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NUTRITION OF CHILDREN WITH HEART DISEASES

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ABSTRACT

Heart diseases are the main cause of sudden death. The aim of the present study was to prepare and evaluate diets for children with rheumatic heart disease to help the medicine in maintaining of the patients life.

Children were divided into two groups, the first group (group I) had consumed diets under investigations, while the other group (group II) consumed normal house meals. Children groups were divided into 10 age periods within new born-18 years.

The rate of increasing of heights and weights for different children of the two groups were carried out. The blood analysis were carried out for determination of hemoglobin, sodium, potassium, calcium and iron for both groups under investigations.

The correlation of different components of foods with those of blood were estimated.

The positive effect on weight and height gain revealed to the sufficient amount of protein and calories presented in this therapeutic diets. While the positive effect for these diets on hemoglobin by increasing its levels returned to the high contents of protein and iron in these therapeutic diets which has beneficial effect for these patients by increasing the oxygen carrying capacity improving tissue oxygenation with its good impact on the growth rate and parameter of development for these patients.

Meanwhile covered the daily requirements for the patients under investigation according to the recommendation of FAO/WHO 1997.

INTRODUCTION

Food is the basic necessary of life-Nutrition is defined as the scientific study of food and its relation to health. It can also be defined as the science which deals with those processes by which body utilizes food for energy, growth and maintenance of health. Human must have natural foods and eat foods to fulfill his nutritional requirements (Joshi, 2000).

Children have a higher basal metabolic rate than adults owing to their rapid growth with its consequent great cellular activity and to their relatively greater surface area. Healthy children are also active, which entails a considerable increase in the caloric requirement. The importance of an adequate caloric intake cannot be often emphasized.

Since protein is a chief essential for growth, it is important to provide this nutrient not only in sufficient quantities but also of the best biological quality. Throughout childhood approximately 15 percent of the calories of the diet should come from protein. On the basis of weight, an allowance of 4 gm per kg is desirable for the infant. The need for protein continues great

throughout adolescence at which time the total daily need is greater than that of the adult.

Milk is one of the most important sources of growth protein. A quartlitre of milk a day provides the protein needs of young children, and about half of the protein requirement at the beginning of adolescence. Additional sources of excellent protein are eggs and lean meats, while legumes and cereals products provide good supplementary protein (Proudfit and Robinson, 1957).

Minerals, copper, zinc, hardness of water, electrolytes like sodium may also be involved in the cause or prevention of cardiac disease.

Heart diseases are the main cause of sudden death in the civilized world. Moreover, diabetes and obesity increase the dangers of such diseases. Meanwhile, sudden death in the common in the developing countries mainly because of infections and mal-nutrition diseases (WHO, 1980).

Congestive heart failure is the result of heart diability to provide the body with the blood necessary for its metabolismic needs. The disturbance in tissue blood flow harms the respiratory tract and blood circulation. It holds up water and sodium, increases the external liquids and makes kidney's state and function go worse. It causes pulmonary edema and bad respiration (Krupp and Chatton, 1983).

The cardio-vascular diseases generally manifest due to over load on the heart than its rated capacity, and alteration in the walls of artiers resulting in obstruction to the normal blood flow.The dietary management first requires shedding of the overload (proper height – weight relationship) and restoration of mineral arterial posture.Cholesterol, high caloric diet and excess electrolyte sodium in particular are the main points of focus and require restraint in a patient's diet (Joshi, 2000).

This research was carried out to illustrate a nutrition program for children with heart diseases using natural raw materials for designee the daily diet to help medicine in maintaining of patients life .

MATERIALS AND METHODS

Materials:

Children having different heart diseases (congestive heart failure , cornary , Atherosclerosis and rheumatic heart diseases)., were divided into two groups , group I had consumed diets under investvtigations and group II had consumed normal house meals , On the other hand , these two groups were divided into 10 age periods within new-born and 18 years ,

All materials such as meat, poultry, milk and milk products, vegetables, fruits, juices, cereals and cereals products, sugar, salt, spices, honey and jam were obtained from the local market in Mansoura.

