Original Research Article

IMPACT OF NUTRITION EDUCATION THROUGH INNOVATIVE STORY TELLING IN PRE-SCHOOL CHILDREN WITH AUTISM SPECTRUM DISORDER

ABSTRACT

Aim: To assess the impact of Nutrition education through innovative story telling in fruits consumption among the pre-school children with autism spectrum disorder.

Sample: Ninety children with autism spectrum disorder were selected from Preschools and BUDS schools of Thiruvananthapuram district.

Study design: To assess fruit consumption of pre-school children (3-6 years) with autism spectrum disorder, ninety children with autism spectrum disorder was selected from urban and rural areas of Trivandrum district, Kerala. Out of ninety, forty-five children with ASD were randomly selected as experiment group and forty-five children as control group. The experimental group received the nutrition education through story telling using story books.

Place of study: Urban and rural areas of Trivandrum district were randomly selected for study.

Methodology: Frequency of fruits consumption of 90 children (45 as control and 45 as experimental group) were collected using food frequency questionnaire in pre and post phase. After the nutrition education, pre and post scores of both groups were compared to find the deviation among the population.

Results: Majority of the children with autism spectrum disorder shows significant changes in post Nutrition education. Frequency of fruits consumption increased after the Nutrition education in the experimental group compared to control group.

Conclusion: Early childhood is a period of rapid growth and is an important phase for developing eating habits because the dietary behaviours acquired during the early years of life can extend to adulthood.

Keywords: Autism Spectrum Disorder, Nutrition Education, Fruits, Story Telling

1. INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental condition marked by limitations in social interactions and communication, as well as a restriction in interests and repetitive behaviours (Hodges *et al*., 2019). The taste, smell, colour, and texture of food can all affect autism children. They may reduce or completely skip certain foods, or even entire food categories. Based on multiple researches, children diagnosed with ASD who follow a specific

diet consisting of fruits and vegetables have a reduction in their symptoms (Hartman and Patel, 2020).

A study conducted in South Korea examines the possible impacts of nutrition education that emphasizes the consumption of fruits and vegetables on the dietary habits and behaviour of pre-schoolers. The results show that teaching pre-schoolers the value of eating a balanced diet with an emphasis on fruits and vegetables enhanced both the children's emotional and behavioural development and their consumption of fruits and vegetable. It is necessary to conduct a large-scale, long-term research with a more thorough study design in order to better explore the role that fruit and vegetable intake plays in the cognitive development and behaviour of pre-schoolers (Choi *et al*., 2018). Preschool-aged children are more susceptible to nutritional deficiencies. Preserving optimal nutritional status during the early years is therefore crucial. (Kwaicka and Regulska-Ilow, 2013).

Storytelling is an essential part of preschool education. It helps children develop their language skills, creativity, communication skills, social skills, and confidence. When children listen to stories, they learn new words, phrases, and sentence structures. They also learn how to express themselves and communicate with others. Storytelling can help children understand complex concepts and ideas in a fun and engaging way. Hence this paper aims to assess the impact of Nutrition education through innovative story telling in fruits consumption among the pre-school children with autism spectrum disorder.

2. MATERIALS AND METHODS

2.1. Locale of Study

Ninety children with autism spectrum disorder were selected from Thiruvananthapuram District of Kerala State.

2.2. Plan of Action

Ninety children with autism spectrum disorder were selected and their frequency of fruits consumption using food frequency questionnaire was assessed. Out of 90, forty-five were provided nutrition education and were subjected to assessment post education.

2.3. Selection of Sample

Ninety children were randomly selected from private schools, BUD’s schools in Thiruvananthapuram district of Kerala state.

2.4.Data collection tools

- Food frequency questionnaire (Vijay *et al.*, 2020) to assess frequency of fruits consumption

2.5. Main study

The total sample was randomly selected categorized as control and experimental group (45members each). The experimental group was subjected to nutrition education using

stories. Nutrition education was imparted using story books. Story books were imparted through direct method in schools. Topics covered in the stories included the importance of nutrition, importance of fruits consumption, requirement for daily fruit intake, know more about the types of fruits, understand the cons of junk foods and encourage their group participation. Mainly the education addressed the importance of fruits consumption. One of the most effective methods in teaching children is story telling. It helps children to better understand the message of the program. The illustrations accompanying the story can be prepared within the context of the program by the educators themselves or together with the children. The illustration was related to the content of stories and only a minimal number of illustrations were used. The fourth section, the practice stage, ideally begins right after the first, second and third sections are completed. However, depending on the unique set of circumstances governing the students, this section was also performed at another time deemed more appropriate by the educator. The practice section included painting activities conducted on different subject matter, role-playing a story that has been told beforehand or using cardboard or play dough to recreate stories.

