



Stress Inducing and Stress Reducing Foods in Children

Sapna Dinesh¹ and Syama Kumari.s²

¹Prasanthi, Kesava Dev Road, Mudavanmugal, Poojapura, Trivandrum-695012, Kerala, INDIA

²Dept of Home Science, Kerala Agricultural College, Trivandrum., Kerala, INDIA

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Abstract

Stress today is a worldwide epidemic affecting every individual regardless of age. For more than half a century stress has been of significant interest to scientists and educationists all over the world. Today in Kerala the stress related problems are increasing alarmingly among children and adults. Things that cause us stress are called stressors. Many events can be thought of as stressors. These could be academic pressure, conflicts, nutritional disorders, other health related problems etc. Diet is one area of behaviour that tends to be abused or neglected when under stress, which in turn affects our ability to cope with stress. A major problem seen today among children is eating disorder and poor food consumption pattern. The present study therefore aims in studying the diet and food consumption pattern of the children and thereby identifying the stress inducing and stress reducing foods for the children.

Keywords: Stress, stressor, stress inducing foods, stress reducing foods.

Introduction

Stress is one of the topics of the century, which has attracted the attention of a wide range of people. Children begin to experience stress at a very early age and they are often more vulnerable to stress than adults. Modern life style, environmental, and academic pressures and also cultural variations all are definitely causing much stress to our children as can be seen from their behaviour, responses and problems.

Stress, Nutrition and Health can be viewed as a related mechanism, a fact and a process respectively one leading to the other in a vicious and vitreous cycle and form the wellness model of life and happiness. As the old saying goes, "Health is Wealth" and all humans have countless potentials to gain health and happiness, the essence of successful life and maximum performance.

According to Gomez, stress is defined as our reaction to the environment as well as our internal thoughts and feelings¹. Arthur and John defined stress as a physical or psychological stimulus, which produces strain or disruption of the individual's normal psychological equilibrium². Stress to some extent is normal and is essential to meet the challenges of life. But when it exceeds the limit and become excess, it becomes a problem to be managed urgently.

Today's children are found to be experiencing more stress than those of previous years. Reasons could be many. As many of the health and other problems occur due to diet and food consumption pattern so it could be interesting to know whether the changing food and food consumption pattern has anything to do with the growing stress of children. Studies are very few to know the relationship of food consumption pattern and stress of

children. Hence a probe into this matter could be much useful particularly to parents and teachers.

Nutrition and food consumption pattern have a major role in the children's physical and mental well being. So, there is likely chance that these factors affect their stress level also. A deeper insight into this can help children, parents and teachers to understand children's stress and help them to adopt a healthy eating plan thereby making them physically and mentally fit leading a stress free life. The present study therefore was conducted with an objective to study children's stress, their diet pattern and its relationship with their stress. Two different places with different food consumption and dietary patterns were selected for comparison.

Objectives: i. To study and understand the level of stress in school children. ii. To understand the food consumption pattern of school children. iii. To find out the relationship between food consumption pattern of children and their stress. iv. To identify the stress inducing and stress reducing foods of the children.

Methodology

School children studying in Thiruvananthapuram and Malayalee students studying in Abu Dhabi were selected for the study. Being the capital cities, Thiruvananthapuram and Abu Dhabi were the places selected for the study, as a major cross section of the population could be obtained from both of these places. As appropriate scale was not available a simple stress assessment scale (S.A Scale) was developed and standardized following standard procedures. A pilot study was done on 493 children, selected from schools not selected for the final study to test the clarity, ambiguity and difficulty of the statements and

the feasibility to measure stress. The reliability of the finalized scale was found to be 0.99.

The S. A. Scale was administered to school children from 4 to 17 years of age. Three schools were selected each from Thiruvananthapuram and Abu Dhabi using random sampling method. From each school two divisions of each class from preschool to XII STD were randomly selected and the scale was administered. The data was collected from 80 preschoolers, 202 children from I – V STD, and 385 children from VI-XII studying in Thiruvananthapuram and 152 preschoolers, 307 children of I-V STD and 488 children of VI-XII standard studying in Abu Dhabi. Thus a total of 667 children in Thiruvananthapuram and 947 children in Abu Dhabi were screened for stress. i.e., the scale was administered to a total of 1614 children from 4-17 years of age.

From the total children screened, both from Thiruvananthapuram and Abu Dhabi 30 children with highest stress scores were selected from each age group ranging from 4 to 17 years giving equal representation to boys and girls, i.e. a total of 840 children formed the major sample, 420 each from Thiruvananthapuram and Abu Dhabi.