Diet list named breakfast, snack I , lunch , snack II and dinner prepared with various amounts from different food sources such as bread and bakeries, milk and milk products , meet and meet products , vegetables and friuts .....etc

Methods:

Chemical analysis:

Approximate chemical composition: Moisture, ash, crude protein, crude fat, and crude fiber were determined according to the methods of the A.O.A.C. (1990), while total carbohydrates content was calculated by differences between 100 and sum of ash, protein, crude fat and fiber content.
% carbohydrate = 100 – [% moisture + % protein + % fat + % ash + % fiber].

Energy value:

It was estimated as follows:-

Energy (calories) = (g carbohydrates x 4.1) + (g protein x 4.1) + (g fat x 9.1).

Vitamins and minerals content:

Vit. A, Vit. B, Vit. C, Na^{+}, K^{+}, Ca^{++}, Fe^{++} and P^{++} were determined according to SEFA (1997) and Abd-Alkader (2001).

Milk and milk products analysis:

Milk fat content:

The conventional Gerber's method was followed using the special butyrometer tube for milk, yoghurt and cheese as described by the British Standard Institution's (B.S.I.) Method (1955).

- Biological measurements:

- Diagnosis:

Heart disease in children was diagnosed using by:

a- Through history and clinical examination.

b - Chest X-ray and Electro Cardio Gramme (ECG).

c- Echo cardiography to determine the exact anatomy of cardiac malformation.

- Blood analysis:

Five ml intravenous blood were withdrawn from each patient. 1 ml was collected in a tube containing EDTA as anticoagulation, for the determination of hemoglobin value by the Cell Dyn apparatus (ABOTT. Co.). The rest of the sample (4 ml) was collected in dry centrifuge tubes. The serum was separated after centrifugation for 10 minutes at 3000 rpm, then the serum was collected for the determination of the level of sodium, potassium, calcium and iron.

The measurement of sodium and potassium is carried out by the AVL 9180 Electrolyte Analyzer that uses Ion Selective Electrode (ISE) measurement principle in laboratories in chilldren hospitle of Mansoura .

The kit used for the determination of calcium level in the serum was supplied by Bio Me´rieux (Gindler, 1972).

The kit used for the determination of iron in the serum was iron chromazurol B supplied by ELITECH Diagnostics (Callahan 1982). It consists of the colorimetric determination at 612 nm for the calicium and at 637 nm for the irom using spectrophometer cecil of the colorimetric determination at 612 nm for the calcium and at 637 nm for the iron using a spectrophotometer Cecil 8000.

Weights and Heights:

Weight and height measurements were carried out using the scale – RTZ – 120 A Health scale 120 x 0.5 kg, 260 x 1 Lb. (Hecos) Shanghai, China. Weights were recorded per kilogram every month for every child using scale for one year. Heights were measured every month per cms using longthmeter attached by the scale.

RESULTS AND DISCUSSION

The average of chemical components (fresh weight basis) of therapeutic diet for children (1-3 years old) (table 1) :

Date given in table 1 show that the average of protein intake was 46 g/day more than the daily requirement of FAO & WHO (1997) by 109 %, such increment was due to the present of boiled egg, whole milk and roast chicken, such results go in by (Proudfit and Robinson, 1957).

Data in the same Table show that the average of fat content was 21 g/day which is less than the FAO & WHO (1997) daily recommendation with 8 %. Also, the average intake of carbohydrates was 165 g/day which less than the daily requirement of FAO & WHO (1997) by 11 %. While the intake of calories was 1042 cal/day which is less than the FAO & WHO (1997) daily requirement by 25 %.Such quantities of these contents intake agreement with (Joshi, 2000).

On the other hand, the intake of Vit. A was (452 I.U)/day which more than the daily recommendation of FAO & WHO (1997) by 13 %. also, Vit. B intake was 7 mg/day which less than the daily requirements of FAO & WHO (1997) by 44 %. While, the intake of Vit. C was 63 mg/day which more than the daily requirement of FAO & WHO (1997) by 215 %. Such increase for Vit. A and Vit. C was due to boiled egg, lemon juice and fresh salad. Such results agree with those reported by (Cook, 1999).

