Home Science Nirmala Niketan, in association with the Nutrition Society of India (Mumbai Chapter), is organizing a two-day national seminar titled ***'Nutritional Perspectives in Bone Health: Recent Advances'***. The topics covered in the seminar include updates in body composition and bone health, menopause and osteoporosis, antioxidants, paediatric bone health, nutrient and nutraceutical advancements in bone health.

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RESEARCH IN HOME SCIENCE HIGHER EDUCATION: AN OVERVIEW PART II

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This review article is in continuation of the desk research published in the previous issue of Research Reach (Vol. 15 No. 1, 1–19) which analyses the Ph.D. research titles in the field of Home Science published in the **'University News'**, a weekly chronicle of Higher Education by the Association of Indian Universities, New Delhi, for a period of 12 years (1991–2002). The list was classified according to the major areas of Home Science, namely, Foods and Nutrition; Home Science Education and Extension Education; Child Development and Family Relations; Home Management; Textiles and Clothing. Part I of this analysis covered the research titles, names of the universities and the researchers in the area of Foods and Nutrition. Part II appearing here in this issue of RESEARCH REACH covers Home Science Education and Extension Education.

HOME SCIENCE EDUCATION AND EXTENSION EDUCATION

The second major area in Home Science as an academic field with a total of 41 Ph.D. studies for the 12-year period studied (1991– 2002) was Home Science Education and Extension Education. This constituted 19.43 % of the total of 211 Ph.D. research studies in all the five major areas of Home Science put together in the period of study (Table 1).

Table 1: Ph.D. Research in Home Science Education and Extension Education: Number of doctoral studies in the respective years

Year	N. of Doctoral Studies
1991	2
1992	2
1993	2
1994	1
1995	-
1996	-
1997	9
1998	4
1999	8
2000	1
2001	3
2002	9
Total	**41**

FINDINGS

Year-wise analysis of number of Ph.Ds.in Home Science Education and Extension Education shows variations from one year to the other. The range is wide from no doctoral study (1995,

1996) to one study (1994, 2000) to 9 studies in a year (1997, 2002). Analysed in terms of a three year period, 1991– 93 had six studies; 1994– 96 had only one study; 1997– 99, 21 studies; 2000– 02 had 13 studies. From 1991 to 1996 there were only a total of seven studies. From 1997, there appeared a real spurt in the number of Ph.Ds in Home Science Education and Extension Education. The greatest number of Ph.Ds.in a year was seen in 1997 and 2002, though in 2000 it was only one. Within a quarter there is a range of 4 – 9 between 1997– 99; 1– 9 between 2000– 2002. The number of Ph.Ds.in the academic field of Home Science Education and Extension Education did not show a steady increase during the study period of 1991– 2002. It was rather fluctuating from year to year. Up to 1996 very few Ph.Ds were granted. Even from 1997, though the number increased, the fluctuations were pronounced. In fact, the last quarter of the study period had less number than the previous quarter. Since 1997, there was a definite increase in the number.

The reasons for the wide variations could be due to the number of universities offering Ph.D. programs in the field in the first six years; the number of students drawn to take up research degree in the field; the number of qualified guides available; and the fact that the students may have had gaps in continuously engaging themselves in the study. These reasons could be checked in the real situations.

ISSUES /QUESTIONS OF IMPORTANCE

- Which year Ph.D. programmes began in the field of Home Science Education & Extension Education? How many universities offered Ph.D.in the field in 1991 and up to 1996?
- Do students in Home Science seek higher education in Teacher Education programmes such as M.Phil and Ph.D. in Education rather than Home Science Education and Extension Education?
- What could be the reason(s) for a spurt in the Ph.Ds.in this field from 1997 – 2002?
- There were nine Ph.Ds.in 1997 and 2002. What made it possible to have so many when there were so few in earlier years?
- What is the enrolment and completion pattern of students in this field of study during the study period of 1991– 2002?

A total of 19 Universities granted 41 Ph.D. degrees in the academic field of Home Science Education and Extension Education in the study period of 12 years. Out of the 41 Ph.Ds. 24 (58.54%), nearly 60% of the degrees were given by **Six** universities. Another eight Ph.Ds. came out from **four** Universities during the study period. **Nine** Universities produced only one Ph.D. each during the study period (Table 2).

Table 2: Number of Ph.D. Research Studies in Home Science Education & Extension Education according to the Universities/Colleges granting the Degree

Names of the University/College		Number of Ph.Ds
1.	Sri Avinashilingam Institute of Home Science and Higher Education for Women, Coimbatore, Tamil Nadu	7
2.	Banaras Hindu University, Varanasi, Uttar Pradesh	4
3.	Rajasthan Agricultural University, Bikaner, Rajasthan	4
4.	Nagpur University, Nagpur, Madhya Pradesh	3
5.	Punjab Agricultural University, Ludhiana, Punjab	3
6.	Sri Padmavathi Mahila Viswa Vidyalayam, Tirupati, Andhra Pradesh	3
7.	Gandhigram Rural Institute, Gandhigram, Tamil Nadu	2
8.	B.R. Ambedkar University, Muzzaffarpur, Bihar	2
9.	M.S. University, Baroda, Gujarat	2
10.	University of Jammu, Jammu-Kashmir	2
11.	S.N.D.T. Women's University, Mumbai, Maharashtra	1
12.	Barkatullah University, Bhopal, Madhya Pradesh	1
13.	Devi Ahalya Viswa Vidyalaya, Indore	1
14.	Punjab Agricultural University, Kaone, (Muktasar)	1
15.	Osmania University, Hyderabad, Andhra Pradesh	1
16.	Punjab University, Chandigarh, Haryana	1
17.	R.D.Viswa Vidyalaya, Jabalpur	1
18.	Bangalore University, Bangalore, Karnataka	1
19.	No University name	1
	Total	**41**

It is interesting to note that prior to 1997, only **five** Universities, namely, Sri Avinashilingam Institute of Home Science and Higher Education for Women, Coimbatore; Banaras Hindu University, Varanasi; Nagpur University, Nagpur; MS. University, Baroda and one university the name of which was not mentioned had given **seven** Ph.Ds. out of 41 (17.07%) in Home Science Education and Extension Education. All the other 14Universities granted Ph.Ds. in the field only from 1997 onwards. A possible explanation is that many Universities began their Ph.D. program after 1995 or the number of students opting for Ph.D. in this field of study slowly increased.

FINDINGS

- Sri Avinashilingam Institute of Home Science and Higher Education for Women had a maximum of **seven** Ph.Ds.in the academic field of Home Science Education and

Extension Education. Only **one** was granted in the year 1991 and **six** Ph.Ds. were granted between 1997 and 2002.

- Banaras Hindu University, Varanasi and Rajasthan Agricultural University, Bikaner, had granted **four** Ph.Ds. each during the study period. The former one had given **two** doctoral degrees before 1996 and **two** between 1997 and 2002. The latter had given all the four Ph.Ds. only after 1997.
- **Three** universities, namely Nagpur University, Nagpur; Punjab Agricultural University, Ludhiana; and Sri Padmavathi Mahila Viswa Vidyalayam in Tirupati had **three** Ph.Ds. each in this field of Home Science. Except **one** Ph.D. from Nagpur University which was given in 1993, all the rest **eight** Ph.Ds .were given from 1997 –2002.
- **Two** Ph.Ds. were granted in four Universities each, namely, Gandhigram Rural Institute, Gandhigram, Tamil Nadu; BR. Ambedkar University, Muzaffarpur, Bihar; M.S. University, Baroda and University of Jammu, Jammu. Except **one** Ph.D. granted in from M.S. University, Baroda in 1992, the rest of the **seven were** granted from 1997 – 2002.
- **Only one** Ph.D. was granted out of the rest of the **nine** universities. They were S.N.D.T. Women's University, Mumbai; Barkatullah University, Bhopal; Devi Ahalya Viswa Vidyalaya, Indore, Punjab Agricultural University; Kaone (Muktasar), Osmania University, Hyderabad; Punjab University, Chandigarh(Haryana); RD Viswa Vidyalaya, Jabalpur; and Bangalore University, Bangalore. Of the **nine** Ph.Ds. from nine Universities **eight** were given from 1997– 2002. **Only one** Ph.D. was granted in 1992. The name of the University is not known.
- It is really striking that only three Agricultural Universities had Ph.Ds.in Home Science Education and Extension education.
- Sri Avinashilingam Institute of Home Science and Higher Education for Women seemed to have a focus on Home Science Education and Extension Education.

ISSUES/QUESTIONS

- Many Agricultural Universities do not seem to have a Ph.D. program in Home Science Education and Extension Education. This certainly is not expected as the Universities were originally started to focus on farm and the home especially to take the research findings both from the academic fields of agriculture and Home Science to the people on the farm and in the home to improve the quality of farming and quality of life at home. In this context, Home Science Extension gains importance. We know of the nation–wide agricultural extension programs as well as research. Why does Home Science lag behind? A critical look at the situation may be of value.
- Within each Institution or University offering Ph.D. in the academic field of Home Science Education and Extension Education, very few were granted the doctor of philosophy degrees in the earlier years (between 1991 – 96). Though the number increased after 1997, it was still not a steady growth, though the years 1997 and 2002 had the

maximum number of 9 Ph.Ds. Is it that this academic field is less attractive or the studies taken up are not unique to the field of Home Science?

- What is the scope of the field of Home Science Education & Extension Education in terms of the opportunities? What is the real picture in this regard?
- Who are the students who enrol in Ph.D. programs and the purpose the students have in getting the degree?
- Do Universities/Departments in this academic field orient the students with all possibilities of making contributions in the Development programs in terms of field research/evaluation of projects etc.,

Content of Research in Higher Education in Home Science Education & Extension Education

A study of titles of the major academic field of Home Science Education and Extension Education is taken up to understand the focused areas of research within this major field. The titles of Ph.D. research in Home Science Education and Extension Education were classified according to their specific content as indicated by titles. The data revealed that there were two fields of study:

- Home Science Education
- Extension Education in Home Science

Home Science Education as a field of study at the Ph.D. level had four specific areas within it (Table 3).

Table 3: Home Science Education

Sub–Areas	No. of Doctoral Studies
1. Teachers	02
2. Students	04
3. Teaching	01
4. Curriculum	02
Total	**09**

In the four specific areas,

- ✓ There were **two doctoral studies on teachers:** one in 1997 and the other in 2002. One study was on job satisfaction of rural and urban teachers, taking into account variables of home, health, emotional and educational adjustment. Another one was on women teachers' awareness of the protection they are given by national legislation, in their marital home. Both studies are focused on the teachers' own feelings about their work life and their knowledge about the legislation to protect their married life. These studies may be

useful in giving a perspective of the personal lives of the teachers and can serve as a base for Teacher Development programmes.

- ✓ There were **four doctoral studies on students.** These studies were spread over 1992 – 99 (one in 1992, two in 1997 and one in 1999). **Three of the four studies** were on personality development of college students and one on the academic achievement of women students considering variables such as home, health, emotional and educational adjustment.

  Interestingly, the **two** studies on personality development were on the effects of participation in the National Cadet Corps (NCC) and a self-concept enhancement programme for college students. The third one was on the students' vocational aspirations and their views on the adequacy of their preparation. All the three were on developing students as persons which is as important as their becoming academicians.
- ✓ There was **only one study on 'teaching'**. This was on teaching housing at the undergraduate level using teaching aids and was completed in 1993.
- ✓ There were **only two doctoral studies on 'Curriculum'.** One was on collecting information about employed women in traditional and modern homemaking responsibilities taking into consideration the physical facilities available for them and also their attitudes and problems, as a base for framing Home Science curriculum. Another one critically evaluated the Home Science curriculum prescribed by Bangalore University. The years in which they were completed 1993 and 2002.

An analysis of the studies in the sub-area of Home Science Education reveals that:

- Only nine out of a total of 41 Ph.Ds. (21.95 %) were in the academic field of Home Science Education. Nine studies in 12 years is a very small number. Very few doctoral students seemed to choose problems in this sub-area. These nine studies were conducted between 1992 and 2002 (one in 1992, two in 1993, three in 1997, one in 1999 and two in 2002).
- Of these nine doctoral theses, four important aspects of teacher education, namely, teachers, students, teaching, and curriculum were included.
- The studies on teachers were concerning the personal lives of the teachers, and could be useful in teacher development programmes.

The three studies concerning students were on the development of their personality with non-curricular inputs such as participation in the NCC and in self-concept enhancement programme. There was one study on student achievement considering their environment other than academics. The importance of holistic approach to academics is brought home through these studies.

- There was only one study on teaching which was on teaching a specific subject in Home Science using teaching aids. In the field of education, teaching is an essential aspect and is often given the least attention.
- There was not a single study on the learning process, which underlines the whole process of education.

- The two curricular studies indicated that the framing of curriculum relevant to home situations. The number of studies again is negligible though in the right direction.

These results raise several issues/questions

- Home Science Education as a field of academic study is unique because the experiences at home and in the classroom have to combine in order that teaching and learning be meaningful. Hardly any research was taken up on such processes that will facilitate both teaching and learning in different subject matter areas of Home Science (Foods and Nutrition, Child Development, Home Management, Clothing and Textiles) or even studies of such classrooms where such teaching – learning processes are in practice. Why are we hesitant to take up such studies? What are the reasons that come on the way of taking up such valuable studies?
- Interactive learning situations planned and implemented would be of value as every learner can bring in his/her own contributions to the learning situation and be a part of the whole, especially in a field such as Home Science, which is very much a part of day to day living and life. Why are such efforts at studying the processes that facilitate interactions among students/between teachers and students not seen?
- Considering the single digit number of doctoral studies in a period of 12 years in this area of Home Science Education, the question it raises is, how much are we concerned about the teaching and learning facilitation in the classroom?
- In education, teacher-student relationships are vital for the facilitation of learning. The kind of relationships can be empowering or disempowering. There is a big gap in studies on relationships of teacher(s)/student(s)/groups of students. What are we going to do about it?
- There is a big gap in studies on 'Attitudes' and 'Values' of students/teachers /administrators towards the subject matter areas, the teaching and evaluation processes. How are we going to meet this gap?
- The scope of research in education is so vast and we have hardly made any move in any single aspect with interest, leave alone with confidence. How do we proceed from here? Are we ready to sit and take a critical look at the scope of research in this field?

The classified focus areas with reference to Content of Research and Number of Doctoral Studies in higher education in Extension Education in Home Science are given in Table 4.

