Research Reach

Journal of Home Science

ISSN 0974-617X

Vol.12, No.2 July, 2013

Research Centre,
College of Home Science,
Nirmala Niketan
49, New Marine lines,
Mumbai - 400 020.

RESEARCH REACH

JOURNAL OF HOME SCIENCE

Vol. 12, No.2 **July, 2013**

Research Centre,
College of Home Science,
NirmalaNiketan,
49, New Marine Lines,
Mumbai-400 020.

For Subscription to the journal and other particulars, kindly contact:

The Principal,
College of Home Science,
NirmalaNiketan,
49, New Marine Lines,
Mumbai-400 020,
India.
Email: journal@nirmalaniketan.com OR
nnrc.researchreach@gmail.com
Website: nirmalaniketan.com
Tel. No: 22076503 / 22007544

RESEARCH REACH

JOURNAL OF HOME SCIENCE

EDITORIAL

Nirmala Niketan, College of home science, started the year 2013 by conducting a three day international conference on "enhancing health, well- being and sustainability- opportunities, challenges and future directions." Research papers were presented by several delegates from institutes across India. Few of the papers in this July issue of Research Reach are based on research that was shared by the participants during the conference.

The issue begins with a review paper on genetically modified foods in which Dr.Uma Chitra summarizes selected studies that raise questions on whether genetically modified foods are harmful or helpful. Increased teacher turnover is an issue of utmost concern in schools today. The research paper by Dr Reeta Sonawat & Ms. Preksha Gandhi examine the importance of school board and age of the teacher on performance factors that influence teacher attrition. We have two papers from the textile department of IIS University Jaipur, Rajasthan. One of them by Ms. Sulekha Ojha & Dr.Radha Kashyap, documents *mukke-ka-kaam*, the metal embroidery of Rajasthan. The other paper by Sonal M Johar et al deals with the role of clothing on adolescent behavior. Developing innovative recipes has always been a research area of interest for home scientists. The paper by Dr. Deepali Kotwal and Indira P. Burile on recipes from dehydrated lotus stem is an attempt in this direction.

We are also presenting a list of titles of research projects conducted by various departments of our institute during the academic year 2012-2013.

We hope you enjoy and benefit from reading this July issue.

Chief Editor,
Dr. Malathi Sivaramakrishnan

INSTRUCTIONS TO THE AUTHORS

Research Reach-Journal of Home Science (ISSN 0974 – 617X)is devoted to original Research and Development in all branches of Home Science. It is a bi-annual publication from the Research Centre, College of Home Science, NirmalaNiketan, 49, New Marine Lines, Mumbai – 400020.

The format of the journal includes (using **Font- Times New Roman 12):**

1. Review paper on specific topics of current trends pertaining to Home Science. It should be a mini review with around 15-18 typed pages.
2. Research papers with a maximum of 7-14 pages
3. Research notes limited to a maximum of 2-6 typed pages
4. Paper / Book Review of not more than 1 typed page each.

SUBMISSION OF PAPERS:

Kindly provide e-mail ids to speed up communication.
The paper can be sent by e-mail i.e. to **journal@nirmalaniketan.com**or **nn_rc@rediffmail.com** or **nnrc.researchreach@gmail.com** on a CD. Send 2 hard copies (printed on one side) with the matching soft copy.

KINDLY NOTE: Hard copies (Printed version) of the paper without a soft copy will NOT be accepted.

Submission of the manuscripts to Research Reach- Journal of Home Science implies that "the data reported is authentic and original with clear objectives, materials used, methods employed and the results obtained. It is not published or offered for publication elsewhere"

The article should cover:
Title page: Title of the paper, the names of authors and the name of the department should be given

Abstract: The abstract should start on a new page (DO NOT MENTION THE AUTHOR OR INSTITUTION NAME ON THIS PAGE). Give an abstract of about 250 words reporting concisely the objectives, approach and the principal findings. The abstract should be followed by 5 key words

Text: The text can follow the abstract in the same page with introduction, materials and methods, results, discussion, conclusion, acknowledgement, if any and references. Referencesshould be cited at the appropriate point in the text by giving author's name and year. (**Example**: Machado, 2006)
References should also be typed at the end of the paper giving full details. The format should be as follows

For journal references:

- Machado P, and Prakash J (2006) Morbidity profile and prevalence of anemia in Indian Women From a rural coastal community J. Food Sci. Technol. Nepal, Vol 2, 53-56

For Book References:

- Wheless JW and Ashwal S (1999) The Ketogenic Diet (ch.45) In: Swaiman KF (ed) Pediatric Neurology- Principles and Practice. Stephen Ashwal/ Mosby, 719-728.

For Web references:

- Joanne Cammans (2006) Nutrition, health & related claims http://www.health.sa.gov.au/pehs/Food/survey-health-claims-jan07.pdf accessed on 11thJan 09
- Food Colours -A survey of artificial colours in foods and beverages (2005)http://www.health.sa.gov.au/pehs/Food/report-food-colours-nov05.pdf accessed on 25th April 08.

Figures & illustrations: For clarity purposes, the figures, diagrams in the paper should be in grayscale or black& white format or drawn using excel program. (Do not send colored graphs)

Tables: Table should have proper title on the top. Each table should not exceed 8 columns. Column headings should be brief. The values in the table should to be rounded-off to 2 decimals places or less.

The editorial board deserves the right to edit the manuscripts in order to make them suitable for publication in the journal and the judgment of the reviewing expert regarding the quality of the paper is final.

Information / Views / Data published in the journal are of the authors only.

INSTRUCTIONS TO THE AUTHORS

Research Reach-Journal of Home Science (ISSN 0974 – 617X)is devoted to original Research and Development in all branches of Home Science. It is a bi-annual publication from the Research Centre, College of Home Science, NirmalaNiketan, 49, New Marine Lines, Mumbai – 400020.

The format of the journal includes (using **Font- Times New Roman 12):**

1. Review paper on specific topics of current trends pertaining to Home Science. It should be a mini review with around 15-18 typed pages.
2. Research papers with a maximum of 7-14 pages
3. Research notes limited to a maximum of 2-6 typed pages
4. Paper / Book Review of not more than 1 typed page each.

SUBMISSION OF PAPERS:

Kindly provide e-mail ids to speed up communication.
The paper can be sent by e-mail i.e. to **journal@nirmalaniketan.com**or **nn_rc@rediffmail.com** or **nnrc.researchreach@gmail.com** on a CD. Send 2 hard copies (printed on one side) with the matching soft copy.

KINDLY NOTE: Hard copies (Printed version) of the paper without a soft copy will NOT be accepted.

Submission of the manuscripts to Research Reach- Journal of Home Science implies that "the data reported is authentic and original with clear objectives, materials used, methods employed and the results obtained. It is not published or offered for publication elsewhere"

The article should cover:
Title page: Title of the paper, the names of authors and the name of the department should be given

Abstract: The abstract should start on a new page (DO NOT MENTION THE AUTHOR OR INSTITUTION NAME ON THIS PAGE). Give an abstract of about 250 words reporting concisely the objectives, approach and the principal findings. The abstract should be followed by 5 key words

Text: The text can follow the abstract in the same page with introduction, materials and methods, results, discussion, conclusion, acknowledgement, if any and references. Referencesshould be cited at the appropriate point in the text by giving author's name and year. (**Example**: Machado, 2006)
References should also be typed at the end of the paper giving full details. The format should be as follows

For journal references:

- Machado P, and Prakash J (2006) Morbidity profile and prevalence of anemia in Indian Women From a rural coastal community J. Food Sci. Technol. Nepal, Vol 2, 53-56

For Book References:

- Wheless JW and Ashwal S (1999) The Ketogenic Diet (ch.45) In: Swaiman KF (ed) Pediatric Neurology- Principles and Practice. Stephen Ashwal/ Mosby, 719-728.

For Web references:

- Joanne Cammans (2006) Nutrition, health & related claims http://www.health.sa.gov.au/pehs/Food/survey-health-claims-jan07.pdf accessed on 11thJan 09
- Food Colours -A survey of artificial colours in foods and beverages (2005)http://www.health.sa.gov.au/pehs/Food/report-food-colours-nov05.pdf accessed on 25th April 08.

Figures & illustrations: For clarity purposes, the figures, diagrams in the paper should be in grayscale or black& white format or drawn using excel program. (Do not send colored graphs)

Tables: Table should have proper title on the top. Each table should not exceed 8 columns. Column headings should be brief. The values in the table should to be rounded-off to 2 decimals places or less.

The editorial board deserves the right to edit the manuscripts in order to make them suitable for publication in the journal and the judgment of the reviewing expert regarding the quality of the paper is final.

Information / Views / Data published in the journal are of the authors only.

RESEARCH REACH

JOURNAL OF HOME SCIENCE

Volume 12 Number 2 July 2013

CONTENTS PAGE NOS.

RESEARCH PAPERS

Genetically modified foods- harmful or helpful?
Dr. Uma Chitra
Kasturba Gandhi College for Women, Secunderabad 1

Effect of school board and age of teachers on effective performance factors that influence teacher retention
Dr Reeta Sonawat &Ms. Preksha Gandhi
S.N.D.T Women's University, Juhu campus, Mumbai 8

A documentation and exploration of *mukke-ka-kaam*: The metal embroidery of Rajasthan
Ms. Sulekha Ojha & Dr. Radha Kashyap,
The IIS University, Jaipur 20

Proximity of clothing to self as related to appearance management and social participation among adolescent girls
Sonal M Johar, Dr. Radha Kashyap & Dr. Usha Kulshreshtha**
The IIS university, Jaipur, Rajasthan &**University of Rajasthan 26

Development of recipes from dehydrated lotus stem
Dr. Deepali Kotwal & Indira P. Burile
L.A.D. and Smt. R. P. College for Women, Nagpur 39

LIST OF THESIS TITLES (2012 -13)
College of Home Science, Nirmala Niketan 50

SUBSCRIPTION ORDER FORM 53

OTHER PUBLICATION OF THE RESEARCH CENTRE 54

 Research Reach, J.H.Sci. Vol.12. No.2, 1-7

GENETICALLY MODIFIED FOODS- HARMFUL OR HELPFUL?

Dr. Uma Chitra
Fulbright-Nehru Scholar (2009)
Head, Dept. of Nutrition & Dietetics
Kasturba Gandhi College for Women
Secunderabad

As genetically modified (GM) foods are starting to intrude in our diet, concerns have been expressed regarding their safety. There are several foods consumed today that are genetically modified (GM) whole foods, or contain ingredients derived from gene modification technology. Benefits presented by proponents of GM technology include improvement in fruit and vegetable shelf-life and organoleptic quality, improved nutritional quality and health benefits in foods, improved protein content of foods, improved quality and quantity of meat, milk and livestock. Biotechnology can be used to introduce or concentrate certain nutrients into common dietary staple food plants as a way of delivering optimal levels of key nutrients or fighting some nutritional deficiencies. Genetic engineering can be used to increase crop yield and reduce crop loss by making plants tolerant to pests, weeds, herbicides, viruses, insects, salinity, pH, temperature, frost, drought, and weather. Drought resistance in GM crops will reduce water use in agriculture. This will be very useful in some tropical or arid regions where water is scarce. However, there is a concern that deliberately breeding antibiotic resistance into widely consumed crops may have unintended consequences for the environment as well as for humans and animals consuming the crops. Although genetic modification of foods is important and beneficial, it should be adopted under conditions that avoid potential risks. GM foods hold potential to greatly increase the nutritional value of food as well as the productivity of crops, while at the same time provide many safety as well as environmental concerns. Time and effort must be devoted to field testing before the release of any new genetically engineered organism or food. Caution and suitable regulation are necessary to avoid possible environmental and safety problems, which can jeopardize expected benefits of this new science.

KEY WORDS: GM Foods, genetic engineering, pest resistance, nutritional quality

As genetically modified (GM) foods are starting to intrude in our diet, concerns have been expressed regarding their safety. Are GM foods safe for human health? Studies concerning their safety are still few. Genetic engineering of food is the science which involves deliberate modification of the genetic material of plants or animals. It is an old agricultural practice carried on by farmers since early historical times, but recently it has been improved by technology. Genetic engineering is described as the science whereby the characteristics of an organism are deliberately modified by the manipulation of the genetic material, especially DNA, and transformation of certain genes to create new variations of life. By manipulating the DNA in various ways and transferring it from one organism to another (the so-called recombinant DNA technique), it has been possible to introduce traits of almost any organism to a plant, bacteria, virus, or animal. As a result, many food plants have been genetically modified for various purposes. Food crops that are being produced or modified by genetic engineering techniques are called genetically modified crops. There are several foods consumed today that are either

genetically modified (GM) whole foods, or contain ingredients derived from gene modification technology.

The GM Food Controversy

Despite the potential benefits of genetic engineering of foods, the technology is surrounded by controversy. Some of the specific fears expressed by opponents of GM technology include alteration in nutritional quality of foods, potential toxicity, and possible antibiotic resistance from GM crops, potential allergenicity and carcinogenicity from consuming GM foods. In addition, some more general concerns include environmental pollution, unintentional gene transfer to wild plants, possible creation of new viruses and toxins, limited access to seeds due to patenting of GM food plants, threat to crop genetic diversity, religious, cultural and ethical concerns, as well as fear of the unknown (Uzogara, 2000).

About sixty different genetically modified kinds of food have been marketed world-wide. GM versions of soya bean, canola, corn, potato, sugar beet and cotton have been approved for sale. Many important crops are already being grown from seeds engineered with built-in immunity to herbicides, viruses, insects, and disease. From GM plants are derived ingredients (e.g. oils, flours, meals, syrups, flavors, and colorants), whole foods, food products, and feed used in various industries. Several genetically modified foods are expected to hit the U.S. market in the next few years (Allen, 1999). In the European Union (EU), although only two genetically modified foods have been authorized for commercialization, there is an intense social debate concerning the risks associated with the production of such foods. Two poles of opinion exist: on the one hand, the production companies; on the other, lobbies - mainly environmentalist groups -which view genetically modified foods as a risk to both health and the environment, and are against their commercialization. The studies made by scientists, combined with debates held by organizations such as FAO and WHO, confirm that genetically modified foods commercialized to date are at least as safe, with regard to the health of the consumer, as conventional foods. They have all passed strict tests to check their nutritional composition and their lack of allergenicity and toxicity (Ramon, 2000).

Potential risks of GM Foods

Detractors of these products express their concerns about a potential increase in the allergenicity of genetically modified foods, and the transfer of marker genes encoding antibiotic resistance from the novel food to the intestinal microbiota. The release of transgenic organisms into the environment has potential ecological risks and, in contrast to safety evaluation, there is little previous experience / expertise in environmental risk assessment. In the case of genetically modified foods, transgenic organisms to be released are primarily plants. Thus the possible spread of a transgene from its transgenic host to wild relatives is a potential risk. A second environmental risk is the potential decrease in biodiversity associated with the cultivation of transgenic crops. Another possible environmental risk is the occurrence of harmful effects of transgenic crops on non-target species. Worldwide controversy arose after the release of a report on the effects of transgenic pollen from maize plants that expressed the *Bacillus thuringiensis* toxin effective against the European corn borer. According to that report, besides its initial target, the transgenic pollen also killed the larvae of the Monarch butterfly (Ramon, 2000).