Among the children who were identified as experiencing above average stress, information regarding their food use frequency was collected. The frequency of use of different food items in the dietaries of respondents clearly indicated the foods regularly consumed by them. In this study food use frequency and food preferences of the subjects were measured separately using a checklist on an eight point scale and a three point scale respectively. The locally popular foods and those frequently advertised through media were listed and respondents' use and preference for each item was rated separately. The food use frequency and preference score for each of the food groups used by the respondents were calculated using the formula suggested by Reaburn et al. as follows³.

$$\text{Mean Score} = \frac{R_1S_1 + R_2S_2 + \dots + R_nS_n}{100}$$
$$\text{Percent of total score} = \frac{\text{Mean Score}}{n}$$

S_i = Scale of rating given for frequency of use of a food item ($i=1, 2, \dots, n$). R_i = Percentage of subjects selecting a rating coming under frequency group ($i=1, 2, \dots, n$). n = Maximum scale of rating (4 in this case).

The percentage of respondents using each food item and also their preferences for each food item was then computed based on the frequency of use and food preference score. The foods were grouped according to their use. The foods used for breakfast, lunch, evening tea and dinner were grouped as fats and oils, sugar, vegetables, fruits, fish, meat, egg and main dishes. It was further classified as rice items, wheat items, and maida items, fast foods, sweets, snacks, and desserts and beverages for computation. Beverages included milk, milk

drinks where the children consumed milk powders available in the market, carbonated drinks like coke, sprite, etc, and other commonly used drinks.

The data collected were consolidated and statistically analyzed and the results are given below with discussions.

Results and Discussion

In order to study the age and gender wise stress levels in children, both boys and girls were grouped separately as early childhood years (4-6 years), late childhood years (7-10 years) and adolescence (11-17 years). The stress assessed was divided into five levels namely, normal, mild, moderate, severe and very severe and comparisons were made. The study revealed that out of the 1614 children studied, more than 90% of the children showed mild to moderate level of stress. The children with above normal stress in both the cities are depicted in table 1.

In Thiruvananthapuram when age wise comparison was done, it was seen that children faced more stress during early adolescence. Gender wise comparison revealed that 99.1% of the girls and 99% of the boys faced above normal stress. But in the case of Abu Dhabi children, stress level varied with age. For girls, late adolescence was very stressful where as for boys, preschool age and beginning of adolescent period seemed to be stressful. It was also seen that 91.3% of the girls and 93.7% of the boys had above normal stress. Thus compared to the children of Thiruvananthapuram, in Abu Dhabi, boys had more stress than girls. On the whole, children of Thiruvananthapuram faced more stress than those of Abu Dhabi irrespective of sex. But in both places more than 90% of the children were found to be facing above normal stress which is not a healthy sign.

Similar results were obtained in a study done by Khalid et al, to determine the prevalence rates and severity of depression, anxiety and stress among Saudi adolescent boys. The study indicated that indicated that out of 1723 adolescent boys studied, 59.4% had at least one of the three disorders, 40.7% had at least two and 22.6% had all the three disorders. Moreover, more than one third of the participants (38.2%) had depression, while 48.9% had anxiety and 35.5% had stress. Depression, anxiety and stress were strongly, positively, and significantly correlated⁴

This result agreed with the observations made by many psychologists, doctors and counselors that most of the children of today are facing severe stress that they find very hard to cope with. According to them many of the psychosomatic problems and suicides commonly seen in our children are found to be the results of this stress. The causes of the stress can be either due to their familial or academic problems or their lifestyle. According to a study by Mizra et al. students experienced highest stress levels due to academic pressure, followed by self-imposed stress⁵.

Table-1
Level of stress in children from Thiruvananthapuram and Abu Dhabi based on age and sex