Extension Education in Home Science as a field of study at the Ph.D.level had within it four specific areas of focus, namely,

- Extension Personnel
- Social Issues
- Women's Studies
- Women's Development Programmes

Table 4: Extension Education in Home Science

Sr. No	Topics	No. of studies
1.	Extension Personnel	2
2.	Social Issues	2
3.	**Women's Studies**	
	a. Women's Status	3
	b. Women's Knowledge	2
	c. Women's Communication	3
	d. Women's Health	2
	e. Women's Leadership	3
	f. Women's participation in Development	6
4.	**Women's Development Programmes**	
	a. For Young Girls	4
	b. For Women	3
	c. Evaluation of Women's Development Initiatives	2
	Total	**32**

In these four specific areas,

- ✓ There were only **two** doctoral studies on **Extension Personnel.** Both the studies were on their jobs – their perception, performance and satisfaction, problems of those working as lady Village Extension Officers in one study and as Training Associates in Krishi Vigyan Kendras in India in the other study. Both the studies were conducted in 1991.
- ✓ There were only **two** Ph.D. studies in Home Science Extension Education on **Social Issues.** One was submitted in 1997 and the other one in 1999. The social issues studied were **'female infanticide'** and **'juvenile delinquents',** specifically female infanticide in selected districts of Tamil Nadu and socio-psychological study of juvenile delinquents in the northern coastal area of Andhra Pradesh.
- ✓ Ph.D. research in Home Science Extension Education showed an unbelievably large number of **women's studies,** a total of **19** studies during the study period of 1991–2002. Almost all the Ph.Ds. were awarded between 1997 and 2002, with the exception of one which was given in 1992.

  These 19 studies included studies on:
  - Women's Status
  - Women's Knowledge
  - Women's Communication
  - Women's Health
  - Women's Leadership
  - Women's Participation in Development
- ✓ There were **three** studies on **women's status,** given Ph.Ds. between 1992and 99. Two studies focused on the **socio-economic conditions** in specific geographical areas, Varanasi and Jammu and the third study was on workload of women in sericulture.

- ✓ **Two** doctoral studies were on **women's knowledge** –one on awareness of medicinal values of spices and condiments among housewives of Punjab and the other one was on scientific validation of indigenous homestead practices used by rural homemakers. These two degrees were given in 1999 and 2000.
- ✓ The third area of **women's communication** had **three** Ph.D. research reports, **two** on communication behaviour of rural women and communication pattern of rural women with reference to farm and home activities. The third one was on the mass media of television in changing knowledge and attitude of rural mothers towards selected child welfare messages. Two Ph.Ds. were given in 1997 and one in 2001.
- ✓ The area of study of **women's health** had **two** Ph.Ds. one on women's reproductive health within socio-cultural context and another one on environmental pollution and health management in urban areas. Both were awarded in the year 2001, 2002.
- ✓ **Women's leadership** studies were **three** in number. The Ph.Ds. were given in 1997, 1999 and 2001. One was on leadership among women farmers in Karnataka, the second one was on women's leadership in the Panchayati Raj in Royalaseema with a view to study its implications for Home Science Extension and the third one was on the working and interaction style analysis of selected women in Panchayati Raj system towards empowerment.
- ✓ There were **six** Ph.D. studies on **'Participation of women in Development'**, completed between 1998 and 2002. Four studies were on women's participation in command area development in Jammu; participation of women in farming systems of semi-arid eastern plains of Rajasthan; Tribal women's role in agriculture and the home in command and non-command areas of Banaswara district of Rajasthan; and Gender differentials in managerial abilities and participation in agriculture. The other two studies were on the extent of participation in rehabilitation programmes by visually impaired women in Madurai and Tiruchy districts of Tamil Nadu and the impact of the involvement of women in agriculture and allied activities on the home environment in Punjab. Ph.D. research in Home Science Extension had **nine** studies focusing on **'Women's Development Programmes'** These nine studies included studies in specific areas of
    - Young girls
    - Women
    - Evaluation of women's development initiatives
- ✓ There were **four** Doctoral studies on **Development programmes for young girls** completed between 1994 and 2002.Two studies were on improving or strengthening young girls/women in strengthening their capacity to earn, namely, 'Earn while you Learn' programme for economically strengthening young girls; Problems and prospects of Training Rural Youth for Self-Employment (TRYSEM) among women belonging to the scheduled caste in Dindigul district of Tamil Nadu. The other two studies were: Family life education for adolescent girls through non-formal adult

education programme; and Assessment of improved module of the 'National Adolescent Girls Scheme' and the evaluation of the ongoing scheme.

- ✓ There were **three** Doctoral research studies on **Development Programmes for Women** between 1997 and 2002. All the three studies focussed on income generation for women. One was on establishing a reeling unit and evaluating an income generating industry for women; the second one was a study on women's dairy cooperatives and the third one was capacity building of fisher-women: A participatory approach.
- ✓ There were **two** Doctoral studies on the **Evaluation of Women's Development Initiatives** and were conducted in 1999. The focus was on economic development evaluation. One study was on the impact of economic development interventions in Chittoor district and the other one an economic evaluation of rural development programmes in Jabalpur district with special reference to small and marginal farmers.

An analysis of the doctoral research in the academic field of Extension Education in Home Science reveals:

- **Thirty-two** of the total of **41**Ph.Ds. **(78.05 %)** were in the academic field of Extension Education in Home Science. This shows that the academic field of Home Science Extension is given a lot more importance than Home Science Education.
- A bulk of the doctoral research in Home Science Extension Education during the study period (1991 – 2002) was on Women's studies i.e.**19 out of 32 (59.38 %)** and**9 out of 32 (28.13 %)** were on Women's Development Programmes.
- Only **four out of 32 (12.5%)** doctoral studies in Extension Education were on content areas other than Women's Studies and Women's Development Programmes. Of the four, **two** were on Extension Personnel and two were on social issues of relevance.
- It looks as though there was a sudden spurt of Women's Studies and Women's Development Programmes, probably after Women's Decade, which brought the attention of academicians on women and their development.
- It is intriguing that the doctoral studies focussed on only women, except one study on gender and gender differentials, which is vital in bringing to focus both women and men for improving the quality of life in home and community. The status of women at home and in the community affects their lives.
- It is quite striking that there is little focus on the approaches to learning and mode of communication in Extension Education Programmes or Development Programmes.

These results bring to the fore some **issues of importance** as described below:

- ➢ Research in higher education in Home Science Extension Education during the study period appeared to be mainly research in Women's Studies and studies related to Women's Development programmes. This was a definite shift in focus. The question arises, 'Is there a need for this shift?'

Women's studies first emerged in India during the 1970s. Research Centre for Women's Studies (RCWS) in S.N.D.T. University, Mumbai was established in 1974. Punjab University, Chandigarh, has the oldest programme in Women's Studies (since 1970). Advanced Centre for Women's Studies in TISS/CWS was established in 1982. Several Universities established the department of women's studies since 1984. Between 1980 and1990, four universities had their women's studies cell or departments. Between 2000 and2010, six universities had their departments of women's studies. There is an Indian Association for Women's Studies, offering M.Phil. and Ph.D. programmes. Should Home Science Extension departments engage in Women's studies? If yes, what should be their focus? Looking at the contents of the studies with special reference to Home Science, the two studies in the area of women's knowledge, two studies in the area of women's communication and two studies in women's participation in development have relevance to Home Science, i.e., only **six** out of **19 studies (31.58%)** were specific to Home Science. Of the **nine** studies on Women's Development Programmes, only **two** were specific to Home Science. Out of the bulk of **28** studies in both the categories, only **eight (28.57%)** were specific to Home Science Extension. This raises the question,' Should Home Science Extension Ph.D. students and guides pay attention to the relevance of the studies to Home Science? Can they not utilise the research done by various studies done by Departments of Women Studies in the universities mentioned?

- Almost all the doctoral studies in Extension Education in Home Science were not gender studies. There was only one gender study in the area of women's participation in development. By the 1990s, the concept of 'Women in Development' (WID) was changed to 'Gender and Development' (GAD). To elaborate, the doctoral studies under review focussed on women and did not take into account the power relations of men and women at home and in the community. **It is well established that the secondary status of women in families and communities affects the development as a whole and women in particular.** Studying only women limits the contributions the study could make to the field. This surely is a matter of concern.
- The academic field of Extension Education in Home Science is concerned with bringing about a change in the attitude and practices of the people. It deals with various strategies of change in behavioural pattern of people by scientific and technological innovations for the improvement of the quality of life.It facilitates a person to learn how to think rather than what to think. People need to ascertain their needs in order to solve problems and help in acquiring knowledge and develop convictions in that direction. In short the academic field of Extension Education in Home Science is concerned with people, their knowledge, attitudes and skills for improving the quality of their lives. It is concerned with helping people to help themselves through a process of education. This implies a process of involvement and participation of people, men, women, and youth in all matters concerning their own development. This further implies a concern for methods and techniques that are

useful in facilitating participation of people in their own development. The doctoral studies in Home Science Extension, during the study period of 12 years, did not give attention to educational processes. There was only one study 'Capacity building of fisher women: A participatory Approach.' This is a serious gap.The process of understanding people, their thinking and feeling with reference to various aspects of life and living, when and how do they change are important in Extension Education. Studies with reference to people's knowledge, the beliefs that govern their lives, the traditions that build these beliefs, day-to-day actions that reflect these beliefs, reasons for such beliefs become the bases for understanding people in development. Strengthened beliefs are attitudes. How are some of the attitudes that require change formed? Who are the players in building beliefs and attitudes of the people within families and communities? Is it enough if people are given scientific information for them to change their beliefs and hence their behaviour? Approaches that work need to be studied.

POINTERS TO FUTURE

Home Science Education and Extension Education, as an academic field, has vast scope in terms of research in higher education in Home Science. Research students and guides in this field should be aware of the contributions made by allied academic fields such as 'Education', 'Women's studies', 'Psychology' and 'Sociology' for enriching their own field and at the same time reflect on the uniqueness of the academic field of Home Science to take up doctoral level studies to be relevant to the field they are in. They could draw inspiration from other academic fields but they should be firm in contributing to the field they chose to be in. Educational processes within families and communities and the teaching-learning processes in educational institutions offering Home Science as a field of study and in the extension programmes need special attention.

Home Science subject matter areas deal with people's lives in the context of the home and community and are concerned with the quality of their lives. Home Science education and extension education draws on the scientific bases of many of the day-to-day practices in foods and nutrition, housing, home management, child development and family relations, and clothing and textiles. Since the subject matter areas contribute to the content of the educational programmes, Home Science education and Extension Education has an important task of integrating people's knowledge and convictions regarding different aspects of their lives with the scientific knowledge through a process of facilitation.

Home Science Education and Extension Education as an academic field needs to focus on:

- Families and communities, in essence, the people - men, women and children;
- People's traditions – their knowledge and convictions relating to various aspects of their lives, the foods they eat, the clothes they wear, dress they are used to, their ways of bringing up their children, their customs and traditions of marriage and family

relationships, the resources they have and the ways they manage, their beliefs around health and ill health etc.;

- The needs of the people with regard to different aspects of their lives , as recognized by people themselves, and as identified by scientists in the subject matter areas of Home Science;
- Understanding when and how people change their day-to-day practices. What are the different factors that facilitate the change and that work against the change;
- Strategies that bring people face to face, through a process of action-reflection-action, their own knowledge and convictions that govern their behaviour, for people themselves to recognize;
- Approaches in education that facilitate people's participation in their own development;
- Planning programmes with the people for their own development, in other words, taking learners along while planning educational programmes to make it relevant to them;
- Methods and techniques that help people to reflect on their own life situations that bring their attention to their own problems and seek solutions;
- Assessing the effectiveness of approaches, methods and techniques in terms of the responses of the people and improved quality of their lives;
- Assessing the academician's own knowledge and convictions regarding people and its effect on the response of the people to development efforts.

STUDIES IN THE MAJOR AREA OF HOME SCIENCE EDUCATION AND EXTENSION EDUCATION

HOME SCIENCE EDUCATION

I. Teachers

1. Effect of home, health, social, emotional and educational adjustment on job satisfaction of rural and urban female teachers (Singh, Usha. BR. Ambedkar Bihar University, Muzzafarpur. 1997).
2. Assessment of legal awareness amongst women teachers of schools with special reference to the protections provided to women by the legislation in matrimonial home. (Buchke, Vanmala. Barkatullah University, Bhopal. 2002).

II. Students

Personality Development

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NUTRITIONAL AND HEALTH STATUS OF NORMAL AND INTELLECTUALLY CHALLENGED CHILDREN IN BANGALORE.

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Intellectually challenged (IC) children are those whose intellectual functioning level is well below average and have significant limitations in skills required for daily living. These children are seen in 2.5–3% of the general population. A study was conducted in Bangalore to assess the socio-economic status, somatic status, dietary intake and health status of non-IC and IC children in the age group of 6 to 14 years. One hundred (50 Non-IC and 50 IC) children were selected from four different schools in south Bangalore. A questionnaire was developed to record personal data, socio-economic status, dietary pattern and dietary intake of the children. The anthropometric measurements of the children were recorded using standard procedures. Dietary intake was based on 24-hr diet recall method. Health status was assessed by recording the common ailments experienced by the children. Nutritional awareness of parents was measured using a questionnaire. The height of the non-IC children ranged from 95.5% to 97.2% and that of IC ones ranged from 92.4% to 96.4% of the NCHS standards. Majority of the children in non-IC group (74%) and IC group (78%) had grade-I chronic energy deficiency (CED). The consumption of nutrients was better in non-IC group as compared to IC group. The overall health status was better among non-IC children. Thirty six percent of the non-IC children were aware of some nutritional facts and 16% of the IC group displayed such awareness. Our study reiterated the fact that the overall nutritional status of IC was poor when compared to non-IC subjects of similar age and socio-economic background.

Key words: Intellectually challenged (IC), Somatic status, Dietary pattern, Dietary recall, Health status, Nutritional awareness.