In genetic engineering, marker genes bearing antibiotic resistance are often used in the target organism. There is a concern that deliberately breeding antibiotic resistance into widely consumed crops may have unintended consequences for the environment as well as for humans and animals consuming the crops (Phillips, 1994). In addition genetic modification could inadvertently enhance natural plant toxins by switching on a gene that has both the desired effect and capacity to pump out a poison. Genes for some natural toxins such as protease inhibitors in legumes, cyanogens in cassava and lima beans, goitrogens in canola species, and pressor amines in bananas and plantains, may be turned on and lead to an increase in levels of these toxins which can pose a hazard to the consumers of these crops. Consumer advocates, especially those in EU countries, say that there is not enough research done to prove that GM crops are safe to eat.

Genetic modification of food plants could transfer allergenic properties of the donor source into the recipient plant or animal. As well, genes from non-food sources and new gene combinations could trigger allergic reactions in some people, or exacerbate existing ones. GM foods containing known allergens (like peanuts, wheat, egg, milk, tree nuts, and legumes, crustacea, fish and shellfish proteins) could spark allergic reactions in susceptible consumers (Dona and Arvanitoyannis, 2009).

Critics of genetic modification of foods fear that commercialization of transgenic crops will pose a new threat to crop genetic diversity already endangered by current agricultural practices that favor the worldwide adoption of a few crop varieties (Phillips, 1994). Genetic modification also reduces bio-diversity of the world's food supply through the use of 'terminator' seed technology which produces sterile seeds and controls seed supply especially in developing countries (Koch, 1998).

Possible effects on human and animal health

The insertion of a new gene can sometimes lead to an increase in existing levels of anti-nutrients, some of which cannot be reduced with heat treatment (Bakke-McKellep et al, 2007). One of the most widely available commercial GM products nowadays, glyphosate-resistant Roundup Ready® soybean may display an increase in anti-nutrients (Padgette et al, 1996). Heat stable anti-nutrients such as phytoestrogens, glucinins, and phytic acid were also found to cause infertility problems in sheep and cattle (Liener, 1994), allergenic reactions and binding to phosphorus and zinc thereby making them unavailable to the animal respectively (Adams, 1995). An increase in the anti-nutrient level should not be accepted since a GM food may be consumed as raw material.

Another area of concern focuses on the possibility that antibiotic resistance genes used as markers in transgenic crops may be horizontally transferred to pathogenic gut bacteria, thereby reducing the effectiveness of antimicrobial therapy. Although this probability is considered to be low, other marker genes such as the jellyfish green fluorescent protein (GFP) gene have been utilized (Halford and Shewry, 2000). The only study assessing toxicity and allergenicity of GFP in male rats for 26 days concluded that GFP exhibits a low allergenicity risk (Richards et al, 2003). Only one transgenic plant (canola) containing GFP has been tested for toxicity. Every transgenic organism containing a new marker gene should be tested for toxicity with long term studies, since GM food will be consumed for a lifetime.

The consumption of products from Bt (*Bacillus thuringiensis-*) insect resistant plants raised some controversy regarding the possible long term effects of Bt on health. Although Betz et al (2000) state that it has been used for over 40 years without causing adverse effects, the difference with GM plants is that Bt is not degraded in the plant and as a result both animals and humans may be exposed to this toxin (Aronson and Shai, 2001).

The introduction of novel proteins into foods such as GM soybean variety expressing methionine from Brazil nut (Nordlee et al, 1996) and GE corn variety modified to produce a Bt endotoxin Cry9C (Bernstein et al, 2003) may elicit potentially harmful immunological responses, including allergic hypersensitivity (Conner et al, 2003). Moreover, according to Prescott et al (2005) the introduction of a gene expressing nonallergenic protein such as GM field pea, expressing alpha-amylase inhibitor-1, may not always result in a product without allergenicity. There is a need to evaluate new GM crops on a case-to-case basis and to improve the screening requirements for GM plants.

Benefits of GM Foods

Benefits of the genetic engineering of foods include increased year-round food availability, improved nutritional quality, and extended shelf-life which will benefit consumers, farmers, and the environment. Flavr Savr tomato was produced by Calgene Corporation. It was bio-engineered to ripen on the vine, and have a longer shelf-life by having delayed ripening, softening, and rotting processes. Delayed ripening of fruits and vegetables (via ethylene control technology and suppression of cell wall destroying enzyme, polygalacturonase) leads to superior flavor, color, texture, longer shelf-life and better shipping and handling properties (Thayer, 1994). Recently, sweet-tasting, firmer, seedless peppers and tomatoes have been produced. The slow or delayed ripening characteristics could also be replicated in other crops like raspberry, strawberry, and pineapple, and can extend the crop's shelf life. Extending a product's shelf-life not only benefits the producer and seller, but also enables the consumer to utilize the product for a longer time before it spoils. Genetic engineering can be used to increase levels in food of minerals and naturally occurring anti-oxidant vitamins (carotenoids, flavonoids, vitamins A, C, and E), compounds that can slow or shut down biological oxidation, a damaging chemical reaction, that appears to promote the development of some cancers, heart disease and blindness (Smaglik, 1999). Many genetically engineered plants and even animals will grow faster and reproduce faster. Genetically modified crops have tailored and added value features such as nutrients and health benefits (Uzogara, 2000).

Genetic engineering can be used to increase crop yield and reduce crop loss by making plants tolerant to pests, weeds, herbicides, viruses, insects, salinity, pH, temperature, frost, drought, and weather. Insect resistant fruits such as apples, virus resistant cantaloupes and cucumbers, and herbicide tolerant corn, tomatoes, potatoes, and soybeans have all been produced. Other advantages include improvement in organoleptic quality, improved protein and carbohydrate content of foods, improved fat quality and improved quality and quantity of meat, milk and livestock. Genetic modification can also lead to crops with enhanced nitrogen fixation and increased crop yield, which will reduce fertilizer use and cost of production. By engineering quality traits and new chemistries into plants, agricultural productivity is increased, the need for added farm acreage is reduced, resource consumption is limited, harmful environmental impacts

are decreased, while the world's food supply is greatly increased. Increased food production through biotechnology will have a positive global impact by increasing the dietary staples (such as rice, wheat, corn, cassava, potatoes, bananas, beans, cereals, legumes, tubers) of many regions of the world.

By using genetic engineering techniques it is possible to increase the productivity or the nutritional value of some crop varieties of interest in developing countries. GM foods with nutritional enhancement that are under active consideration particularly for developing countries include rice with enhanced β-carotene and iron and potato with enhanced protein. Safety and nutritional assessment of these foods are of particular importance from developing countries' perspective as consumption of such crops may cause significant changes in dietary intake patterns (Sesikeran and Vasanthi, 2008).

This result and others such as the production of transgenic potatoes useful as oral vaccines, and the construction of transgenic papaya which grow in acidic soils, highlights the need to transfer this technology to developing countries. In the 21st century we will have to produce more and better foods. More in developing countries, where the efficiency of the agricultural system is still low and population growth and hunger occur; and better in developed countries, where consumers are concerned about novel organoleptic sophistication or nutrition that can be added to their daily diet. This will only be possible through the application of molecular genetic technology (Ramon, 2000).

Although genetic modification of foods is important and beneficial, it should be adopted under conditions that avoid potential risks. Time and effort must be devoted to field testing before the release of any new genetically engineered organism or food. GM products should be evaluated over a long period of time to establish their effects on health, agricultural pests, and the environment. Caution and suitable regulation are necessary to avoid possible environmental and safety problems, which can jeopardize expected benefits of this new science.
Therefore to establish the safety of GM foods for humans a more rigorous specific risk assessment will have to be carried out with several GM lines. This should include:

- An initial nutritional/toxicological testing on laboratory animals
- If no harmful effects are then detected, it should be followed by clinical, double-blind, placebo-type tests with human volunteers, keeping in mind that any possible harmful effects would be particularly serious with the young, old and disabled.

Although intensive scientific effort is currently in progress to thoroughly understand and forecast possible consequences on humans, animals, and the environment, it is anticipated that many years of careful independent research with animals and clinical trials will be needed in order to accomplish this assessment. Labeling of GM foods will benefit both the consumer and manufacturers for the following reasons:

1) It will enable consumers who prefer specially engineered GM foods (e.g. those with health enhancing properties) to get them while enabling others to avoid certain foods for ethical, cultural, or religious reasons.

2) Labeling would enable manufacturers to emphasize the improved quality of their product, for example, improved taste, longer shelf life, and insect resistance, and these would be good selling points that could appeal to consumers.

However, labeling could be difficult to implement because the label has to be maintained throughout the food chain, no matter how many times the GM food is used as an ingredient, food or feed. Labeling GM foods may also be expensive, and the cost of labeling will be passed on to the consumer. As more food crops are being brought under the GM regime and the range of modifications are increasing, current safety assessment systems are being revisited to assess their utility for assessing future GM foods and identify areas for improvement in safety assessment methods. It is believed that genetic engineering will lead to a general improvement in agriculture and food, and will provide healthier, cheaper, more stable, nutritious, better tasting, and safer foods.

REFERENCES

Uzogara SG. (2000). The impact of genetic modification of human foods in the 21st century: A review. Biotechnology Advances 18: 179-206.

Allen S. Revolution on the farm: tinkering with the DNA on your dinner plate. The Boston Sunday Globe, July 12, 1999.

Ramon D. (2000). Genetically modified foods: a case of information or misinformation? Internatl. Microbiol. 3:1-2.

Phillips SC. (1994). Genetically engineered foods: do they pose health and environmental hazards? CQ Researcher. 4(29):673-696.

Dona A, Arvanitoyannis IS. (2009). Health Risks of Genetically Modified Foods. Critical Reviews in Food Science and Nutrition 49:164-175.

Koch K. (1998). Food safety battle: organic vs. biotech. Congressional Quarterly Researcher 9(33):761-784.

Bakke-McKellep AM, Koppang EO, Gunnes G, Sanden M, Hemre GI, Landsverk T and Krogdahl A. (2007). Histological, digestive, metabolic, hormonal and some immune factor responses in Atlantic salmon, *Salmo salar L.*, fed genetically modified soybeans. J. Fish Dis. 30 (2):65-79.

Padgette SR, Taylor NB, Nida DL, Bailey MR, MacDonald J, Holden LR and Fuchs RL. (1996). The composition of glyphosate-tolerant soybean seeds is equivalent to that of conventional soybeans. J. Nutr. 126: 702-716.

Liener IE. (1994). Implications of anti-nutritional components in soybean foods. Crit. Rev. Food Sci. Nutr. 34:31-67.

Adams NR. (1995). Detection of the effects of phytoestrogens on sheep and cattle. J. Anim. Sci. 73:1509-1515.

Halford NG and Shewry PR. (2000). Genetically modified crops: methodology, benefits, regulation and public concerns. Br. Med. Bull. 56(1):62-73.

Richards HA, Chung-Ting Han, Hopkins RG, Failla ML, Ward WW and Stewart CN Jr. (2003). Safety assessment of recombinant green fluorescent protein orally administered to weaned rats. J. Nutr. 133(6):1909-1912.

Betz FS, Hammond BG and Fuchs RL. (2000). Safety and advantages of *Bacillus thuringiensis*-protected plants to control insect pests. Reg. Toxicol. Pharmacol. 32:156-173.

Aronson AI and Shai Y. (2001). Why Bacillus thuringiensis insecticidal toxins are so effective: unique features of their mode of action. FEMS Microbiol. Lett. 195:1-8.

Nordlee JA, Taylor SL, Townsend JA, Thomas LA and Bush RK. (1996). Identification of a Brazil nut allergen in transgenic soybeans. N. Engl. J. Med. 334:688-692.

Bernstein JA, Bernstein IL, Bucchini L, Goldman LR, Hamilton RG, Lehrer S and Rubin C. (2003). Clinical and laboratory investigation of allergy to genetically modified foods. Environ. Health Perspect. 111:1114-1121.

Conner AJ, Glare TR and Nap JP. (2003). The release of genetically modified crops into the environment: Part II. Overview of ecological risk assessment. Plant J. 33-19-46.

Prescott VE, Campbell PM, Mattes J, Rothenberg ME, Foster PS, Higgins TJ and Hogan SP. (2005). Transgenic expression of bean alpha-amylase inhibitor in peas results in altered structure and immunogenicity. J. Agric. Food Chem. 53(23):9023-9030.

Thayer AM. (1994). FDA gives go-ahead to bio-engineered tomato. Chemical & Eng. News. May 23; 72:7-8.

Smaglik P. (1999). Food as medicine: nutritionists, clinicians disagree on role of chemo-preventive supplements. The Scientist. 13(11):14.

Editorial. A golden bowl of rice. Nature Biotech 1999; 17:831.

Sesikeran B. and Vasanthi S. (2008). Constantly evolving safety assessment protocols for GM foods. Asia Pac. J. Clin. Nutr. 17 (S1): 241-244.

 Research Reach, J.H.Sci. Vol.12. No.2, 8-19

EFFECT OF SCHOOL BOARD AND AGE OF TEACHERS ON EFFECTIVE PERFORMANCE FACTORS THAT INFLUENCE TEACHER RETENTION

Dr Reeta Sonawat &Ms. Preksha Gandhi
Department of Human Development
Specialization in Early Childhood Education
S.N.D.T Women's University
Juhu campus

Teacher retention is to provide a programme to maximize children's learning and holistic development and is critically important in creating a stable learning environment for all students. The present study was undertaken to study the effective performance factors that influence teacher retention among pre-primary and primary teachers. The objectives of the study were to determine the effect of school boards and age of the teachers on performance factors like personal life, salary, assignment and credential, classroom, school and students' performance, and to study the correlation among the various performance factors. Purposive sampling technique was used to select the samples which included pre- primary and primary teachers who had worked in more than one school in the past. The sample consisted of 22 administrators and 100 teachers of which 48 were pre-primary teachers and 52 primary teachers. Data was collected with the help of questionnaire to know the causes of leaving the school. Results indicated that the school board in which the teachers work was a significant factor influencing salary and other job benefits, classroom factors and student performance factors among the pre-primary teachers. . The age of the teacher had a significant influence on the assignment and credential and classroom factors. The performance factors have significant correlation with each other. 54% of the schools provide on-the-job training, benefits and a healthy working environment in order to retain the teachers in the school.

KEY WORDS- Teacher retention, effective performance factors

Teachers play a very important role in the life of young children. The high rate of teacher turnover is a concern for children's growth and development today. Several factors have been linked to high levels of teacher turnover like high job stress, inadequate compensation, lack of adequate training and qualification, and meager salary increments. It is important for preschools to reduce the turnover rate and increase the retention rate of qualified preschool teachers to provide a programme to maximize children's learning and holistic development. The government of India has discontinued the study of the teacher attrition rate from 1986, and hence not much research work is done on the teacher turnover issue in India.

Certo and Fox (2002) focused on teacher attrition and retention. Focus group interviews and telephone interviews of teachers were conducted to know about organizational influences on teacher attrition and retention. The study showed that insufficient salary, lack of administrative support, and lack of planning time are the top reasons for teachers to leave the school. Lack of opportunity for job sharing and policies related to high-stakes testing were also found to impact attrition.

