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Innovative educational program based on banduras social cognitive theory for food label understanding in early adolescents

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Abstract
Adolescence offers an intervention opportunity to prevent the onset of health damaging behavior, and establish healthy eating habits. In the current scenario, when there are shifts from homemade to prepackaged foods, food labeling could serve as a population-based approach to help consumers make healthy choices. The food label is direct means of communication of product information between buyer and sellers. It enables the consumer to differentiate between foods and brands to make informed purchasing choices. Food labeling represents a valuable tool to help consumers make informed decisions about their diet, life-style and plays an important role by disseminating important nutrition information to consumers. The present study is a school based educational intervention study, designed to measure changes in nutrition related knowledge, understanding and use of nutrition facts on food label by obtaining pre and posttest intervention scores using questionnaire technique. The research work was conducted in four phases. Phase me with objective to assess eating habits, nutrition status of early adolescents and their existing nutrition knowledge, attitude, and understanding of food labels. Phase II to develop an educational program based on Banduras social cognitive theory. Phase III to impart education on food label through the developed educational program and Phase IV to assess the understanding of the adolescents regarding food label. The sample of the study was 490 early adolescent children from seven government schools of Delhi. The experimental group was of 250 and control group comprised of 240 students. The average pretest scores in experimental group for nutrition knowledge were 2.62 which significantly increased to 8.24, for attitude towards information on food label scores significantly increased from 20.41 to 29.92, scores of practice of using information on food label significantly increased from 20.63 to 28.24 and scores for understanding the nutrition facts on food label too significantly increased from 1.24 which to 3.75, whereas no significant improvement in scores were observed in control group. The results thus demonstrate that children participating in this study successfully learned how to read and compare information on food label. The research also, demonstrates that innovative teaching session, on food labels with emphasis on understanding the nutrition facts table can enable children to select foods which are healthy after carefully reading the food label.

Keywords: food label, nutrition labeling, package food, food choice, processed food

Introduction
Technological development, industrialization and globalization have brought revolution in many fields of life. Nutritional and lifestyle related transition is widely evident in developing as well as developed countries. Food preparation methods, eating behavior and attitude towards food have altered radically over a period of time. Research shows that food consumption patterns has significantly changed, with fewer population consuming traditional diets based on cereals, pulses, vegetables and root crops. Today use of ready to eat food, instant food and package food has become a major part of people's lives. The ready acceptance of processed and convenience foods by consumers is accompanied with a major shift in dietary patterns, resulting in change in nutritional status of people (Ma Sofia, V. *et al.* 2008) [14]. In India too consumption of non-traditional fast foods, processed foods, and packaged foods has been increasing at a rapid pace, and more so among adolescents and children (Misra, A. and Khurana, L. 2008) [8]. Over the past 20 years, there has been an almost 300% rise in consumption of packaged foods (Procter, K. 2007) [19].

These changes are accompanied by a rapid increase in chronic diseases such as obesity, diabetes, cancer and heart diseases. A wide variety of readily available foods in market makes individual food choice an essential component of health maintenance. In the current scenario, when there are shifts from homemade to pre-packaged foods, food labeling could serve as a population-based approach to help consumers make healthy choices (Jessie, A. 2005) [10].

It is recognized that adolescence is a very important transition stage in one's life and is characterized by many physical and psychological changes. It is a stage of emotional turmoil for individual adolescents who are in the process of discovering their identity in the society. The experiences during this stage can substantially influence further development of an individual. Along with this, the large size of adolescent population in India makes it imperative to give them special attention as a vulnerable group. Sound food habits formed during early adolescence have the potential to persist into adulthood and can help to prevent or delay chronic disease conditions. The nutrition status of adolescent is shaped by the environmental factors like peer pressure and prevailing food fashions. Therefore, it is extremely important to guide them regarding appropriate selection of food items thus empowering them of sound decision making. Any intervention made at this stage can have a long term influence; this makes early adolescents an appropriate target for the nutrition intervention.

