

Full Length Research Paper

The effect of dietary fiber on the growth of the adolescent

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Abstract

The purpose of this study was to investigate the relationship between dietary habits of consumption of different amounts of dietary fiber to a group of students in rural and urban areas and its relation to the growth of adolescents. In this study 216 adolescents from Jordan (urban) and 112 from (rural) region were selected by adopting randomization method. The study was conducted with the sample of 428 adolescent. 3- day food consumption survey was carried out and energy and nutrient content were calculated by using food composition table. The clinical signs of nutrients deficiency were determined, different diet composites were taken from rural and urban areas respectively. The analysis of fiber was made in the laboratory. The findings can be summarized as follows: The average height was 165,8 cm for urban and 159,6 cm for rural. The average weight was 59,0 kg for urban and 47,8 kg for rural groups. No significance differences between rural and urban areas were observed in respect to consumption level of energy, protein, carbohydrate, fats, vitamin A, riboflavin, Zinc and phosphorous. The difference was observed for calcium, iron thiamin, vitamin C, and niacin. Consumption levels of these nutrients were higher in rural group than urban. It has been found that the intake of dietary fiber is more than double in the rural areas than urban. It may be concluded that high fiber diet adversely effect growth of adolescent .

Key words: Dietary fiber, dietary habits, adolescent

INTRODUCTION

Dietary fiber is defined as a group of non-digestible and include cellulose, semi-cellulose, pectin, lignin, waxes and also include protein, fat and minerals is indigestible and is absorbed and raised outside the body Salvadoran, (Schneeman, 1984 and Gallaher, 1990).

Dietary fiber is divided into two parts by: (Anderson, 1986; Malfris *et al.*, 1988)

A) Dissolved in water (pectin and waxes and some semi-cellulose)

B) Non- dissolved in water (cellulose and some lignin and cellulose semiconductor)

Dietary soluble fiber works in the water to shorten time of food mass in the intestine passage, and increase faecal weight, and slow down the hydrolysis of starch process, and slow down the absorption of glucose process also

reduces the level of cholesterol in the blood (Juntunen *et al.*, 2003 Englyst *et al.*, 1999). While dietary fiber work is dissolved in water to increase time mass of food in the digestive tract passage (, so the consumption of dietary fiber from different food sources has a multiplier effect of the interest.

In the Middle East, and Jordan is one of the countries of this region, grains play an important role in nutrition, especially in rural areas where the use of grain is shelled for the production of bread, which means increased dietary fiber consumption, but for the urban they use shelled for the production of bread grain.

In this research we want to know the relationship between dietary habits of consumption of different amounts of dietary fiber to a group of students in rural and

urban areas and its relation to the growth of adolescents.

METHODOLOGY

The research was conducted in Jordan on 428 students of whom 216 students in the urban area and 212 students in the countryside. The sample was selected at random and representative and conducted surveys and analyzes where food was measured daily food consumption of students for a period of 3 days, and measurement of height and weight (and then took a sample of their food and was conducted by the dietary fiber raw analysis).

Student sample characteristics: age 13-17 years, from the ninth and tenth grade students, were selected group of students from schools in the capital Amman to represent the urban (216) and a group of students from schools in the countryside (212) students. The collection of information: has the process of collecting information using the questionnaire interviewer where he was to instruct students how to record the types of food you who took it in three days, including a day off.

It was the expense of students' nutrient consumption by the use of food analysis tables. (Lanza and Butrum, 1986), as well as taking food representative sample of students from the urban area and rural area was raw dietary fiber in their analysis (Selvendran, 1984) A comparison was made between the results of the analysis and the results of the Hungarian dietary fiber raw account of the tables. The different dietary fiber analysis methods, including dietary fiber and crude analysis where the use of 55 ., Of sulfuric acid treated as sodium hydroxide 313 ., N and boil then washed and filtered, and the crude fiber output and the quantitative analysis and the amounts found in foods analysis tables is a raw fiber and greater part of these fibers is cellulose, semi-cellulose and Jenin 1990) Gallaher Schneeman and Spiller, et.al., 1978), . Results were then compared to the daily food needs of energy and protein and vitamins and mineral salts in order to identify the presence of nutritional deficiencies or lack of it, to search and find out the causes and find solutions and recommendations. As compared to the lengths and weights of students with the ideal length weights (standard) (Williams and Anderson, 1993) also has a comparison between the results in the urban area and in the rural erase statistically.