School age is a period of rapid growth in human development when the nutritional demand is high and dietary habit is established. Children aged 6 to 10 years are more independent and physically active than they were in the preschool years. Intellectually challenged (IC) children have intellectual functioning level that is well below average and have significant limitations in skills necessary for daily living. IC children comprise 2.5–3% of the general population. These children have IQ score below 70–75. In general, IC children reach developmental milestones such as walking and talking much later than the general population, with varying severity. IC children are classified into four levels based on the functioning of the individual – mild, moderate, severe, and profound. Malnutrition, either under or over nutrition, is a

common condition among intellectually impaired children and so, nutritional support should be an integral part of the management of these children and should focus not only on improving nutritional status but also on improving the quality of life for children and their care-takers. Children at risk for nutrition-related problems should be identified early. The nutrition and health consequences of intellectually backward children has not been studied intensely in the Indian context. With this in view, a study was carried out to assess the current nutritional status, health status and nutritional awareness among the parents of non-IC and IC groups.

METHODOLOGY

One hundred children (50 Non-IC and 50 IC) from four different schools in South Bangalore catering to children with similar socio-economic background were selected. A questionnaire was developed to record personal data, demographic and socio-economic status (to match the groups), somatic status, dietary pattern, nutrient intake, health status and nutritional awareness of parents. The height, weight and BMI of the children were recorded using standard procedures. Information on the dietary and food habits of each child, regularity of meals, food preferences, and special diets, was collected. Dietary intake was assessed using the 24-hour dietary recall method. Health status was assessed by recording the common ailments experienced by the child. Information was obtained from the mother and also by visual observation. Nine statements for non-IC and seventeen statements for IC children respectively were considered for the study. It is a well-known fact that children's food preferences or food intake are influenced by parental eating habits and family dietary pattern. So, nutritional awareness of the parents also was considered as important and was measured using a questionnaire. Eighteen statements were considered for the study. The responses were scored as 'one' for the right answer and 'zero' for the incorrect answer. The respondent's awareness were categorized as low ($\leq$ 50%), average (51–75%) and high ($\geq$75%) based on the total scores.

RESULTS AND DISCUSSION

Among the participants, maximum number belonged to the age group of 9–11 years both from non-IC (42%) and IC (40%) category, followed by 6–8 years. It was also observed that a small number of children belonged to the older age group i.e. 12–14 years. In this study, there were only four children aged 14 years, all of whom were in the IC group. Girls were more in the non-IC group (54%) whereas boys were more in the IC group (68%). More number of IC boys may have been admitted to school. The education level varied widely among children's parents both in the non-IC and the IC category (Table 1).

Table 1: Classification of children by their age

Characteristics	Category	Non-IC (n=50)	I C (n=50)	χ^2 Value
Age Group (years)	6-8	17	16	0.21^{NS}
	9-11	21	20	
	12-14	12	14	

*Significant at 5% Level, NS: Non-Significant

Somatic status reflects the body size as influenced by several factors, most important being heredity, environment and diet. Nutrition forms the core which influences height and weight of children. Anthropometric measurements like height and weight are frequently used to assess nutritional status in young children. The mean height among non-IC from 6 years –13 years ranged from 111.83 cm –149.33 cm and IC children from 106.4 cm –144.60 cm. The mean height of non-IC is higher than their IC counterparts in all age groups (Table 2). However, the difference in height between non-IC and IC children in the age group of 6 and 8 years is statistically significant ($p< 0.05$). The mean weight of non-IC children in the age group of 6 years –13 years ranged from 18.17 kg – 42.50 kg and IC children ranged from 17.0 – 37.0 kg. and were better than that of the IC children except in age group of 8 and 9 years which was statistically significant ($p<0.05$).

Ten percent of IC children and 6% of non-IC showed non-IC BMI but the difference was found to be non-significant. Majority of the children in non-IC group (74%) as well as IC group (78%) had Chronic Energy Deficiency (CED) grade –II (Table 3) according to the classification given by Srilakshmi (2008).

The height and weight of children in both the groups were lower than normal. The height and weight of the normal children were greater than their intellectually challenged counterparts. The difference in height (6 and 8 years) and weight (8 and 9 years) between non-IC and IC children was statistically significant. Earlier studies (Lestrez et al. 2002; Neyestani et al 2010; Shabayek, 2004; Tompsett_et al., 1999) have shown similar results in anthropometric values among non-IC and IC children.

Child under nutrition is often a contributory cause of retarded growth. Individual dietary choices may be more or less healthful. Proper nutrition requires proper ingestion and equally important are the absorption of vitamins, mineral, and food energy in the form of carbohydrates, proteins, and fats. Information elicited on the general dietary pattern of the children indicated that majority of the children belonging to non-IC and IC group (76%) were consuming a non-vegetarian diet and had a preference for it (64% in non-IC and 70% in IC group).

Table 2: Comparison of height and weight of Non-IC and IC children

		Height (cm)				Weight (kg)		
Age (yrs)	Sample (n)	Normal (n=50)	Sample (n)	I C (n=50)	't' Test	Normal (n=50)	IC (n=50)	't' Test
6	6	111.83 ± 4.9	5	106.40 ± 4.3	2.77*	18.17 ± 2.6	17.00 ± 2.0	1.20 NS
7	6	125.50 ± 8.5	6	116.00 ± 9.7	1.80 NS	24.17 ± 4.0	21.00 ± 4.0	1.37 NS
8	5	127.20 ± 10.4	5	112.60 ± 5.4	2.79*	26.40 ± 6.0	17.80 ± 2.9	2.89*
9	6	127.83 ± 3.8	7	119.71 ± 13.3	1.54 NS	24.83 ± 3.2	19.43 ± 3.6	2.86*
10	8	129.63 ± 4.8	7	128.14 ± 10.3	0.35 NS	25.38 ± 4.3	25.43 ± 7.5	0.02 NS
11	7	134.86 ± 8.0	6	130.33 ± 10.0	0.89 NS	30.14 ± 8.4	24.17 ± 4.4	1.64 NS
12	6	142.00 ± 7.4	5	136.80 ± 14.6	0.72 NS	30.83 ± 3.7	32.00 ± 14.7	0.17 NS
13	6	149.33 ± 9.7	6	144.60 ± 17.7	0.65 NS	42.50 ± 11.0	37.00 ± 10.8	0.87 NS
14	-	-	4	154.00 ± 9.6	-	-	44.75 ± 3.0	-

* Significant at 5% level, NS: Non-Significant.

An assessment of the regularity of meals revealed that most of the non-IC (76%) and IC (78%) children were regular in their food intake and adhered to four meals-a-day pattern. Majority of the children as reported by the parents never wasted the food. Eating out is a new trend in young generation especially in cities. Though the study group belonged to lower and middle socio-economic status, they had the practice of 'eat-out' once a month at least.

It is well known fact that IC children face problems during feeding like chewing, swallowing and digesting the food but this was not observed in this study. Possibly, the parents may have gained knowledge on importance of food and feeding pattern from IC schools as mentioned by Riis et al. (1991); Sullivan et al. (2000). Children with cognitive and adaptive disabilities are at increased risk for developing feeding difficulties and secondary nutritional deficiencies. Schwarz (2003) reported that diagnosis-specific intervention significantly improves nutritional status and reduces clinical morbidity in these patients.

Table 3: Classification of children by Body Mass Index

Body Mass Index	Classification	Non-IC (n=50)		IC (n=50)		χ^2 Value
		N	%	N	%	
CED Grade-III (severe)	< 16	0	0	0	0	
CED Grade-II (moderate)	16.0-17.0	37	74.0	39	78.0	
CED Grade-I – (mild)	17.0-18.5	6	12.0	4	8.0	
Low wt. – Normal	18.5-20.0	4	8.0	2	4.0	1.62^{NS}
Normal	20.0-25.0	3	6.0	5	10.0	
Combined		50	100.0	50	100.0	

NS: Non-Significant, Srilakshmi. B (2008) - Classification of BMI

The National Family Health Survey has revealed that over 70 per cent of the children in many states suffer from iron deficiency probably due to lack of adherence to the recommended nutrient intake (RNI). The iron intake was found to be around 17mg. by children in both the groups. Similarly, the vitamin A intake of children in both the groups was well below the recommended dietary allowances for Indians. Several workers have indicated that the diet of school-age children is inadequate both in quality and quantity (Mattos et al. 2000; Sanchez et al. 2003; Mathur et al. 2007).

The differences for nutrients viz., energy, carbohydrate, protein, fat, and iron between the groups were non-significant (Table 4). The consumption of nutrients was better in non-IC group compared to IC group. Since both the groups belong to comparable socio-economic status, feeding problems observed in IC children may have affected their food intake and thereby the nutrient intake. Nutrition education seems necessary for caregivers of disabled children. Importance of nutrition in school age children has been emphasized because malnutrition during this period can decrease not only physical and mental developments but also the learning ability of children (Lee et al 2002).

Table 4: Classification of children by their consumption of nutrients

Nutrients	Non-IC (n=50)		I C (n=50)		't' Test
	Mean	SD	Mean	SD	
Energy (Kcal)	1666	351	1566	377	1.37^{NS}
CHO (g)	208	29	204	32	0.65^{NS}
Protein (g)	27.2	7.5	26.1	8.5	0.69^{NS}
Fat (g)	26.6	5.0	25.3	5.5	1.24^{NS}
Iron (mg)	18.2	4.6	17.0	5.5	1.18^{NS}
Vitamin A (µg)	555	82	517	57	2.69*
Vitamin C (mg)	28.0	5.9	23.1	4.5	4.67*
Calcium (mg)	538	112	464	91	3.63*

*Significant at 5% Level, NS: Non-Significant, t (0.05, 98 df) = 1.96

Better health status as evident by higher score (> 75 %) was shown by higher number of non-IC (72%) but by only 46% of IC children. Poor health scores were observed in only small number of non-IC (6%) children. But the same was observed in double the number of IC children (14%). The overall health status was better among non-IC than IC children which was statistically significant ($x^2 = 8.62$, $p<0.05$) (Table 5).

Table 5: Classification of children on health status and their overall health

Health Status	Category	Children			Overall health status of children (%)		't' Test
	Score	Normal (n=50)	I C (n=50)	χ^2 Value	Normal (n=50)	I C (n=50)	
Low	≤ 50 %	3	7	8.62*	81.3±16.7	73.7±15.0	3.28*
Moderate	51-75 %	11	23				
High	> 75 %	36	23				

** Significant at 1% level, χ^2 (0.05, 2 df) = 5.991
* Significant at 5% level, t (0.05, 98 df) = 1.96

Good health score shows that the child had no other ailments other than common cough, cold, or fever. It was observed that a few of them had stomach ache, diarrhoea, and vomiting. However, as anticipated, overall health status of non-IC was better than IC children. In Netherlands, Van-de Valk et al. (2000) reported 2.5 times more physical health problems in those with intellectual disability than in the general population. Ramzan et al. (2000) concluded that awareness about balanced diet, improvement in the level of education and

socio-economic conditions, easy access to health facilities and prevention of the gender discrimination are the remedial measures to be taken to redress the situation.

Nutritional awareness in parents is beneficial for several reasons. They can inculcate good dietary habits in their children right from childhood. Nutritional awareness of respondents was assessed by interviewing the respondents. Scoring was done and the respondents were categorized into low, moderate, and high depending on their level of awareness. Majority of the mothers of IC children (84%) exhibited higher nutritional awareness than those of non-IC (64%). Moderate level of nutritional awareness was shown by 36% non-IC and 16% IC group. The difference in the nutritional awareness between the mothers of the two groups was significant ($x^2 = 5.20^*$, $p<0.05$) (Table 6). The results indicated mean overall nutritional awareness of the mothers was 75.9 in the non-IC group and 79.5 in the IC group which was statistically significant ($p<0.05$).

Table 6: Nutritional awareness level of the participants

		Respondent group			Overall nutritional awareness		
Nutritional Awareness Level	**Category**	**Normal (n=50)**	**I C (n=50)**	**χ^2 Value**	**Normal (n=50)**	**I C (n=50)**	**t Value**
Low	≤ 50 %	0	0	5.20*	75.9 ±7.6	79.5 ±9.4	2.69*
Moderate	51-75 %	18	8				
High	> 75 %	32	42				

* Significant at 5% level, x^2 (0.05, 1 df) = 3.841, t (0.05, 98 df) = 1.96

Aranceta et al. (2003) reported that children whose mother had a low level of education and those who spent more than two hours daily watching TV were more likely to follow the 'snacking' pattern. It was also concluded that lower education and poor socio-economic background of the family are associated with less healthy dietary patterns. Mealtime structure, TV-viewing during meals and the source of foods (e.g. restaurants, schools) are also important factors related to children's eating patterns. Nutrition education might be effectively promoted through suitable mass media, but personalized interaction with mothers may be more effective to improve the nutritional status of their children as parents have some responsibility for children's dietary habits and they are often the focus of public health interventions designed to improve children's diets. Nutrition education to mothers is a must to maintain good nutritional status among school children with special reference to IC children.

CONCLUSION

The present study reiterated the fact that the overall health status of IC children was poor when compared to that of non-IC of the same age and socio-economic background. Regular assessment of the nutritional status and training for the parents and caretakers of IC population may be of value in correcting nutrient deficiencies promptly, as nutrient intake has a bearing

on the growth, development and stature of an individual. Utmost care and attention is required by parents and caretakers, school teachers, and institutions of IC children to avoid the adverse consequences of poor nutrition in addition to the complications of intellectual challenges and dependency among school-age children.

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NEURO-FEEDBACK TRAINING FOR CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER IN KERALA

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Neuro-feedback (NF) is a type of neuro-behavioural training which has gained increasing attention in recent years, for training the children with Attention Deficit Hyperactivity Disorder (ADHD). Recent studies have shown promising results and NF training is becoming a valuable addition to the multimodal treatment of ADHD. This study is a randomized and controlled study to evaluate the impact of NF training on the social intelligence, attention span, memory and steadiness of children with ADHD. The children with ADHD who met the DSM-IV criteria were selected randomly from schools of Trivandrum. Seventy children and adolescents ranging from the age of 6 to 18 years participated in 30 sessions of an intensive NF programme. The children were randomly divided into two groups of 35 each as the experimental group who underwent the NF programme and as the control group who did not undergo NF programme. A pre and post evaluation was undertaken and statistically analysed using t-test which revealed significant improvement in the social intelligence, attention span, memory and steadiness in the children undergoing the programme. Hence, this study establishes that NF is an effective training for the children with ADHD to improve their attention span, social intelligence, memory and steadiness.