Data in Table (1) show that minerals intake such as calcium (531 mg/day) and iron (12 mg/day), these contents are more than the daily requirements of FAO & WHO (1997) by 6 % and 50 % respectively. Such increment was due to the presence of cheese, milk and yoghurt which are rich in calcium content and meat, apple juice and mango juice which are rich in iron. These data agree with those found by SEFA. (1997).

The average of chemical components (fresh weight basis) of therapeutic diet for children (4-6 years old) (Table 2):

Data in Table (2) show that the average of daily protein intake was 55 g which more than the recommendation of FAO & WHO (1997) by 1005 % such increase was due to the present of whole milk, boiled egg, grilled meat and kabab hala. The same trend was found by (Cook, 1999).

Data in the same table show that fat content intake was 25 g/day which is less than the FAO & WHO (1997) daily requirement with 16 %.

On the other hand, the average intake of carbohydrates was 183 g/day which less than the daily requirement of FAO & WHO (1997) by 18 %. Such results go in by Joshi (2000).

Table 1. The average of chemical components (fresh weight basis) of therapeutic diet for children (1-3) years old.

Days	Protein (gm)	Fat (gm)	Carbo. (gm)	Ash (gm)	Fiber (gm)	Calories	Vitamins			Minerals				
							A (IU)	B (mg)	C (mg)	Na^{+} (mg)	K^{+} (mg)	Ca^{++} (mg)	Fe^{++} (mg)	P^{++} (mg)
Saturday	47	24	165	5	2	1059	392	9	73	551	1000	567	23	803
Sunday	47	28	150	6	1	1039	434	7	14	413	1038	493	11	741
Monday	44	19	166	6	2	994	460	7	38	353	1138	534	12	1534
Tuesday	48	15	170	7	4	1023	288	9	177	363	878	551	6	1
Wednesday	43	22	156	8	1	1008	856	5	26	387	1067	501	10	588
Thursday	50	19	186	6	2	1130	287	9	53	354	1231	542	12	683
Total	279	127	993	38	12	6253	2717	46	381	2421	6352	3188	74	4350
Average	46	21	165	6	2	1042	452	7	63	403	1058	531	12	725
FAO/WHO	22	23	187	--	--	1400	400	12.2	20	--	--	500	8	500
Dif. %*	109^{+}	8^{-}	11^{-}	--	--	25^{-}	13^{+}	44^{-}	215^{+}	--	--	6^{+}	50^{+}	45^{+}

Table 2. The average of chemical components (fresh weight basis) of therapeutic diet for children (4-6) years old.

Days	Protein (gm)	Fat (gm)	Carbo. (gm)	Ash (gm)	Fiber (gm)	Calories	Vitamins			Minerals				
							A (IU)	B (mg)	C (mg)	Na^{+} (mg)	K^{+} (mg)	Ca^{++} (mg)	Fe^{++} (mg)	P^{++} (mg)
Saturday	55	24	186	5	3	1200	426	11	98	668	11274	659	35	922
Sunday	52	27	173	7	2	1167	490	8	18	368	1184	691	13	837
Monday	56	29	184	7	2	1252	481	9	38	400	1321	610	14	876
Tuesday	63	27	193	9	5	1262	787	11	199	513	1064	766	7	1213
Wednesday	48	23	176	9	1	1125	997	6	31	426	992	603	11	660
Thursday	61	20	186	7	3	1237	360	11	54	355	1398	497	11	1019
Total	335	150	1098	44	16	7243	3541	56	438	2730	7133	3826	91	5527
Average	55	25	183	7	2	1207	590	9	73	455	1188	637	15	921
FAO/WHO	27	30	225	--	--	1800	500	16.8	20	--	--	500	9	500
Dif. %*	105^{+}	16^{-}	18^{-}	--	--	32^{-}	16^{+}	46^{-}	265^{+}	--	--	27^{+}	66^{+}	84^{+}

FAO/WHO: The daily requirements of food components of Union Committee for FAO / WHO, 1997.