Ingersoll (2001) carried out a study on teacher turnover using data from the National Center for Education Statistics (NCES) nationally representative Schools and Staffing Survey (SASS) and its supplement, the Teacher Follow up Survey (TFS). This analysis examines both teacher migration and teacher attrition. Forty two percent of all departing teachers report as a reason either job dissatisfaction or the desire to pursue a better job, another career, or to improve career opportunities in or out of education. The data shows that teacher turnover is a significant phenomenon and a dominant factor driving demand for new teachers and, in turn, creating school staffing problems.

Effective teacher performance factors are those factors that help the teachers to work effectively in the profession. The various effective performance factors that influence teacher retention are as follows:

1. **Personal life factors**
   The personal life factors refer to those personal reasons which cause the teachers to leave and change the job. They include some issues at her home like marriage, taking care of their children, health issues of self or of any family member, pregnancy or transfer of family member,
2. **Assignment and credential factors**
   These include factors which are related to dissatisfaction with the projects, assignments and subjects given to the teachers to teach in the school.
3. **Salary and job benefits**
   These include reasons related to low salary, less increment and benefits provided by the school which may be a reason for the teachers to leave the job.
4. **Classroom factors**
   The classroom related factors like high teacher child ratio, high job stress and difficulty in managing special children fall under the classroom factors for the teachers to leave their jobs.
5. **School factors**
   The school factors include lack of professional development, motivation, dissatisfaction with working conditions, lack of administration, support and recognition which lead to teacher attrition.
6. **Students' performance factors**
   Dissatisfaction with students' assessment and benefits tied with students' performance are some of the reason that fall under students' performance factors for attrition.

The objectives of the research were –

1. To study whether the school board affects the teachers performance factors
2. To understand the effect of age of teacher on the teacher performance factors
3. To determine the correlation among the teacher performance factors
4. To determine the administrators perception of the causes for teacher turnover
5. To determine the administrators perception of the measures taken by their school for teacher retention

METHODOLOGY

The sample for the research consisted of 100 teachers of which 48 were preschool teachers and 52 were primary school teachers. Purposive sampling technique was used to select teachers who have worked in more than 1 school, with prior permission. Teachers were selected across Mumbai from central, western and harbor line. The Teacher Follow-Up Survey tool was adapted and prepared for the research. The tool consists of a questionnaire with 35 questions about the various performance factors that have been a reason for the teachers to leave the last school taught by them. These reasons were sub categorized into 6 performance factors – Personal life, Assignment and credential, salary and job benefits, classroom, school and students' performance factors. The personal life factor consist of 8 questions, assignment and credential factors include 4 questions, 4 questions for salary and job benefits, classroom factors with 5 questions, school factors include 10 questions and student' factor with 4 questions. For the purpose of scoring each statement, a rating score with 1 which means not at all important, 2 means slightly important (25% important), 3 means somewhat important (50% important), 4 means Very important (75% important), 5 means extremely important (100% important) was used.

A separate questionnaire for administrators was developed by the researcher and was distributed to 22 principals or supervisors of the preschools and primary sections. There were 6 questions in the administrator questionnaire about the information of teacher turnover, causes for teacher turnover and measures taken by schools for teacher retention.

The rating scale was scored as follows for the statements:

1	2	3	4	5
Not at all Important	Slightly Important	Somewhat Important	Very Important	Extremely Important

RESULTS AND DISCUSSION

The results present the findings of the research with quantitative analysis based on the data collected through the questionnaires filled by the teachers and supervisors. The results shown are on the basis of the objectives i.e. effect of school board and age of teacher on teacher performance factors, correlation between the various performance factors, causes of teacher turnover and measures taken by the schools for teacher retention. The following are the results and discussion for each objective.

1. **Effect of school board on teacher performance factors:**
   Table 1 represents mean, standard deviation and the results of one-way ANOVA between teacher performance factors and school board. The ANOVA results showed that the scores on performance factors such as salary and other job benefits, classroom factors and student performance factors were significantly different across school boards. The results of the post

hoc tests reveal that the three performance factors are significantly different between the SSC and ICSE board schools.

Table 1: Mean scores, Standard Deviation, and ANOVA between teacher performance factors and the school board of pre-primary teachers

Effective performance factors	Board of school	N	Mean	Std. Deviation	F	Sig
Personal Factors	SSC	28	17.79	8.162		
	CBSE	4	13.50	4.933	0.73	0.48
	ICSE	16	18.69	7.162		
	Total	48	17.73	7.618		
Assignment and Credentials Factor	SSC	28	14.29	3.287		
	CBSE	4	14.25	3.500	1.01	0.37
	ICSE	16	15.50	1.265		
	Total	48	14.69	2.799		
Salary & Other Job Benefits Factors	SSC	28	10.54	4.023		
	CBSE	4	11.00	4.243	3.83	**0.03****
	ICSE	16	7.19	4.004		
	Total	48	9.46	4.267		
Classroom Factors	SSC	28	12.93	3.620		
	CBSE	4	12.75	3.686	5.42	**0.01****
	ICSE	16	9.75	1.770		
	Total	48	11.85	3.415		
School Factors	SSC	28	26.43	4.476		
	CBSE	4	25.00	4.320	0.81	0.45
	ICSE	16	27.88	5.084		
	Total	48	26.79	4.658		
Student Performance Factors	SSC	28	15.96	5.015		
	CBSE	4	18.75	1.893	3.47	**0.04****
	ICSE	16	19.13	1.500		
	Total	48	17.25	4.215		

*If the P-value (Sig.) is < 0.05 the difference between groups is significant.

The table 2 represents mean, standard deviation and the results of ANOVA between school boards and primary teachers' performance factors. No significant difference was found between the performance factors across school boards.

Table 2: Mean scores, Standard Deviation, and ANOVA between teacher performance factors and boards of the schools of primary teachers

Effective performance factors	Board of school	N	Mean	Std. Deviation	F	Sig
Personal Factors	SSC	20	17.05	8.568		
	CBSE	4	22.75	3.096	1.47	0.24
	ICSE	28	15.89	7.041		
	Total	52	16.87	7.577		
Assignment and Credentials Factor	SSC	20	14.50	1.878		
	CBSE	4	13.25	3.403	0.53	0.59
	ICSE	28	14.61	2.699		
	Total	52	14.46	2.445		
Salary & Other Job Benefits Factors	SSC	20	9.40	4.604		
	CBSE	4	10.75	4.272	0.25	0.78
	ICSE	28	9.07	4.413		
	Total	52	9.33	4.414		
Classroom Factors	SSC	20	11.80	3.548		
	CBSE	4	12.50	2.380	1.51	0.23
	ICSE	28	10.54	2.502		
	Total	52	11.17	2.975		
School Factors	SSC	20	27.10	5.160		
	CBSE	4	25.00	4.320	0.35	0.70
	ICSE	28	26.43	4.476		
	Total	52	26.58	4.683		
Student Performance Factors	SSC	20	17.60	4.070		
	CBSE	4	12.75	6.131	2.43	0.09
	ICSE	28	16.93	3.681		
	Total	52	16.87	4.135		

*If the P-value (Sig.) is < 0.05 the difference between groups is significant.

2. Effect of age of teacher on teacher performance factors

Table 3 shows the effect of age of the teacher on teacher performance factors that affect the decision to leave the school. The result shows that there is a significant difference between assignment and credential factors and classroom factors across different age groups of teachers. Post Hoc test result shows that there is a significant difference in the assignment and credentials factors between teachers in the age group of 20- 30 years and between 31-40 years and between groups 20-30 years and 41-50 years.. For classroom factors significant difference is seen between teachers less than 30 years and teachers more than 40 years.

Table 3: Mean scores, Standard deviation and ANOVA between teacher performance factors and age of pre-primary and primary teachers

Effective performance factors	Age	N	Mean	Std. Deviation	F	Sig.
Personal Factors	<20-30	36	16.14	7.507		
	31-40	36	**18.33**	8.401	0.76	0.47
	41-50	28	17.39	6.511		
	Total	100	17.28	7.571		
Assignment and Credentials Factor	20-30	36	13.39	3.036		
	31-40	36	14.89	2.025	7.30	0.00**
	41-50	28	**15.68**	2.109		
	Total	100	14.57	2.61		
Salary & Other Job Benefits Factors	20-30	36	**9.53**	4.411		
	31-40	36	9.42	4.332		
	41-50	28	9.18	4.347	0.05	0.95
	Total	100	9.39	4.323		
Classroom Factors	20-30	36	**12.53**	3.517		
	31-40	36	11.25	2.719	3.51	0.03**
	41-50	28	10.5	3.049		
	Total	100	11.5	3.196		
School Factors	20-30	36	26.5	4.13		
	31-40	36	**26.92**	4.819	0.8	0.93
	41-50	28	26.61	5.188		
	Total	100	26.68	4.649		
Student Performance Factors	20- 30	36	16.64	4.396		
	31-40	36	**17.11**	4.419	0.34	0.71
	41-50	28	17.5	3.543		
	Total	100	17.05	4.157		

*If the P-value (Sig.) is < 0.05 the difference between groups is significant.

3. Correlation between various teacher performance factors

Table 4: Correlation between various performance factors of preschool teachers (personal life, salary, assignment and credentials, classroom, school and student performance factors)

Performance factors		Personal Factors	Assignment and Credentials Factor	Salary & Other Job Benefits Factors	Classroom Factors	School Factors	Student Performance Factors
Personal Factors	Pearson Correlation	1	-0.21	0.16	0.14	0.16	**-.42(**)**
	Sig. (1-tailed)	.	0.08	0.13	0.17	0.14	0.001
	N	48	48	48	48	48	48
Assignment and Credentials Factor	Pearson Correlation	-0.21	1	**-.36(**)**	**-.44(**)**	-0.04	**.39(**)**
	Sig. (1-tailed)	0.08	.	0.01	0.001	0.40	0.003
	N	48	48	48	48	48	48
Salary & Other Job Benefits Factors	Pearson Correlation	0.17	**-.36(**)**	1	**.50(**)**	0.03	**-.42(**)**
	Sig. (1-tailed)	0.13	0.006	.	0	0.41	0.001
	N	48	48	48	48	48	48
Classroom Factors	Pearson Correlation	0.14	**-.44(**)**	**.50(**)**	1	0.03	**-.40(**)**
	Sig. (1-tailed)	0.17	0.001	0	.	0.41	0.002
	N	48	48	48	48	48	48
School Factors	Pearson Correlation	0.16	-0.03	0.03	0.03	1	-0.02
	Sig. (1-tailed)	0.14	0.40	0.41	0.41	.	0.44
	N	48	48	48	48	48	48
Student Performance Factors	Pearson Correlation	-.42(**)	**.39(**)**	**-.42(**)**	**-.40(**)**	-0.02	1
	Sig. (1-tailed)	0.001	0.003	0.001	0.002	0.44	.
	N	48	48	48	48	48	48

** Correlation is significant at the 0.01 level (1-tailed). Those marked with (-) negative sign show negative correlation and the others are having positive correlation.

Table 4 shows the correlation between various performance factors of the preschool teachers. Table 4 shows that student performance factors have a negative correlation of (.423) with personal life factors, (.42) with salary and job benefits and (.40) with classroom factors. This means, if teachers give more importance to personal life factors than they will give less importance to student performance factors and vice versa. The reason for this result may be that teachers who feel personal life is more important are very much family oriented and may leave the school for any family related reasons and may feel students performance do not matter for them. While those giving more emphasis to student performance factors are dedicated to teaching and are affected by their performance. The performance not being good or the assessment techniques may affect the teacher and be an important reason to leave.

The higher the priority given to salary, lower will be the priority given to student performance factors. The reason may be that few teachers work for the purpose of finance and are not very keen on the student performance. They may not show interest in the students' performance, thus it may not affect their decision to leave the school. The reason for the correlation between students' performance and classroom factors may be that those teachers who are satisfied with their teaching and position in the class may not bother for the school factors.

The student performance factors have a positive correlation with assignment and credential factors of (.39). This shows that teachers giving higher priority to assignment factors give higher priority to student performance and vice versa. The reason for this may be that the teachers who are dedicated and are more involved in teaching give more importance to the subject, grade and assignments and also give higher priority to performance of students which is dependent on their teaching.

Assignment and credentials factor has a negative correlation with salary and other benefits of .36 and classroom factors of (.44). The result shows that the teachers who give more importance to assignment and credential factors give less importance to salary and classroom factors and vice versa. The reason for this result may be that teachers who are more dedicated to teaching are affected by the assignment factors like subject and grade to be taught but they do not give importance to salary and classroom factors. They may have less importance towards salary as earning may not be their main motive but the main motive may be work for satisfaction or interest in teaching. The teachers will give less importance to classroom factors as for them more than autonomy over the class or using all resources, quality of teaching is more important. Since the result is for preschool teachers it can also be that the teachers may not give higher priority to grade and assignment given to them, and subjects are also not there in the preschool education. These teachers may give higher importance to salary and classroom factors as at the beginning of the career earning money can be important and getting autonomy over classroom can be prestigious.

The salary factor shows a positive correlation with classroom factors of (.50), and negative correlation with student performance factors of (.42) and assignments and credentials factors of (.36). The result shows that higher the priority given to salary by the teacher, higher is the priority given to classroom factors and lower importance given to salary, lower will be the importance given to classroom factors. The reason for this result may be that many teachers prefer having

comfort in working and mostly the teachers of older age would ask for high salary and ease in working.

Table 5: Correlation between various performance factors of primary teachers (Personal life, salary, assignment and credentials, classroom, school and students performance factors)

		Personal Factors	Assignment and Credentials Factor	Salary & Other Job Benefits Factors	Classroom Factors	School Factors	Student Performance Factors
Personal Factors	Pearson Correlation	1	-0.19	-0.10	0.16	0.027	**-.335(**)**
	Sig. (1-tailed)	.	0.09	0.26	0.14	0.43	0.008
	N	52	52	52	52	52	52
Assignment and Credentials Factor	Pearson Correlation	-0.19	1	-.27(*)	**-.55(**)**	-0.001	**.38(**)**
	Sig. (1-tailed)	0.09	.	0.03	0	0.50	0.003
	N	52	52	52	52	52	52
Salary & Other Job Benefits Factors	Pearson Correlation	-0.09	-.27(*)	1	**.42(**)**	-0.09	**-.44(**)**
	Sig. (1-tailed)	0.26	0.02	.	0.001	0.27	0.001
	N	52	52	52	52	52	52
Classroom Factors	Pearson Correlation	0.15	**-.55(**)**	**.42(**)**	1	-0.11	**-.44(**)**
	Sig. (1-tailed)	0.14	0	0.001	.	0.23	0.001
	N	52	52	52	52	52	52
School Factors	Pearson Correlation	0.03	-0.001	-0.09	-0.11	1	.23(*)
	Sig. (1-tailed)	0.43	0.50	0.27	0.23	.	0.05
	N	52	52	52	52	52	52
Student Performance Factors	Pearson Correlation	**-.34(**)**	**.39(**)**	**-.44(**)**	**-.44(**)**	**.23(*)**	1
	Sig. (1-tailed)	0.008	0.003	0.001	0.001	0.047	.
	N	52	52	52	52	52	52

** Correlation is significant at the 0.01 level (1-tailed). * Correlation is significant at the 0.05 level (1-tailed).

The table 5 shows correlation between each of the performance factors of the primary teachers. The result shows correlation between students' performance factors of the primary teachers and personal life, salary, assignment and credentials, classroom, school and students' performance factors .The result shows that personal life factors have a negative correlation of (.34) with student's performance factors. The students' performance factors have negative correlation of (.44) with both salary and classroom factors. The reason for the result may be that many teachers give a higher priority to personal and family life rather than the students' performance. They give less importance to teaching the assessment and students' performance affecting their teaching. The result indicates that higher the priority given to salary lower will be the priority given to students' performance. Many times in the Indian context, there are dual earning members in the families, so for them salary may or may not be important. If the teachers are working for the dedication and interest, they will not think about the salary as the important part of their decision. Those who are very dedicated will give high importance to assignment as well as student performance.