RESULTS AND DISCUSSION

It has much increased "interest in dietary fiber in recent years, began to take place" significant "and a prominent" in the research of their importance in human nutrition, and that most of these research results indicate that there is a relationship and that most of these research results indicate that there is a relationship between dietary fiber consumption and reduce the risk of heart disease and

cancer as the dietary fiber link Some toxic substances that cause cancer and thus reduce the risk of colon cancer (Malfris, *et al.* 1988), and reduce the risk of Gastroenterology, constipation where that excess dietary fiber increases the softness and the size of the food mass (FLOCH *et al.*, 1986, Mendel off, 1987, Wallis *et al.*, 1.999).

The dietary fiber helps you feel full, thus aiding in weight loss, and the amount of protein, fat, carbohydrates and loses with dietary fiber and put up with feces. The dietary fiber increase the output of bile salts in the faces and dietary fiber are linking some toxic substances and graduating them out of the body, And, where increased dietary fiber consumption where less incidence of pressure disease (Rossener 0.1988) They also have really "protective" against pregnancy poisoning (Lanza and Butrum, 1986 , Yonkers, 1997)) and diabetes as dietary fiber slows the absorption of glucose and thus reduce the speed increase blood sugar.

In spite of all these benefits of dietary fiber, it has some side effects, as dietary fiber consumption in large quantities cause the low level of some mineral salts (calcium, iron, zinc) in the blood, because the dietary fiber cause the speed of food mass in the intestine passage, also, the phytate present in mineral salts which are related to vehicles which reduces the absorption of mineral salts (Haghshenass, *et al.*, 1972).

Some of the research results (Bugart, 1987, Bingham, 1987) indicate that dietary fiber provides the body with energy, but the foods that contain a high proportion of dietary fiber need to chew plus and need to secrete larger than saliva quantities, causing a decrease "in the total energy amounts learned of them, resulting crash dietary fiber by micro-organisms in the gut acids short fatty chain (acetic, Biotirk), which provide the body by energy, as the micro-organisms found in the intestinal (Sacharolytic species) analysis of some dietary fiber and produce some short fatty acids (Bugart, 1987). These fatty acids are absorbed each other and reaches the blood, also the importance of these acids stimulate sodium and water absorption equilibrium in the body, it also works to reduce the pH of the colon (Anderson, 1986, Bingham, 1987).

There is a statistically significant difference between food shortages for students of urban and rural students ($\alpha < 0.05$) *. Decrease in consumption for the recommended amounts in tables (RDA) (Williams and Anderson, 1993).

- the amount of consumption of tryptophan (an amino acid) in urban areas is 1265 mg and in the countryside 1270 mg, either the amount of niacin that can be converted from tryptophan in urban areas 25.42 mg and in the countryside 21.4 mg, so the lack of niacin covered from tryptophan.

- As well as it has been found that there is a statistically significant relationship between the consumption of vitamin A each rate, zinc and calcium with students lengths ($\alpha < 0,01$).

Table 1: Average height and weight-for-age students

	urban	Countryside	urban	countryside	urban	countryside	urban	countryside	urban	countryside
Age (year)	13	13	14	14	15	15	16	16	17	17
Average weight (kg)	42.5	39.0	53.76	44.27	59.43	48.11	61.44	49.71	63.83	53.86
Average length (kg)	165.5	152.7	162.0	154.3	168.1	160.6	167.2	163.8	174.1	165.4
The number of students	8	4	70	78S	72	44	54	50	12	36
Percentage of students(%)	3.7	1.9	32.4	36.8	33.3	20.8	25.0	23.5	5.6	17.0