Key Words: NF, Attention Span, Social Intelligence, DSM-IV, VSMS

About 1% of children in Kerala have been identified as having Learning Disabilities (LD) according to the census reported in 2016 by the Kerala Social Security Mission (Disability Census Report 2014–2015). Attention Deficit Hyperactivity Disorder (ADHD) is a neuro-developmental disorder with symptoms including inattention, hyperactivity and impulsiveness (American Psychiatric Association, 2000). Training children with ADHD in the classroom has become a challenge for educators and thus, an educational tool for training these children is essential.

In recent years Neuro-feedback (NF) training has gained attention among educators and researchers. Medication and behaviour intervention are the current standard treatments for ADHD and both have various limitations. Executive functioning which is found to be impaired in children with ADHD affects them academically in the normal school and classroom setting (Rabiner et al., 2010). Therefore, research in the area to develop tools that can be implemented in the classroom-setting is highly essential. NF is a type of bio-feedback that measures brain waves to produce a signal that can be used as feedback to teach self-

regulation of brain function. NF, is also called neuro-therapy or neurobio-feedback, and frequently uses electroencephalography (EEG) and real-time display of brain activity to teach self-regulation of brain function. Multiple sensors are positioned on the scalp to measure activity, and the measurements are displayed on a video or using sound. (Neurofeedback: https://en.wikipedia.org/wiki/Neurofeedback#Uses).

Several studies suggest that NF improves performance on working memory tasks and decreases inattentiveness, hyperactivity and disruptive behaviour (Holmes et al. 2010; Loo et al. 2012; Monastra et al. 2005; Klingberg et al. 2005). Few other studies found that NF can decrease symptoms of ADHD, (Arns et al. 2009; Moriyama et al. 2012; Arns et al. 2012; Hodgson et al. 2014; Gevensleben et al. 2010; Williams 2010; Leins et al. 2007; Duric, et al. 2012), improve attention, (Lofthouse et al. 2012) and cognition (Gevensleben et al. 2014; Naomi et al 1998; Butnik 2005). Thompson and Thompson (1998) indicated that NF along with meta-cognitive strategies is a useful combined intervention for students with ADD.

The present study aimed at evaluating the impact of the NF programme with respect to social intelligence and attention span, memory and steadiness of children with ADHD.

METHODOLOGY

Students from schools with poor scholastic performance were screened for ADHD using DSM-IV criteria. The students who met with the DSM-IV criteria were selected for the study. The children were randomly separated into two groups by simple randomization method.

All regular school-going children with ADHD characteristics belonging to the age group of 3–18 years living in and around Trivandrum district and capable to deal with demands of the study were included in the study. But the children with ADHD with co-morbid psychiatric conditions or other general medical conditions and undergoing other kinds of intervention procedures were excluded. Seventy children with ADHD with from different schools of Thiruvananthapuram district were randomly divided into control group (A) with 35 children (26 boys and 9 girls) and experimental group (B) with 26 children (14 boys and 12 girls). After taking the consent from the parents, the experimental group was subjected to NF training and compared with the control group who received no specialised training.

The Diagnostic and Statistical Manual of Mental Disorders (DSM), published by the American Psychological Association (APA), that offers a common language and standard criteria for the classification of mental disorders such as ADHD (Thompson and Thompson, 1998)was used. The Vineland Social Maturity Scale (VSMS) was used to measure differential social capacity of an individual and estimate the social age and social quotient of high correlation (0.80) with intelligence. The scale consists of 89 items grouped into various to measure social maturation in eight social areas. The tool used in the present study includes a mini iPad of 16GB (Wi-Fi-enabled) which is connected with a Neuro-Mind Wave headset via Bluetooth.

1. **iPad with developed apps:**
   The major training tools used in the programme were applications (commonly referred to as 'apps') developed by Centre for Disability studies which are user friendly. These applications that were installed in the iPad and they necessitated attention, focus and steadiness by the participants. The apps included activities like attention, steadiness, memory game, spot find, life skills, jiffy guess, meditation and relaxation.

2. **Neuro-Mind Wave head set :**
   The Neuro-Mind Wave headset is an NF instrument that measures the brain waves. The Neuro-Mind Wave headset is a slim, black or light blue plastic device which fits comfortably, if not unobtrusively, over one's left ear. The primary sensor sits on the forehead pretty comfortably, although it takes a minute or two for first-time users adjust to it. The sensor senses the alpha-beta signals from the brain. The output of the signals can be obtained from the iPad. The ear clip is comfortable, and the whole apparatus has the advantage of easily allowing one to wear over-ear headphones. It connects via Bluetooth to the device of choice, and works with most modern operating systems (Windows XP or newer, Mac OS X 10.6.5 or newer) and mobile devices running Android or iOS. Its battery life is rated at 8–10 hours with a single AAA battery.

The children from the experimental group were given NF training for 30 sessions, each of which lasted for a duration of 45 minutes after the pre-score of VSMS of both the groups was taken. All the activities involved attention-demanding tasks on the iPad to a comparable amount of 25–30 minutes per training activity. A bar on the right side of the iPad screen represented the alpha and beta waves. Children were instructed to reach a relaxed but attentive state during the sessions. The attention of the child was ensured through appropriate strategies like directing a ball in an upward direction. The session commenced with attention-training followed by steadiness-training, life-skill training and was completed with meditation and relaxation. The same order was used for every child who underwent the intervention.

The NF system used in this study detected two frequencies: 1) the low frequency range alpha wave and 2) the high frequency range of beta wave. The brain waves were measured using Neuro-Mind Wave headset. The Mind Wave device was connected via Bluetooth to the iPad. During the NF training, the forehead sensor reads the alpha-beta waves. It was ensured that every child underwent the same protocol in all the 30 sessions over a period of six months which was monitored by a trained research assistant. The NF training programme system was designed for an automatic level enhancement after each activity.

Figure 1: Neuro-MindWave headset

The outcome measures included the Social Intelligence Score (VSMS Score), scores of sustained attention span, memory and steadiness after each sessions of NF programme. Assessment time-point where as follows:

1. V1: Social Intelligence score before the NF training programme (Pre-Study).
2. V2: Social Intelligence score after the NF training programme (Post-Study).
3. NF1: The Score of Attention, Memory and Steadiness after 10 Sessions.
4. NF2: The Score after 20 Session of NF training.
5. NF 3: The Score after 30 Session of NF training.

RESULTS AND DISCUSSION

The children's attention span, memory and steadiness were scored before and after each session and were compared with the control group who had not received the NF training. The mean scores showed that there is an appreciable improvement in the experimental group as compared to the control group in all the three parameters (Table 1).

Table 1: Actual scores obtained by the children in the experimental and control group

Control Group	Mean Pre-Score	Mean-Post-Score	Experimental Group	Mean Pre-Score	Mean Post-Score
Attention Span	36	36.5	Attention Span	42	49.8
Memory	11	11	Memory	10	16
Steadiness	13	15.3	Steadiness	15.35	22.5

There was an increase in the social intelligence scores of the children with ADHD who attended the NF training programme (Table 2). The NF training also imparted life-skill education to improve the social skills of the children, which could be a factor for improving social intelligence among children with ADHD.

There was no significant difference between the attention span scores obtained by the children in NF session 1 and session 2. As the training continued, the difference was significant at 0.01 level between the scores obtained by the children in NF session 1 and NF session 3. Again, surprisingly, the difference between NF 2 and NF 3 was not significant (Table 3).

Table 2: Scores obtained for social intelligence by the children

Group	N	Pre-test score	Post-test score	t-value	df	Significance
Experimental group	26	92.50	93.56	4.870	25	0.000
Control group	35	92.69	92.75	1.57	34	0.1251

The present study establishes that the NF programme will improve the attention span, memory and steadiness of children with ADHD. The strength of the study was the effective randomization and multi-disciplinary blinded assessment. Primary assessment and diagnosis was conducted by a clinical psychologist and the training was given by a developmental therapist. Pre- and post-blinded assessment was done by a different developmental therapist. The result of this study supports the use of NF as an alternative treatment for ADHD.

Table 3: Comparative scores of each session of training

Dependent Variable	NF Session		Mean Difference	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Attention Span	1	2	-4.808	3.374	.158	-11.53	1.91
		3	-8.385*	3.374	.015	-15.11	-1.66
	2	1	4.808	3.374	.158	-1.91	11.53
		3	-3.577	3.374	.292	-10.30	3.14
	3	1	8.385*	3.374	.015	1.66	15.11
		2	3.577	3.374	.292	-3.14	10.30
Memory	1	2	-3.154*	1.091	.005	-5.33	-.98
		3	-6.462*	1.091	.000	-8.64	-4.29
	2	1	3.154*	1.091	.005	.98	5.33
		3	-3.308*	1.091	.003	-5.48	-1.13
	3	1	6.462*	1.091	.000	4.29	8.64
		2	3.308*	1.091	.003	1.13	5.48
Steadiness	1	2	-3.231*	1.598	.047	-6.42	-.05
		3	-7.654*	1.598	.000	-10.84	-4.47
	2	1	3.231*	1.598	.047	.05	6.42
		3	-4.423*	1.598	.007	-7.61	-1.24
	3	1	7.654*	1.598	.000	4.47	10.84
		2	4.423*	1.598	.007	1.24	7.61

It was seen that there are no significant differences in the scores of NF 1 and NF 2 for attention span. However, the results indicate that there is a significant difference (0.01 level) between that of NF 1 and NF 3 but not between NF 2 and NF 3.

The memory scores had improved between 10 and 20 sessions, being significant at 5% level. Also, a significant improvement was seen between session 2 and session 3. But the difference was not statistically significant between the steadiness scores obtained in session 1 and 2 or between session 2 and 3. However, the difference between the scores of sessions 1 and 3 was significant at 0.01 level.

It can be summarized that the memory score of the subjects increased after the second set of NF sessions. But the attention span and steadiness score needed a longer duration for significant improvement. Several studies have reported that NF training was very effective in improving the attention span of ADHD children (Lofthouse et al. 2012a; Gevensleben et al. 2012 a,b; Nan et al. 2012; Lofthouse et al. 2012b; Duric et al. 2012; Loo et al. 2005; Liechti et al. 2012; Escolano et al. 2011; Bakhshayesh et al. 2011). This was also seen in the present study.

SUMMARY AND CONCLUSION

This study provided important evidence to support the use of NF training as one of the methods to manage ADHD. Though the results of this study are very promising and encouraging there are few limitations. The sample size of the study is relatively small and replicating the findings with a larger sample would be important. Improving academic performance is a critical target for children with ADHD, and this study did not focus on measuring the academic functioning. The current study, however, does provide initial evidence that a longer duration for the training and a few follow-up is essential to know whether the changes detected are transient or enduring.

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POSTURAL ANALYSIS USING OWAS (OVAKO WORKING POSTURE ASSESSMENT SYSTEM) FOR WOMEN CONSTRUCTION WORKERS IN COIMBATORE CITY

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In India, the construction industry is the second largest employer next to agriculture. Construction work is a perennial activity in the region and is dependent on women labourers for unskilled jobs, and majority of women in the workforce feature in unorganized labour. The major factor impacting such women workers is their ignorance about occupational health hazards – both physical and ergonomic. Between the two, physical health receives minimum priority for consideration. Ergonomic hazards are found to be beyond their knowledge. Unfortunately, these women workers are not aware of the physiological and subsequent psychological risks. The ergonomic risk factors and problematic tasks cannot, however, be identified easily without a systematic analysis of the jobs. These factors, thus, kindled an interest to analyse the working postures by the OWAS (Ovako Working Posture Analysing System) method as many studies indicated that OWAS was a suitable, reliable and practical method for analysing construction jobs. It was seen in this study that construction workers followed poor postures that could put them at considerable health risks.

Keywords: Construction Industry, Women Construction Workers, Ergonomics, Musculoskeletal disorders, OWAS.

Modernization and industrialization are responsible for the massive growth of the construction industry. The expanding and fast growing construction sector and lack of better employment opportunity elsewhere has drawn large number of workers in this sector. There are more than 20 million of construction workers in India at present (Narayanan 2010). More than half of the 31 million construction workers in India are women and their potential is not used to the fullest. They clean the building sites, and they serve the skilled men workers by carrying materials as head load and doing tasks directed by them. The differentiation in work allotted to men and women on building sites occurs on the grounds of what is considered appropriate for men and women, and not on the basis of the skill and the capacity of the women to do the work (Government of India, 2008a). The building industry is one of the major employers of women workers in India (Nathan, 1999). Women may get ill as a result of the work they do. Severe musculo-skeletal problems can result from repetitive movements, even though they may seem less strenuous than heavy-lifting. Musculo-skeletal disorders (MSDs) is a serious risk for women labourers (Rosenstock and Jackson, 2000). Rosecrance (2003) explains, 'Ergonomics as the interaction between workers and their work environment'. By knowing about ergonomics, one can better fit construction tasks and tools to the people performing

them. When ergonomics is ignored, the health of workers can suffer, resulting in MSDs. MSDs are the result of months and years of overuse of human joints and connective tissues. On the job, it is called as lower back and shoulder pain, tendonitis or carpal tunnel syndrome. Several physical risk factors for work-related MSDs (WMSDs) can be identified in working life such as postures, manual handling, high peak load, static load, vibration, repetitive work, contact stress, speed or acceleration of movement (Pinzke and Kopp, 2001). The symptoms of WMSDs are discomfort, pain, fatigue, swelling, stiffness, numbness and tingling (Oregon OSHA, 2007).

"Structural adjustment processes, financial crises, prolonged economic downturns, the 'feminization of poverty' have all forced more and more women to take up economic activities outside the home." Women account for 70 % of the absolute poor and that the percentage may be rising. Besides, the seasonal demand for labour in the agricultural sector deprives them of regular income. As a result, they are forced to work in construction sector to meet the dire needs in the family. Many women either commute to distant urban centres or migrate temporarily to work in construction sites (Madhok, 2005).

The ergonomic risk factors and problematic tasks cannot, however, be identified easily without a systematic analysis of the jobs. Schneider and Susi (1994) discussed ergonomic hazards in constructing a new building based on their on-site observations. Their descriptive study identified activities with potential hazards in each construction stage, but no quantitative analysis was performed. Kivi and Mattila (1991) and Mattila et al., (1993) analysed the working postures of construction workers by the OWAS method. Their studies indicated that OWAS was a suitable, reliable and practical method for analysing construction jobs. Good documentation by OWAS provided a powerful and reliable basis for work improvement.

