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Nutritional Status of School Going Children in Relation to Their Dietary Intake at Mid-Morning

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Abstract: Present study was conducted to evaluate the quality of lunch box contents, BMI and eating behavior of school children. An informed consent was taken from parents after dissemination of study and then 150 students of both genders aged 6-11 years were randomly selected from a school, their height (m^2) and weight (kg) was measured to calculate BMI (kg/m^2). Lunch boxes were examined for their contents, 60 lunch boxes contained simple chips (SP), french fried chips (CF), packed chips (CP), chopri roti (R), allo wala paratha (PA), simple paratha (PS), boiled egg (EB), fry egg (EF) and omelet (EO) in common. Lunch boxes were analyzed for moisture, ash, crude protein, crude fiber, crude fat and nitrogen free extract (NFE). Result showed at the age of 11 years 33.3% children were overweight, 11.10% children were obese and only 44.40% normal weight. At the age of 10 years 3.7% children were overweight as well as obese and only 44.40% normal weight. At the age of 9 years 25% children were overweight and 54% children were normal weight. At the age of 8 years 4% children were overweight and 48% children were normal weight. While at the age of 6 years and 7 years no one child was overweight and nor was child obese. Dietary intake at mid-morning was also observed in which at the age of 11 years 78% children were using money for buying high fat lunch meal and 22% children took lunch box with them. At the age of 10, 9, 8, 7 and 6 years, respectively 50, 52, 18, 05 and 0% children were using money for buying high fat lunch meal and 27, 40, 70, 76 and 81% children took lunch boxes with them while 23, 8, 12, 19 and 19% children had no lunch as well money. Lunch boxes contents (%) contained moisture, ash, crude protein, crude fiber, crude fat and nitrogen free extract (NFE) 34.43±0.058, 0.631±0.020, 11.78±0.500, 0.34±0.10, 6.9±500 and 44.57±0.410, respectively. BMI of school going children were increased with age due to high consumption of fatty and vendor foods and lunch box avoiding behavior.

Key words: BMI, school going children, vendor foods, lunch box

INTRODUCTION

Eating breakfast is the very important meal of the day especially for school going children studies shows that children who eat breakfast perform better in classroom and on the playground. A nourished breakfast improves the learning potential of children, allow them to learn effectively. Good health and nutrition is the basic need to achieved child's full educational potential because good nutrition effect on educational development and good learning ability of children. Breakfast which is rich in carbohydrate provides glucose as fuel to the brain. A high carbohydrate cereal breakfast can positively influence one's morning mood (Widenhorn *et al*., 2008). Scientific research supports this, demonstrating that breakfast eaters are less stressed than those who skip it. Research has also shown that eating high-fiber breakfast cereals can help combat fatigue and improve mood. In a series of memory and recall tests, it was found that eating breakfast significantly improved performance at information retention tasks. Recollection speed was also enhanced. It is conversely important for children to go with a health breakfast.

Many children skip breakfast because they do not want eat homemade meal or have don't have time to eat (Utter *et al*., 2007). Breakfast skipping remains a considerable problem in children (Hoyland *et al*., 2012). Attempting to lose weight and lack of time in the morning is one of the most common reasons in skipping breakfast. However, evidence suggests that skipping breakfast results in the opposite-making it harder to lose weight and keep it off. Eating breakfast helps to balance food intake throughout the day, making overeating less likely. Research also shows that both children and adults who eat breakfast, particularly a cereal one, are less likely to be overweight than their counterparts who skip this meal (Cho, 2003). This is reflected in the observation that breakfast skippers tend to have lower nutrient intakes compared to habitual breakfast consumers (Matthys *et al*., 2007; Williams, 2007).

The school lunch box has an important influence on health of child. Physician Committee for Responsible Medicine (PCRM), USA had evaluates the meals which are served in the National School Lunch Program. Healthful lunch box includes rich amount of vegetable,

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fruit, legumes, whole grain and potable water. This kind of lunch not only nourish children but also help them to maintain normal body weights to develop good lifelong eating habit and reduce the risk of chronic diseases later in life (PCRM, 2003).