* The percentage of the difference between the average and the FAO & WHO daily requirements.

In the same table, data show that the intake of calories was 1207 cal/day which less than the FAO & WHO (1997) daily recommendation with 32 %. The findings coincide with those reported by SEFA (1997).

Data in Table (2) show that Vit. A intake was 590 I.U/day and Vit. C was 73 mg/day these data are more than the daily recommendation of FAO& WHO (1997) by 16 % and 265 % respectively. Such increment was due to the presence of processed cheeses guava and carrots. These data agree with those found by Vernan and Sutherland (1994). While Vit. B intake was 9 mg/day which less than the daily requirement of FAO& WHO (1997) by 46 %.

Data in the same table show that minerals calcium, iron and phosphorus intake were 637 mg/day, 15 mg/day and 921 mg/day respectively which are more than the daily requirement of FAO & WHO (1997) by 27 % Ca^{+}, 66 % Fe^{++} and 84 % P^{++}. Regarding to these results, children consumed straw berry jam, halawa tehenia, boiled egg and processed cheese. These same trend was found by Lawric (1974).

The average of chemical components (fresh weight basis) of therapeutic diet for children (7-9 years old) (table 3) :

Table (3) shows that, the average of protein intake was 61 g/day, this amount is more than the daily require because of the presence of fool medames, fish and white cheese which had high ratio of protein as reported by El-Sherbiny *et al.* (1986).

Concerning the average of fat intake, it was found to be 38 g/day which was more than the fat daily requirements recommended by FAO & WHO (1997) by 5.5 %. This increment is due to boiled egg, white cheese and roast chicken. These data agree with those found by Cook (1999) and Vernan and Sutherland (1994).

The average of carbohydrate intake was 212 g/day which was lower than the daily requirement of FAO & WHO (1997) by 28 % such decrement is due to little quantity of carbohydrates intake. Such results go in by Ashour *et al.* (1993).

The average of calories intake in Table (3) was 1471 cal/day that was less than the recommended daily requirements of FAO & WHO (1997) by 33 %, and this decrease was due to controled consumed food which enriched in fats. These results are in accordance to results of (SEFA, 1997).

The data in the same table show the average of Vit. A intake, that was 632 IU. But this intake was lower than the daily requirements of FAO & WHO (1997) by 9.7 %. Such decrease was due to the low content of vitamin A in such food . These results are in agreement with those reported by Cook (1999) and Vernan and Sutherland (1994).

Vitamin B had the average of 12 mg/day with 38 % decrement than the daily requirements recommended by the FAO & WHO (1997). This decrease was due to almost all food consumed were poor in vitamin B.

Regarding to the average of Vit. C, it was found to be 86 mg/day. This intake is higher than the daily requirements of FAO & WHO (1997) by 186.5 %. Such increase was due to Orange, guava and lemon juice. The same trend was found by SEFA (1997) and Cook (1999).

Also, the same data show that, the average of calcium intake was 793 mg/day which was more than the daily requirements of FAO & WHO with 13 %.

Moreover, it was found that the iron intake had an average of 25 mg/day that considered higher than the recommended daily requirements of FAO & WHO with 150 %.

In addition , the average of phosphorus intake was higher than the daily requirements of FAO & WHO with 52 %.

Such increment of those minerals calcium, iron and phosphorus was due to the presence of whole milk, white cheese, strawberry jam, biscuits and bread. These findings coincide with those reported by Vernan and Sutherland (1994), Cook (1999) and Ashour *et al.* (1993).

The average of chemical components (fresh weight basis) of therapeutic diet for boys (10-12 years old) (Table 4) :

Data in Table (4) show that the average of protein intake was 77 g per day, such quality are more than the daily requirement of FAO & WHO (1997) by 63 % for boys (10-12) years old. Such increase is revealed to the high content of protein in boiled egg, fish, meat and chicken meat as found by (Proudfit and Robinson, 1957).