Students' performance has a positive correlation of (.23) with school factors. This shows that teachers who are dedicated and passionate about teaching concentrate more on the students' performance as many times the benefits are dependent on the students' performance.
The result also shows a positive correlation with salary and a negative correlation with assignments factors.

4. Administrator's perception on causes of teacher turnover

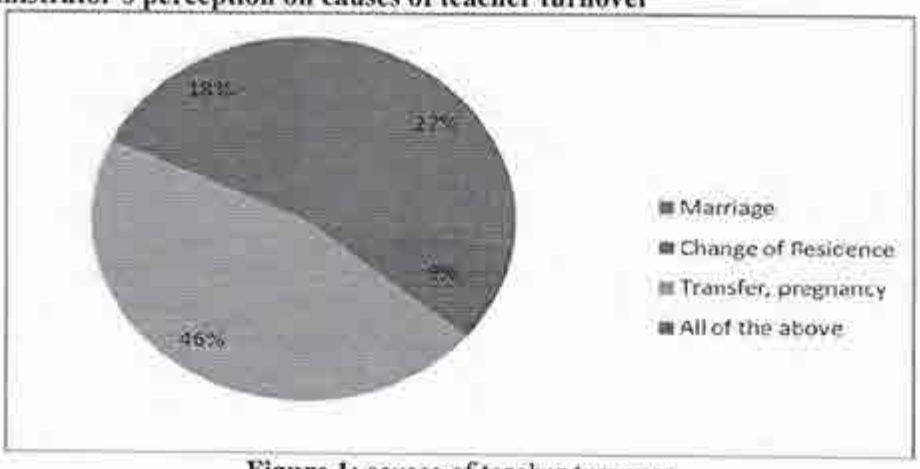

Figure 1: causes of teacher turnover

Forty six percent of administrators said factors like pregnancy,transfer were the reasons for the teachers to leave the school. Women being the majority of the teacher population, pregnancy is an important reason for the teacher to change the job. Change of residence usually accompanies marriage, and women prefer working close to the residence as they have to manage household and family responsibilities. Transfer of family members accompanies change of residence for the teacher and results in change of school.

5. **Administrators' perception on measures taken by schools for teacher retention.**

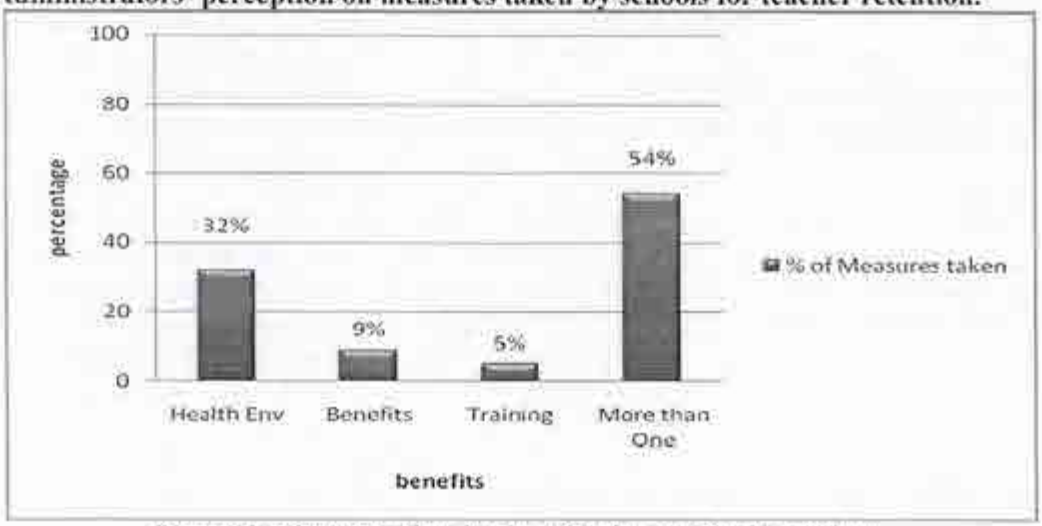

Figure 2: measures taken by the schools to retain the teachers.

54 percent of the administrators feel that their school provides more than one of the above mentioned facilities in order to retain the teachers.

When teachers are provided healthy environment, benefits like provident fund and gratuity, and training to update their knowledge, there are higher chances that they will be satisfied with the job and not leave the job.

CONCLUSION

This study reveals various aspects of teaching profession that influence teacher retention. It is clear from the study that various factors affect teachers to leave the school. The age of the teacher shows an effect on the teachers' decision to leave the school. Board of school has been known as a reason that has an impact on teachers' decision to change the school and this is seen in this study as well. The schools provide teachers with training; healthy working environments, benefits and thus it can be concluded that schools are taking efforts to implement strategies to reduce the loss of teachers. This examination of the causes of teachers' dissatisfaction and reasons for leaving the school helped to prepare booklets for teachers and administrators on teacher retention-provide positive experiences for the teachers and the program helped the administrators with strategies to retain teachers. This in turn will aid in minimizing teacher turnover and will help in teacher retention.

ACKNOWLEDGEMENT

I am grateful to the BEI (Barrington Education Initiatives, Switzerland) for sponsoring this study and enriching the study.

REFERENCES

Certo.L.J, Fox, J.E. (2002). Retaining quality teachers. The high school journal, 86(1), 57-75.

Harris, D.N; Adams, S.J. Understanding the level and causes of teacher turnover: A comparison with other professions. *Economics of Education Review*

Ingersoll. R, (1995). Teacher supply, teacher qualification and teacher turnover. Washington, DC; National Center for Education Statistics

Ingersoll, M. R. (2001) Teacher turnover and teacher shortages: An organizational analysis. American Education Research Journal, 38, 499-534.

Rao, Y. 2008. Why does your teacher like ICSE? Retrieved March 22, 2012 from http://zeenews.india.com/news/maharashtra/maharashtra-primary-teachers-may-have-tougher-eligibility-norms_688585.html

Supovitz, J. and J. Christman. (2003). Developing communities of instructional practice. Philadelphia: Consortium for Policy Research in Education.

http://depts.washington.edu/ctpmail/PDFs/Shortage-RI-09-2003.pdf

Teacher Follow Up survey Retrieved June 25, 2011 from http://nces.ed.gov/surveys/sass/questionnaire.asp

http://depts.washington.edu/ctpmail/PDFs/Shortage-RI-09-2003.pdf

http://www.aefpweb.org/sites/default/files/webform/TchTurnoverStAchAEFA.pdf

 Research Reach, J.H.Sci. Vol.12. No.2, 20-25

A DOCUMENTATION AND EXPLORATION OF MUKKE-KA-KAAM: THE METAL EMBROIDERY OF RAJASTHAN

***Ms. Sulekha Ojha, &**Dr. Radha Kashyap,**
*Asst Professor, **Professor, Head, Dept. of Fashion & Textile Technology,
The IIS University, Jaipur

Rajasthan, a colourful state has a rich heritage of vivid types of embroideries and different communities are practicing it in their own style. The women folks of remote villages are unexposed to the modern civilization and are experts in preparing articles of such great aesthetic value. Hence there is a need for traditional embroideries to be popularized. An effort has been made to develop it in to an industrial craft in order to save the everlasting art and reminiscent beauty of the past. The present study aims in documenting the motifs of *Mukke-Ka-Kaam*embroidery of Barmer region of Rajasthan and to explore the tools and techniques used in executing this embroidery. This heritage is presently under extinction henceforth, an attempt is made to preserve this cultural heritage of art and craft.

KEY WORDS: Mukke-ka-kaam, Barmer, Embroidery, Rajasthan, Documentation.

Embroidery is a beautiful thread work done on a variety of fabrics which makes them more attractive and gorgeous. In India, hand embroidery has been practised since several centuries and the motifs were inspired and sourced from wall paintings, statues found in ancient civilisations, sculptures, nature, temples, carvings or monuments. Embroidery is a means of creativity and expression for the people of the soil. Their love and expression of nature, patience and perseverance in making beautiful articles are expressed through the art of embroidery (Joshi, 1986).

Literature reveals that metal embroidery is of the following types- *zardozi*, *gota*work, *danke-ka-kaam* and *mukke-ka-kaam*. Gold and silver metallic threads are drawn through a series of dies to obtain a fine thread. This can either be hammered flat or used as it is. It can be wound around a silken or cotton filament core to make it into a thread (Rai, 2008).Gold work is always surface embroidery and the vast majority is done in the form of laid work or couching, that is, the gold threads are held onto the surface of the fabric by a second thread, usually of fine silk. The ends of the thread, depending on the type, are simply cut off, or are pulled through to the back of the embroidery and carefully secured with the couching thread (Crill, 1999).

Mukke-ka-kaam, a type of embroidery in Rajasthan extensively uses the gold and silver threads to make the fabrics even more attractive. The gold and silver metal threads are known as *mukke-ka-kaam*that produce stunning embroideries used widely in Barmer and Jaisalmer regions of Rajasthan. This style is mostly done in the Thar belt of Rajasthan, especially among the Sindhi Muslim and Meghval communities. These young artists begin their training at the early age of seven or eight, learning to create exquisite patterns on plain fabric. Initially working on simple designs, they gradually perfect their skills, acquiring the delicacy and refinement of accomplished needlewomen. They work as apprentices to their mothers and grandmothers, sisters and aunts, who then pass on to them the designs and patterns. Motifs that are commonly used are zigzag

patterns of stars and triangles. The local name of motifs and design are derived from everyday objects like *funi*, *patasha*, *chaukri*, courtyard and *daboo* (Bhandari, 2004)

The development in traditional textiles is as essential as in any other field. The Indian folk and traditional embroideries play an important role in the fashion world, as now a day's fashion trends are fragile and consumers constantly demand innovative changes over existing fashion fields. From time immemorial, it is a well-recognized fact that we have a rich cultural heritage. This heritage is nowadays under extinction, henceforth, efforts are made to preserve this cultural heritage of art and craft.

Hence keeping the above points in mind the main objectives of the study were:
1. To document the motifs of *Mukke-ka-kaam*
2. To explore the tools and techniques used for *Mukke-ka-kaam*.

METHODOLOGY:

Locale of the study: The present study was conducted in the Barmer districts of Rajasthan.

Selection of Method: For the collection of data a structured interview schedule was prepared and information was collected from the artisans. The tool consisted of close ended questions to collect the desired information on various aspects i.e. sources of procuring raw material and embellishment, most prevalent motifs, fabric used, embroidery frame, materials used in making of embroidery, needles and stitches used and problems faced by the artisans

Selection of sample: The information was collected from a purposively selected sample of artisans involved in doing *Mukke-ka-kaam* in Barmer. The sample consisted of 20 artisans in the age group of 20- 45 years who had work experience of 10-15 years so that they would have an in-depth knowledge about the metal embroidery. Approximately 10 units for *Mukke-ka-kaam* work were approached to explore the tools & techniques used, working condition of artisans and problems faced by the artisans. Museum, books, catalogues, magazines and local artisans were also used as source of information for documentation of motifs.

RESULTS & DISCUSSION:

Documentation of Motifs

Documenting a cultural heritage linked with a craft or a group of crafts is directly related to the preservation of tradition and traditional wisdom. Documentation serves as a baseline for more proactive interaction and movement into the realm of regeneration/ revitalization. It was observed that the designs on the bodice of *Kanchli*(garment worn by women) arranged perpendicular to the neck was a distinguishing feature of *Mukke-ka-kaam*. The *mukka* was so skilfully couched on to the fabric that there was lesser chance of visibility of the fabric. One of the salient features of *Mukke-ka-kaam* is that it neither fades nor turns black as compared to any other metal embroidery work.

Various motifs of *Mukke-ka-kaam* were collected from different sources for documentation. The motifs were classified into different categories i.e. star, floral, circular, square and triangles.

Plate:1Star Motifs

Plate 2:Floral motifs

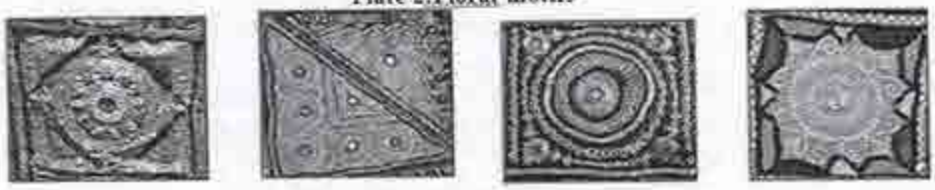

Plate :3Circular Motifs

Plate 4:Square and Triangular Motifs

Tools and technique used in doing *Mukke-ka-kaam*

Fabrics: *Mukke-ka-kaam* was usually done on bright colored fabrics. The traditional color palette had red, green, blue, black, maroon etc. This decorative technique was usually worked on fabrics like cotton and casement. *Mukke-ka- kaam* was usually worked on double layered fabric due to the weight of the *mukka* and this was worn in winter because *mukka* is a metallic thread that produces heat.

Frames: In this embroidery frames were not used. The embroidery was directly done on to the fabric.

Needle & Thread: The couching of the *mukka* was done with a needle of size 06 & 07.*Mukka*is the local name for metallic gold or silver thread that is wound around a core of cotton fibre. Both golden and silver *mukka* was used in this embroidery work. *Mukka* was couched on to the fabric surface by using contrasting colored cotton thread. Black wool was used to outline the design. Bright cotton anchor thread was also used.

Stitches: In addition to couching, various other stitches like the buttonhole, chain stitch and outline stitches were also used. Satin stitch was used for filling in the designs. Metallic thread and cotton thread was required for couching. The laid thread was attached to the fabric surface by the line stitches made with couching or tied thread, which was in contrasting colour.The laid thread was substantial and heavier than the couching thread.The couching was skillfully executed so as to reveal the maximum surface area of the metallic yarn.

Tracing: The design was traced on paper by a pencil and small holes were punched on it closely. The design paper was placed on the fabric to be embroidered and smeared with a solution of kerosene oil and indigo, which passes through the holes; making an impression on the fabric.

Embroidery process: This type of embroidery was usually done without frame. The artisan sits on the floor and uses small needles to create intricate designs. It takes weeks and months to finish each artwork. The skilled craftsmen work with needle and gold and silver *mukka*. After hours of painstaking labor the beautiful imagination turns into a rich textile.

Application of *Mukka*: Double layered *mukka* thread either in gold or silver was laid on the fabric and was then couched on by another cotton thread as required by the design. The craftsmen pull the needle and thread away from themselvesand when the needle is inserted into the fabric the left hand supports and controls the thread, so that the metal thread is laid properly. The portion of the cloth that has to be embroidered upon is placed on the index finger of the left hand, which is inturn supported by rest of the fingers leaving the left hand free.Mirror is also used which is tucked by buttonhole stitch. The *mukka* moves according to the design. Stitches like chain stitch and satin stitch were used for the filling of the design. *Mukka* was couched on to the fabric surface by using a cotton thread because cotton thread supports the*dori* to stay at its place and reduces the chances of breakage. If silk thread were used then there may have been more chances of breakage.