MATERIALS AND METHODS

The study was done on construction sites in Coimbatore city. Construction is a physically demanding occupation, these women workers often lift, stoop, kneel, twist, grip, stretch, reach overhead, or work in other awkward positions to do a job are at risk of developing work and posture-related musculoskeletal disorders and orthopaedic problems including back (spinal) problems, carpal-tunnel syndrome, tendinitis, rotator cuff tears, sprains and strains of various types.

The OWAS method is based on a simple and systematic classification of work postures combined with observations of work tasks. The method can be applied for the development of a workplace or a work method, to reduce its musculoskeletal load and to make it safer and more productive (Karhu et al. 1977).

Since OWAS has been used in several industries including construction (Kivi, Mattila, 1991; Li, 2000), ergonomic evaluations of tasks performed by female workers in unorganized sectors of the manual brick manufacturing units (Sahu, 2010) forging industry (Singh, 2010) postural loading among the assembly operators (Ismail et al, 2009) musculoskeletal disorders among prawn seed collectors of Sunderbans (Gangopadhyay et al, 2008) low back pain among residential carpenters (Gilkey et al, 2007) preadolescent agricultural workers of West Bengal (Gangopadhyay et al, 2005) commercial egg production (Scott and Lambe, 1996) emergency medical response (Doormaal et al, 1995) nursing (Engles et al, 1994) soft drink handling and distribution (Wright and Haslam, 1999) and postural analysis of four jobs on two building construction sites (Li and Lee, 1999) as well as other types of work.

OWAS method

The OWAS method was used in this study because (i) it is easy to use, (ii) it can be used to analyse a wide range of different postures, and (iii) it has been reported as a suitable tool in analysing construction jobs (Karhu et al, 1981; Kivi and Mattila, 1991; and Mattila et al, 1993). OWAS identifies the most common postures for the back (4 postures), arms (3 postures) and legs (7 postures), and the weight of the load handled (3 categories).Whole body posture is described by these body parts with a four digit-code. These 252 postures have been classified to four action categories indicating needs for ergonomic changes.

The observations are made as snapshots and sampling has been with constant time intervals. The bbserver identified the OWAS posture code of each selected posture from the video image for each work task. Table 1 shows the OWAS postures code definition. Each OWAS posture code was then analysis by using the individual OWAS classified posture combination to get the action category for each work phase. The classification for individual posture combination indicates the level of risk-injury for the musculoskeletal system. If the risk for MSD is high, then the action category indicates the need and urgency for corrective actions. OWAS action categories for prevention are also shown in Table 2.

Table 1. OWAS Code for Each Body Part

Body	OWAS Code	Description of the posture
Back	1	Back Straight
	2	Back Bent
	3	Back Twisted
	4	Back bent and twisted
Arm	1	Both arms below shoulder level
	2	One arm at or above shoulder level
	3	Both arms at or above shoulder level
	1	Sitting with legs under seat level
	2	Standing with both legs straight
	3	Standing or kneeling on one leg, leg straight

Leg	4	Standing or kneeling on both legs, legs bent
	5	Standing or kneeling on one leg, leg bent
	6	Kneeling on one or both knees
	7	Walking or moving
Load handle	1	Less than 10 kg
	2	Over 10 kg but less than 20 kg
	3	Over 20 kg

Table 2. The OWAS Action Categories for Prevention

Action Category	Explanation
1	Normal and natural postures with no harmful effect on the musculoskeletal system – **No action required**
2	Posture with some harmful effect on the musculoskeletal system – **Corrective actions required in the near future**
3	Postures have a harmful effect on the musculoskeletal system – **Corrective actions should be done as soon as possible**
4	The load caused by these postures has a very harmful effect on the musculoskeletal system – **Corrective actions for improvement required immediately.**

Source: Karwowski and Marras, 2003

RESULTS AND DISCUSSION

OWAS Posture Analysis Status for the Selected Sample

The sample (n=50) selected were videographed while they were performing their activities on a particular day and stills showing sequence of actions were taken for further analysis. Hence, this par.t of the study is analysed under:

OWAS Code 1. For carrying loads, 2. For passing bricks manually, 3. For sieving sand, 4. For shoveling, 5. For filling mud in the foundation and 6. For sweeping.

The posture of the selected participants was recorded while they were performing different types of tasks on the respective day of the study such as carrying (bricks, mortar mixture, cement, sand and mud), passing bricks manually, sieving sand, shovelling, filling mud in the foundation and sweeping in construction site.

The workers bent to fill the pan, lifted the load (25 to 35 kg) to their head with both arms above shoulder level and walking (9 to 15 metres) to dump the materials and returned back again to refill the load. On an average, they carried the materials for 6 to 7 hours a day (active working hours) with lunch break of 1 hour and depending on the need which varied from one construction site to another. We classified the activity to fall in the OWAS code (back, arm, leg and load) 2373 and 1373 for the postures adopted on that positions of that day. The different postures adopted (done in sequence) by the women construction workers while

carrying different kinds of materials are shown in Table 3. They were video-graphed while carrying all the materials and the actions (carrying bricks, mud, cement and sand) indicated that the load caused by these postures may have a harmful effect on the musculo-skeletal system (Plate1) as it is the same posture they adopt to carry all the materials. Hence, our finding warrants the implementation of corrective actions for improvement at the earliest.

In the case of passing bricks manually, the workers were found to pass bricks (actually throw with force) to the mason who was working on the upper floor as no staircase was built to carry the bricks (Plate 2). It was found that in many residential construction sites they follow the same method of passing the bricks. Workers bent and twisted their back keeping both arms below shoulder level. Either they were standing or squatting on both feet with knees found to be bent; but the load was less than 10 kg. Nevertheless, the physical workload was heavy. In a minute, 20 bricks were passed with enough speed and force which shows the repetitive use of hand with awkward posture. OWAS code obtained 4141 and 4151 identifies the strain increased for bending the body and the legs but not much for the weight handled. The action sequence and the codes resorted prove that the postures have a harmful effect on the musculo-skeletal system of the samples and hence requires corrective actions as soon as possible.

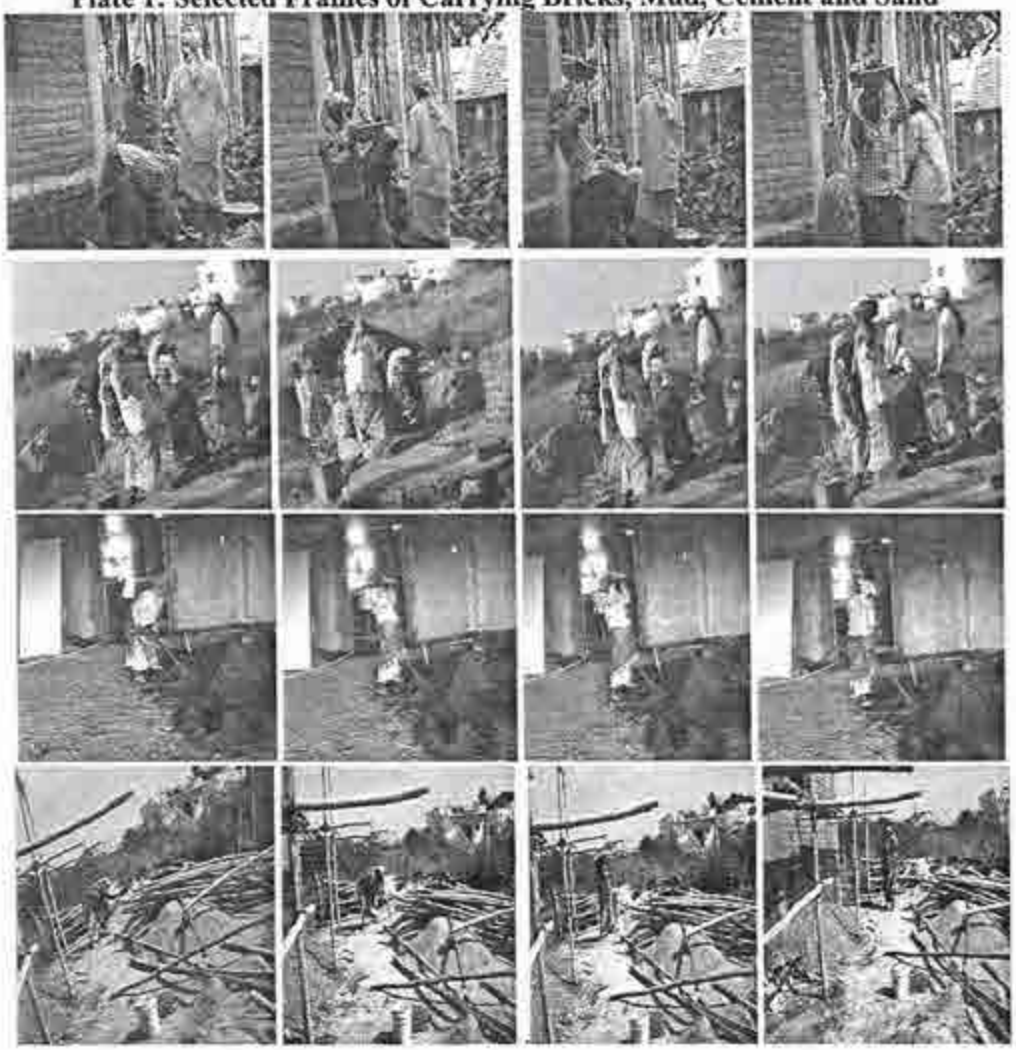
Table 3. OWAS Posture Analysis Status for the Selected Sample (n=50)

Task	Duration (hrs/day)	Posture studied	OWAS Code				Action Category
			Back	Arm	Leg	Load	
Carrying Loads	6 – 7	1	2	3	7	3	4
		2	1	3	7	3	4
Passing bricks Manually	3 – 4	1	4	1	4	1	3
		2	4	1	5	1	3
Sieving sand	3 - 4	1	1	1	2	1	3
		2	2	1	2	1	3
		3	4	1	2	1	3
Shoveling	2 - 3	1	2	1	7	1	3
		2	3	1	7	1	3
		3	4	1	7	1	3
Filling mud in the foundation	3 - 4	1	2	1	4	1	3
		2	3	1	4	1	3
		3	4	1	7	1	3
Sweeping	1 - 2	1	2	1	7	1	2
		2	3	1	7	1	2
		3	4	1	7	1	2

The selected sequential postures of sieving sand revealed that the workers bend their back, twist and stoop forward with the hand extended to sieve sand (Plate 3). Bending and twisting,

standing on legs, kept at an angle with both arms below shoulder level was the positional sequence adopted. Here again, the load was found to be less than 10 kg. Sieving sand required more of wrist motion but this repetitive motion of the wrist, normally observed, could not be recorded by OWAS due to its work sampling nature. Unnatural wrist postures, such as ulnar deviation and flexion, which have been identified as particularly harmful as put forth by Putz-Anderson (1988) could not be recorded since there is no classification for wrist postures in basic OWAS. Details for the awkward posture except for the wrist motion recorded was found to be 1121, 2121 and 4121 OWAS codes (for the postural deviations adopted). The values highlight the drudgery and physical load incident on the workers while performing jobs which can definitely affect their skeletal musculature.

Plate 1: Selected Frames of Carrying Bricks, Mud, Cement and Sand



Posture 1 **Posture 2** **Posture 3** **Posture 4**

Observation done for shovelling revealed the samples to adopt bending or twisting (back) or both while moving, with arms below shoulder level. Long hours of working in awkward positions toads the risk of WMSDs as jobs like shovelling was done only after doing their major activity for which they were employed. Being contractual labourers, they were entrusted jobs depending upon the requirements for labour and specific activities needed to be completed by the employer (contractors or masons) on a day. Hence, the work time allocated was only about 2–3 hours. Prolonged working in such postures had impacted on their OWAS code – 2171, 3171 and 4171 – for the postural deviations they adopted on the particular day. The stress on the back and leg was found to be higher for the activity.

Plate 2: Selected frames for carrying load

Posture 1 **Posture 2** **Posture 3** **Posture 4**

Plate 3: Selected Frames of Sieving Sand

Posture 1 **Posture 2** **Posture 3** **Posture 4**

Plate 4: Selected postures for Shovelling

Posture 1 **Posture 2** **Posture 3** **Posture 4**

Plate 5: Selected Frames of Filling Mud in the Foundation

Posture 1 **Posture 2** **Posture 3** **Posture 4**

The above frames of filling mud in the foundation reveal that the awkward posture the workers adopt was similar to those used while shovelling. Evidently, within a short span of time, where repetitive action, use of muscular force, awkward posture and carrying load are involved in a sequence, this activity was found to be heavily taxing on the workers. Being an intermittent activity, shovelling after doing some other tasks which is equally fatiguing, it is not felt necessary to highlight that the activity exposes the workers to heavy energy sapping and physical pain. The OWAS code values (2171, 3171 and 4171) also are indicative of the load they put on the back and leg musculature. Hence, these postures also warrant corrective action.

Though the activity of sweeping was performed comparatively only for a small duration, the posture adopted movements within a small area, hold of broom and the like had affected the OWAS codes to be similar to shovelling. Yet, by virtue of bending that did not involve a heavy load, it can be summarised that it may not affect the musculoskeletal system very badly.

Plate 6: Selected frames of Sweeping

Posture 1 **Posture 2** **Posture 3** **Posture 4**

CONCLUSION

The OWAS method was employed to study the working postures of women construction workers for their jobs at construction sites since OWAS can be used efficiently in identifying awkward working postures for the shoulders, back and legs. As all the tasks studied were performed for a prolonged time coupled with bending and twisting, the propensity for the workers to succumb to work-related musculoskeletal disorders is high. Moreover, as many of the body parts tend to record OWAS codes for back and legs as 3 and/or 4, it is concluded that the performance of these activities by these workers are hazardous and surely would result in their becoming victims of occupational diseases.

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Research Reach J. H. Sci. Vol. 15. No. 2, 45-50

A STUDY OF DIETARY HABITS, EXERCISE SCHEDULE AND HEALTH STATUS OF PHYSICAL EDUCATION TEACHERS (PETs)

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This study looked at the dietary habits, exercise schedule and health status of physical education teachers (PETs). Fifty PETs from selected schools in Mumbai were interviewed about their personal exercise regime, three-day diet recall, and medical illnesses. A step-test was used to assess their fitness levels. Their dietary habits, intake of calories, carbohydrates, proteins and fat was lower than the recommended dietary allowance (RDA). Eighty per cent of PETs had a regular exercise schedule with stretching and walking being the most preferred exercises. Forty-eight percent of PETs had BMI above 25 while 8% of PETs had BMI above 30. Majority of PETs were not well-versed with the food pyramid. Despite the low nutrient intake and not having major medical problems, PETs did have a higher than normal BMI. Therefore, it is recommended that more work needs to be done in this area to ensure that PETs are good role models to their students.