Healthy lunch box is very important for development of brain and also helps in concentration and learning process of children. Often high-fiber diet helping healthy digestion and reduce feelings of fatigue. Mostly foods which are buying with pocket money from canteen contain rich amount fat, sugar and salt. In addition, fast food which is usually low in iron, fiber, vitamins and extremely high in sodium (Vicent, 2008). Children learn attitudes towards everything from surrounding involving eating pattern and money management during school going age which impact their health children spend pocket money on buying chips, sandwich, burger, shwarma, samosa, bubblegum or lollies etc which are quite unhealthy food. It is our responsibility to teach them to eat nutritious food as eating patterns are established early in life and are difficult to change later in life (Kepos, 2007).

Keeping in view the importance of breakfast for school going children's, the present study was carried out to determine nutritional status of school going children in relation to their dietary intake at mid morning.

MATERIALS AND METHODS

For the proposed study, 150 boy and girls of age between 6 to 11 years were randomly selected form a school. A Proforma was designed to record their eating habits. An anthropometric measurement was done to assess the body mass index (BMI) of children. A quantitative survey was also made to know the contents of existing lunch box and pocket money spending on buying lunch meal.

Anthropometrics parameters: Age of children was verified from the school record that ranged between 6 to 11 years. Weight of children was measure in kilogram (kg) by weighing machine foot balance with minimum clothing. Height of each child was recorded in (cm) by Stadiometer. For MBI the child's body weight (kg) divided by the square of his or her height (meter). The data were arranged according to Wardlew classification for determining malnutrition (Wardle *et al*., 2004).

Quantitative survey: All lunch boxes of children were examined to assess the quality of their contents. Out of 150 lunch boxes of children, only 60 were examined to assess the quality of their contents. The food item of buying with pocket money were also observed.

Proximate analysis: Moisture content was determined by oven method according to method No. 934-06 AOAC (1997). Protein Contents in the lunch box sample were determined by Kjeldahl's method as described in AOAC (1997) method No. 920-152 and crude protein percentage was calculated by multiplying percent nitrogen with the factor 6.25.

Crude fat content was determined by Soxtec System (Model: H-2 1045 Extraction Unit, Hoganas, Sweden) according to Method No. 30-10 described in AACC (2000). For Crude fiber the fat free sample of lunch box was taken and treated with H_2SO_4 for 30 min and repeating the same procedure with NaOH solution. Crude fiber of the sample was determined through Labconco Fibertech (Labconco Corporation Kansas, USA) by following the Method No. 32-10 given in AACC (2000). Ash content was determined by placing the sample in Muffle Furnace (MF-1/02, PCSIR, Pakistan) at 550±5°C. The crucible was heated on the oxidizing flame till no fumes. Ash was calculated according to Method No. 08-01 described in AACC (2000). NFE was calculated according to the following expression:

NFE (%) = 100-(crude protein+crude fat+crude fiber+total ash%)

RESULTS AND DISCUSSION

Health status of children according to BMI: Body mass index (BMI) and age categories of school going children have a highly significant relationship. BMI values were highest among obese volunteers as shown in Table 1, while underweight volunteers were having less BMI values as compared to standard values for Asian Adolescent volunteers (18.50-22.90). It is obvious from the table.1 that the age of 11 years 33.3% children were overweight, 11.10% children were obese and only 44.40% normal weight. At the Age of 10 years 3.7% children were overweight as well as obese and only 44.40% normal weight. At the age of 9 years 25% children were overweight and 54% children were normal weight. At the age of 8 years 4% children were overweight and 48% children were normal weight. While at the age of 6 years and 7 years no one child was overweight and nor was child obese. These result also indicated that BMI of children was gradually increase with increases of age. The result of present study is similar with those of Jayatissa and Randanda (2006) they assessed the nutritional status of adolescents between 10 to 15 years in relation to their dietary and activity patterns. The concluded that rate of under children was 47.2% and overweight was 2.2%. According to the Asian-specific BMI cutoff values, the overall prevalence of overweight and obesity of the general Pakistani population, was 25.0%. The prevalence was high among those aged 15-24 years, at 12.4% for men and 13.8% for women.