Silver & Gold Mukka

Outlined by black wool

Wall Hanging Bujkis Pouches Kanchli

Procurement of raw material:
The embroidery was usually done on cotton fabric. The fabric, *mukka* thread and mirror were procured from the local market. The cost of *Mukka* was 2500Rs/Kg.

Problems faced by artisans:
Low wages: The women embroider does not get sufficient wages for their work. It takes 15 days to a month to complete one article. The income was very less and it was not at all profitable after such painstaking long hours of working.

Middlemen: The women do not get direct orders from the buyers. They got work on contract basis which was not sufficient for the artisans to lead a proper life. Middlemen play an important role in the sale of the products resulting in loss to the artisans.

Lack of Education: The lack of education among the artisans prevented them from communicating directly to the buyers. The mediators were taking full advantage of this situation. Actual workers, being uneducated or less educated always remained in loss.

CONCLUSION:
Mukke-ka-kaam is primarily being practiced in Barmer District of Rajasthan. This craft is done by Meghval and Sindhi Muslims Community. This is the unique art of Barmer but is lesser known in comparison to the other metal embroideries. This work is declining day by day as it is not much in demand. This work is mostly done by women. The younger generation are not interested in learning this art as their profession because the income is very less as compared to any other craft work and profession. There is a need to make innovation in the present situation. With the help and co-operation of the government, local administration and other agencies, the owners of the working units should help get proper infrastructure. The Banks and other agencies should make facilities for loans through simple process on low interest rates to promote the *mukke*-ka-kaam. The present study will serve as a guideline of experimentation for upcoming designers, students, boutique owners, entrepreneurs and for fashion innovators to know about the motifs and tools& technique used in doing *Mukke-ka-kaam*. Government should also establish stores and give the unit owners an opportunity to sell their products whether the order of work is available or not and sell at good margins. Efforts should be made to contact the buyers in domestic and foreign market so that they may export their product directly to the buyer, and it will help in revival of the craft. Promotional activities should be undertaken such as trade fairs, exhibitions etc.

REFERENCES

Bhandari V (2004). Costumes, Textiles and Jewellery of India: Traditions in Rajasthan, Prakash Publications; New Delhi.

Crill R (1999). Indian Embroidery London: V&A. Publications, 7-8

Naik SD. (1997). Embroidery and Traditional Handloom Weavers, A.P.H. Publishing Corporation, New Delhi.

Joshi DN. (1986) Grandeur of Gujarat Embroidery. Indian Textiles. J., 97(1):98-100.

Rai I. (2008). Indian Embroideries and Textiles, Jodhpur : Books Treasure, pp16

Shrikant U. (1998). Ethnic Embroidery of India, Samata Enterprises, Mumbai,p.129.

PROXIMITY OF CLOTHING TO SELF AS RELATED TO APPEARANCE MANAGEMENT AND SOCIAL PARTICIPATION AMONG ADOLESCENT GIRLS

Sonal Madan Johar,* Dr. Radha Kashyapand Dr. Usha Kulshreshtha*****
*Research Scholar, Dept. of Home Science, University of Rajasthan;
Associate Professor and Head, Dept.of Clothing and Textiles, International College for Girls, IIS University, Jaipur, Rajasthan,*Associate Professor and Head, Dept. of Psychology, University of Rajasthan

The purpose of this study was to investigate the relationship of proximity of clothing to self with appearance management and social participation among three different socio-economic groups, to find the moderating effect of socio-economic status on this relationship and to find the percentage of variance in appearance management and social participation as predicted by proximity of clothing to self of adolescent girls. Participants were 600 adolescent girls (200 each from low, middle and high socio-economic group) aged between 15-18 years from only girls schools of Jaipur city. They completed a questionnaire that included measures of socio-economic status, proximity of clothing to self, appearance management and social participation. Correlation analysis, sub-group analysis and regression analysis indicated significant positive relationship between proximity of clothing to self and appearance management. No relationship was found between proximity of clothing to self and social participation for the overall sample and for adolescents belonging to low and middle socio-economic group.For high socioeconomic group, significant positive correlation was found between proximity of clothing to self and social participation. Socio-economic status does not have any moderating effect on the relationship between proximity of clothing to self with appearance management and social participation.

KEY WORDS: Clothing, clothing behavior,proximity of clothing to self, appearance management, social participation.

Clothing and clothing behavior

Clothing is a major aspect of personal appearance that often bears culturally shared meanings. Clothing not only satisfies basic physiological needs for survival along with food and shelter, but also satisfies psychosocial needs. Many studies have shown that higher order needs, such as belonging and self esteem can be satisfied through clothing (Kwon, 1997).

Horn & Gurel, (1981) referred clothing as a second skin or extension of the bodily self that represents the nearest aspects of one's environment. It has been noted that the way one feels about oneself affects the choice of clothing and the clothes one decides to wear also affects one's feelings about the self. Clothing is often used to strengthen self-concept, especially for people who tend to perceive themselves negatively. Depressed individuals use clothing as a tool to boost their morale (Kwon, 1988).

Clothing behavior, in a broader sense, refers to the choice and selection of clothing , the amount of time and money spent on clothing and the manner in which clothing is worn (Hwang , 1996).

Through clothing behavior one can beautify the appearance, make the physical self more desirable, increase acceptance by a group and prevent rejection. Since the mid-50's, researchers have attempted to break down the all-encompassing "clothing behavior" into more narrowly defined constituent concepts. Clothing behavior is a multidimensional discipline and its dimensions have been delineated, defined, and conceptualized into various behavioral elements such as clothing attitudes, clothing awareness, clothing values, clothing consciousness, proximity of clothing to self, clothing interest, importance of clothing and perceived clothing deprivation.Theoretical orientations drawn upon to direct and explain clothing behavior research stem primarily from the disciplines of psychology, sociology and social psychology (Davis, 1984).

Clothing during adolescence

Adolescence is known to be the most troublesome period of life of an individual. Adolescents may experience vagueness, confusion, and discontinuity of the self due to redefinition of their roles as they emerge from childhood. During adolescence peers exert an increasing influence relative to parents and play an important role in their identity formation and in the socialization process (East et. al, 1992). The peers constitute a reference group to which the adolescent wants to belong and with whom he compares himself. Yet, not all adolescents are able to gain acceptance into a peer group. Items and artifacts that promise peer acceptance receive considerable attention, particularly items related to physical aspects of personal appearance.

Adolescents normally have a great interest in clothes and in their own appearance. Of all the social groups, teenagers are one of the groups that are most attached to fashion and physical appearance in general (Bouchard, 2002). They use clothes to feel better about their bodies, to conform to their peer group and to conform to specific role models (MacGillivray & Wilson, 1997).

Clothing therefore becomes an important domain of life in the process of redefinition of the self and in the attraction to different groups of significant others. Adolescents identify with their peers and develop their self-concepts, in part, through conformity to preferred styles of clothing, attitudes or actions established in the adolescent subculture (Steinberg, 1985).

Proximity of clothing to self

The proximity of clothing to self concept has evolved within the context of quality of life theory building and assessment; and has been useful in explaining the contribution of clothing to perceived life quality (Sontag, 1978/1979). Fulfillment of physical as well as psychological needs is important to a sense of positive quality of life and clothing is one such thing which satisfies both. Sontag and Schlater (1982) proposed proximity of clothing to self (PCS) as a relational concept pertaining to the psychological closeness of clothing to the self.

The perceived quality of life of adolescents may be influenced about their feelings about their clothing because clothing is very salient to them. Adolescents develop a high proximity towards clothing. But they differ in the extent to which they perceive clothing as the second skin i.e. they have varying proximities towards clothing. Such variation helps explain other clothing variables such as awareness, interest, use, satisfaction or dissatisfaction and also help to clarify the correlation among clothing variables such as self-concept and self-esteem (Creekmore, 1974).

Sontag et al. (1997) determined that adolescents who have high proximity of clothing to the self may anticipate that their clothing should help them gain a sense of personal competence or make them feel good about themselves.

Socio-economic status

Socioeconomic status (SES) refers to a person's overall social position as determined by their achievement in education; occupational status; and income and wealth (Smith, 1994). There is overwhelming evidence that socioeconomic status influences quality of students' social and cognitive development, decisions they make, and ultimately, the quality of task performance.Children who are raised in poverty often experience problems at school, which can lead them on a path towards developing either conduct problems or withdrawn behaviors (Battin-Pearson et al., 2000). In contrast, advantages to having a higher level of socioeconomic status include being able to afford an array of services and goods and social connections that potentially benefit children (Bradley & Corwyn, 2002). Socioeconomic background also influences the development of instrumental (e.g., price and fabric) and social (e.g., look and brand) motivations in consumption (Page & Ridgway, 2001).

Appearance management

Emphasis on the importance of physical attractiveness as a means of conveying desirable information has led people to manipulate their appearances through the use of cosmetics, plastic surgery, weight reduction, hair dressing, ornaments, accessories, and clothing in order to attain at least an approximation of attractive physical appearances. Appearances are positively or negatively evaluated by others (e.g., peers, parents, significant others) in an appreciation process; those perceived evaluations in turn influence the appearance-management behaviors of the creators themselves. Positive assessments from others increase self-esteem, whereas negative assessments lower the self-esteem.

Individuals construct and interpret images through processes of appearance management (Kaiser, 1997). According to Kaiser (1997), appearance management includes not only the process of thinking about how one looks, but also carrying out any activities pertaining to the way one looks. It encompasses attention, planning, organizing, decisions, and acts related to one's personal appearance.

When adolescents receive compliments or criticism about their clothing from others, they internalize these and form certain personal standards for their appearance depending upon their proximity towards clothing (Sontag, Lee & Peteu, 1997). If these personal standards are not met, the adolescent may or may not engage himself in more appearance management behaviors to construct and maintain an attractive appearance. Those behaviors are further reinforced by evaluations from family members, peers and significant others, as well as messages from the media (Pinhas, et.al, 1999)

Social participation

Social participation is defined as an individual's participation in groups outside the family, the political arena and the workplace (political parties, unions, pressure groups). The beneficial effect

of social participation on adolescent development has been generally accepted (Eccles & Gootman, 2002).

Organized activities help adolescents meet their need for social relatedness, potentiating a broad range of social developmental opportunities. Poor social competence and poor peer relationship in children, on the other hand, can contribute to later problems such as juvenile delinquency, school dropouts and psychiatric problems. Therefore, it is important to facilitate opportunities for social participation within this age group.

Values and attitudes toward oneself and one's society may influence levels of social participation. This indicates that people who value clothing differently, that is have different proximities towards clothing, will differ in their pattern of social participation (Gordon, 1975). Kaiser (1983-84) demonstrated the importance of clothing and appearance through linking stages of social acceptance with participation in a variety of situations. Since appearance is what is presented to others in social situations, normative dress may enhance social participation on one hand, while on the other hand dissatisfaction with one's appearance or dress, may hinder social interaction. Putnam (2000) argues that where positive roles, social trust and norms of reciprocity flourish, individuals participate socially. Since clothing today serves primarily a social function, it should support, if not encourage, the wearer in his or her social transactions.

Based on the above discussion, the present study was formulated with the specific objective of finding a) the relationship between proximity of clothing to self with appearance management and social participation, b) the moderating effect of socio-economic status on this relationship and c) the amount of variance in appearance management and social participation as predicted by proximity of clothing to self.

The specific hypotheses of the present study are:

1. There will be a significant relationship between proximity of clothing to self and appearance management.
2. Socio-economic status will have a significant moderating effect on the relationship between proximity of clothing to self and appearance management.
3. A considerable part of variance in appearancemanagement would be predicted by proximity of clothing to self.
4. There will be significant relationship between proximity of clothing to self and socialparticipation.
5. Socio-economic status will have a significant moderating effect on the relationship between proximity of clothing to self and socialparticipation.
6. A considerable part of variance in Social participation would be predicted by proximity of clothing to self.

METHODOLOGY

Subjects undertaken for the present study were drawn from six schools (only for girls) within the Municipal Corporation of Jaipur city, Rajasthan. Adolescent girls from the age group of 15-18 years participated in the study. A total of 600 questionnaires were administered to get data from

200 girls belonging to each socioeconomic group (low, middle and high). Purposive sampling technique was used for selection of sample.Correlationdesign was used for the study since none of the variables were manipulated by the investigator.

Measures were selected for the current research based on their successful use in previous research with an adolescent sample to promote comparability to the findings of the previous research.

Following tools were used to measure different variables:

1) **Socio-Economic Status Scale (SES):** The socioeconomic status scale by Dubey and Nigam (2005) was used to find out the socio-economic status of the adolescents.The test-retest reliability for this scale is 0.81. There are 30 items in the SES scale. The items consist of a list of statements which help differentiate the adolescents as belonging to the high, middle or low socio-economic group.There are four alternatives for each statement. The adolescents were asked to tick the alternative which best describes their socioeconomic condition. Scoring was done according to the instructions given in the manual. On the basis of the overall score obtained the subjects were classified as belonging to the high (score of 80 and above), middle (score of 60-79) or low (score of 59 and below) socio-economic group

2) **Proximity of clothing to self-scale**: The proximity of clothing to self scale developed by Sontag and Schlater (1982) was used to measure the psychological closeness of clothing to the self of the adolescents. The construct reliability of the scale is 0.83 and the extracted variance is 0.46. The PCS scale has a total of 24 items. The items consist of a list of statements describing the way clothing may or may not relate to a person. There are six alternatives for each statement. The adolescents were asked to place a number between 1 and 6 using a 6-point Likert scale. All the items in the PCS scale are positively coded; there are no reverse coded items in the scale. Scoring was done according to the instructions given in the manual. The summated score of all the 24 items provides the PCS score of the adolescent. Since all the items are positively coded; higher the score, higher the proximitytowards clothing of the sample.

3) **Appearance management Scale**:Appearance management behavior of adolescent girls was measured by using the multi-dimensional body self –relations questionnaire (MBSRQ) developed by Brown, Cash & Mikulka (1990). There are seven subscales of the MBSRQ scale namely appearance evaluation, appearance orientation, fitness evaluation, fitness orientation, health evaluation, health orientation and illness orientation. Only first two subscales appearanceevaluation and appearanceorientation were used for the present study to assess the appearance management behavior of adolescent girls. The Chronbach's alpha reliability of appearance evaluation dimension is 0.88 and for appearance orientation is 0.85.

   There are a total of 19 items in the two subscales randomly placed in the appearancemanagement scale which consists of a list of statements about how subjects might think, feel, or behave about their appearance. Some items are positively coded while some are negatively coded.There are five alternatives for each statement. The adolescents were asked to place a number between 1 and 5 using a 5-point Likert scale. Total sum of scores was taken according to the instructions given in the manual to obtain the final

appearancemanagement score. A higher score on the appearancemanagement scale indicates higher satisfaction with one's appearance and more investment of time and money into one's appearance.

4) **Social participation scale**: Social participation of the adolescents was measured by The Perceived Adolescent Relationship Scale developed by Andrews and Francis (1989) to find out the level of participation of the sample in groups outside the family.The Chronbach's alpha reliability for the social participation scale is 0.68.The subscale has 3 items that describe the pattern of social participation of individuals. There are seven alternatives for each statement. The adolescents were asked to place a number between 1 and 7 on a 7-point Likert scale. All the 3 items in the SP scale are positively coded; there are no reverse coded items in the scale. The summated score of all the 3 items provides the Social participation score of the adolescent. Since all the items are positively coded; higher the score, higher the social participation of the subjects in social activities.