The food label is direct means of communication of product information between buyer and sellers. It enables the consumer to differentiate between foods and brands to make informed purchasing choices. A label gives basic product information regarding nutrient content, ingredients, manufacturing details, cost, usage etc. Label serves as a vehicle for packed food marketing, promotion and advertising too (Jessie, A. 2005) [10]. Food labels are potentially powerful tools of communication which are often not considered when traditional channels are discussed to discourage consumption of unhealthy packed food (Goldberg, J. 1992) [5]. Effectively, the title 'nutrition facts' appear on top and should include both the ingredients and nutritional information of the food in a particular size and shape (rectangle). The nutritional information should be listed in a particular order denoting its importance.

Today nutrition labels are being made mandatory on nearly all packaged foods in accordance to the Food Safety and Standards (Packaging and Labeling) Regulations, 2011 [3], notified by Food Safety and Standards Authority of India. Consumers also have more nutrition information due to expanded food labeling, mandated by the government. Food Label are a secret weapon for healthy eating, it is any written, electronic or graphic communication on the package, containing variety of information and a panel about nutritional value of food item. The nutritional information or nutritional facts on food label are given as per 100gm or 100ml or per serving of the product and contains energy value in Kcal, protein in g, carbohydrate (Specify quantity of sugar) in g, fat in g, the amount of any other nutrient for which a nutrition or health claim is made or omitted.

The nutrition facts on a label of a food product provide information on its total calories and calories from fat, sugar, protein, minerals and vitamins (Anonymous, 2007) [1]. Nutritional labeling is an attempt to provide consumers, at the point of purchase, with information about the nutritional content of individual food products, in order to enable consumers to choose nutritionally appropriate food (Grunert, K. and Wills, J. 2007) [6]. Thus, it is important that the nutrition information provided on the packet be appropriate and understandable to the consumers and that it impacts food-choice behavior. Initially food labeling was limited to food name, quantity, price and identity of the manufacturer. But recently, its important aim is to bridge the gap between the consumers and the original food ingredients. Thus detailed and well- informed nutrition labels have become an indispensable part of today's consumption scenario (Singla, M. 2010) [23]. The principle reason for nutrition labeling is that the consumers have a right to know what is in the purchased food, so that consumers can take better decisions for their own well- being and for their family also (Rotfeld, *et al.* 2009) [20]. However, research on nutrition labeling formats is relatively scarce and virtually, there is no insight into how labeling information is used in a real world buying situation and how it will affect consumers' dietary patterns (Havish, M. and Aparajita, D. 2015) [7]. Creating awareness about the use of label information among young consumers can enhance their skills in choosing healthy foods (Subba Rao, *et al.* 2012) [24]. There is now also increasing evidence to indicate that mere display of food labels cannot help the consumers make informed choices. For instance, a recent study on the perceptions and practices of the Indian Households (HHs) related to food safety revealed that as many as 60% of the HHs buy packed food sometime or the other but only 20% check the food labels (NIN, 2006) [18]. Studies among south Indian women indicated that although women see the labels on packed foods for date of manufacturing and 'best before date', many of them are not aware of quality symbols like ISI, AGMARK and FPO (Sudershan, R. *et al.* 2008) [25]. In the Indian context, where the literacy levels are considerably low, addition of symbols to the routine labeling may be more beneficial. For instance, in developed nations the traffic light scheme has been designed to provide at glance information on the quantity of fat/saturated fat, sugars and salt content in the food preparations. Studies revealed that this kind of labeling is becoming more popular. But there are hardly any studies that have tested the effectiveness of using such symbols in the Indian scenario. The current status of food labeling in India that way is very primitive and in fact, the exact status is also unknown and also there is no study on educating children about Nutrition Fact Label (NFL).

Indian consumers are aware about the nutritional information provided on the label but fail to use it because of lack of understanding. The impact of processed foods has been felt significantly in rural India also, where the environment created by mass advertising has reduced intake of traditionally nutritionally richer foods. The outreach of marketing by the industry is seen and felt in rural areas also where people may not have access to clean drinking water or hygienic sanitation but there is easy availability of variety of potato wafers, Coke, Pepsi, Noodles and pastas.

