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EFFICACY OF NUTRITIONAL GAMES TO IMPROVE LEARNING OF NUTRITIONAL KNOWLEDGE IN ADOLESCENTS

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ABSTRACT

Objective: To study and compare the effectiveness of nutritional games to improve nutritional knowledge levels in adolescents. **Design:** A school based intervention was carried out for 8th and 9th grades for a period of two and a half months. A multi- factorial design was used with repeated measures of nutrition knowledge at three points in time, of dependent samples from control and intervention group. A sample of two schools each in experimental and control groups were selected by multi stage random sampling. Data was collected by interviewing the adolescents using a pretested, semi- structured schedule. **Results:** The study revealed a significant difference in the nutrition knowledge scores after post intervention-1. Significant decrease ($p < 0.05$) in the knowledge level was not observed at post intervention-2 indicating retention of knowledge due to effective learning through nutritional games. **Conclusion:** The developed nutritional games kit was found effective in imparting nutrition education for adolescents.

KEYWORDS

Intervention, Nutritional games, Heterogeneity and Knowledge.

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INTRODUCTION

Adolescent period is a time of peak growth and development, with total nutrient needs greater than any other period during the life cycle and provide a second chance for growth or catch- up growth for those children who have experienced a nutrient deficit during early life (Helene Delisle *et al*, 2005)¹. Due to rapid change in physical growth and psychological changes that occur, it place adolescents into a nutritionally vulnerable group with unhealthy dietary behaviours that do not meet

recommended dietary allowances (Savieje *et al*, 2007)².

Therefore it is necessary to provide healthful eating opportunities and suitable environments for adolescents, to make better food choices which can support overall good health and wellbeing. Adolescents are less dependent on their families for meals than younger children. Family meals offer a venue and an opportunity for more healthful foods and interaction among family members than adolescent might choose to eat on their own (DienneNeumak-Sztainer *et al*, 2000)³.

Adolescents typically consume very few fruits and vegetables and have the lowest rates of fruit and vegetable consumption in the population (US Dept. of Health and Human Services. Healthy people, 2010)⁴. Disparities in fruit and vegetable consumption could be due to various independent and interacting environmental, social, cultural, psychological and behavioural factors which provide a dynamic situational context that influence their food choices (Booth *et al*, 2001)⁵. Subjective norms, barriers, knowledge, usual food choice, parental style, spirituality/ religiosity and depressive syndromes were statistically significant predictors of adolescents' intake of fruit and vegetables (Leslie *et al*, 2003)⁶.

Adolescents face a series of challenges not only affects their growth and development but also livelihood as adults and remain a largely neglected and hard to reach segment of the population. Due to their positive tendency to learn more and curiosity, open mind to learn new things, use of effective communication channels to impart nutrition education can play a vital and significant role to enhance their nutritional awareness and good health. Nutrition education acts as an effective medium to improve healthy dietary habits and to make better food choices (Raghunatha *et al*, 2007)⁷. Nutrition education plays an important role in improving overall nutritional status of individuals/ community at large with respect to food, health and nutrition in convincing them to adopt to desirable changes in food habits (Begum *et al*, 2011)⁸.

Nutrition intervention and education strategies are in need and essential to promote the adoption of

healthy eating habits. Therefore nutritional games are used to disseminate the information to the adolescents in the current study because games provide the learners with instant information about the correctness of their efforts. Games are multi-dimensional entities that enable players to participate individually or in teams/groups in voluntary, competitive, physical or mental activities involving challenge and fantasy elements following specific rules, regulations and restrictions in order to reach a goal- specified by the game itself and finally learning to a quantifiable outcome (Zyda, 2005; Charsky, 2010)^{9,10}.