Frequency of fruits consumption of 90 children (45 as control and 45 as experimental group) were collected using food frequency questionnaire in pre and post phase. After the nutrition education, pre and post scores of both groups were compared to find the deviation among the population.

3. RESULTS

3.1. PARTICIPATION OF STUDENTS DURING STORY TIME

During the story session, fourteen questions were given to assess the participant's comprehension and participation in the nutritioneducation session. Scores ranging from 0 to 3 were obtained from observation of the pre-schoolers with autism. Scores were given based on their intensity of participation. Three points were awarded for always, two points for occasionally, one point for infrequently, and zero points for never. Scores of 42–22 were classified as high scores; scores of 21–15 as medium scores; and scores of less than or equal to 14 as lower scores.

Table 1. Participation score of children during story time

Scores	Percentage
High score	26(57.78)
Medium score	10(22.22)
Low score	9(20)

Table 1 shows that during the story-telling session, 57.78% of pre-school children scored high participation score, 22.22% had medium participation score and the other 20% had lower participation score.

3.2. FREQUENCY OF FRUITS CONSUMPTION

Table 2. Fruits consumption of experimental and control group

FRUIT CONSUMPTION		PRE	POST	|t| value	P value
	Experimental Group	26.02 ±16.24	42.51 ±13.40	9.87	0.00**
	Control Group	22 ±11.22	23.06 ±11.36	1.00	0.32

Table 2 makes it abundantly evident that fruit consumption increased after the nutrition education. The pre-score in the experimental group was 26.02, while the post-score was 42.5 (t value=9.87, p value=0.00).In contrast, no discernible variation was seen in the control group.

Table3. Fruits consumption of experimental group

OTHER VEGETABLES	PRE	POST	|t| value	P value
Apple	2.06 ± 2.46	3.28 ± 2.32	4.63	0.00**
Banana	2.57 ± 2.74	4.24 ± 2.36	5.55	0.00**
Cherries	0.60 ± 0.91	0.68 ± 0.94	0.89	0.37
Dates	0.17 ±0.44	0.33 ± 0.52	2.46	0.01*
Grape	1.53 ± 2.16	1.80 ± 1.97	2.07	0.04*
Guava	0.80 ± 0.59	1.80 ± 1.92	4.63	0.00**
Jackfruit	0.44 ± 0.75	0.66 ± 0.79	2.22	0.03*
Kiwi	0.62 ± 1.17	0.91 ± 1.44	2.07	0.04*
Lemon	1.35	1.64	2.22	0.03*

	± 1.90	± 1.83		
Mango	0.378 ±0.71	0.71 ± 0.78	2.62	0.01*
Orange	2.84 ±2.68	4.60 ± 2.04	5.43	0.00**
Pomegranate	2.62 ± 2.64	4.42 ± 2.24	4.72	0.00**
Pineapple	0.75 ± 1.46	1.08 ± 0.97	2.09	0.04*
Papaya	2.00 ± 2.25	3.51 ± 2.18	5.02	0.00**
Passion fruit	0.24 ± 0.88	0.24 ± 0.93	0.00	1.00
Rambutan	0.22 ± 0.82	0.44 ± 1.09	1.87	0.06
Strawberry	0.15 ± 0.82	0.24 ±0.52	1.15	0.25
Sapota	1.04 ± 1.63	1.57 ± 1.72	4.00	0.00**
Tomato	3.00 ± 1.12	3.02 ± 1.09	1.00	0.32
Watermelon	1.22 ± 1.78	2.77 ±1.77	7.41	0.00**

Following the nutrition education session, there was a discernible rise in fruit consumption, as shown by Table 3, which displays the experimental group's consumption pattern. There has been an important change in how children approach eating apples, bananas, dates, grapes, guavas, jackfruit, kiwis, lemons, mangoes, oranges, pomegranates, pineapple, papayas, tomatoes, and watermelons. The quantity of passion fruit, strawberries, rambutan, and cherries consumed, however, did not change much. There were no discernible differences between the strawberries (t value = 1.15), rambutan (t value = 1.87), and cherries (t value = 0.37). The mean value of the apple increases from 2.06 to 3.28 (t value = 4.63). In the same way, the mean value of guavas rises from 0.80 to 1.80 (t value = 4.63), whereas the mean value of bananas increases from 2.57 to 4.24 (t value = 5.55). The average scores for oranges and pomegranates show changes, ranging from 2.84 to 4.60 and 2.62 to 4.42. When comparing the papaya mean value to the pre and post scores, it is likewise high (t value = 5.02). Watermelon (t value = 7.41) and tomatoes (t value = 4.00) both show increases in their mean values.