STATISTICAL ANALYSIS:

Raw data was analyzed with the help of SPSS software using the following statistical techniques: Coefficient of correlation was calculated to find out the degree and form of relation between proximity of clothing to self with appearance management and social participation. Sub-group analysis was done to examine the moderating effect of socio-economic status on the relationship of proximity of clothing to self with appearance management and social participation. Regression analysis was used to find the percentage of variance in proximity of clothing to self as predicted by appearancemanagement and socialparticipation among adolescent girls.

RESULTS AND DISCUSSION

Proximity of clothing to self and appearancemanagement

Table 1: Coefficient of correlation between proximity of clothing to self and appearancemanagement for the overall sample (N=600)

Proximity of clothing to self	Appearance management	.252 (**)

** Statistically significant at $p < 0.01$

Table 2: Critical ratio between the coefficient of correlation between proximity of clothing to self and appearancemanagement in the three sub-groups of socioeconomic status

Sr. no.	Socio-economic status Sub-groups	Correlation coefficient between Proximity of clothing to self & appearance management	Critical Ratio (z)	Level of significance (p)
1	Low	r = 0.306 (**)	0.22	0.83
	Middle	r = 0.286 (**)		
2	Middle	r = 0.286 (**)	-1.67	0.09
	High	r = 0.432 (**)		
3	Low	r = 0.306 (**)	-1.45	0.15
	High	r = 0.432 (**)		

** Statistically significant at $p < 0.01$

Table 3: Regression Analysis of proximity of clothing to self on appearancemanagement

Multiple R	0.252
R square	0.063
Adjusted R square	0.062
Standard error	8.719
F	40.618
Significance of F (p)	0.000

The table 1 reveals significant relationship between proximity of clothing to self and appearancemanagement in the overall sample($r = 0.252^{***}$).The results of table 2 shows that socioeconomic status does not have any moderating effect on the relationship between proximity of clothing to self and appearancemanagement in all the three sub-groups namely low-middle, middle-high and low-high, since all critical ratios are found non significant ($p > 0.01$). Therefore we reject hypothesis 2. The findings of table 3 show that proximity of clothing to self-account for 6.3% of the variance in appearancemanagement. Therefore, we partially accept hypothesis 3.

Adolescence is a stage when an individual is most anxious about the image he or she presents before others. Since clothing is a part of image that is visible in social context, concerns about acceptable and favorable clothing motivates him to experiment with his clothing. In the process of this experimentation, adolescents become psychologically linked with their clothing and develop proximity towards their clothing. clothing is used anappearancemanagement tool to present a favorable image, which will not only help him, receive positive responses from the peers but also acceptance and inclusion into the peer group. Greater the psychological closeness towards clothing more is the indulgence in clothing use as an appearancemanagement tool. This is apparent as adolescents are often seen investing more time and energy in clothing practices. They consciously select clothing to construct and maintain an attractive appearance which is further reinforced by positive evaluations from peers and family members. Their clothing helps them gain a sense of personal competence and makes them feel good about themselves (Piacentini & Mailer, 2004).

These days adolescents from all socioeconomic groups are exposed to latest clothing and fashion trends through one common channel i.e. media. Moreover, dress or clothing items are available in the market in every price range so that adolescents from all socioeconomic groups have the accessibility to the same kind and design of clothing or dress in their own budget. Therefore, adolescents from all socioeconomic groups, with their respective proximities towards clothing can indulge into similar appearancemanagementbehaviors within their own means. This indicates that there is a relationship between proximity of clothing to self and appearancemanagement irrespective of the socioeconomic group to which an adolescent belongs. Therefore socioeconomic group does not have any moderating effect on the relationship between proximity of clothing to self and appearancemanagement.

The present results are in harmony with the results of earlier studies which found relations between various clothing and appearance variables. Smucker & Creekmore (1972) and Steinberg (1985) confirmed that adolescents identify themselves through conforming to preferred styles of clothing, attitudes or action established in the adolescent subculture. They become more

conscious and interested in their clothing and use it as a tool for validation of the self and inclusion in social interactions. They manage their appearances to a great extent through clothing. They value clothing more than other objects as part of the self and psychologically become linked to clothing, i.e. develop proximity towards clothing.

Roach and Eicher, (1979), noted that the perceived quality of life of adolescents may be influenced about their feelings for their clothing because clothing is very salient to them. Adolescents become more conscious about and interested in their clothing than younger children and develop a high proximity towards clothing. Managing their appearances through clothing practices becomes a second nature to the adolescents as this helps them to gain social acceptance in their peer group. Therefore, a significant correlation between proximity of clothing to self and appearancemanagement is inevitable, which is clear from the results.

Kaiser, (1990); Bouchard, (2002) confirmed that adolescents normally have a great interest in clothes and in their own appearance. Of all the social groups, teenage is one of the group for whom fashion and physical appearance are the most important. They use clothes to feel better about their bodies, to conform to their peer group and to conform to specific role models. MacGillivray & Wilson, (1997) and Kaiser (1990) believed that teens' conformity to clothing patterns occurs as part of social interactions and represents a major factor in peer acceptance.

Table 4: Proximity of clothing to self and socialparticipationcoefficient of correlation between proximity of clothing to self and socialparticipation for the overall sample (n=600)

Proximity of clothing to self	Socialparticipation	.059

** Statistically significant at p< 0.01

Table 5: Critical ratio between the coefficient of correlation between proximity of clothing to self and socialparticipation in the three sub-groups of socioeconomic status

Sr. no.	Socio-economic status sub-group	Correlation coefficient betweenproximity of clothing to self andsocialparticipation	Critical Ratio (z)	Level of Significance (p)
1	Low	R = 0.055	-0.74	0.46
	Middle	R = 0.129		
2	Middle	R = 0.129	-0.75	0.46
	High	r = 0.202 (**)		
3	Low	R = 0.055	-1.49	0.14
	High	r = 0.202 (**)		

** Statistically significant at p< 0.01

Table 6: Regression analysis of proximity of clothing to self on socialparticipation

Multiple R	0.059
R square	0.003
Adjusted R square	0.002
Standard error	3.612
F	2.061
Significance of F (p)	0.152

Table 4 shows that there is non-significant correlation between proximity of clothing to self and socialparticipation in the overall sample (n=600). Therefore, hypothesis 4 is being rejected.The results in the table 5 show that socioeconomic status does not have any moderating effect on the relationship between proximity of clothing to self and socialparticipation (as all critical ratios are non significant). Therefore, we reject the hypothesis 5. The results of regression analysis ofproximity of clothing to self on socialparticipation(table 6), showed that proximity of clothing to self does not have a significant effect on socialparticipation. Therefore proximity of clothing to self does not account for any variance in socialparticipation. Hence, we reject the hypothesis 6.
Adolescents are often critical about their feelings towards clothing and personal appearance. Clothing or dress influences acceptance of an adolescent into a particular group. Dress limits the socialparticipation of adolescents when they judge their clothing as inappropriate for the situation. Conversely, dressing in a way that ensures social comfort in the presence of peers contributes significantly to their social survival. But the given results show that there was no correlation between proximity of clothing to self and social participation of adolescents for the overall sample and for adolescents belonging to low and middle socioeconomic group. For high socioeconomic group, significant positive correlation was found between proximity of clothing to self and social participation. This difference may be because of the other social and cultural factors responsible for adolescent development such as family environment, upbringing, values, priorities and status in society.

Clothing patterns of adolescents are more or less the same in all socioeconomic groups. In a casual situation, it is difficult to classify the adolescents into different socioeconomic groups on the basis of their dress or clothing, as all are dressed according to the prevailing fashion. Cheaper as well as expensive versions of a dress pattern are available in the market to cater to the demands of a wide range of consumers belonging to different socio-economic groups. The easier accessibility to same pattern of dress within one's own means makes the adolescents belonging to different socioeconomic groups equally competitive in the field of fashion and therefore, they do not feel that they are inappropriately dressed in any situation. This reflects in the results as there is no correlation between proximity of clothing to self and socialparticipation for overall sample. This also explains why socioeconomic group does not have any moderating effect on the relationship between proximity of clothing to self and social participation and why proximity of clothing to self does not account for any variance in social participation.

Only for adolescents belonging to high socioeconomic group, significant correlations between proximity of clothing to self and socialparticipation were found. This may be because values and attitudes toward oneself and one's society influence levels of social participation. This indicates that people who value clothing differently i.e., have different proximities towards clothing; differ

in their pattern of social participation. Adolescents belonging to high socioeconomic group are expected to wear much more expensive and branded clothing according to their social status and therefore their social participation is more dependent on the appropriateness of their clothing compared to adolescents belonging to lower and middle socioeconomic status. Their social participation becomes limited as every time they enter a social situation they are expected to wear new and luxurious clothing which shall not be repeated next time.

The present findings are not in harmony with the results of previous studies which show possible linkages between different clothing variables and various forms of socialparticipation. The results of Harrison's study (1968) of college males indicate that interest in clothing related positively to social participation, while Strickland (1969) found that girls who participated more than others and also held positions in organizations demonstrated greater clothing awareness. Kaiser (1983-84) demonstrated the importance of clothing and appearance through linking stages of social acceptance with participation in a variety of situations. Since appearance is what is presented to others in social situations, normative dress enhances social participation.

CONCLUSION:

Adolescence is a stage when an individual is most anxious about the image he or she presents before others. Clothing being a part of image that is visible in social context, concerns about acceptable and favorable clothing motivates adolescents to become psychologically linked with their clothing and develop proximity towards their clothing. Clothing is used as an appearancemanagement tool to present a favorable image, which helps the adolescent receive positive responses from the peers and favor his or her acceptance and inclusion into the peer group. Adolescents are seen investing more time and energy in clothing practices, consciously selecting clothing to construct and maintain an attractive appearance which is further reinforced by positive evaluations from peers and family members. Since similar patterns of dress or clothing items are available in the market in every price range, adolescents from all socioeconomic groups, with their respective Proximities towards clothing can indulge into similar appearancemanagement techniques within their own means. Proximity of clothing to self is positively correlated, with and accounts for variance in appearancemanagement irrespective of the socioeconomic group.

Social and cultural factors are responsible for adolescent development such as family environment, upbringing, values, priorities and status in society result in different correlations between proximity of clothing to self and socialparticipation among different socio-economic groups. Only for adolescents belonging to high socioeconomic group, correlation exists between proximity of clothing to self and socialparticipation. Adolescents belonging to high socioeconomic group are expected to wear much more luxurious and branded clothing in accordance to their social status and therefore their social participation is more dependent on the appropriateness of their clothing compared to adolescents belonging to lower and middle socioeconomic status. Their social participation becomes limited as they are expected to wear latest and lavish clothing in every social circumstance.

REFERENCES:

Andrews D, & Francis SK (1989). Development of perceived adolescent relationship scale.*Perceptual and Motor Skills, 69, 305-306.*

Battin-Pearson S, Newcomb MD, Abbott, R.D., Hill, K.G., Catalano, R.F., & Hawkins, J. (2000). Predictors of early high school drop-out : A test of five theories. *Journal of Educational Psychology* , 92, 568-582.

Bouchard, P. (2002, September, 24). *Les "adosnaissantes" : Retour en force des stereotypes de sexe*[Young female adolescents : Comeback of sex stereotypes]. Paper presented at the Chaired'etude Claire-Bonefantsur la condition feminine, Universite' Laval, Quebec city, Canada.

Bradley, R.H., &Corwyn, R.F. (2002).Socioeconomic status and child development.*Annual Review of Psychology,* 53, 371-399.

Brown, T., Cash, T., &Mikulka, P. (1990). Attitudinal body-image assessment: Factor analysis of the Body-Self Relations Questionnaire. *Journal of Personality and Assessment, 55,* 135-144.

Creekmore, A.M. (1974). *Clothing Related to Body Satisfaction and Perceived Peer Self.* Michigan State University Agricultural Experiment Station Research Report 239.

Davis, L.L. (1984). Judgement ambiguity, self-consciousness, and conformity in judgements of fashionability.*Psychological Reports,* 54, 671-675.

Dubey, L.N. & Nigam, B. (2005).Socio-Economic Status Scale, (Urban), SaraswatiShikshaMahavidyalaya, Jabalpur.

East, P. L., Lemer, R. M., Lemer, J. V., Soni, R. T., & Jacobson, L. P. (1992). Early adolescence-peer group fit, peer relations, and psychological competence: A short term longitudinal study. *Journal of Early Adolescence. 12,* 132-152.

Eccles, J.S., & Gootman, J.A. (2002).*Community programs to promote youth development.*Washington, DC: National Academy Press.

Gordon, L.V., (1975). *The Measurement of Interpersonal Values.*Chicago : Science Research Assoc., Inc.

Harrison, E.L. (1968). Clothing interest and social participation of college men as related to clothing selection and buying processes.Unpublished Master's Thesis, University of Tennessee.

Horn, M.J., and Gurel, L.M., (1981).*The Second Skin.*Boston : Houghton Mifflin Company.

Hwang, J., (1996). Relationships between body-cathexis, clothing benefits sought, and clothing behaviour, and effects of importance of meeting the ideal body image and clothing attitude. Unpublished doctoral dissertation , Virginia Polytechnic Institute and State University, Blacksburg.

Kaiser, S. B. (1983-1984). Toward a contextual social psychology of clothing: A synthesis of symbolic interactionist and cognitive theoretical perspectives. *Clothing and Textiles Research Journal, 5*, 1-9.

Kaiser, S.B. (1990). *The Social Psychology of Clothing : Symbolic Appearancesin Context*, 2nd ed., Fairchild, New York, NY.

Kaiser, S.B. (1997). *The Social Psychology of Clothing : Symbolic Appearancesin Context*, 3rdb ed., Fairchild, New York, NY.

Kwon, Y.H. (1988). Effects of situational and individual influences on the selection of daily clothing.*Clothing and Textile Research Journal*, 6(4), 6-12.

Kwon, Y.H. (1997). Sex, sex-role , facial attractiveness, social self –esteem and interest in clothing. *Perceptual and Motor Skills ,84*, 899-907.

MacGillivray, M.S. & Wilson, J.D. 1997.Clothing and appearance among early, middle and late adolescents.*Clothing and Textiles Research Journal* 15(1): 43-50.

Page, C., & Ridgway, N. (2001). The impact of consumer environments on consumption patterns of children from desparate social backgrounds. *Journal of Consumer Marketing*, 18(1), 21-40.

Piacentini, M., & Mailer, G. (2004). Symbolic consumption in teenager's clothing choices. *Journal of Consumer Behavior*, 3(3), 251-262.

Pinhas, L., Toner, B., Ali, A., Garfinkel, P., &Stuckless, N. (1999).The effects of the ideal of female beauty on mood and body satisfaction.*International Journal of Eating Disorders*, 25(2), 223-226.

Putnam, Robert (2000). Bowling Alone :*The Collapse and Revival of American Community*, New York : Simon and Schuster.

Roach, M.E., &Eicher, J.B. (1979).The language of personal adornment.In J.W. Cordwell, & R.A. Schwarz (Eds.).*The fabrics of culture : The anthropology of clothing and adornment*. New York : Mouton.