Key words: Physical education teachers, exercise schedule, dietary habits, health status.

It is important for the physical education teachers PETs to provide a good role model to their students by being physically fit, athletic and energetic. There is abundant research demonstrating the positive effects, a good physical role model can have on students (Staffo 2000). Students identify with and emulate teachers whom they respect. A survey conducted by the Diabetes Foundation of India (Misra, 2009) revealed that nearly 70 per cent of teachers (both men and women) in different schools in Delhi were fat, especially around the waist. Four decades ago, the following questions were posed: "Do PETs now practice what they will ultimately teach? Do they make the 'physical fitness objectives' a living objective, day by day? Are PETs really fit?"(Staffo, 2000). Very few studies on the health status, addressing the above mentioned issues of PETs, have been documented in our country. Hence, it would be interesting to study the nutritional status of PETs working in municipal schools and private schools.

METHODOLOGY

The present study was conducted in thirty aided, non-aided and municipal schools in the city of Mumbai. The medium of instruction was English and Hindi. The PETs were interviewed using a questionnaire. The demographic profile, anthropometric measurements such as height, weight, waist circumference, hip circumference and waist to hip ratio were recorded. Body Fat Monitor, fat%, BMR and BMI were measured using OMRON HBF-306. Tanita™ weighing scale was used to measure body weight. The subject was requested to perform a Harvard's step test for 3 minutes and after which the pulse rate and percent oxygen saturation (SpO2) were measured using a pulse-oxy meter.

RESULTS AND DISCUSSION

Majority of the PETs were in their early 30s.There was little difference in the dietary habits, exercise schedule and fitness levels of PETs from private (aided/non aided) and municipal schools.

Misra et al (2009) reported that in general, 60 min of physical activity is recommended every day which includes aerobic activity, work-related activity and muscle-strengthening activity. This should include at least 30 min of moderate-intensity aerobic activity (e.g., brisk walking, jogging, hiking, gardening, bicycling etc.), 15 min of work-related activity (e.g., carrying heavy loads, climbing stairs etc.) and 15 min of muscle strengthening exercises. The latter should be done at least 3–4 times a week using light weights (15–20 pounds). As evident from Table 1, PETs, (men and women) in the current study performed physical exercises (walking at a speed of around 4km/hour) burning an average of 400 calories per day.

They also, when possible, indulged in other physical activities like gymnastics, cycling, stretching, climbing stairs and brisk walking. As these other activities were not performed on a regular basis and for variable times, it was difficult to estimate the calories burnt during these activities individually.

The results of the current study were in agreement with the observations made by Misra et al (2009). Though the PETs performed average of 60 minutes of exercise, there was no consistency in the variety and type of exercise performed (aerobic, muscle strengthening and work-related activity).

Table 1: Exercise regime of PETs

Exercise	Men (n)	Women (n)
Climbing stairs	22 (75.8%)	12 (57.0%)
Walking to a destination	21 (72.0%)	11 (52.0%)
Sports games*	20 (68.9%)	12 (57.0%)
Field work **	03 (10.3%)	01(04.7%)
Gymnastics	02 (06.8%)	00 (00.0%)
Cycling	01 (03.4%)	01 (04.7%)
Mean (min)	62.5 (± 35.1)	61.5 (± 31.1)

* Sports games included tennis, badminton and football (moderate to high intensity)
** Field work included teaching exercises to students in the school playground.
Anova: f value = 1.33, df = 1, 48, p = 0.26 not significant.

The average energy consumption of both men and women PETs was 52% and 58% of the recommended dietary allowance (RDA) respectively. It was interesting to note that the average protein consumption of PETs was 78% of the RDA. The observations in this study are in consensus with the observations by Ranjan (2007) that several recent studies on the subject of India's economic growth and changing food consumption have found evidence of widespread decline in calorie intake.

The frequency of fatigue and body pain was attributed by them to exercises which were performed during the week such as cycling, running, sports, athletics etc. Eighteen per cent of PETs attributed their acidity to their irregular dietary intake or the stress faced throughout the week. Less than 10% of the PETs used substances like tobacco.

None of the PETs consumed nutritive or non- nutritive supplements as they were not aware of them. All but two PETs acknowledged the importance of nutrition education and combination of diet and exercise for healthy living, and only 20% were aware about the food pyramid.

In the present study, the mean height of men and women PETs were lower and the weight and the BMI were higher than the norm for reference Indian man and woman. (ICMR 2010). Awopetu (2011) showed that the students' perception of teachers'

personality is a determinant of students' interest in physical education at the senior secondary school level.

Table 2: Macro-nutrient intake of PETs

Parameter	Men	RDA	Women	RDA
Energy (Kcal)	1209 (±286.3)	2320	1108 (±205.1)	1900
Carbohydrate (g)	199 (±70.9)	-	165 (±36.1)	-
Protein (g)	46.5 (±15.4)	60	43.0 (±12.6)	55
Fat (g)	23.5 (±05.3)	25	22.4 (±04.3)	20

The average calorie consumption of PETs having poor, below average and average fitness level were 1140, 1244 and 1171 respectively. The duration of exercise (in minutes) in PETs having poor, below average and average fitness level were 57, 55, and 62 respectively. Thus there was no significant relationship between fitness level and dietary pattern (calorie consumption) and activity level.

Table 3: Anthropometric measures of PETs (*WHO Multi-centre Growth Study Group (ICMR, 2010)

Parameters	Men	Reference man*	Women	Reference woman*
Waist to hip ratio	0.9±0.05		0.8±0.07	
BMI	25.1±4.36	20.3	24.5±3.74	21.2
Fat %	25.1±6.5		33.2±6.4	25.1±6.5
BMR (KCal)	1520±205.0		1300±158.5	

The Harvard Step Test is a test to measure the physical endurance of an individual. It was a great concern to note that none of the PETs had 'good'or 'excellent' physical endurance. Few of PETs had 'average' physical endurance as measured by Harvard step test. About 15% - 20% of the PETs were unable to participate in the step test either due to fatigue and body pain or due to discomfort in performing the test.

Table 4: Functional test (Fitness level) of PETs

Fitness level*	Men	Women
Poor	7 (14%)	7 (14%)
Below Average	8 (16%)	3 (06%)
Average	5 (10%)	3 (06%)
Good	0	0
Excellent	0	0
Refused to perform step test	9 (18%)	8 (16%)

*as per Harvard Steps Test norms

The fitness level of PETs on Harvard Step Test was calculated using the following formula:

$$\text{Fitness level} = \frac{\text{Time until exhaustion on the step test (in seconds)} \times 100}{2 \times \text{sum of heartbeats in the recovery periods *}}$$

* The heartbeats during recovery periods were measured between 1 to 1.5 minutes, 2 to 2.5 minutes and 3 to 3.5 minutes and total of heartbeats these three periods were was considered as sum of heartbeats in the recovery periods.

One may consider improving the physical endurance of PETs and also preferably of other teachers by recommending regular participation in physical training programs. It is proven that our fitness levels decline drastically with age. Even though this was expected, the study has also uncovered a lesser known fact, that our fitness levels start declining not just when we reach middle age, rather our overall fitness levels start declining right after the 20s. (Fitness Level Declines Dramatically With Age, 2010).

CONCLUSION

Hence it can be concluded that overall PETs appeared to be good role models for their students. But still there is a scope of improvement as far as their nutrition awareness, dietary habits, exercise schedule and health status are concerned. Adding nutrition education in the training syllabus of PETs should be considered.

A similar study of PETs in other parts of Maharashtra and India may throw more light on dietary habits, exercise schedule and physical fitness of PETs working in these areas.

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NUTRITIONAL ANTHROPOMETRY OF TRIBAL PRESCHOOL CHILDREN (4-6 YEARS) IN THRISSUR DISTRICT OF KERALA

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The preschool children from tribal areas in Kerala have not been a focus for their nutritional status. This study reveals that not only are they suffering from malnutrition, it is also more prevalent in girls than in boys. Boys are taller and heavier than girls and the height and weight of both, boys and girls were lower than ICMR (2010) standards. Majority of preschool children were malnourished according to weight for age classification and short according to height for age classification. Waterlow's classification for malnutrition revealed that 71.4 per cent boys and 87.4 per cent girls are stunted. Mean head circumference, chest circumference and MUAC were lower than the standards given by Nutrition Foundation of India (NFI). Nutrition education and nutrition intervention programmes can improve the present situation of tribal preschool children.

KEY WORDS: Anthropometry, Tribal, Preschool, Height, Weight, MUAC

The tribal population in India (8% of total population) is varied, mirroring its great ethnic diversity. This group stands out since they live in an exceptional physical, socio- economic and cultural environment and their food intake is affected by the climatic conditions (Rao *et al.*, 2006). The tribal population of Kerala is 1.14 per cent. As the anthropometric measurements of children can reveal their nutritional status, and as this information in Thrissur district (Kerala) is lacking, the present study has been undertaken with the aim of measuring the nutritional anthropometry of preschool children in this area.

MATERIALS AND METHODS

The study was conducted in Thrissur district of Kerala state. From the 24 panchayats having tribal population in the district, five panchayats was selected randomly for the study. Seventy-five tribal families having preschool children (4-6 years) were selected purposively. Fifteen children (three children from each panchayat) were selected as the sub sample. Height, weight, head circumference, chest circumference and mid upper arm circumference of preschool children were measured using the standard procedures adopted for conducting anthropometric survey. The data collected was then analysed using statistical methods in SPSS version 16.

RESULTS AND DISCUSSION

The height for age indicates linear growth retardation and cumulative growth deficits and also captures chronic malnutrition. Weight for age is a composite index of growth as it accounts for

both acute and chronic malnutrition. The result (Table 1) reveals that boys are taller and heavier than girls and the height and weight of both, boys and girls were lower than the ICMR (2010) standards. There is significant difference (1% level) in the height and weight of the tribal children as compared to ICMR standards and there is also significant difference between boys and girls.

Table 1: Mean height and weight of preschool children with ICMR standards

	Mean height ±SD		't' value		ICMR standards	
	Boys	Girls	Boys	Girls	Boys	Girls
Height (cm)	102.7± 11.1	101.4±9.3	3.06*	5.01*	109.1	108.2
Weight (kg)	15.2±2.4	14.2±2.3	6.21*	11.63*	18	18

*Significance at 1%.

This finding is in tune with Philip *et al.* (2015), who reported the same trend in a study conducted in tribal areas of Wayanad district. In the case of non-tribal preschool children, the mean height and weight of both boys and girls were found to be significantly lower when compared with ICMR standards (Aneena, 2003). Mean MUAC of boys and girls when compared with NFI standards (1991) showed significant difference from the standard values. There is a significant difference between boys and girls in the case of head circumference and chest circumference but there is no significant difference in the case of MUAC. This observation was in line with that of Jose (1998) and Aneena (2003) in non-tribal preschool children in Thrissur district.

The nutritional status of preschool children according to weight for age classification given by Gomez *et al.* revealed that only 21.4 per cent of boys and 12.8 per cent of girls were normal while majority of boys (50 per cent) and girls (57.4 per cent) have mild malnutrition. When compared with the classification given by the Indian Academy of Paediatrics (IAP) in 1972, 46.4 per cent of boys were normal while 46.8 per cent of girls were having Grade I malnutrition. Mathen (1998) also reported that majority of the rural preschool children in Kerala belonged to either Grade I or Grade II malnutrition. According to Waterlow's classification 35.7 per cent of boys were having normal height for age but 31.9 per cent of girls were having marginal malnutrition. But Visweswara Rao's classification reveals that both boys (53.6 %) and girls (59.6%) showed adequate height for age. Apart from these, Mclaran's classification says that 53.6 per cent of boys and 55.3 percent of girls are short. The trend was similar in the studies conducted by Shyna (1996) and Jose (1998) in the non-tribal preschool children in Thrissur district. The studies revealed that based on height for age distribution, majority of the preschool children were coming under marginal deficit for height and normal height with respect to age.

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Waterlow classified the height for age and weight for age to understand the type and duration of malnutrition. According to this classification (Table 3) 71.4 per cent of boys and 87.4 per cent girls were stunted and was having a long duration malnutrition. Bisai and Mallick, (2011) reported that Kerala has the lowest proportion of children with underweight (23%), stunting (25%) and wasting (16%). They also suggested that, a much higher prevalence was seen in Koramudi tribal children with a prevalence of 52.9% underweight, 49.6% stunting and 22.7% wasting.

Table 2: Distribution of preschool children as per weight for age and height for age

Classification	Deviations from ICMR standards	Boys (N=28)	Girls (N=47)
Distribution of preschool children as per height for age according to Gomez *et al.'s* (1956) classification			
Gomez classification	<60 % of standard (Severe malnutrition)	00 (0)	00 (0)
	60-75% of standard (Moderate malnutrition)	08 (28.6)	14 (29.8)
	75-90 % of standard (Mild malnutrition)	14 (50.0)	27 (57.4)
	>90% of standard (Normal malnutrition)	06 (21.4)	06 (12.8)
Distribution of preschool children as per height for age according to Rao and Vijayaraghavan's (2009) classification			
Waterlow's Calssification	<95% of standard (normal)	10 (35.7)	13 (27.7)
	90-95% of standard (marginal malnutrition)	08 (28.6)	15 (31.9)
	85-90% of standard (moderate malnutrition)	06 (21.4)	12 (25.5)
	>85% of standard (severe malnutrition)	04 (14.3)	07 (14.9)

Mid-upper-arm circumference (MUAC) is being used as an alternative index of nutritional status for children during famines or refugee crises (Fernandez *et al.*, 2010). Result of the present study (Table 4) reveals that 92.9 % of boys and 85.1% of girls are normal and 7.1%, 14.9% of boys and girls respectively have moderate malnutrition. Girls are having higher malnutrition compared with boys. In a study conducted by Singh and Mukherjee (2015), the results revealed that mean MUAC among boys was higher than girls at all ages.