Public health interventions in particular have the potential to affect youth, especially when disseminated through channels that reach a majority of adolescents, such as schools (Hoelscher, D. 2002) [9]. Research shows that nutrition interventions, especially those that are behavioral based have been effective in producing dietary behavioral change among adolescents (Lytle, L. 1995) [13]. In addition, these behavioral changes are continued over time (Nader, P. *et al.* 1999) [17]. Therefore, intervention in youth is cost effective and can influence the development of chronic diseases later in life (Lenfant, C. 1995 and Kelder, S. 1994) [12, 11]. Schools not only provide viable platforms to reach a large segment of

children, but also offer the advantage of carrying out education interventions within the context of the child's natural environment (Gavaravarapu, S. *et al.* 2009 and Subba Rao, *et al*. 2012) [4, 24].

Thus present study is designed to provide nutrition education in school about eating right. The study aims to assess the existing knowledge of early adolescents regarding NFL and to educate them about NFL through innovative methods. Children are likely to benefit from educational programs that teach them how to use labels as tools to compare and select food items available in market and make healthy food choices. The study aims to increase the knowledge and use of nutrition food labels among children. Thus the objective of present study was to design a nutrition education program, to enhance the knowledge of 12 to 14 years old early adolescents regarding understanding of food label on package foods.

Methodology

The present study is a school based educational intervention study, designed to assess the knowledge of early adolescents regarding food label and to educate them through innovative methods to promote lifelong food selection skills and habits. More specifically the broad objective of present study was to design an innovative interactive nutrition education program to enhance the knowledge of 12 to 14years old children regarding understanding of Nutrition Facts on food label. This study is designed to measure changes in nutrition related knowledge, attitude, understanding and use of nutrition facts on food label by obtaining pre and post intervention scores using questionnaire technique.

Thus the study was conducted with 490 seventh and eight standard early adolescents in 7 Delhi government schools in phased manner, phases being divided as PHASE-1: Assessment of the eating habits, nutrition status of early adolescents and their existing nutrition knowledge, attitude, practice and understanding of nutrition facts on food labels using questionnaire, Phase-2: Development of a nutrition educational Program on NFL is based on the findings of phase one and review of literature. The conceptual framework of nutritional counseling program for food label understanding is a prototype program developed on constructs of Bandura's social cognitive theory (SCT) involving well defined objectives, activities, and take home educational materials (Seth, U. 2008) [21]. Thus the innovative program on food label was developed with key features as a class activity, power point presentation and take home educational materials. Phase-3: Imparting education to the early adolescents on nutrition labeling through the developed educational program. The developed program on food label was implemented by organizing a 40 minute workshop on 250 students from only four schools (experimental group), rest 240 students from three school served as control sample of the study, who were not exposed to the program. Phase-4: Assessment of change in nutrition knowledge, attitude, practice and understanding regarding NFL among early adolescents, by administrating the pre score questionnaire once again for obtaining post scores. The data collected, was consolidated and systematically treated to calculate percentages, mean scores and SD. Statistical tests were performed using SPSS version 10, 2000 for windows, to compare the differences between the Pre-test and post-test scores of control and experimental groups. For comparison of means, a two-tailed dependent t-test was used to examine the significance for differences.

Results and Discussion

The present study on "Innovative Educational Program on Food Label Understanding for Early Adolescents (12 to 14 years)" aims at designing a nutrition education program on understanding Food Label for adolescents. The sample comprised of 490 students aged between 12-14 years from seven government schools in Delhi. The sample comprised of 100 (20.6%) 12 years, 214 (43.6%) 13 years and 176 (35.8%) 14 years old adolescents. Out of total sample of 490 students 228 (49%) were girls and 262 (51%) were boys. 192 (39.1%) students were from class VII and 298 (60.9%) students were from class VIII. Figure 1 depicts the age, gender and class wise distribution of the sample.