Games are challenging, imaginative, interesting and delightful; being embedded within a narrative and exhibiting clear rules and regulations- provide a perfect context for students to engage and learn effectively (Cheng *et al*, 2013)¹¹. Nutrition games are a way to provide competitive spirit, peer group interaction, visual stimulation while teaching about good and healthy eating practices. Games also help in skill development and motor development. Learning requires feedback to 'unfreeze' the individual's behaviour and to provide reinforcement of the change (Cunningham, 1984)¹².

Keeping in view of this, a school based approach suitable for adolescents in an urban setting is conducted to impart nutritional awareness in school going adolescents.

MATERIAL AND METHODS

Study design and data collection

The study design was a multi-factorial with repeated measures at three points in time, of dependent samples from control and experimental groups. A pretested knowledge assessment questionnaire consists of multiple choice questions on various aspects of nutrition and health was administered to adolescents. All answers were coded and fed to computer and analysed using SPSS package version 20. Before intervention base line data was obtained from the students and found heterogeneous in nature. Experimental group was given intervention through nutritional games for a period of two and a half months and post intervention -1 was implemented (post-test). Post intervention -2 (Retest) was

implemented to know the retention of the concepts taught through intervention strategy after a period of five weeks after post-intervention -1. Control group was not given any treatment. For the purpose of analysis, each right answer was assigned one mark and the wrong answer was given a zero. The questionnaire was administered to get the base line data was re-administered twice to analyse the impact of two interventions separately for experimental and control group.

Selection of schools and sample size

A list of schools was obtained from the district Education officer, Anantapur. Among the schools, four schools were selected by multistage random sampling technique and the principles/ correspondents of each school were explained about the purpose of the study and consent was obtained. Purposive sampling method was adopted to select 8th and 9th class children as study subjects. Within the class disproportionate random sampling technique was used to select 30 students consists of both gender from each class apportioned on 50-50%. Consent was obtained from study samples. Two schools each were randomly assigned as control and experimental group. A total of 240 school going adolescents consists of 121 boys and 119 girls formed the study sample.

Inclusion criteria

Adolescents of both sex, studying in class 8th and class 9th between 13 to 15 years who were not ill and present during the study period and was willing to participate were included in the study.

Exclusion criteria

Students of 8th and 9th class who were seriously ill or absent during the study period or non- willing to participate were excluded from the study.

Statistical analysis

Data from the nutrition knowledge and evaluation questionnaire were entered and analysed with the statistical Program for the Social Sciences, version 20. Post hoc analysis was conducted using RM Anova (repeated measure Anova) to compute the effect size of actual difference in nutrition knowledge between and within control and intervention group at initial, post intervention - 1(post-test) and post intervention -2 (retest) levels.

RESULTS

The base line data on the concepts of nutrition in control and experimental schools were 13.12 ± 3.29 and 18.55 ± 5.74 respectively. After intervention there was a significant increase in knowledge levels among the experimental group of students was observed.

At base line, significant difference ($p < 0.05$) was observed in the nutrition knowledge levels of school children between control and experimental schools indicating heterogeneity of the groups (Table No.1). This could be due to the selection of different schools for control and experimental groups to avoid the influence of treatment on control group.

Post intervention results indicated a significant improvement in the knowledge levels of the experimental group. However significant improvement was not observed in the knowledge levels of control group not exposed to any treatment (Table No.2).

When comparisons were made between the mean improvement in the knowledge levels of control and experimental groups, it was found that there was a significant increment in the experimental group as compared to the control group indicating the efficiency of the intervention (Figure No.1).

The improvement in mean scores of experimental group is significant compared to control group $p < 0.01$

Regarding the retention of knowledge gained through intervention, no significant difference was observed between the mean scores school children in the experimental group of post intervention -1 and post intervention -2 indicating the retention of knowledge gained through intervention (Table No.3).