While the average intake of fat was 28 g/day which are more than the FAO & WHO (1997) daily recommendation with 31 %.

On the other hand, data in the same table show that the intake of carbohydrate per day was 246 g. Such quantity are less than the daily requirements of FAO & WHO (1997) by 26 %.While, the intake of calories was 1592 cal./day which are less than the FAO & WHO (1997) daily recommendation with 36 %.

The daily intake of Vit. A and Vit. B were (558 IU) and 20 mg, respectively which are less than the daily recommendation of FAO & WHO with 30 % and 18 %. While the daily intake of Vit. C was 93 mg/day which was more than the FAO & WHO (1997) daily recommendation with 210 %. This increment of Vit. C intake was due to its high ratio in guava, orange and lemon juice. This is agree with those found by (Cook, 1999).

On the other hand, data in the same table show that the average of calcium intake was 894 mg/day which was lower than the FAO & WHO (1997) daily requirement with 0.6 %. While, iron intake was 19 mg per day which is more than that of the daily recommendation of FAO & WHO (1997) by 72 %. Such increasing in iron intake revealed to the presence of grilled meat and mango juice in the diets which had high ratios of iron as reported by SEFA (1997).

Concerning the average of phosphorus intake per day was 1273 mg which was higher than the daily requirements of FAO & WHO (1997) by 41 %. The cause of increasing phosphorus intake was consuming non fat cheese, processed cheese and chicken meat which contain high levels of phosphorus. Such findings coincides with those reported by Vernan and Sutherland (1994) and lawric (1974).

Table 3. The average of chemical components (fresh weight basis) of therapeutic diet for children (7-9) years old.

Days	Protein (gm)	Fat (gm)	Carbo. (gm)	Ash (gm)	Fiber (gm)	Calories	Vitamins			Minerals				
							A (IU)	B (mg)	C (mg)	Na^{+} (mg)	K^{+} (mg)	Ca^{++} (mg)	Fe^{++} (mg)	P^{++} (mg)
Saturday	62	37	218	8	3	1486	663	15	124	802	1504	792	36	1117
Sunday	57	41	198	9	2	1409	560	10	22	541	1412	829	17	974
Monday	62	44	203	7	2	1436	528	11	47	457	1325	900	15	1020
Tuesday	69	36	222	10	6	1538	396	15	229	495	1268	816	49	1296
Wednesday	48	35	196	11	1	1323	1247	7	43	510	1066	692	22	729
Thursday	77	38	273	8	4	1638	429	15	56	420	1730	732	14	1270
Total	370	231	1276	53	18	8830	3793	73	421	3229	8305	4763	153	6406
Average	61	38	212	9	3	1471	632	12	86	538	1384	793	25	1067
FAO/WHO	22	36	295	--	--	2200	700	19.5	30	--	--	700	10	700
Dif. %*	177^{+}	5.5^{+}	28^{-}	--	--	33^{-}	9.7^{-}	38^{-}	186.5^{+}	--	--	13^{+}	150^{+}	52^{+}

Table 4. The average of chemical components (fresh weight basis) of therapeutic diet for boys (10-12) years old.

Days	Protein (gm)	Fat (gm)	Carbo. (gm)	Ash (gm)	Fiber (gm)	Calories	Vitamins			Minerals				
							A (IU)	B (mg)	C (mg)	Na^{+} (mg)	K^{+} (mg)	Ca^{++} (mg)	Fe^{++} (mg)	P^{++} (mg)
Saturday	80.54	30.80	247.00	8.71	4.41	1609	456	18	128	961	1740	995	37	1411
Sunday	65.32	29.60	232.80	9.35	2.70	1465	517	11	25	560	1539	841	18	1062
Monday	75.00	32.22	229.55	9.28	3.14	1527	451	46	52	516	1789	826	15	1167
Tuesday	89.25	30.44	274.40	12.34	6.94	1893	364	18	224	651	2200	999	10	1621
Wednesday	59.51	23.23	228.19	12.84	2.47	1272	1197	8	48	601	1301	809	19	892
Thursday	93.06	25.09	268.70	10.56	5.90	1786	368	19	72	534	2338	899	17	1487
Total	462.59	171.38	1480.84	63.08	25.56	9552	3353	120	559	3823	10907	5369	116	7640
Average	77	28	246	10	4	1592	558	20	93	637	1817	894	19	1273
FAO/WHO	41	41	335	--	--	2500	800	24.5	30	--	--	900	11	900
Dif. %*	63^{+}	31^{-}	26^{-}	--	--	36^{-}	30^{-}	18^{-}	210^{+}	--	--	0.6^{-}	72^{+}	41^{+}