TVM Girls N=(346) Age	Total No	Normal No (%)	Total Children with Above Normal Stress N (%)	Boys N=(321)	Total No	Normal No (%)	Total Children with Above Normal Stress
				Age			
4	30		30(100%)	4	27		27(100%)
5	16		16(100%)	5	17		17(100%)
6	17	1(5.9)	16(94.1%)	6	17		17(100%)
7	21		21(100%)	7	15		15(100%)
8	24		24(100%)	8	23		23(100%)
9	32		32(100%)	9	19	1(5.3)	18(94.7%)
10	24		24(100%)	10	26	1(3.8)	25(96.2%)
11	32	1(3.1)	31(96.9%)	11	28		28(100%)
12	23		23(100%)	12	37		37(100%)
13	28		28(100%)	13	32		32(100%)
14	25		25(100%)	14	25	1(4.0)	24(96%)
15	27		27(100%)	15	17		17(100%)
16	28	1(3.6)	27(96.4%)	16	18		18(100%)
17	19		19(100%)	17	20		20(100%)
Total	346	3(0.9)	343(99.1%)	Total	321	3(0.9)	318(99.1%)
AUH							
Girls N=(553)				Boys N=(394)			
4	61	4(6.6)	57(93.4%)	4	40	4(10.0)	36(90%)
5	16	1(6.2)	15(93.8%)	5	35	4(11.4)	31(88.6%)
6	23		23(100%)	6	24		24(100%)
7	41	4(9.8)	37(90.2%)	7	29	1(3.4)	28(96.6%)
8	41	1(2.4)	40(97.6%)	8	30	1(3.3)	29(96.7%)
9	38	3(7.9)	35(92.1%)	9	20	2(10.0)	18(90%)
10	40		40(100%)	10	21	3(14.3)	18(85.7%)
11	25	2(8.0)	23(92%)	11	25		25(100%)
12	51	1(2.0)	50(98%)	12	27	5(18.5)	22(81.5%)
13	36	3(8.3)	33(91.7%)	13	26		26(100%)
14	57	2(3.5)	55(96.5%)	14	35	2(5.7)	33(94.3%)
15	29	14(48.3)	15(51.7%)	15	27	2(7.4)	25(92.6%)
16	25	10(40.0)	15(60%)	16	29		29(100%)
17	70	1(1.4)	69(98.6%)	17	26	1(3.8)	25(96.2%)
Total	553	46(9.1)	505(91.3%)	Total	394	25(6.3)	369(93.7%)

TVM- Thiruvananthapuram, AUH- Abu Dhabi.

In order to study whether, the food consumption pattern had any influence on the stress of children their food use frequency was studied. The food use frequency obtained by the children of both Thiruvananthapuram and Abu Dhabi for various food items is given in table 2.

Table-2
The food use frequency obtained for boys and girls for various food items

Food Items	Mean Score	
	Girls	Boys
Fats and oils	3.54	3.77
Sugar	3.89	3.26
Vegetables	3.60	4.10
Fruits	4.20	4.14
Fish	4.16	4.13
Meat	3.41	3.71
Egg	3.95	3.56
Main Dishes		
Bread	3.50	4.10
Cornflakes	4.07	3.86
Rice items	4.18	4.09
Wheat items	4.20	4.16
Maida items	4.12	3.67
Fast Foods	4.11	4.01
Sweets	4.17	4.13
Snacks	3.81	3.59
Dessert	4.05	3.89
Beverages		
Milk Drinks	2.08	3.42
Carbonated Drinks	3.99	3.70
Tea/Coffee	2.08	3.40
Milk and Milk Products	3.80	3.65
Fruit Juices	3.71	3.39

The results indicated that the traditional food habits of Keralites are completely changing and a diversion to western style foods are seen more among girls. So also 90% or more of them daily used lots of sweets, desserts and fast foods. This consumption pattern could be a major reason for the fast growing incidence of over weight and obesity in children and adolescents.

The details of frequency of use of food were calculated based on the modality suggested by Reaburn et al.³. When the food consumption pattern of boys and girls were compared interesting information was revealed. Except for some foods, there was no difference in the mean score of girls and boys. The difference was seen among girls and boys only in the use of vegetables, bread, maida, milk and milk products and tea and coffee, where it was consumed more by boys than girls except for maida items. Both boys and girls consumed all other food items almost equally i.e. daily. The results also revealed that wheat items and fruits were consumed more (4.20) by girls. The use of milk drinks, tea and coffee was less (2.08) among girls

where as in the case of boys too, wheat items were used more (4.16) and the use of sugar were less (3.26) among boys.

The rise in consumption of fast foods in developed and developing nations might have particular relevance to the childhood obesity epidemic⁶. According to Gibson, energy density of children's diets are directly associated with not only fat but also a range of starchy foods including breakfast, cereal, bread and potatoes. In the present study also the consumption of meat, egg, fast foods, sweets, snacks and deserts were relatively high among children of both sex particularly among girls⁷. Ambili reported similar results in the case of children with overweight or obesity in Thiruvananthapuram⁸. Studies by Mudur also confirmed that there has been a significant increase in the consumption of fats and energy dense foods along with reduction in physical activity. Thus preference score revealed that children liked these foods and enjoyed eating such items⁹.