Table 3: Distribution of malnourished children as per Waterlow's classification

% weight for age	% height for age		Observed values	
Cut off levels as % of ICMR standards			Boys	Girls
< 90	< 80	Normal	06 (21.4)	06 (12.8)
< 90	>80 (wasted)	Short duration malnutrition	00 (00.0)	00 (00.0)
> 90	< 80 (stunted)	Long duration malnutrition (nutrient dwarf)	20 (71.4)	41 (87.4)
> 90	>80 (stunted & wasted)	Current & long duration malnutrition	02 (07.2)	00 (00.0)

Table 4: Distribution of chest, head circumference and MUAC of preschool children with NFI standards (1991)

	Mean value		't' value		NFI standards	
	Boys	Girls	Boys	Girls	Boys	Girls
Mean head circumference (cm)	49.2	47.74	1.82**	2***	50	49.1
Chest circumference (cm)	51.5	50.0	2.53*	4.31*	53.1	52.1
MUAC (cm)	15.0	14.8	4.26*	6.19*	16	16

Significance - *1% level ** 5% level*** 10% level

Prevalence of malnutrition was found by calculating the weight / height^2 ratio according to the classification given by Rao and Singh (1970) (Table 5). The data revealed that 60.7 per cent of boys as well as 59.6 per cent of girls are suffering from moderate malnutrition and 17.9 per cent boys as well as 25.5 per cent girls are undernourished. The percentage of undernourished girls is much higher than boys. Similar findings were found in studies conducted in the non-tribal preschool children in Thrissur district (Aneena, 2003; Shyna, 1996; Mathen, 1998; Jose, 1998).

Table 5: Distribution of preschool children based on various classifications

Distribution of preschool children according Rao and Singh classification		
	Boys	Girls
>0.0015 (normal)	06 (21.4)	07 (14.9)
0.0013 – 0.0015 (Moderate)	17 (60.7)	28 (59.6)
<0.0013(Under nutrition)	05 (17.9)	12 (25.5)
Distribution of preschool children according to MUAC		
>13.5 (Normal)	26 (92.9)	40 (85.1)
12.5 – 13.5 (Moderate)	02 (7.1)	07 (14.9)
<12.5 (Severe)	00 (0)	00 (0)
Distribution of preschool children based on head and chest circumference (Gopaldas, 1987)		
< 1 normal	20 (71.4)	30 (63.8)
≥ malnourished	08 (28.6)	17 (36.2)

CONCLUSION

From the results we can conclude that there is marginal or moderate malnutrition in the tribal preschool children and it was found that girls are more malnourished compared to boys.

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Research Reach J. H. Sci. Vol. 15. No. 2, 57-60

ADOPTION OF ENVIRONMENTAL STANDARDS BY HOSIERY INDUSTRIES IN LUDHIANA

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Keeping the importance of spreading awareness regarding sustainability in mind, this study was planned with the aim of exploring the status of awareness and practice of environmentally sustainable activities in hosiery units of Ludhiana. Eighty hosiery units were randomly selected for survey from the sampling frame obtained from Ludhiana Knitwear Club. Information regarding the practices of sustainable activities was collected by interview and questionnaire methods. It was seen that large scale units were more aware and were practicing environmental sustainable activities to a greater extent in comparison to medium and small scale units.

Key words: Environmental sustainable practices, personal responsibility, innovation, waste management, conservation, work force capability, awareness workshop.

There is an increasing awareness in the world regarding the present state of the environment, caused by over-exploitation of natural resources for economic development. Interestingly, the consumers are also questioning the brands regarding their contribution to environmental damage. Consumers need to be informed about the durability, low wastage production and the use of recycled material and eco-friendly, recyclable products from sustainable sources so that pressure on resources is reduced. Manufacturers are facing major challenges to bring sustainability, both by saving resources and reducing costs. This study was planned with the aim of exploring the awareness and practice of environmentally sustainable activities in hosiery units of Ludhiana.

METHODOLOGY

Eighty hosiery units were randomly selected for the survey from the sampling frame obtained from Ludhiana Knitwear Club. Information regarding the practice of sustainable activities was collected using interviews and questionnaires. This information was supported by photographs and observation of the activities in the units.

RESULTS AND DISCUSSION

It was found that large-scale units were more aware and were practicing environmentally sustainable activities to a greater extent in comparison with medium and small scale units. Large scale units were more involved in managing their actions related to the environment in comparison with medium and small scale units to ensure greater compliance with the

environmental standards. The most widely practiced and highly ranked environmental activity related to personal responsibility was being compliant with the environmental standards, followed by the practice of understanding established environmental standards. But the practice of the use of eco-labels was very poor. The large units had a better understanding of environmental standards and made efforts towards a reduction of their environmental impact. Although most of the small and medium scale units were aware of the standards, only a few of them were found following them and making any effort towards the reduction of their environmental impact. Very few small and medium scale units measured their environmental impact, while large-scale units were found measuring the impact in the form of energy audits. None of them measured their impact in terms of greenhouse emissions. This may be because large-scale units had monetary and human resources to conduct awareness workshops regarding environmental issues; hence seemed more responsible in their actions.

Table 1. Practice of the Environmental Sustainable Activities

Environmental Sustainable Activities	Weighted Mean				Rank
	S N=55	M N=17	L N=8	T N=80	
Personal Responsibility	1.67	4.12	13.28	3.34	2
Transparency	0.42	2.65	11.89	2.04	3
Innovation	0.74	1.65	13.28	2.01	4
Conservation	2.53	8.06	15.66	5.03	1
Waste Management	0.02	1.07	8.14	1.06	6
Leadership	0.09	2.19	4.89	1.02	7
Workforce	0.51	1.41	3	1.19	5

Large-scale units were more transparent in disclosing environmental improvement activities. A majority of the hosiery units followed accurate environmental report sharing with stakeholders. It was followed by the practice of accurate and timely disclosure of the environment activities to the government ministry of environment, forests and climate change. Environmental audits were hardly conducted.

Large-scale units had made efforts towards developing innovative products and improving the processes to reduce the energy consumption and production of waste, while very few small and medium-scale units were engaged in following innovative environment-friendly practices in their units. The most prominent innovative environmental activity was the development of processes to reduce energy consumption followed by the development and improvement of products and processes. Renewable energy was also used in the form of solar energy and rain harvesting resources to create new processes and products by some of the manufacturers to reduce the impact of environment. None of the small, medium and large scale units were

engaged in the technical development of new and improved raw material, development of processes to reduce production of waste, use of organic fibres and eco-friendly transport options.

Servicing of the machines was carried out properly and awareness regarding environmentally safe practices was created in relation to conservation environmental practice. Not much effort was made to construct energy-efficient buildings ('green' buildings). None of the small and medium scale units had made any effort towards the construction of 'green' buildings with energy efficient features in comparison to large scale industries where environment friendly green features such as big windows for natural lights, high roofs for cooling effect and exhaust fans for ventilation were observed. Very few large scale units had big luscious gardens with tall eucalyptus trees all around the boundaries in comparison to very few small and medium scale units. Some of the units had even initiated tree-plantation campaigns.

Waste-management activities were followed by hosiery units of Ludhiana to a very small extent. Few large units were carrying out proper disposal of industry waste and effluent treatment and making efforts towards the improvement of technology and processes for the same. Small and medium scale hosiery units were not engaged in any activities related to waste management such as recycling and treatment of water and waste in comparison to large scale units. Practice of rainwater harvesting was followed by large scale units. Other practices such as the treatment of hazardous waste and polluted air and the use of biodegradable material for packaging except for proper disposal of industry waste or effluent treatment were followed by only one large-scale unit.

Majority of the units owners were aware of the environmental issues and made regular efforts towards improvement in various technologies and processes with regard to energy efficiency and environmentally sustainable activities. The units carried out environment awareness campaigns by holding sessions on environmental issues, indulging in eco-friendly activities and distributing posters in the units.

Most of the workers of the large scale units were aware of the environmental issues in comparison to small and medium scale units respectively. Some of the large scale units encouraged workers to put forward energy-saving ideas and even rewarded the best idea given by the workers. These practical ideas were implemented in the various departments with the help of environment managers. This practice of encouraging employees was not prevalent in small and medium scale units. In small units, ideas suggested by the employees in relation to environment conservation were rarely awarded.

The extent of practice of environmental sustainable activities among small, medium and large hosiery units of Ludhiana revealed that the units were majorly engaged in conservation related activities followed by activities related to personal responsibility and transparency. The least adopted practices were waste management and leadership. The regular servicing of the

machines was the top-most adopted environmentally sustainable activity practiced by the hosiery units in Ludhiana followed by other activities such as having awareness programmes regarding environmental safety issues, environmental awareness amongst workers, and compliance with environmental standards.

For the dissemination of information regarding environmental sustainable activities, an awareness workshop was organized in one purposively selected small-scale hosiery unit. The workshop was appreciated by the unit owners and motivated them to implement various eco-friendly practices in order to reduce its negative impact on the environment.

The hosiery industry of Ludhiana is also making efforts towards striking a responsible balance between increasing productivity and safeguarding natural resources. Large-scale units were more aware and were practicing environmentally sustainable activities related to conservation, personal responsibility, leadership, waste-management, innovation, transparency and work force capability to a greater extent in comparison to medium and small scale units. These creative and thoughtful practices did not hamper progress but stimulated eco-friendly change by saving resources, driving down costs and making the world a better place to live for humans and all other creatures.

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QUIZ 03: HUMAN DEVELOPMENT

Nirmala Almeida

College of Home Science Nirmala Niketan, Mumbai

I. Find the answer to each of the following items. They all end with 'TION'

1. Changing the schema when a new object or event does not fit in _____TION
2. A mathematical statement of the relation between two variables _____TION
3. The process by which species change over generations _____TION
4. For Erikson, the crisis in middle adulthood is generativity versus _____TION
5. The process by which an individual interprets sensory information _____TION
6. Correct identification of items previously experienced _____TION
7. Realizing one's full unique potential _____TION
8. Preprogrammed growth change that follows a genetic plan _____TION
9. Process by which we become a member of a social group _____TION
10. An individual's ability to make appropriate choices _____TION
11. Adopting the attributes of others and internalizing them _____TION
12. Removal of a reinforcer to reduce the frequency of behaviour _____TION
13. Interpreting situations as more harmful than they are _____TION
14. Attributing one's own unacceptable thoughts to others _____TION
15. It occurs when people are blocked from reaching their goal _____TION

II. Match the NONVERBAL CUE with its MEANING

NON-VERBAL CUE	MEANING
A Clenched Fist	1 Sad
B Frown on the Face	2 Frightened
C Trembling Voice	3 Happy
D Nodding of the Head	4 Restless
E Tears in the Eyes	5 Hides one's feelings
F Light Spring like Type of Walk	6 Closeness/ Intimacy
G Arms Crossed	7 Angry
H Sheepish Grin	8 Thinking
I Paces Up and Down	9 Does not understand / accept what one is saying
J Turns the face away	10 Listens to /Agrees with someone
K In Close Proximity to Another	11 Embarrassed
L Index finger on the Forehead	12 Blocked

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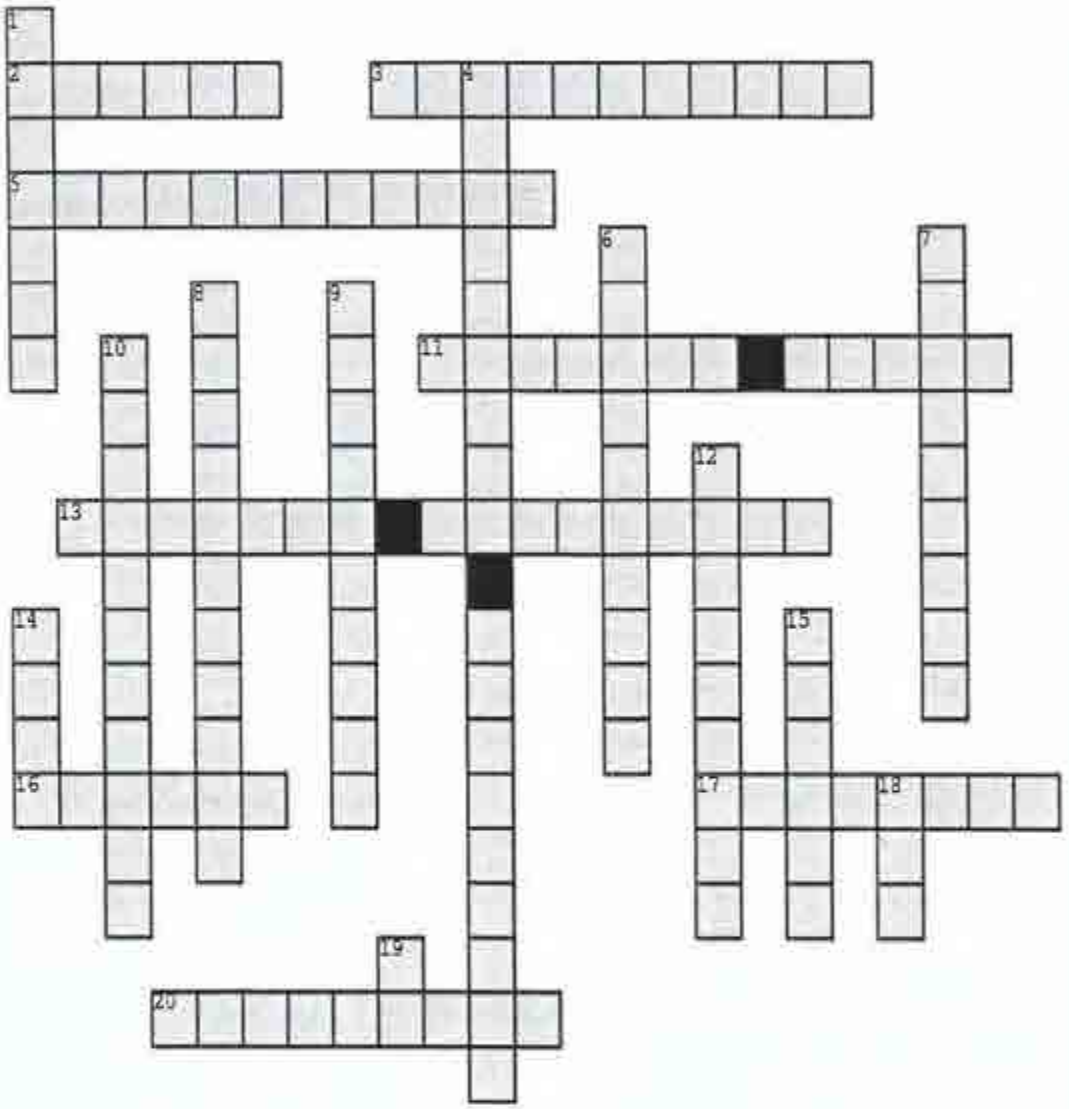
III. CROSSWORD



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ACROSS:

2. Well known for his theory of motivation
3. The term given by Vygotsky for giving a child help in the form of asking leading questions and providing examples
5. Speech problems where there are omissions, substitutions, additions and distortions of words
11. Technique where the parent allows the child to do whatever he/ she wishes
13. Used unconsciously to help individuals deal with anxiety
16. A psychological disorder characterized by abnormality in social functioning and language
17. Inconsistent and unresponsive caregiving leads to this type of attachment
20. Preconceived judgment about a group and its individual members

DOWN:

1. One of the core conditions of counselling
4. Phrases such as caught between a rock and a hard place refer to this type of conflict
6. The disability where the child has difficulty in writing
7. Sampling where the researcher chooses individuals who have particular characteristics
8. Children see and understand things from their point of view
9. The ego pushes unacceptable impulses into the unconscious
10. A surgeon has this type of intelligence
12. The identity status of those who have neither gone through an identity crisis nor made a commitment
14. A disorder where children eat inedible substances
15. Founder of Behaviourism
18. A test where children have to tell stories in relation to animal figures
19. A measure of dispersion (short form).