Table4. Fruits consumption of control group

OTHER VEGETABLES	PRE	POST	|t| value	P value

Apple	2.71 ± 2.25	2.62 2.12	0.89	0.38
Banana	1.64 ± 2.11	1.64 ± 2.11	0.00	1.00
Cherries	0.73 ± 1.37	0.73 ± 1.37	-	-
Dates	0.73 ± 1.42	0.73 ± 1.42	-	-
Grape	1.40 ± 2.17	1.40 ± 2.17	-	-
Guava	1.20 ± 2.08	1.20 ± 2.08	-	-
Jackfruit	0.62 ±0.91	0.62 ± 0.91	-	-
Kiwi	0.28 ± 0.96	0.28 ± 0.96	-	-
Lemon	1.71 ± 2.50	1.66 ± 2.47	0.40	0.69
Mango	0.95 ± 1.56	0.91 ± 1.52	0.44	0.66
Orange	1.91 ± 2.50	1.80 ± 2.45	0.49	0.63
Pomegranate	2.35 ± 2.56	2.46 ± 2.47	0.58	0.56
Pineapple	0.66 ± 1.43	0.51 ± 1.32	1.48	0.15
Papaya	1.62 ± 2.31	1.66 ± 2.26	0.70	0.49
Passion fruit	0.24 ± 0.95	0.24 ± 0.95	-	-
Rambutan	0.17 ± 0.91	0.17 ± 0.91	-	-
Strawberry	0.06 ± 0.25	0.06 ± 0.25	-	-
Sapota	2.31 ± 2.27	2.22 ± 2.26	1.00	0.32
Tomato	0.04 ± 0.20	0.04 ± 0.20	-	-
Watermelon	1.64 ± 1.72	1.28 ± 1.54	1.83	0.07

Table No. 2indicates that after two months, there were no noticeable changes in the amount of fruit consumed by the control group.

4. DISCUSSION

An increased or decreased sensitivity to environmental sensory cues is one of the sensory processing issues associated with autism spectrum disorder (ASD). This suggests that a significant number of children with this disease have food selectivity, which is the medical term for problems with eating and nutrition. ASD is characterized by high dietary preference. Numerous aspects, including as texture, appearance, brand, packaging, temperature, meal presentation, colour, taste, and fragrance, have been reported by parents of children with ASD to impact their children's food choices. Furthermore, as a therapeutic nutrition education to address their child's behaviour as well as gastrointestinal problems, parents may use specific dietary restrictions, such as gluten-free (GF) or casein-free (CF) diets.

The digital storytelling involves a child making choices of snacks and meals at school and indicates how these choices have an impact on the environment and health if consumed or wasted. The stories also pointed out the Over-consumption or wrong consumption. Pre-schoolers are encouraged to understand the interconnection of health, nutrition and environment. The scenario involves interactive choices of various foods and their impact on the environment when consumed or wasted. The children have the probability to enhance the scenario through their different dietary choices and are expected to make decisions for the evolvement of the story. This study may contribute to the promotion of children’s nutrition education and environmental sensitization in the context of sustainable education.

5. CONCLUSION

Majority of children with ASD of experimental group show remarkable changes in fruits consumption with control group. And their frequency of fruits consumption was changed.Today’s children are tomorrow’s future. Therefore, nurturing them with good nutrition from their young age is highly essential.The development of nutritional education program within the educational institutions provide all the relevant information to the people regarding the essential nutrients of proteins, vitamins, minerals, carbohydrates, fats, calcium, potassium, zinc, iron and so on.The personality of a child is largely shaped during the preschool period, and the behavioural habits that are formed during this period will go on to impact adult behaviour. Therefore, the eating habits that a child acquires during the preschool period will be brought to bear on their future stages of life and, given that they have adopted healthy habits, be effective in preventing various nutritional problems in the future. Good nutrition and healthy eating habits build a healthy foundation for children. Nutrition education should be provided at every stage of formal and informal education.

8. REFERENCES

1. ChoiEB, LeeJE, and HwangJY. Fruit and vegetable intakes in relation to behavioural outcomes associated with a nutrition education in preschoolers. *Nutrition Research and Practice*. 2018; 12(6): 521-526.

2. Hartman RE. and Patel D. Dietary Approaches to the Management of ASD. *Adv. in Neurobiol.*2020; 24: 547-571.

3. HodgesH, Fealko C, and SoaresN.Autism Spectrum Disorder: Definition,Epidemiology, Causes. Transl. *Pediatr*. 2019; 9(1): 55-65.

4. Kwaicka A. and Regulska-Ilow B.What a nutritional status, diet and dietary supplements can affect autism.*Natl Libr. of Medi*. 2013;64(1):1-12.

5. VijayA, MohanL, Taylor MA, GroveJI, Valdes AM, Aithal GP, et al. The evaluation and use of a food frequency questionnaire among the population in Trivandrum, south Kerala, India. *Nutrients*.2020; 12(2): 383.