Dietary intake pattern of children at mid-morning: Dietary intake at mid-morning was found to have a highly significant relationship between age categories, took

Table 1: Health status of children according to BMI and dietary intake pattern of children at mid-morning

Age (year)	Under weight (%)	Normal weight (%)	Over weight (%)	Obese (%)	Money (%)	Lunch box (%)	Nothing (%)
6	80	20	0	0	0	81	19
7	71	29	0	0	5	76	19
8	48	48	4	0	18	70	12
9	21	54	25	0	52	40	8
10	42	44.40	3.70	3.70	50	27	23
11	11	44.40	33.30	11.10	78	22	0
Total	45.5	39.9	11	2.46s	26	58	16

Table 2: Proximate composition of chips product

	Mean±SE		
Parameter (%)	Simple chips (CP)	French fried chips (FC)	Packed chips (PC)
Moisture	44.93±0.00^{b}	45.83±0.76^{a}	28.43±0.55^{c}
Ash	1.07±0.21^{b}	3.90±0.10^{a}	0.86±0.05^{c}
Fat	13.90±0.10	13.70±0.36	14.60±0.00
Crude protein	0.40±0.10	0.47±0.06	0.37±0.06
Crude fiber	0.50±0.00	0.50±0.00	0.50±0.00
NFE	39.20±0.72	35.60±0.85	55.24±0.45

Table 3: Proximate composition of bread product

	Mean±SE		
Parameter (%)	Chopri roti (R)	Simple paratha (PS)	Allo wala paratha (PA)
Moisture	27.30±0.300^{a}	27.20±0.100^{a}	27.03±0.058^{b}
Ash	0.05±0.020^{a}	0.05±0.020^{a}	0.03±0.020^{b}
Fat	11.82±0.928^{a}	10.00±0.500^{b}	11.27±0.493^{a}
Crude protein	9.00±500^{a}	9.00±500^{a}	6.00±500^{b}
Crude fiber	0.50±0.10	0.50±0.10	0.50±0.10
NFE	53.15±1.039	51.43±0.410	53.37±0.634

Table 4: Proximate composition of egg product

	Mean±SE		
Parameter (%)	Bailed egg (EB)	Fry egg (EF)	Omelet (EO)
Moisture	37.90±2.29	30.06±2.66	40.03±1.70
Ash	0.26±0.5^{c}	0.28±0.01^{a}	0.27±0.04^{b}
Fat	12.07±0.21^{c}	15.13±0.23^{a}	13.57±0.55^{b}
Crude protein	13.00±0.10^{a}	11.00±0.10^{b}	13.0±0.10^{a}
Crude fiber	0.07±0.02	0.06±0.01	0.06±0.01
NFE	36.70±2.21	43.46±2.50	33.05±1.92

lunch box and pocket money as given in Table 1 it observed that at the age of 11 years 78% children were using money for buying lunch meal and 22% children took lunch box with them. At the age of 10, 9, 8, 7 and 6 years, respectively 50, 52, 18, 05 and 0% children were using money for buying lunch meal and 27, 40, 70, 76 and 81%, children took lunch box with them while 23, 8, 12, 19 and 19% children had no lunch as well money. Hulshof *et al.* (2003) findings in the UK and elsewhere, the prevalence of breakfast skipping was greater in older compared with younger children. Barton *et al.* (2005) determined skipping of breakfast was greater in girls than boys. Sandercock *et al.* (2010) described breakfast skipping as well as being greater in urban areas and areas of high deficiency.

Food intake pattern: Food intake by school going children was recorded by 24 h recalls method by using food frequency questionnaire. Number of children who were taking different foods has been shown in Fig. 1. It was observed that 2-3 servings/day food consumed from snack and drinks group and 9 servings/day food from cereals, grains, legumes and beans groups. While 6 servings/day Children were consumed food from meat and seafood group while consumption from fruit 1-2 servings/day and 2 servings/day were from vegetables. Consumption from Dairy, Milk and Egg group was 1 servings/day. Consumption from Fat, Spread, Margarine, Butter and Oil group was 3-4 servings/day and 2 servings/day consumption from Confectionery group. Children large consumption of food from snack and drink group which are buying with pocket money from canteen. It contains rich amount fat, sugar and salt which cause obesity among school children. Similar observation was made by Haapalathi *et al.* (2003). They described the meal patterns of children that child consumed 26% vegetable and 21% fruit daily at home while 46% children took salad daily at school.

