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Vijayalakshmi P
M.Sc., Department of Home
Science, Women's Christian
College, Chennai, Tamil Nadu,
India.

Dr. Sheila John
Supervisor and Head,
Department of Home Science,
Women's Christian College,
Chennai, Tamil Nadu, India.

T Sivapriya
(Ph.D.), Department of Home
Science, Women's Christian
College, Chennai, Tamil Nadu,
India.

Correspondence
T Sivapriya
(Ph.D.), Department of Home
Science, Women's Christian
College, Chennai, Tamil Nadu,
India.

Relationship of body mass index, diet quality, physical activity level and fruit & vegetable intake among parents' and their preschool aged children

Vijayalakshmi P, Dr. Sheila John and T Sivapriya

Abstract

Objectives: Healthy nutrition during childhood should include eating a variety of foods, consuming sufficient energy to growth and development, and also to avoid the development of obesity. The parental psychological distress may influence child physical and nutritional health through parental feeding practices. The present study was designed to examine the relationship of body mass Index, diet quality, physical activity level, fruit & vegetable intake among parents' and their preschool children.

Methods: Nutritional status of one hundred and thirty eight pre-schoolers was determined using anthropometric parameters, dietary assessment to determine diet quality. Physical activity level was assessed using Physical activity index tool

Results: Results indicated that there was significant positive correlation between parents and child nutrient intake. There was no significant association between body mass index and fruit and vegetable consumption. No significant correlation was found between the body mass index of parents and children.

Conclusion: It is crucial to instil healthy dietary practices among preschool children and their parents to prevent them from noncommunicable diseases. The importance of consuming adequate fruits and vegetables should be emphasised.

Keywords: Preschoolers, parents, BMI, dietary practices, physical activity, vegetable and fruit consumption

1. Introduction

Obesity is a health concern in adults and children ultimately resulting in an increased risk for chronic diseases including type 2 diabetes, cardiovascular disease, and cancer. Evidence suggests that children's body mass index and eating behaviours are associated with the body mass index and eating behaviours of their parents. Increased fruit and vegetable consumption as part of a healthy, balanced diet is an established health goal, globally and is often recommended by practitioners as a targeted behavioural strategy to reduce body weight^[1].

Although attempts have been made to prevent obesity during the first years of life, early childhood period may represent the best opportunity for obesity prevention. During this stage, lifestyle behaviours that promote obesity are just being learned, and it is easier to establish new behaviours than to change existing ones^[2].

Evidence from studies of typically developing children suggests that dietary contributors to caloric imbalance include increased consumption of sugar-sweetened beverages, reduced fruit and vegetable intake, increased portion sizes and eating more meals away from home. It remains unknown, whether these dietary pattern are obesogenic in children^[3].

A review evaluating the role of the home environment on fruit and vegetable intake in children and adolescents showed that availability, parental modeling, and parental intake were all positively associated with children's fruit and vegetable consumption. The role of the mother in children's eating behaviors may be well documented^[4].

The increase in childhood obesity over the past several decades, together with the associated health problems and costs, is raising grave concern among health care professionals, policy experts and parents. The possible underlying causes of the obesity epidemic can be attributed to energy intake, energy expenditure, and energy balance, noting that children who eat more "empty calories" and expend fewer calories through physical activity are more likely to be obese than other children. Children with at least one overweight or obese parent are at higher risk for becoming obese or overweight themselves compared with children of normal weight

parents, even as early as age 4 years. Besides the influence of genetics two of the most important contribution to a child's weight is dietary intake and physical activity which are often influenced by parents. These behaviors are especially important because they are shaped early and continued through adulthood [5].

Although few interventions have specifically addressed fruit and vegetable consumption, evidence suggests that coupling dietary advice to increase fruit and vegetable intake with advice to decrease energy intake is a particularly effective strategy for weight management. This approach may facilitate weight loss because it emphasizes positive messages rather than negative, restrictive messages [6].

The broad objective of the study was to screen preschoolers and their parents in the age group of 3 – 6 years for overweight and obesity. The study will bring to light childhood obesity and its causes. Early identification of risk factor in these subjects can help to prevent earlier, and to inculcate healthy eating habits.