Smith, David Horton (1994) 'Determinants of voluntary association participation and volunteering: a literature review', *Nonprofit and Voluntary Sector Quarterley*, 23(3), pp. 243-263.

Smucker, B., &Creekmore, A.M. (1972) Adolescents' clothing conformity, awareness and peer acceptance.*Home Economics Research Journal*, 1, 92-97.

Sontag, M.S. (1978/1979). Clothing as an indicator of percieved quality of life.(Doctoral dissertation, Michigan State University, 1978).Dissertation Abstracts International, 40, 1655B-1656B.

Sontag, M.S. & Schlater, J.D. (1982). Proximity of clothing to self : Evolution of a Concept. *Clothing and Textiles Research Journal*, 1, 1-8.

Sontag, M.S., Peteu, M. and Lee, J. (1997). Clothing in the Self System of Adolescents : Relationships Among Values, Proximity of Clothing to Self, Clothing Interest,

Anticipated Outcomes and Perceived Quality of Life. Research Report 556.Michigan State University Agricultural Experiment Station.

Steinberg, L. (1985). *Adolescence*. New York : Alfred. A. Knopf.

Strickland, E. (1969). Relationship of clothing and personal appearance to social acceptance and participation of girls in a Mississippi high school.Unpublished Master's Thesis, Iowa State University.

Research Reach, J.H.Sci. Vol.12. No.2, 39-49

DEVELOPMENT OF RECIPES FROM DEHYDRATED LOTUS STEM

Dr. Deepali Kotwal* and Indira P. Burile
M.Sc., M.Phil, N.E.T., Ph.D. (Food Science and Nutrition), Associate Professor,
Dept.of Food Science and Nutrition, L.A.D. and Smt. R. P. College for Women,
Shankar Nagar, Nagpur 440 010, (Maharashtra)
*kotwal.deepali@gmail.com.

The Lotus stem is a root vegetable that is indigenous to Asia, and is found underwater.The purpose of this study was to evaluate the process of dehydration of Lotus stem from fresh Lotus stem and to develop recipes from dehydrated Lotus stem. Three methods adopted to dehydrate Lotus stem from raw fresh Lotus stem were sun-drying, use of hot air oven and microwave. All the products were subjected to sensory analysis, nutritional analysis, and evaluated for cost effectiveness. The dehydrated chips were stored throughout the shelf-life period (30 days) in the polyethylene food storage bag (Ziploc® with freeze guard). Prior to dehydration, blanching of the raw lotus stem was done. Three products were prepared (lotus stem curry, lotus stem with honey chili and lotus stem chips) using dehydrated Lotus stem (three different methods of dehydration were followed: sun drying, hot air drying and microwave drying). The first two recipes were prepared after the chips were rehydrated to original volume while the third recipe (which used the dried chips as such without rehydration) highlighted the popping up of the volume to almost double size during the procedures of frying; indicating similarity to all starchy products. These Lotus stem recipes were evaluated for all six sensory attributes, and shelf life study. The dehydrated Lotus stem sample scored better in both sensory characteristics and shelf life study than the fresh one. Nutritive value and Shelf Life was found to be higher in the dehydrated product.

KEY WORDS: Lotus stem,Lotus root,dehydration, lotus stem curry, lotus stem with honey chili, lotus stem chips, sensory analysis, shelf life.

Lotus, *Nelumbonucifera Gaertn* (Nymphaeaceae), also known as sacred lotus, is a well known medicinal plant, and it'sflower is the national flower of India. Lotus stem (*Kamal kakdi, Bhein*) is very rich in iron and calcium content besides beinghigh in dietary fiber. It is highly recommended for pregnant women and adolescent girls (Kowsalya *et al* 2007). People with chronic complaint of constipation can also profit from its use. There are several therapeutic benefits of the Lotus plant for which different parts are used. The extracts of rhizomes, seeds, flowers and leaves have been reported to have varied therapeutic potentials. Several bioactive compounds have been derived from these plant parts belonging to different chemical groups, including alkaloids, flavonoids, glycosides, tri-terpenoid, and vitamins etc., which all have their own therapeutic impact (Mukherjee et al 2009). The main aim of this study was to develop recipes from dehydrated lotus stem which was dried using modern and traditional methods. Use of dried lotus stem in recipes reduced the preparation time, enhanced the nutritive value and added a variety on shelf.In the present study, the word lotus stem is synonymously used for lotus root, simply because of the impact of local area nomenclature and a mistaken identity. In reality, actually the root of the lotus is being used here which remains beneath the water and not the stem that stands erect above the water.

METHODOLOGY:

4 Kg of Lotus stem purchased from the local marketwas cleaned, blanched and dehydrated. Removal of dirt and the mud was done by thorough washing under tap water followed by processes of peeling, slicing, soaking in salted water and blanching for 15 minutes. This processed lotus stem was either used as fresh lotus stem or was dehydrated using 3 different methods Viz. Sun drying (C1)(slices arranged in one layer on Aluminum trays 12" x 8" for 8 hours at maximum day temp of 29°C), Hot air oven drying (C2) (slices kept in aluminum trays in one layer at 100°C for 2 hrs)or Microwave drying (C3) (slices kept on glass plates in microwave oven of 700W at high power for 10 minutes at 150°C). The weights before and after drying were recorded. DehydratedLotus stem developed by treatments, were packed in commercially available polyethylene food storage bags [Ziploc® with freeze guard (17.7 cm x 20.3 cm)]. It was stored at room temperature 21^{0}C for a period of one month. The methodology for the present study was divided into six phasesconsisting of selection of recipes which were standardized in the laboratory using scientific steps and trials. The standardized recipes were further subjected to palatability evaluation. Nutritive value calculation and estimation of the cost of recipes were undertaken for each variation. Comparison of the experimental recipes with their respective control recipes were done by statistically analyzing the compiled and tabulated data.

Formulation ofrecipes from dehydrated Lotus stem: Three recipes namely- Lotus stem curry (LC), Lotus stem with honey chilli (HC) and Lotus stem chips (SC) were prepared from dehydrated Lotus stem. These three recipes were deliberately chosen as these recipes had a spicy, saucy and crispy-crunchy taste–and-texture respectively- much relished by all- specially the adolescents.Lotus stem curry was prepared using standard procedure for the control product which was developed further by addition of dehydrated lotus stem which was rehydrated prior to its use. The composition of control and experimental Lotus stem Curry is shown in Table 1.

Table 1: Composition of Control and Experimental Lotus Stem Curry per serving

SN	Ingredients	Weight (g)			
		Control	LC 1	LC 2	LC 3
1	Lotus stem fresh	30	-	-	-
2	Lotus stem dry	-	30 (6)*	30 (4.8)*	30 (5.4)*
3	Tomato	20	20	20	20
4	Onion	10	10	10	10
5	Ginger	1.25	1.25	1.25	1.25
6	Garlic	1.25	1.25	1.25	1.25
7	Corianders leaves	2	2	2	2
8	Cumin seeds	0.6	0.6	0.6	0.6
9	Red chilli powder	2	2	2	2
10	Turmeric	0.6	0.6	0.6	0.6
11	Oil	5	5	5	5
12	Salt	2	2	2	2

*Dehydrated Lotus stem was again rehydrated within 5-6 minutes prior to preparation. On rehydration the weight gain of the Lotus stem was almost 30 g showing total similarity to the fresh sample.

The composition of control and experimental Lotus stem with Honey Chilli is given in Table 2.

Table 2: Composition of Control and Experimental Lotus Stem with Honey Chilli per serving

SN	Ingredients	Weight (g)			
		Control	HC 1	HC 2	HC 3
1	Lotus stem fresh	30	-	-	-
2	Lotus stem dry	-	30 (6)*	30 (4.8)*	30 (5.4)*
3	Corn flour	10	10	10	10
3	Arrowroot floor	10	10	10	10
4	Black pepper	1.25	1.25	1.25	1.25
5	Ginger	1.25	1.25	1.25	1.25
6	Red chilli powder	2	2	2	2
7	Tomato	20	20	20	20
8	Oil for frying				
9	Honey	10	10	10	10
10	Spring onion	10	10	10	10
11	Salt	2	2	2	2

*Dehydrated Lotus stem was again rehydrated within 5-6 minutes prior to preparation. On rehydration the weight gain of the Lotus stem was almost 30 g showing total similarity to the fresh sample.

Table 3 depicts the proportion of ingredients of control and experimental Lotus stem Chips.

Table 3: Composition of Control and Experimental Lotus Stem chips per serving

SN	Ingredients	Weight (g)			
		Control	SC 1	SC 2	SC 3
1	Lotus stem fresh	30	-	-	-
2	Lotus stem dry	-	6 *	4.8 *	5.4**
3	Mango powder	2	2	2	2
4	Oil for frying	5	5	5	-
5	Salt	1	1	1	1

*Dehydrated Lotus stem slices were directly deep fried in oil, (without rehydration)
**Microwave dehydrated lotus stem slices were used as such without frying

Sensory Evaluation of Recipes

A panel of judges comprising of 6 judges from the staff and research studentsof post graduate food and nutrition departmentwas selected for evaluation. Score cards were prepared separately for the 3 recipes. Standardized recipes were developed for evaluation.Numerical scoring test using human panel and a rating scale, ranging from excellent to poorfor sensory evaluation were selected) Acceptability trials of the recipes, with incorporation of dehydrated Lotus stem, on three consecutive days in three trials), was undertaken. All 4 viz. Control and 3 experimental recipes were presented along with the score cards to the judges. The mean of the scores given by them in three trials was taken as the mean score. The freshly prepared products were given to the 6 judges along with score cards for evaluation. Score cards were constructed with keys. Recipes with codes, score cards with keys, glass of water, spoons and paper napkin were presented to judges for evaluation (Ranganna 1986).

Nutritive Value: Nutritive value of each recipe was calculated using food composition tables (Gopalan et al 1989)

Cost of Recipes: Cost of each recipe was calculated keeping in view the recent prices.

Shelf Life studies: Shelf life was evaluated by visual quality assessment of appearance, change in color, firmness or turgidity, initiation of rotting or senescence and incidence of microorganism growth

STATISTICAL ANALYSIS:

The data collected by evaluation done by the panel of judges was tabulated and analyzed by applying appropriate statistical method. Results of sensory evaluation were gathered and tabulated and means were calculated.Null hypothesis were framed. Comparison were made using student's't' test (Garrett 2007).

RESULTS AND DISCUSSION

30g fresh Lotus stem was dehydrated wherein due to moisture loss; the final weight after drying was 6 g on sun drying, 4.8 g on hot air oven drying and 5.4 g on microwave drying. The shelf life of all the dehydrated Lotus stem slices was increased and they could be stored for a period of 1 month without any signs of deterioration. The rehydration time was 10 minutes in boiling water and 30 minutes in water at room temperature. The rehydrated samples resembled the fresh Lotus stem slices and also had the same weight. There was no real difference between fresh and dried Lotus stem on rehydration. It necessarily implies that after rehydration the weights of the dehydrated chips (6g, 4.8g, and 5.4 g respectively) increased and was equal to 30 g. Similarly after frying, the dehydrated chips (6g, 4.8g, and 5.4 g respectively) approximately equaled in volume to the volume of the fresh fried chips which was taken as 1 serving. Hence the above weights were taken for calculations for all the three recipes and for all the different dehydration methods.

Lotus Stem recipes were prepared by using fresh and differently dehydrated lotus stems. Products prepared from dehydrated lotus stem were considered as experimental and were compared with control recipes made from fresh Lotus stem.

Lotus Stem Curry: Table 4 shows palatability evaluation scores and Table 5 depicts the statisticalComparison betweencontrol and experimental Lotus stem curry

Table 4: Mean palatability evaluation scores for control and experimental lotus stem curry

SN	Sensory Attributes	Control	LC 1	LC 2	LC 3
1	Appearance	10	10	9.66	9.55
2	Color	9.77	9.88	9.77	9.55
3	Texture	9.77	9.88	9.66	9.55
4	Taste	9.77	9.88	9.66	9.55
5	Flavor	9.88	9.88	9.55	9.55
6	Acceptability	9.88	9.88	9.55	9.55

The sundried lotus stem curry received better scores than the other two dehydrated products and was equally scored when compared to the control. Non-significant differences were observed when student's t test was applied suggesting that all experimental recipes were acceptable.

Table 5: Results of t-test for comparison between control and experimental lotus stem curry

SN	Comparative Groups	Appearance	Color	Texture	Taste	Flavor	Acceptability
1	Control vs LC1	0	0.19	0.61	0.61	0	0.00
2	Control vs LC2	0.80	0	0.53	1.10	1.88	1.83
3	Control vs LC3	1.13	0.83	0.83	0.83	1.32	1.32

Note: *=Significant difference at 5% (Table value of't' at 5% = 2.228)
**=Significant difference at 1% (Table value of't' at 1% = 3.169)

All the values showed non-significant difference at both 0.05 and 0.01 levels.It can be interpreted that the Lotus Stem Curry made from fresh and dry Lotus stem was found to be comparable with each other.

Nutritive Value of Control and Experimental Lotus Stem Curry:
Nutritive value of control and experimental Lotus Stem Curry was calculated using food composition table given by Gopalan et al. (1989).Nutritive value of Fresh Lotus stem was calculated by referring www.Lotusrootnutritionfact.htmand dry Lotus stem as per Gopalan et al 1989.Nutritive valueof Lotus Stem curry per servingis presented in Table 6.

Table 6: Nutritive Value of Control and Experimental Lotus Stem Curry per serving

SN	NUTRIENTS	LOTUS STEM CURRY			
		Control	LC1	LC 2	LC 3
1	Energy (Kcal)	117.78	157.4	155.6	156.5
2	Carbohydrate(g)	11.63	13.03	12.09	12.56
3	Protein (g)	2.40	2.489	2.458	2.478
4	Fat (g)	7.13	10.66	10.89	10.78
5	Iron (mg)	2.48	10.14	8.927	9.546
6	Calcium (mg)	54.48	101.58	94.23	97.95
7	Phosphorous(mg)	76.01	67.97	66.52	67.25
8	Sodium (mg)	1092.2	1637.4	1666.4	1651.7
9	Potassium (mg)	300.8	469.9	408.4	439.5
10	Magnesium(mg)	39.30	64.18	61.66	62.94
11	Vitamin – C (mg)	30.33	19.0	19.40	19.21
12	TDF (g)	3.456	5.152	4.670	4.914

The calculated value for energy in all the variations using the dehydrated Lotus stem was higher than control. Sundried lotus stem curry contained the highest energy. Similarly carbohydrate, protein, fat, iron, calcium, sodium, potassium magnesium and (TDF) total dietary fiber contents were high in experimental products while Vitamin C and Phosphorous values were higher in control product.

Lotus stem with honey chilli: Table 7 presents mean palatability evaluation scores for control and experimental products.

TABLE 7: Mean palatability evaluation scores for control and experimental lotus stem with honey chilli

SN	Sensory Attributes	Control	HC 1	HC 2	HC 3
1	Appearance	10	10	10	10
2	Color	10	10	10	9.88
3	Texture	10	10	9.88	9.88
4	Taste	10	10	9.88	10
5	Flavor	10	10	10	10
6	Acceptability	10	10	10	10

Appearance wise all the three experimental products received exactly same mean score when compared to the control.