Chemical composition

Proximate composition of chips product: The proximate composition of different chips products namely i.e., simple chips (CS), French fried chips (CF), packed chips (CP) are shown in Table 2. The moisture contents was lowest in CP and it was highest in CF. the mean value of CF was 45.83±0.764% which was significantly higher at ($p<0.05$) than all other chips products. The different in moisture contents was due to different recipes which were followed for their composition. Ash content was lowest in CP and it was highest in CF. Fat content was lowest in CS and it was highest in CP. The protein content was lowest in CP and it was highest in CS. Zrodlo (2014) found moisture

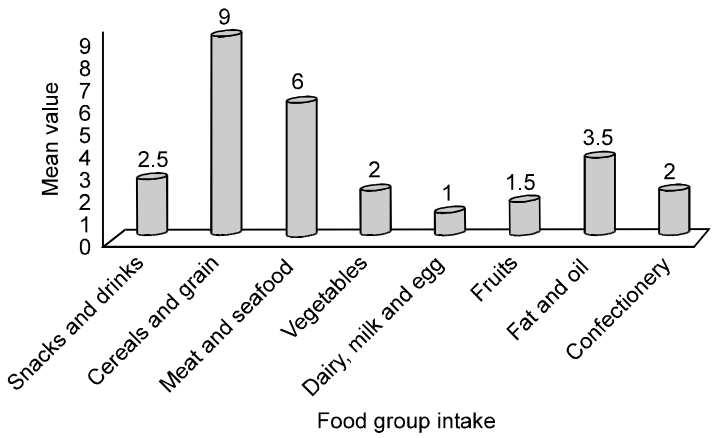

Fig. 1: Food intake patterns

content of the dried, blanched and citric acid treated chips were in the range of 1.38-1.91, 1.04-1.41 and 1.35-1.88%, respectively. While, the fat content in the same samples ranged between 12.57-14.23, 14.09-17.92 and 12.31-14.54%, respectively.

Proximate composition of bread product: The result of the proximate composition of different bread products like chopri roti (R). Allo wala pratha (PA)and simple pratha (PS) are shown in Table 3. The moisture contents of the product chopri roti had maximum moisture content at ($p<0.05$) as compared to simple pratha (PS) and Allo wala pratha(PA). The ash contents at ($p<0.05$) was high in Allo wala pratha (PA) as compare to chopri roti (R) and simple pratha (PS). The fat contents at ($p<0.05$) was low in simple and product chopri roti (R) and simple pratha (PS) had maximum protein as compared to Allo wala pratha (PA). Kadam *et al.* (2012) worked on development and evaluation of composite flour for missi roti/chapatti and carried out to develop the nutritious flours from various food commodities. They calculated that proteins 11.8 to 15.37%, fat 1.53 to 3.45%, fiber 1.24 to 2.05%, ash 2.08 to 2.70% and carbohydrates 65.99 to 74.2%. Similar results were reported by Bibiana *et al.* (2014). Bjorn and Surinder (2006) assessed the protein quality of Indian dishes prepared from whole wheat and refined wheat flour. Their result showed that dishes which were prepared by deep fat frying were approximately 5% lower protein than those of the unprocessed or not frying.

Proximate composition of egg product: The result of the proximate composition of different of boiled egg (EB), fry egg (FE) and omelate (EO) are shown in Table 4. The ash and fat contents of fry eggs were high as compared to boiled egg (EB) and omelate (EO). The results indicated that product fry egg EF had minimum protein contents as compared to products EB and product EO. Ratliff *et al.* (2010); Jillon *et al.* (2005) studied about the potential role of egg breakfast in routine decrease in constant calorie resulted in weight loss. Egg consumed in breakfast results in slightly changing of insulin and glucose level and hence decrease energy intake. BSEA (1992) coded that concentration of nutrients varies from food to food. High fat and high protein food provide energy as well as good for health like meat and egg etc.

Conclusion: The results of present study indicated that BMI of school going children is increased gradually with age because they spend more pocket money and avoid lunch box. The results of dietary intake revealed that 26% children were using money for buying lunch meal and 59% children took lunch box with them. All contents in lunch box were rich in fat and nitrogen free extract (NFE) and low in protein and fiber contents, which is very alarming.

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