2. Objectives of the Study

To assess the nutritional status by collecting information pertaining to anthropometric measurements and indices such as height, body weight and body mass index, diet quality, dietary intake, fruit and vegetable intake and the physical activity level of selected one hundred and thirty eight preschoolers and their parents.

3. Material and methods

The study protocol was reviewed and approved by the Independent Ethics Committee of Women's Christian College, Chennai. A descriptive cross sectional study that included one-to-one interviews with parents' and their preschool children was implemented. The present study was designed to study the relationship of body mass Index, diet quality, physical activity level, fruit & vegetable intake among parents' and their preschool aged children. One hundred and thirty eight preschoolers within the age of 3 to 6 years were selected from a pre-school in Chennai. The nutritional status was determined using anthropometric parameters, dietary assessment to determine diet quality and physical activity level was assessed using Physical Activity Index tool [7].

4. Results and discussion

Globally, majority of people are consistently consuming less than the daily recommended fruit and vegetable intake requirement. There is a large gap between actual and recommended consumption of both fruits and vegetable despite decades of concern and publicity while resultant outcomes were short-lived. Fruits and vegetables provide a diversified, flavored, colorful, tasty, low caloric, and protective, micro-nutrient rich diet. Overall it is estimated that low fruits and vegetables intake is considered as the sixth main risk factor for mortality in the world. Table 1 provides the anthropometric measurements of children and parents.

From Table 2 it can be inferred that there is no significant correlation between mean body mass index of parents (father and mother) and their children. Similarly no significant correlation was found between parents (father and mother) weight and their children.

It is evident from the above table 3, that 99 per cent of children consumed 3 servings of fruits and vegetables while the remaining 1 per cent of children consumed 3-5 servings of fruits and vegetables. When the parents were enquired about the consumption pattern of fruits and vegetables, 62 per cent of

parents consumed 0-3 servings of fruits and vegetables and the remaining 38 per cent of them consumed 3-5 servings of fruits and vegetables.

Table 4, denotes that the mean nutrient intake of nutrients such as energy, protein, fats and essential micronutrient iron were more than the RDA which was statistically significant ($p < 0.000$). On the other hand intake of essential micronutrients such as calcium fell short of the RDA which was also statistically significant ($p < 0.000$). Thus the statistical analysis of the mean nutrient intake of parents when correlated with children was found to be significant at 5 % level.

The correlation between nutrient intake of mother and their preschool children based on nutrients is given in the table 5. Table 5 indicates a statistically significant positive correlation between parent (mother) and child nutrient intake for nutrients such as fat and protein; fat and fat; fat and calcium respectively ($p < 0.001$). The correlation between fathers and their preschool children based on nutrients is given in the table 6. It indicates a statistically significant positive correlation ($p < 0.001$) between parent (father) and child nutrient intake such as fat and fat; iron and protein; protein and fat respectively.

From the above table 7, it was inferred that the P value was > 0.05 and can be clearly inferred that there is no significant association between the fruit and vegetable servings consumed by parents and children and the range of body mass index of the parents and children.

Physical activity is an important part of a healthy life style. It promotes muscles building, increased metabolism and disease prevention. Among children overweight, obesity and low levels of physical activity has been shown to be associated with increased risk of disease in later life (Edelstein, 2015). Physical activity reduces the risk of cardiovascular diseases, diabetes, colon and breast cancer, and depression. Moreover adequate levels of physical activity will decrease the risk of a hip or vertebral fracture and help control weight (WHO, 2016). The general lifestyle related to physical activity indicated that children and their parents lead to sedentary lifestyle. There are studies that have proved that the physical inactivity leads to childhood obesity. Children those who are less in performing physical activity and are more in their sedentary activity are more risk to overweight and obesity (Andersen *et al.*, 1998). The association between physical activity and body mass index is given in the table 9. It was inferred that the p value < 0.05 , it is clearly inferred that there is no significant association between the type of physical activity and body mass index between parents and children.