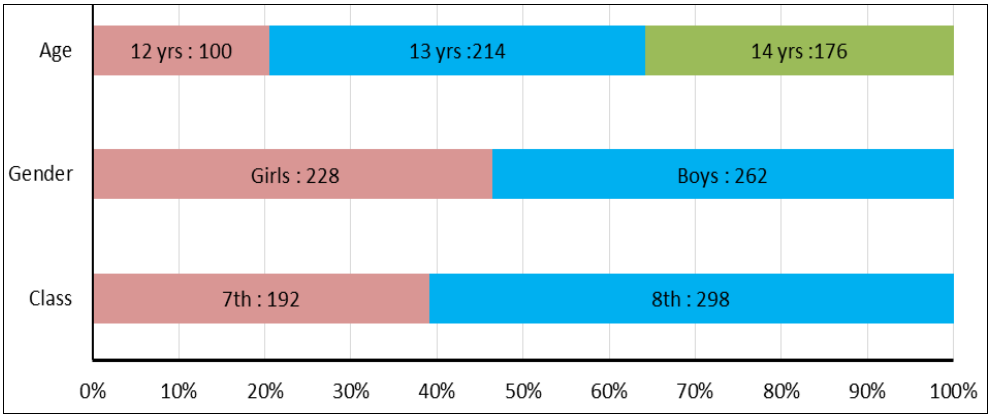

Fig 1: Age, Gender and class wise distribution of sample

Review of literature shows that to ensure the development of effective and innovative nutrition education program, a systematic model of instructional design should be used. Thus a prototype program based on constructs of Bandura's Social Cognitive Theory (SCT) was designed to improve the knowledge, attitude and understanding regarding use of NFL among adolescents with three components as a group presentation, class activity and take home educational material (Seth, U. 2008) [21]. Table 1 depicts the description of various components of developed education program on food label and SCT constructs.

Table 1: Components of Developed Education Program on Food Label and SCT Constructs

Program Components	Description	SCT Constructs
Group Presentation	Power point presentation, involving cartoon characters namely Chintu and Chinky Comic "AAO PADHEN AUR SAMJHE FOOD LABEL"	Knowledge imparting
Class Activity	Learning by doing, self-assessment & discussions Game 'SHOPPING LIST'	Self-efficacy, knowledge retention, reinforcement
Take Home Educational Material-	Access to information & recapitulation Hand out in English: "IMPORTANCE OF NUTRITION FACTS ON FOOD LABEL" & Hand out in Hindi: "FOOD LABEL PAR NUTRITION FACTS KA MAHATAV"	Reinforcement, knowledge, retention

Group presentation was a Power-point presentation involving cartoon characters namely Chintu and Chinky, prepared for children on the findings of the survey done in phase-I and review of literature. To impart knowledge on food label, a presentation on food label was prepared in Hindi and English mainly focusing on different sections nutrition label. A game 'Shopping List' was developed to reinforce the knowledge regarding NFL among children. The objective of the game was to make the education interactive and interesting. Children learns better by doing so for better learning a game was prepared by using different food labels of eatables usually consumed by 12-14 years old early adolescents. A take home material was also developed in the program. The objective of take home material was to provide information in clear and concise language so that the knowledge gained on NFL is retained by the children. A colorful well designed handout in English "Importance of Nutrition Facts on Food Label" and in Hindi "Food Label Par Nutrition Facts Ka Mahatav". The power point presentation was converted into a colorful comic "Aao Padhen Aur Samjhe Food Label". These were the take home educational materials of the program. The take home materials were the recapitulation of the program emphasizing on NFL. The handout also contains an interesting crossword game developed for the adolescents on nutrition knowledge.

The developed program was implemented only on 250 students from only four schools (experimental group), rest 240 students from three school served as control sample of the study, who were not exposed to the program. The knowledge, attitude and understanding scores obtain in phase-I of the study were considered as pretest scores. Posttest scores were obtained from children of both the schools using same questionnaire that was used for pretest score, with only different food package label. Comparison of mean scores of children of both the groups can be seen in Table 2.