Food Habits and Preference of Children: When girl's food habits were studied, it was seen from the results that they consumed more rice items (2.98), sweets (2.97), foods made of maida (2.93) and fast foods (2.91). Some of these foods when consumed too much on daily basis may become harmful as they are unhealthy and will lead to obesity. But surprisingly, it was seen that none of these foods which were consumed more by the girls showed any positive significance with their stress but on the other hand negative significance with their stress was observed. This indicated that consumption of these foods actually reduced their stress. Those foods which showed positive significant relation with their stress at 1% level were fats and oils, vegetables, bread, snacks, milk drinks, tea/coffee, milk products and fruit juices and at 5% level was meat. Thus it can be observed that more use of these foods increased their stress.

Many children do not like vegetables. Mothers of majority of the children reported that, children were reluctant to consume vegetables as such or vegetable preparations along with rice or chapatti. Mothers also complained that most of the children had the habit of separating the vegetables from curries like sambar and the mothers forced them to have vegetables. Psychologists pointed out that forcing to eat something, disliked by the children may add to their stress. But doctors and health experts point out the harmful effects of fats and oils, meat, fast foods etc on the health of children. Meat if not fresh, adds health problems. Doctors and dietician repeatedly reported that consumption of red meat is very harmful in children and adults. Milk drinks available in the market may contain some stimulants for memory, growth, etc. these drinks may cause quick bodily changes in the children. As a result, they may reach menarche earlier particularly girls.

In order to find whether stress of children had any relation with the food items they consumed, further analysis was done using Pearson Correlation Coefficient Method. The results are presented in table 3.

Table-3
Correlation of children’s stress with their food use frequency based on sex

Food items	Girl		Boy	
	Mean	r	Mean	r
Fats and oils	2.36	0.204**	2.59	0.037
Sugar	2.71	-0.265**	2.10	-0.265**
Vegetables	1.56	0.439**	1.90	-0.043
Fruits	1.00	-	0.98	0.030
Fish	0.99	-0.073	1.01	0.074
Meat	2.24	0.115*	2.54	0.188**
Egg	0.92	-0.219**	0.80	-0.084
Main Dishes				
Bread	0.77	0.479**	0.97	0.027
Cornflakes	0.96	-0.091	0.89	-0.133**
Rice items	2.98	-0.096	2.89	-0.059
Wheat items	1.00	-	0.99	0.050
Maida items	2.93	-0.163**	2.49	-0.094
Fast Foods	2.91	-0.258**	2.82	-0.051
Sweets	2.97	-0.105*	2.93	-0.071
Snacks	2.62	0.177**	2.43	-0.201**
Dessert	2.86	-0.169**	2.70	-0.059
Beverages				
Milk Drinks	0.96	0.333**	2.26	0.367**
Carbonated Drinks	1.82	-0.251**	1.61	-0.141**
Tea/Coffee	0.55	0.153**	1.40	0.250**
Milk and Milk Products	1.63	0.288**	1.58	-0.106*
Fruit Juices	0.85	0.172**	0.74	-0.197**

p value <.01 = Significant at 1% level (**). p value <.05= Significant at 5% level (*)

The above table depicts the mean score of various food items in relation with the children's stress. Higher the mean score higher is the stress caused by that particular food in the children. It was interesting to find out some foods showed negative significant relationship which means those foods reduced the stress in them like egg, sugar, desserts, fast foods, and carbonated drinks. Regarding boys, it was seen that they also consumed more of sweets (2.93), rice and rice items (2.89) and fast foods (2.82). Among boys positive significant relationship with stress at 1% level was seen when meat, milk drinks and tea/coffee were

consume indicating that consumption of these foods reduced their stress.

Thus the results revealed that most of the unhealthy foods like sweets and fast foods were consumed more by both girls and boys than other healthy foods like vegetables, fish, meat etc. Though not good for health, these foods seemed to reduce their stress where as some healthy foods like vegetables, meat, milk products etc seemed to increase their stress.

This suggests the likes and dislikes of children on choosing food items have an influence on their stress. While they consumed the foods they liked their stress was less than when they consumed the food they do not like.

However, in the present study vegetables, fruits, etc, were found to increase stress in children. Since it was found that majority of the children consumed most of these foods daily, one may not know whether this stress was due to the food additives, chemicals and fertilizers, preservatives added to the foods as they are mostly purchased from markets and not organically grown. This in an area which calls for further research. May be because they do not like vegetables and it is the stress caused because the parents force them to have those foods which they dislike could also be one of the reasons for increased stress levels.