Table 8: Results of t-testfor comparison between control and experimental lotus stem with honey chilli

SN	Comparative Groups	Appearance	Color	Texture	Taste	Flavor	Acceptability
1	Control vs HC1	0	0	0	0	0	0
2	Control vs HC2	0	0	1.09	1.09	0	0
3	Control vs HC3	0	1.09	1.09	0	0	0

Note: *=Significant difference at 5% (Table value of 't' at 5% = 2.228)
**=Significant difference at 1% (Table value of 't' at 1% = 3.169)

All the values showed non-significant difference at both 0.05 and 0.01 levels. It can be interpreted that the lotus stem with honey chillimade from fresh and dry Lotus stem was found to be comparable with each other.

Table 9: Nutritive value of lotus stem with honey chilli per serving

S N	Nutrients	LOTUS STEM WITH HONEY CHILLI			
		Control	HC 1	HC2	HC3
1	Energy (Kcal)	183.4	229.6	229.59	229.6
2	Carbohydrate(g)	32.9	40.45	40.27	40.37
3	Protein (g)	1.56	1.36	1.32	1.34
4	Fat (g)	5.24	6.93	7.02	6.97
5	Iron (mg)	1.61	6.35	5.49	5.92
6	Calcium (mg)	24.43	63.35	57.98	60.68
7	Phosphorous(mg)	47.52	33.42	31.93	32.69
8	Sodium (mg)	805.9	1074	1084.0	1078.9
9	Potassium (mg)	216.2	300.8	258.2	279.6
10	Magnesium(mg)	24.14	35.72	33.63	34.68
11	Vitamin – C (mg)	21.06	10.78	10.89	10.84
12	TDF (g)	2.56	3.39	3.05	3.22

High energy value in experimental groups was observed than the control. Fat, iron, calcium, sodium, magnesium and TDF were increased in the experimental groups.

Lotus stem chips :Control Lotus stem chips was prepared using fresh Lotus stem whereas experimental Lotus stem chips were prepared using lotus stem slices which were dried by different ways such as sun dried, hot air oven dried, microwave dried (without frying). Table 10 presents mean palatability evaluation scores for control and experimental Lotus stem chips

Table 10: Mean palatability evaluation scores for control and experimental lotus stem chips

SN	Attributes	Control	SC 1	SC 2	SC 3
1	Appearance	8.66	10	10	9.88
2	Color	8.88	10	10	9.66
3	Texture	8.77	10	10	9.88
4	Taste	8.77	10	10	9.77
5	Flavor	8.88	10	10	9.88
6	Acceptability	8.44	10	10	9.77

Experimental 1 and 2 Lotus stem chips received highest mean score for all six sensory Attributes. Experimental 3 received slightly low mean score for its all six sensory Attributes but when compared with control, microwave Lotus stem chips scored more.It is worth mentioning that the control made from fresh lotus stem was given a lesser score than the dehydrated. The first two dehydrated variants were highly rated followed by the third experimental groupthus, indicating a higher acceptability score for the dehydrated chips than those prepared from the fresh variety

When the above means were statistically analyzed (Table 11), it was observed that overall Experimental Lotus stem chips prepared from dry Lotus stem showed significant differences for their sensory attributes when compared with control Lotus stem chips. The null hypothesis was rejected suggesting that there was a significant difference between the mean scores for the control and the experimental groups. The use of the dehydrated lotus stem for chip making can thus be recommended.

Table 11: Results of t-testfor comparison between control and experimental lotus stem chips.

SN	Comparative Groups	Appearance	Color	Texture	Taste	Flavor	Acceptability
1	Control vs SC1	7.82**	8.9**	9.6**	5.6**	8**	11.5**
2	Control vs SC2	7.82**	8.9**	9.6**	5.6**	8**	11.5**
3	Control vs SC3	5.95**	4.8**	6.4**	4.2**	6.4**	7.6**

Note: *=Significant difference at 5% (Table value of't' at 5% = 2.228)
**=Significant difference at 1% (Table value of't' at 1% = 3.169)

The sensory parameters as per the above discussion and results indicated a high rating for the dehydrated products and hence an attempt was also made to calculate the nutritive value of the products. Table 12 displays the nutritive value of the control and the experimental chips per serving.

Table 12: Nutritive value of lotus stem chips per serving

S N	Nutrients	LOTUS STEM CHIPS			
		Control	SC 1	SC2	SC3
1	Energy (Kcal)	189.5	438.2	456.0	134.6
2	Carbohydrate(g)	16.54	29.13	27.15	28.19
3	Protein (g)	2.14	2.013	1.83	1.923
4	Fat (g)	13.22	34.89	37.81	1.59
5	Iron (mg)	3.25	30.37	27.74	29.1
6	Calcium (mg)	43.85	186	166.9	176.8
7	Phosphorous(mg)	158.9	264.5	276.4	270.1
8	Sodium (mg)	2082	5508	5949	5719
9	Potassium (mg)	427.7	1242	1046	1127
10	Magnesium(mg)	26.4	89.86	83.04	86.59
11	Vitamin – C (mg)	33.84	1.2	1.04	1.11
12	TDF (g)	4.46	11.8	10.65	11.25

High energy was observed in the first two experimental recipes since the lotus stem chips were fried whereas in the last experimental group- microwave dehydrated chips were used without frying, hence the lowest fat and energy content is observed. Increments were observed in other nutrients viz. carbohydrates, iron, calcium phosphorous, sodium, potassium, magnesium and TDF.

COST OF LOTUS STEM RECIPES

Costs of all three recipes were calculated based on the proportion and respective prices as per market rates. The cost of fresh Lotus stem was taken as Rs 30 / 100g as that was the prevailing market rate. As such for many residing near the ponds, Lotus stem is available free of cost. The price of Lotus stem dried in different ways were not calculated as the first was sun dried and for the other two electricity consumption was not calculated –it being beyond the immediate scope of

the study and hence for calculations the price of the fresh Lotus stem only was considered both for control and experimental groups

Table 13:Cost of lotus stem recipes

SN	Recipes	Cost in Rs. per 100 g
1	Lotus stem curry	5.37
2	Lotus stem with honey chilli	9.61
3	Lotus stem chips	6.71

CONCLUSION:

Thepurpose of this study was to identify an acceptable process for dehydration of raw ingredients to prepare finished product. It was also deemed necessary to develop and evaluate Lotus stem dried slices as an instant and convenience product. The newly developed dehydrated products were analyzed for cost effectiveness, nutritional composition and sensory parameters. This was done by identifying acceptable procedures for dehydration of raw ingredient to finished product which compared well with the standard.

The three ways of dehydrating were investigated viz. the traditional Sun-drying, the hot air oven drying and the latest microwave cooking which actually cooks the food using the moisture present in it thereby dehydrating it.Before the actual dehydration procedure was handled, all the samples were blanched. The chips with the traditional method took a longer period of time, were cost effective and seemed to be very gradual in the dehydration process. The other two methods although fast were not relatively cost effective and further research on nutrient retention analysis is recommended. The shelf life study was dealt with indicating the complete possibility of having a very high shelf life [more than 30days with ideal packaging] of the dehydrated chips from all the different modes of drying procedures. Further research in this direction is highly recommended specially in Indian climatic situations which can then be enhanced to further industrial progress and entrepreneurship.

The studies and procedures developed in rehydration of these dried products were also very interesting and can be further researched. The dried product rehydrates back to its original size and shape and represents and resembles the fresh counterpart and this was a very fascinating result that needs to be much further dealt upon and projected. Similarly the frying procedures gave an insight upon the popping up of the dried lotus stem which on frying- almost doubles in volume- a tendency similar to that shown by all starchy dried products.

Three recipes namely - Lotus stem curry, Lotus stem with honey chilli and Lotus stem chips were prepared from dehydrated Lotus stem and were compared to the preparations made from fresh samples. It can be concluded that all the three products were highly acceptable and actually the Lotus stem chips that were prepared using the dried samples were rated more in all parameters than the Fresh Lotus stem chip. This indicates the popularity of the dehydrated products from Lotus stem. The dehydration procedures can be carried out successfully on a large scale.

REFERENCES:

Garrett E Henry. (2007). "Statistics in psychology and education", 6th edition, Paragon International Publishers, New Delhi, *page 461.*

Gopalan C, Rama Sastri B.V. and Balsubramanian. (1989). "Nutritive Value of Indian Foods,"1st edition, *National Institute of Nutrition, ICMR, Hyderabad, Pages 47-50,60-63, 93-95.*

Kowsalya, S. and Crassina A. Shimpray. (2007) "Supplementation of Lotus stem powder among the selected anemic adolescent girls" The Indian journal of nutrition and dietetics, Department of food science and nutrition, Avinashilingam University for women, Coimbatore- 641043 ,Received 26th December 2007, Vol.45 No.2 IJNAD (2) 47-83 Feb-2008.

Mukherjee PK, Mukherjee D, Maji AK, Rai S, Heinrich M. (2009) "The sacred lotus (Nelumbonucifera) - phytochemical and therapeutic profile" J Pharm Pharmacol. 2009 Apr;61(4):407-22.Source:Websitehttp://www.ncbi.nlm.nih.gov/pubmed?term=HeinrichM[Author]&cauthor=true&cauthor_uid19298686 in : School of Natural Product Studies, Department of Pharmaceutical Technology, Jadavpur University, Kolkata, India. pulokm@gmail.com

Ranganna S. (1986). Handbook of Analysis and Quality control , 2ndedi, Tata MacGrawHill Edu Pvt. Ltd. (Sensory Evaluation), Pg 594.

www.Lotusrootnutritionfact.htm.http://www.tititudorancea.com/z/nutrition_facts_nelumbo_nucifera_lotus_root_raw.htm

Research Reach. J.H.Sci.Vol.12, No.2, 50 - 52

LIST OF THESIS TITLES (2012-2013)

College of Home Science, Nirmala Niketan, Mumbai-400 020

FOODS, NUTRITION AND DIETETICS

1. Bread: consumption pattern, analysis for sodium and fiber content, formulation of bread
   Shah Shivani & Dr.Geeta Ibrahim

2. Development of products using milk-soy milk combination
   Fernandes Leane & Mrs. Nina Dias

3. Nutritional status of school children age 6-9 years covered by mid day meal program in south Mumbai
   Asurlekar Minal & Dr. Perpetua Machado

4. Dietary and lifestyle patterns and its influence on attention deficit hyperactivity disorder
   Rodrigues Tiana & Mrs. Vibha Hasija

5. Dietary habits, physical activity and health status of bank employees in Mumbai
   Shah Rupal & Dr. Ms.Perpetua Machado

6. Development of mixed vegetable powder
   Vyas Sonali & Mrs. Veena Yardi

7. Development of a trans-fat free nutritious eggless cake mix
   Braganza Janet & Mrs.Mary J.Varghese

8. Nutritional status, emotional intelligence and cognitive abilities of adolescents belonging to low socioeconomic group
   Achrekar Divya & Dr. M. Subhadra

Research Reach. J.H.Sci.Vol.12, No.2, 50 - 52

HUMAN DEVELOPMENT

1. Teacher's perception of applicability of the B.Ed.course for teaching science in SSC secondary schools in Mumbai
   Coutinho Sonal & Mrs. Rhonda Divecha

2. After school programs for 5th-7th standard children in Mumbai: perceptions of children, parents and experts
   Rodrigues Anisha & Mrs. Rhonda Divecha

3. Cadaver kidney donation: awareness and attitude of family physicians and religious leaders
   Sanghvi Shaili & Dr. Nirmala Almeida

4. Quality of life coping strategies and coping effectiveness of counsellors working with people living with HIV
   Pandhi Chitra & Dr. Nirmala Almeida

5. Cross-generational similarities and dissimilarities with young women's career development
   Shah Hetal & Dr. Anuradha Bakshi

6. Emotional Intelligence of mothers of children with intellectual disability and its interrelationship with their level of stress and quality of life
   Sampat Khyati & Ms. Payal Maheshwari

7. Cross-generational similarities and dissimilarities with young men's career development
   Bhartia Harshita & Dr. Anuradha Bakshi

8. Perceptions of parents of children (6-15yrs)with intellectual disability:needs and satisfaction with the services provided
   Rodrigues Lyan & Dr. Subhadra Prabhu

9. The perception of perimenopausal women(43-55 yrs)regarding their awareness and quality of life in relation to perimenopause and menopause
   Fernandes Afira Edna & Dr. Kamini Rege

Research Reach. J.H.Sci.Vol.12, No.2, 50 - 52

TEXTILES AND CLOTHING

1. A comparative study; dyeing jute and cotton with astrazon dye and their evaluation
   Shah Sulsa & Dr. Deepa Rathi

2. Design development of burqa using checks and stripe fabric
   Ansari Samar & Dr. Deepa Rathi

3. Application of lava jean FO as an alternative bleach to hypochlorite on denim
   D'souza Saviona & Dr. Ela Dedhia

4. Designing and developing shopping bags, lunch bags and hand bags using nonwoven fabric
   Shaikh Aaisha& Mrs. Ritu Madan

5. Psychological and sociological aspects of clothing for physically and non physically challenged young adults
   Borges Merilyn & Dr. Deepa Rathi

6. Comparative study of (conventionally and plasma treated) dyed and finished woolen blanket *Deepa Laxmi A & Mrs .Pratima Goyal*

7. Comparative study of dyeing and application of various finishes on silk fabrics using conventional and plasma method
   Nongbri Dafina & Mrs. Pratima Goyal

8. A comparative study between exhaust and semi continuous process in the bleaching of linen
   Alphonso Yolanda & Dr. Ela Dedhia

NOTE: Research Reach- Journal of Home Science is a bi-annual publication of the Research Centre of Nirmala Niketan, College of Home Science covering current, original and authentic Research and Development work from all branches of Home Science. Subscription for each year would cover 2 issues (January and July). Previous issues (2002 onwards can be made available upon request)

Subscription Order Form

Subscription Rates

Institutions

1 year	Rs.660
2 years	Rs.1285
3 years	Rs.1905

Individuals

1 year	Rs.360
2 Years	Rs.685
3 Years	Rs.1005

Date _____

To
The Chief Editor,
Research Centre, College of Home Science,
Nirmala Niketan, 49, New Marine Lines,
Mumbai - 400020.

Madam,
Please (tick as applicable)

Enroll me as a Subscriber ☐

Renew my Subscription ☐

To the Research Reach, Journal of Home Science for the year/ years _____

I am enclosing a Demand Draft for Rs._____
(Please give appropriate amount as per the rates given drawn in favor of **'Nirmala Niketan Institute'** payable at Mumbai.
The subscription rates are inclusive of postage charges)

I would like to receive my copies of Research Reach at the following address:

Name:_____
Address:_____
_____
_____
Telephone No:_____
Email Address_____
Yours faithfully

Signature

OTHER PUBLICATIONS OF THE RESEARCH CENTRE

1. READY RECKONER	**- 25 Rs**
2. GALACTOGOGUES & BREAST FEEDING	**- 25 Rs**
3. NUTRITION FOR NERVES	**- 15 Rs**
4. GOLDEN GREENS	**- 35 Rs**
5. DISSERTATION TITLES	**- 10 Rs**
6. HOW WILL I BE IN THE MILLENIUM	**- 12 Rs**
7. RESEARCH REACH (Prescription for perfection in paper presentation)	**- 10 Rs**

The Above publications are available on payment. Outstation orders will have to cover postage costs.