Table 2: Scores to Assess the Effect of the Developed Program on NFL

Assessment Scale	Group	Pre-test Scores (mean±SD)	Post-test Scores (mean±SD)	p-value
Knowledge (max scores 10)	Experimental	2.62±1.37	8.24±1.29	<0.0001
	Control	2.41±1.83	2.52±1.58	0.9901
Attitude (max scores 35)	Experimental	20.41±5.09	29.92±5.51	<0.0001
	Control	19.92±8.88	20.41±8.18	0.3296
Practice (max scores 36)	Experimental	20.63±4.94	28.24±3.36	<0.0001
	Control	20.54±4.14	21.23±3.82	0.0800
Understanding (max scores 05)	Experimental	1.24±0.94	3.75±0.36	<0.0001
	Control	1.41±1.14	1.52±1.82	0.0800

The average Pre-test scores in experimental group for nutrition knowledge were 2.62±1.37 which significantly increased to 8.24±1.29 (p<0.0001). The Pre-test scores in experimental group for attitude towards information on food label was 20.41±5.09 which increased to 29.92±5.51 (p<0.0001) indicating significant change, whereas no significant improvement in scores were observed in control group. The average Pre-test scores in experimental group for practice of using information on food label were 20.63±4.94 which significantly increased to 28.24±3.36 (p<0.0001) and the average Pre-test scores in experimental group for understanding the nutrition facts on food label were 1.24±0.94 which significantly increased to 3.75±0.36 (p<0.0001).

It was observed that early adolescents had attitude and practice of reading food label and were aware about the information provided on the label but they fail to use it because of lack of knowledge and understanding regarding Nutrition Facts given on the food label. The innovative and interactive program promotes learning by involving student active participation along with very interesting and informative handouts as take home material for recapitulation and better retention of information.

Matvienko *et al.* calculated the mean ratio of knowledge score to determine the improvement of subjects' knowledge between pre and post scores of intervention (Matvienko, O. *et al.* 2001) [15]. They observed that the intervention group had, improved mean scores, where as in control group the change in scores was not observed. In the present study also the intervention group had, improved mean scores, where as in control group the change in scores was not observed. Other researchers, in their study guided by Bandura's SCT, also examined relationship between behavioral, personal and environmental variables on adolescents eating behavior (Cusatis, C. *et al.* 1996) [2]. Review shows that effective nutrition intervention and education strategies based on behavior therapy are needed for promoting adoption of healthful eating and physically active lifestyle in adolescents. Knowledge does not directly relate to behavior change; however, it is the first step in creating a healthy lifestyle. Behavior change occurs slowly over time and requires positive reinforcement. Research work by author on Development of Nutrition Education Module for Healthy Lifestyle of Adolescents also found that nutrition education brought significant change in knowledge and attitude of adolescents in experimental group with Pre-test mean scores changing from 13.4 to 20.7 (p<0.0001), whereas no significant improvement in scores were observed in control group (Seth, U. 2008) [21]. Similar, findings were also found in

a study that a simple, brief educational program could significantly help the children in increasing their knowledge regarding NFL (Hawthorne, K. *et al.* 2006) [8]. Another similar study by the author too shows that children mean knowledge, attitude and understanding scores significantly increased from 5.5±1.48, to 6.1±0.77, 15.7±1.61 to 16.3 ±1.43 and 4.4±2.44 to 5.5 ±1.67 respectively (Seth, U and Jyoti 2015) [22]. The subjects' scores improved significantly (p<0.05), as reflected by a change in the Pre-test and post test scores of knowledge, attitude and understanding of NFL. Whereas no significant change (p>0.05) in Pre-test and post-test scores was observed in control group.

The results thus demonstrate that children participating in this study successfully learned how to read and compare NFL. The research also, demonstrates that the innovative teaching session on NFL can be an effective educational tool to increase nutrition knowledge in children. To conclude innovative ways and interactive nutrition education program helped adolescents to better understand and use information on food label for food selection.

Conclusions

Nutrition education intervention has a positive impact on nutrition knowledge, attitude and understanding of adolescents children. The developed program's concept, content, and presentation strategies and support from teachers and schools are the major factors that have contributed to the outcomes of the intervention. The education on understanding food labels to children helps in developing healthy eating behaviours through choosing foods which are healthy for them after carefully reading and understanding the nutrition facts and other information given on labels. Various researches too support that, dietary behaviours established during childhood and adolescence in future become lifelong habit. Reproduction of this study on a larger sample and on other age groups in private and government schools too would increase confidence in its reliability.

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