The foods which influenced the stress of children of both regions were next grouped as stress inducing and stress reducing foods which is shown in table 4. That is the stress of the children decreased when they consumed those foods and those foods, which showed positive relationship, were considered as stress inducing foods, which when consumed by the children, increased their stress rate. Region wise comparison showed significant difference in the consumption of various foods among the children. Sex wise difference was also noted in consumption of certain foods.

The findings of the study pointed that, all foods needed for the growth and development of the children was used daily by them. Majority of the children in both the regions consumed vegetables, fruits, fish, egg, milk daily. A study done in NFI, New Delhi by Raje et al. on 500 school girls, revealed that green leafy vegetables are consumed daily or alternate days, by 36 percent of the children¹⁰.

Another study done by Kumari and Singh, on secondary school children of 6-12 years belonging to scheduled castes, also reported that green leafy vegetables, other vegetables and fruits are inadequate in adolescents' diet¹¹. A study reported by Hamulka et al. revealed that as the children get older, the habit of having breakfast decreases along with the consumption of milk and milk products, vegetables and fruits, On the contrary, the intake of fats, sweets, snacks, bakery foods and soft drinks like coca cola increased¹².

Table-4
List of Stress inducing and Stress Reducing foods

		Stress Inducing Foods	Stress Reducing Foods
Common for all regardless of region	Girls	Fats and oils, Vegetables, Meat, Bread, Milk Drinks, Tea and Coffee, Milk and Milk Products and Fruit Juices	Sugar, Egg, Rice items, Maida items, Fast foods, Sweets, Desserts, and Beverages like Carbonated Drinks
	Boys	Meat, Beverages, Milk Drinks and Tea and Coffee	Sugar, Cornflakes, Snacks, Beverages like Carbonated Drinks, Milk and Milk Products and Fruit Juices
TVM	Girls	Sugar, Vegetables	Tea and Coffee
	Boys	Milk Drinks, Fats and oils	Fruit juices
AUH	Girls	Vegetables, Fats and oils, Meat, Tea and Coffee, Bread, Snacks, Milk and milk products and Fruit juices	Sugar, Egg, Cornflakes, Rice items, Maida items, Fast foods, Sweets, Desserts, and Carbonated Drinks
	Boys	Meat, Tea and Coffee, Milk drinks	Sugar, Vegetables, Cornflakes, Rice items, Maida items, Snacks, Desserts, Carbonated drinks, Milk and milk products, Fruit juices.

In the present study, most of the foods considered as unhealthy were liked mostly by the children and was found to reduce the stress in them. It can be inferred that those foods which the parents forced them to eat for e.g. vegetables, milk with milk drinks etc, caused stress in them as they did not like these foods. But certain foods are bought by parents and are frequently consumed by the children for e.g. fast foods, packed foods, sweets, snacks from bakeries, carbonated drinks etc. As children preferred these foods, their stress level seemed to reduce. That is when friends get together, some times on the way home after hectic tuitions classes, or during weekends etc, they preferred to have junk foods, meat dishes, carbonated drinks, sweets etc. Therefore, this is the time they enjoyed most and hence relieve from all worries and stress.

Conclusion

The study revealed that when children consumed foods, they liked and enjoyed most, naturally, their stress rate flows down. For e.g. a crying child stops crying and smiles when the child gets a chocolate even if they are not considered as good for their health. Thus, it can be recognized that these foods though commended as not good for health, they reduce the stress of children. But some foods commended as good for health seemed to increase the stress in them. This may be periodical and as age advances preferences and likes of children also changes. But in the long run these foods can affect the health negatively. Therefore, the solution suggested was that the children may be made aware of the foods that are good for their health and which they should eat regularly. Children should be taught to enjoy those foods from very early childhood.

It is the duty of the parents and teachers to develop healthy food habits in children and guide them to enjoy healthy foods from early childhood years. That does not mean that they should be prevented from taking other foods, occasionally with their peers. But when they make this a regular habit of consuming daily such unhealthy foods, this has to be seriously considered by the parents and teachers. But more than that it is the duty of the parents and teachers to make healthy food items tastier and attractive so that they learn to enjoy the foods given to them. Also if every meal session is made happier and lively children will learn to adopt proper eating habits and also enjoy their food in a happy atmosphere. As food seemed to have great impact on the children's stress level, such attention from parents and teachers will help to reduce the stress of children at the same time keeping them healthy and cheerful.

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