Investigation about the relationship between anthropometric measures, physical activity level and dietary pattern among the parents and their preschool children in the age group of 3 to 5 years furnished thought-provoking conclusions. There was no significant correlation between the body mass index of parents and children. The children nutrient intake was higher than the recommended dietary allowance for fats, protein and iron. There is a positive correlation between intake of nutrient and age. There is statistical significant positive correlation between parents and child nutrient intake. There was no significant association between body mass index and fruit and vegetable consumption and also between physical activity and body mass index.

Although few attempts have been made to prevent obesity during the first years of life, this period may represent the best opportunity for obesity prevention. The data generated from this study, particularly that regarding BMI of children and parents, nutrient intake of children and BMI, fruit and

vegetable consumption, BMI and physical activity should be explored.

Table 1

Mean values of Anthropometric Measurements			
Anthropometric Measurements	Child	Father	Mother
Height (cm)	99.15±12.74	164.25 ± 11.30	155.65 ±10.80
Weight kg	15.70±3.73	71.40 ±9.85	63.06±10.30
BMI	17.11±4.01	26.90±4.79	26.39±5.18

Table 2

Correlation between Body Mass Index and Weight of Parents and Pre-school Children						
S.No	Variable			'r' value	p value	Level of significance
1	BMI	Pre-school children 17.117± 4.011	Father 26.902 ±4.792	0.033	0.695	NS
			Mother 26.394± 5.1804	0.102	0.232	NS
2	Weight	Pre-school children 15.709 ± 3.737	Father 71.407 ± 9.856	0.122	0.125	NS
			Mother 63.061 ±10.300	0.394	1.79	NS

*NS- Not Significant

Table 3

Average Consumption of fruits and Vegetables consumed by Parents and Preschool Children			
Variable	Range	N=138	Per cent
Child	0-3 Servings	136	99
	3-5 Servings	2	1
Father	0-3 Servings	86	62
	3-5 Servings	52	38
Mother	0-3 Servings	86	62
	3-5 servings	52	38

Table 4

Mean nutrient intake compared with RDA of preschool children					
Nutrient	Intake	RDA	SD	't' value	Level of significance
Energy (Kcal)	1513.226	1350	29.23	8.361	5%
Carbohydrates (g)	189.8424	337.5	21.02	-35.604	5%
Protein(g)	25.7828	20	11.03	6.051	5%
Fats (g)	34.38331	25	12.81	8.600	5%
Calcium (mg)	477.8813	600	12.58	-11.896	5%
Iron (mg)	16.99804	13	3.08	15.212	5%

Table 5

Correlation between nutrients among mothers and preschool children				
Mother Nutrients	Child Nutrients	'r' value	p value	Level of significance
Fat	Protein	0.30	0.000	1%
Fat	Fat	0.35	0.000	1%
Fat	Calcium	0.29	0.000	1%
Iron	Calcium	0.26	0.001	1%

*1 % - Significant at 0.01 %

Table 6

Correlation between nutrients among fathers and children				
Father Nutrients	Child Nutrients	'r' value	p value	Level of significance
Fat	Fat	0.37	0.000	1%
Iron	Protein	0.37	0.000	1%
Iron	Fat	0.35	0.000	1%
Fat	Calcium	0.21	0.012	5%
Protein	Fat	0.24	0.004	5%

*1 % - Significant at 0.001 % level, 5 % - Significant at 0.05 % level

Table 7

Association between Body Mass Index and fruits and vegetables consumption				
Fruits and vegetable consumption	BMI	Chi-square value	p value	Level of significance
0-3 servings	Underweight Normal Overweight Obese	0.693	0.857	NS

*NS – Not Significant

Table 8

Classification of Physical activity for the child and parent			
Variable	Range	N = 138	Per cent
Child	Active	49	36
	Moderate	-	-
	Sedentary	89	64
Father	Active	21	15
	Moderate	-	-
	Sedentary	117	85
Mother	Active	4	3
	Moderate	-	-
	Sedentary	134	97

Table 9

Association between physical activity and Body mass index				
Physical Activity	BMI	Chi-square value	p value	Level of significance
Active Sedentary	Underweight Normal Overweight Obese	3.695	0.296	NS

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