DISCUSSION

Nutrition education influences the attitudes of adolescents to enhance their knowledge level to understand and appreciate the role of food and nutrition to obtain sound health. School based health initiatives are essential and useful tool for health promotion activities due to formal, closed and regular student teacher interaction and rapport, effective and efficient delivery system,

reinforcement strategies and the capacity to capture adolescents irrespective of socio- economic status, caste, creed, religion, language or family background. The health promoting potential of education strategies and practices utilizing nutritional games in the target group of adolescents for closing the knowledge gap strategy was tested. They act as the building blocks of positive health and wellbeing. A need was felt for school based education to be used as an effective strategy through which health disparities could be addressed to overcome malnutrition among vulnerable section of the population who are also the future citizens of the country. Nutritionally balanced and healthy adolescents reflect the country's human resource potential and the future of the country greatly depends on them.

In the present investigation, nutritional games approach adopted by the investigator in the experimental group showed a significant increase in the knowledge level of school going adolescents of experimental group over control group not exposed to any intervention strategy was attributed to the implementation of nutritional games approach.

For the delivery of health and nutrition messages various communication tools like radio, television, dramatization, folk songs, puppetry, discussions, debates, storytelling, printed materials like handouts, leaflets, booklets, pamphlets could be used effectively (Anjali Patnaik, 2004)¹³.

Nutrition intervention and education strategies are vital and essential to promote the adoption of healthy eating habits for adolescents. Nutritional games are used to disseminate the information to adolescents because games provide learners with instant information about the correctness of their efforts. The study was found effective in bringing a desirable improvement in the knowledge level of adolescents. Similar findings were evident from Tzufen Su (2014)¹⁴, Armel (2014)¹⁵, Silk *et al* (2008)¹⁶, French *et al*, (2006)¹⁷, Baranowsky *et al*,(2003)¹⁸, and Cullen *et al* (2001)¹⁹.

Table No.1: Base line data on knowledge levels of students

S.No	Group	n	Mean± SD	Significance
1	Control	120	13.12 ± 3.29	P<0.05*
2	Experimental	120	18.55 ± 5.74	

*Significant

Table No.2: Post- intervention knowledge levels of school children

S.No	Group	n	Pre-intervention	Post-intervention	Significance
1	Control	120	13.12 ± 3.29	13.64 ± 3.60	p > 0.05 ^{NS}
2	Experimental	120	18.55 ± 5.74	38.49 ± 5.88	P < 0.01 *

NS- Not significant

*- Significant

Table No.3: Retention of knowledge in the students of experimental group

S.No	n	Post- intervention 1	Post- intervention 2	Significance
1	120	38.44 ± 5.88	38.48 ± 5.73	P > 0.05 ^{NS}

NS- not significant

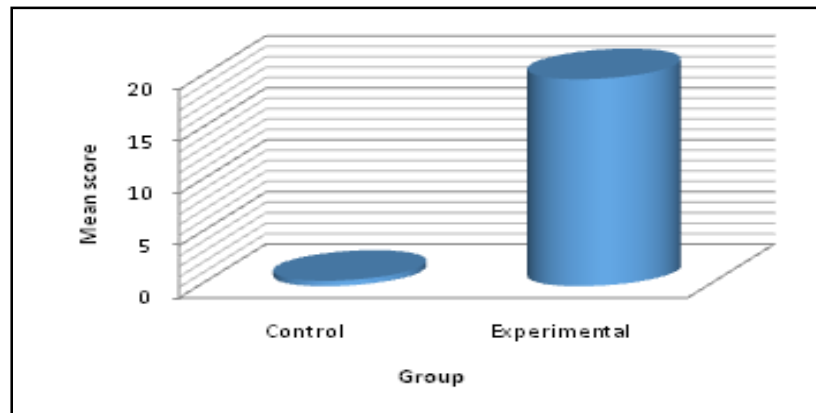


Figure No.1: Improvement in mean scores of school children after intervention

CONCLUSION

Nutrition education is a key element in programming lifelong healthy eating behavior and should start from early stages of life. Development of innovative nutrition education tools (games) are vital and a continuous process to bring about a significant improvement in the knowledge level and was found to be potent, efficient, effective tool and proved beneficial.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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