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LIST OF THESES AND DISSERTATION TITLES SUBMITTED AT DELHI UNIVERSITY

I. Doctoral Theses

1. Bhardwaj, Swati (Guide: Dr Santosh Jain Passi). Trans Fatty Acid (TFA) Content of Edible Fats/Oils and Commonly Consumed Fried/Baked / Dairy Food Items and the Effect of Dietary TFA on Select Cardio-Metabolic Risk Factors. Th 20103.

2. Gupta, Priyanka (Guide: Dr G. S. Toteja, co-guide: Dr Neena Bhatia). Impact of Vitamin B12 Supplementation with Iron and Folic Acid on Adolescent Girls. Th 20227.

3. Khanna, Aparna (Guide: Dr Savitri Ramamurthy, co-guide: Dr Sarita Anand). Motivations and Management Practices of Families in the Acquisition and Use of Consumer Durables: An Appraisal. Th 20097.

4. Kumari, Rashmi (Guide: Dr Santosh Jain Passi, co-guide: Dr Bani Tamber Aeri). Impact of Iron Fortified Food Supplementation on Pregnancy Outcome and Growth/Development of the Infants. Th 20107.

5. Meghna (Guide: Dr Renu Arora). Classroom Furniture Dimensions and Anthropometric Measures of Children in Public Schools. Th 20099.

6. Moirangthem, Amita (Guide: Dr Sarita Anand). Widows of HIV Infected Men: Implications on Women from Manipur. Th 20098.

7. Nayera, Masoodi (Guide: Dr Veenu Seth, co-guide: Dr Kalyani Singh). Evaluation of Nutrition Services in Registered Hospitals of Srinagar and Recommendations for Optimizing Nutrition Care of Patients. Th 20105.

8. Rao, Spriha (Guide: Dr Neena Bhatia, co-guide: Dr G. S. Toteja). Micronutrient Profile of Pregnant Women and its Correlation with Birth Outcome. Th 20101.

9. Sharma, Mahak (Guide: Dr Ranjana Mahna). Study of Metabolic Syndrome and Physical Activity in Urban Middle Aged Population. Th 20100.

10. Singh, Surabhi (Guide: Dr Renu Arora). Banking Services and Customer Satisfaction. Th 20104.

11. Singhal, Neha (Guide: Dr Anupa Siddhu). Physical Activity, Cardiorespiratory Fitness and Risk Factors of Coronary Heart Disease in Apparently Healthy Indian Men. Th 20106.

12. Sneh, Prakash (Guide: Dr Deepali Rastogi, co-guide: Dr Vandana Bhandari). Mughal Costumes (16th - 18th Century) and Royal Costumes of Jodhpur: A Comparative Study. Th 20102.

13. Batham, Meena (Guide: Dr Chitra Arora) Dynamics of roghan gel painting from Kutch–Gujarat. (2015)

14. Aggarwal, Jyoti (Guide: Dr Charu Gupta) Pigment extraction from fungus as a novel source of Textile Dye. (2015)

15. Dhingra, Sudha (Guide: Dr Chanchal) Revival of Tribal Pata Weaving using Natural Dye Aal (*morinda citrifolia*) in Bastar and Korapat (2014)

16. Atheya, Ritu (Guide: Dr Renu Arora) Work-Life Balance strategies: An exploratory study in the Banking Sector.

17. Jain, Ritu (Guide: Dr Seema Puri) Activity and Healthy Eating Among Primary School Children: Impact on Physical Fitness.

18. Gupta, Sonal (Guide: Dr Seema Puri) Effect of Polyphenol *(Cinnamon cassia)* Intervention on the Metabolic Profile and Body Composition of Subjects with Metabolic Syndrome.

19. Chauhan, Shraddha (Guide: Dr Bani T. Aeri) Effect of Canola Oil Consumption on the Serum Lipid Profile of Dyslipidemic Adults.

II. MSc Dissertation titles (Institute of Home Economics, Delhi University) 2015

Foods and Nutrition

1. Singhal, Aastha (Guide: Dr Seema Puri). Dietary Practices and upcoming obesogenic environment of Children (10-12) Year in a Rural Setting near Delhi. 2015

2. Kaushik, Anu (Guide: Ms Shipra Gupta). Knowledge, Attitude and Practices of Young Adilts about Food Hygiene and Related Aspects. 2015

3. Chauhan, Sonika (Guide: Ms Archana Bhagat). Development of Baked Products using Alternative Sweetener Blends: A Study). 2015

4. Bhargava, Vartika (Guide: Dr Ranjana Mahna). Association of Menstrual Disorders in College-Going Girls with Dietary and Lifestyle Factors. 2015

5. Kapoor, Yogita (Guide: Dr Bani T. Aeri). Weight-Related Concerns and Weight Control Behaviour of School-Going Adolescent Girls in Delhi. 2015

6. Vora, Kashish (Guide: Ms Shipra Gupta). Dietary Practices, Lifestyle Patterns and Nutritional Status of Semi-Professional and Professional Female Dancers. 2015

7. Sharma, Monica (Guide: Dr Seema Puri). Consumption Patterns of Artificial Sweeteners among Young Women: An Exploratory Study. 2015

8. Khandelwal, Ritika (Guide: Dr Bahi T. Aeri). Consumption Pattern of Weekly Iron Folic Acid Supplements (WIFS) by Adolesicents Attending Government Schools of Delhi: A Study. 2015

9. Gupta, Tanya (Guide: Dr Tejmeet K. Rekhi). Dietary Practices and Mid-Day Meals Consumption Patterns of Primary School Children Enrolled in DOE (Government) School of Delhi: A Study. 2015

10. Devtalla, Ritu (Guide: Ms Deepsikha Kataria, co-guide: Dr Vidhu Yadav). Antioxidant Properties and Storage Stability of Fruit Juices/Beverages. 2015

11. Sharma, Ruchika (Guide: Ms Deepshikha Kataria, co-guide: Dr Vandana Sabharwal). Consumption Pattern of Caffeinated Beverages and Perceived Health Effects: A Study among Young Working Adults in Delhi. 2015

12. Sumiti (Guide: Dr Rajni Chopra). Quality Assessment of Cooking Oil: A Comparison between High and Low Socio-Economic Strata in West Delhi. 2015

13. Mohan, Tarinee (Guide: Dr Rajni Chopra). Assessment of Quality of Drinking Water: A Comparison between High and Low Socio-Economic Strata in West Delhi. 2015

14. Saikia, Anasuya (Guide: Dr Bani Tamber Aeri). Breakfast Consumption Patterns of College-Going Girls: A Comparative Study between Day Scholars and Hostel Residents. 71002. 2016

15. Adhikari, Anju (Guide: Dr Seema Puri). Nutrition Literacy Status of Young Adult Women (20-30years) Living in New Delhi. 71001. 2016

16. Jain, Arushi (Guide: Dr Ranjana Mahna, co-guide: Dr Kumari Geeta). Weight Status of Public and Govt. School Children (13-15 years of age) in Relation to Diet and Lifestyle. 71004. 2016

17. Rai, Ruchi (Guide: Dr Sonal Gupta). Nutritional Profile and Quality of Life among BPO Employees. 71010. 2016

18. Chopra, Sakshi (Guide: Ms Shipra Gupta). Influence of Cooking Skills on Dietary Practices and Nutritional Status of Young Women. 71011. 2016

19. Mazumdar, Sarmishtha (Guide: Ms Archana Bhagat). Energy Drink Consumption Patterns among College Students: A Study. 71013. 2016

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20. Prasad, Sneha (Guide: Dr Bani Tamber Aeri). Influence of Nutrition Information on Restaurant Menu Choices of College-Going Young Adults. 71017. 2016

21. Jain, Vaishali (Guide: Dr Seema Puri). Determinants of Fruits and Vegetable Consumption among Children (10-12 years) in Delhi NCR: A Study. 71019. 2016

22. Gupta, Anjali (Guide: Dr Tejmeet Kaur Rekhi). Food Safety: Perceptions and Practices of Consumers with Respect to Eating Out. 71003. 2016

23. Pooja (Guide: Dr Vandana Sabharwal). A Study on the Prevalence and Factors Associated with Under Nutrition among Preschool Children Enrolled under ICDS Programme in Delhi. 71009. 2016

24. Gaur, Samyukta (Guide: Ms Shipra Gupta). Nutritional Profile of Nurses from Government Health Facilities in Delhi. 71012. 2016

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26. Puri, Divya (Guide: Dr Deepshikha, co-guide: Dr Vandana Sabharwal). Enhancing the Stability of Oil by Addition of Curcumin. 71005. 2016

27. Ohri, Jigya (Guide: Dr Rajni Chopra) Development of n-3 Enriched Confectionary Fat using Fractionated Palm Oil and Linseed Oil Blend. 71006. 2016

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30. Negi, Shrishti (Guide: Dr Deepshika, co-guide: Dr Vidhu Yadav) Development of Tomato Products with Optimum Retention of Antioxidants. 71018. 2016

Department of Fabric and Apparel Science (2014-15)

1. Chaturvedi, Apoorva (Guide: Dr Chitra Arora) Banjara Embroidery of Andhra Pradesh: An Appraisal.

2. Goswami, Deepika (Guide: Dr Charu Gupta, co-guide: Ms Akanksha Sangal) Contemporizing the Traditional Craft of Kantha.

3. Solanki, Divya (Guide: Ms Harshita Chaudhary, co-guide: Dr M. S. Parmar) Development of Heat and Flame-Resistant Multi-Layered Self-Stitched Fabric.

4. Kaur, Harmeet (Guide: Dr Charu Gupta) Metamorphosis of Capes.

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5. Verma, Kirti (Guide: Dr Bela Kapoor) A Comparison of Non- Convertible Peter Pan Collars.

6. Bakshi, Manjari (Guide: Dr Jyoti Aggarwal) Development of Well-Fitting Shirt Collars for Women's Formal Shirts.

7. Fartiyal, Neha (Guide: Dr Chitra Arora, co-guide: Ms Meena Batham) Documentation on Rangwali Pichhora, a Traditional Odhani of Kumaun Region.

8. Tiwari, Pooja (Guide: Dr Amita Walia, co-guide: Dr M.S. Parmar) To Study Dyeing Behavior of Inherent Fire Repellent Fibers in Comparison with Non-Fire repellent Fibers.

9. Priyanka (Guide: Ms Meena Batham, co-guide: Dr M. S. Parmar) To Develop a Stretchable Cotton Knitted Fabric: An Innovative Study.

10. Dabas, Rinky (Guide: Dr Chanchal, co-guide: Dr Nisha Nagpal) Effect of Eco-Friendly Softeners on Chanderi Silk Fabric.

11. Rai, Suchi (Guide: Ms Harshita Chaudhary) Effect of Ageing on Properties of Woollen Fabrics.

12. Kaur, Sukhvinder (Guide: Dr Charu Gupta, co-guide: Ms Sharda Nautiyal) Optimization of Fabric Formation Using Textile Waste and Water Soluble Fabric: Some Design Effects.

Department of Fabric and Apparel Science (2015-16)

1. Deepika (Guide: Dr Amita Walia) Embellishment of Apparels using Faux Leather: A Creative Approach. 71101

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11. Swati (Guide: Dr Charu Gupta, co-guide: Ms Simran Kaur) Restructuring Post-Consumer Textile Waste into Bags. 71112

12. Yadav, Swati (Guide: Ms Bela Kapoor) Cowls: Pattern Design and Analysis 71113

13. Verma, Vasundhara (Guide: Dr Jyoti Aggarwal) Semiotic Characteristics of Dress: An Exploratory Study. 71114

14. Singhal, Vatsala (Guide: Dr Meena Batham, co-guide: Ms Sonia Chaudhary) Study on Anti-Bacterial Activity of Cotton Fabric Treated with Lemongrass Herbal Extract. 71115.

We acknowledge the Institute of Home Economics for promptly sending the list of theses and dissertation titles submitted to Delhi University. The other titles have been taken from the website of Delhi University.

ANSWERS TO THE QUIZ 03

I. ANSWERS to 'Words that end with a 'TION''

1. ACCOMMODATION
2. CORRELATION
3. EVOLUTION
4. STAGNATION
5. PERCEPTION
6. RECOGNITION
7. ACTUALISATION
8. FRUSTRATION
9. MATURATION
10. SOCIALISATION
11. SELF-DETERMINATION
12. IDENTIFICATION
13. EXTINCTION
14. MAGNIFICATION
15. PROJECTION

II. ANSWERS to match the non-verbal gestures:

A– 7
B– 9
C– 2
D–10
E– 1
F– 3
G– 12
H– 11
I– 4
J–5
K–6
L– 8

III. ANSWERS to the CROSSWORD

ACROSS:
2. Maslow
3. Scaffolding
5. Articulation
11. Laissez Faire
13. Defense Mechanism
16. Autism
17. Insecure
20. Prejudice

DOWN:
1. Empathy
4. Avoidance-Avoidance
6. Dysgraphia
7. Purposive
8. Egocentrism
9. Repression
10. Kinesthetic
12. Diffusion
14. Pica
15. Watson
18. CAT
19. SD

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