Table 2: lengths and weights of student

Gauge	urban						countryside					
	N	age	Average	Deviation	Who under the overall rate		N	age	average	Deviation	Who under the overall rate	
					number	Percent age					N	Percentage
Height cm*			165.8	12.4	126	58.3			159.6	13.3	126	59.4
	8	13	16002		6	2.8	4	13	152.8		4	1.9
	70	14	161.9		38	17.6	78	14	154.2		38	17.9
	72	15	163.5		38	17.6	44	15	160.6		38	8.5
	54	16	168.1		38	17.6	50	16	163.4		38	17.6
	12	17	174.1		8	2.8	36	17	165.4		28	13.2
Weight kg*			59.0	13.2	48	22.2			47.8	9.4	92	43.4
	8	13	52.5				4	13				
	70	14	53.6		16	7.4	78	14			36	17
	72	15	59.5		20	9.3	44	15			18	8.5
	54	16	61.4		8	3.7	50	16			20	9.4
	12	17	63.8		4	1.8	36	17			18	8.5

P < 0,05*

Table 3: Consumption of energy and nutrients rate

Energy and nutrients	urban				countryside			
	X ⁻	Π	Decrease in consumption*		X ⁻	Π	Decrease in consumption	
			number	Percentage (%)			N	Percentage (%)
Energy calories	3069.0	60.1	50	23.2	2972	343.4	64	30.2
Protein (g)	101.8	39.1	12	5.6	98.9	14.7	8	3.8
Calcium (mg)*	517.6	123	190	88.0	780.0	86.2	84	39.6
Phosphorus (mg)	1057.0	441	6	2.8	1653	9.7	2	0.9
Iron (mg)*	17.8	2.7	96	44.4	24.3	10.7	2	0.9
Vitamin A (IU)	2414.0	354	202	93.5	2697	1497	200	94.3
Vitamin B1 (mg)*	1.1	0.4	172	79.6	2.3	0.8	-	-
Vitamin B2 (mg)	1.3	0.1	194	89.8	1.3	0.1	194	92.4
Niacin (mg)*	11.9	2.2	214	99.1	20.8	4.2	156	73.6
Vitamin C (mg)	38.6	23.0	168	77.8	65.7	23.1	92	43.4
الزئك (مغ)	9.6	1.5	162	75.0	10.1	3.1	143	67.0
Dietary fiber (g)	7.6	2.1	216	100.0	13.3	1.4	212	100.0
Carbohydrate (g)	512.9	211	6	2.8	456.3	88.0	12	5.7
Fat (g)	79.2	16.0	162	75.0	76.2	35.8	164	79.2

P < 0,05 *

Table 4: Comparison between students daily consumption of dietary fiber (g \ day) in urban and rural areas

Countryside		urban		Student ID
According to tables	According to chemical analysis	According to tables	According to chemical analysis	
15.04	16.50	8.41	6.04	1
13.04	11.58	5.39	6.00	2
16.54	20.41	9.48	7.58	3
14.87	16.16	7.76	6.54	Average

Table 5: Pathological cases, health food and destitution upon students

Pathological case	number	Percentage (%)	number	Percentage (%)
Disabilities	2	0.9	2	0.9
Headaches	8	3.7	10	4.7
tooth decay	6	2.8	4	1.9
Food shortage	40	18.5	104	49.1
Cracking of the corners of the mouth	16	7.4	116	17.0
Sores in the mouth	8	3.7	36	17.0
Eyes red	16	7.4	32	15.0

P<0.05

There is a significant difference statistically between the lengths and weights of students in urban and weights of students in rural areas ($\alpha < 0.05$). There are 58.3% of the urban students and 59.4 percent of rural students without the ideal lengths. There are 22.2% of the urban students and 43.6 percent of rural students under the ideal weight.

As is evident in Table (5) the nutritional deficiencies of the rural students, most of the food shortages of the urban students ($P < 0.05$), may be due to the fact that brown bread consumption in the countryside and white bread is more common in urban areas.

As evident in Table 3, there is a difference in energy consumption between urban and rural students, but this difference is not statistically significant ($\alpha > 0.05$). Urban students consumption of calcium, iron, thiamin and vitamin C higher than the rural students consumption and this difference is statistically significant ($\alpha < 0.05$). While the consumption of protein, fat and carbohydrates of the rural students less than that of urban students, however, this difference is not statistically significant ($\alpha > 0.05$).

Student's rural consumption of dietary fiber almost double the consumption of urban students. And in table (4) a Comparison between students' consumption of dietary fiber As it calculated from the food tables and analysis and as calculated from the results of laboratory analysis of food.

Table 3 shows 23.2% of the urban students and 30.2% percent of rural students consumption of energy less than the daily ratios established, as well as there is a great shortage in the consumption of vitamin A, B-2, C, and zinc.

The dietary fiber consumption of the rural students almost double the consumption of urban students, and as the dietary fiber contain phytate and Aloklat vehicles are causing a shortage "in the absorption of minerals

(calcium, zinc, magnesium, phosphorus) which consequent lack of growth in Belgi et.al., 1977, (James et al., 1978).

The rural students consumption of calcium is higher than urban students consumption, however, growth is less, and this is due to dietary fiber and the content of compounds phytate and Aloklat which reduce the absorption of calcium, dietary fiber reduces the survival of the food in the intestine time as the vehicles phytate and Aloklat reduce the absorption of some mineral salts. Drews et al., 1979, Ronaghy, 1986).

When the ratio of zinc to phytate compounds is less than 10, zinc absorption is not affected while if this percentage has increased to at least 20 the absorption of zinc decreases (Oberleas and Harland, 1981 Southgate.1987). It is known that vitamin C reduces the negative impact of phytate on mineral salts and that rural students' consumption of vitamin C more than the consumption of urban students, but it should be remembered that Vitamin C is easily lost during cooking and preparation. Here, we emphasize the importance of awareness and guidance through radio and television about the ideal way to cook and prepare food preservation programs.

The results of the studies carried out on humans and animals has shown that cereal fiber causes a decrease "in zinc absorption. research has been conducted on children aged 1-3 years in Uganda, and search results reported that the children of Uganda consume less of Europe's children Energy, because of Europe's children consume more animal products from children in Uganda, and even children of Uganda can get the same amount of energy received by the children of Europe, they should consumption of vegetarian food twice the size of the food consumed by the size of Europe's children (Rutishause and Witehead, 1972).

Some research findings show that dietary fiber consumption reduces the amount of energy drawn from fat, as well as the proportion of vehicles phytate to zinc is very important, "If this ratio is less than 5: 1, the zinc absorption is not affected (Southgate, 1987).

In this study, the average lengths of the students found in the urban area is 165.8 cm, while in the rural area is 159.6 cm, a statistically significant difference at ($\alpha \geq 0, 05$) is also found. And that dietary fiber consumption at rural students almost doubles the consumption of urban students, also there is no statistically significant difference in zinc consumption among students of urban and rural area that any increase dietary fiber consumption may lead to a lack of growth.

The consumption of dietary fiber reduces the absorption of copper, iron and zinc, (Dintzis et.al, 1985.) and result in food shortages in this mineral salts, particularly in feeding vegetarians that zinc of white bread absorb higher absorption of brown bread (Kelsay, 1979) due to the presence of dietary fiber and phytate compounds, and it is known that the amount of phytate in wheat decreases dough by fermentation. fermentating dough two hours, for example, "reduced the amount of phytate about 40%, and the fermentation of the dough 48 hours reduced phytate about 85% (Navert and Sandstrom, 1985,). The addition of sodium phytate to food causes shortages in the absorption of iron.

In this study, the consumption of meat is low, but there are consuming "plus" of pulses and vegetables containing vitamin C, which means avoiding the expected shortage of iron. Also there is an important statistical difference between the energy consumption of the rural students and urban students' consumption ($\alpha \geq 0, 05$). It can also be said that rural students more active than urban students, as they go to school on foot and grazing cattle, therefore they have less weight. Some research also indicates that the food fiber results reduce the useful energy (Southgate, 1987), so it is with increased dietary fiber consumption, it is recommended to increase daily energy allocations.

RECOMMENDATIONS

A. The consumption of fermented bread that made from wheat grain is shelled important to cover the food needs of fiber, because of its great benefits in reducing constipation, reduce the risk of celiac disease, reduce the level of cholesterol in the blood, and reduce the risk of cancer, at the same time, the fermentation of the dough make the fragmentation of phytate vehicles, and so is higher than the absorption of mineral salts.

B. Educate citizens the needs of increase the consumption of vitamin C (vegetables and fruits), with increased dietary fiber consumption (cereals and pulses)

C. The need to follow the correct methods in the preparation and cooking and food preservation, which included reducing the loss in vitamins.

D. Care to feed teenagers balanced fed and their diets should include the food of high energetic value any from animal sources such as milk, eggs and meat.

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