FAO/WHO: The daily requirements of food components of Union Committee for FAO / WHO, 1997.

* The percentage of the difference between the average and the FAO & WHO daily requirements.

The average of chemical components (fresh weight basis) of therapeutic diet for boys (13-15 years old) (Table 5) :

The average of protein intake in Table (5) was 89 g/day. This intake had 71 % more than the daily requirements of FAO & WHO(1997). Such increase was due to fool medames, boiled egg and chicken meat which had high content of protein as mentioned by Cook (1999) and El-Sherbiny *et al.* (1986).

Results in the same table show 34 g/day for the average of fat intake which was less than the daily requirements of FAO & WHO with 26 %.

The average of carbohydrate intake scored 285 g/day, which was lower than the daily requirements of FAO & WHO (1997) by 24 %.

For the average of calories intake in Table (5), it was found to be 1813 cal./day which decreased with 35 % than the daily requirements of FAO & WHO (1997). Such decrement was due to the reducing of fats and carbohydrates in diets.

Regarding to the average of vitamin A in Table (5), it was 468 IU per day which considered less than the daily requirements of FAO & WHO (1997) by 53 %. This decrement in Vit. A intake.

Results in the same table show 16 mg/day for the average of vitamin B, which decrease with 40 % than the daily requirements of FAO & WHO (1997).

Vitamin C intake in Table (20) had an average of 100 mg/day which was higher than the recommended daily requirements of FAO & WHO (1997) by 233 %. Such increase revealed to the presence of guava, capsicum and lemon juice in diet which had high levels of Vit. C as reported by SEFA (1997).

In addition, the same data show 1076 mg/day for the average of calcium intake that was lower with 10 % than the daily requirements of FAO & WHO (1997).

Concerning to the iron intake, its average was 33 mg/day which was more than the daily requirements of FAO & WHO (1997) by 153 %. That increase was due to the high content of iron in fool medames, green beans, apple juice and mango juice which presented to the patients. These results are in agreement with those reported by El-Sherbiny (1986) and SEFA (1997).

The average of phosphorus intake in the same table was 1443 mg/day which was higher with 20 % than the recommended daily requirements of FAO & WHO. The reason of that increment in phosphorus intake was the presence of some rich foods in phosphorus such as processed cheese, strawberry jam and halawa tehenia, the same trend was found by Cook (1999).

The average of chemical components (fresh weight basis) of therapeutic diet for boys (16-18 years old) (Table 6) :

The average of protein intake was 107 g/day which was more than the daily requirements of FAO & WHO (1997) by 98 %. This clear that, the diets presented to the patients were rich in protein sources such as boiled egg, meat and dry beans, and that agree with the finding of Lawric (1974) and Cook (1999).

Table 5. The average of chemical components (fresh weight basis) of therapeutic diet for boys (13-15) years old.

Days	Protein (gm)	Fat (gm)	Carbo. (gm)	Ash (gm)	Fiber (gm)	Calories	Vitamins			Minerals				
							A (IU)	B (mg)	C (mg)	Na^{+} (mg)	K^{+} (mg)	Ca^{++} (mg)	Fe^{++} (mg)	P^{++} (mg)
Saturday	90	33	274	9	5	1793	474	20	143	1044	1944	1059	40	1543
Sunday	75	34	307	11	3	1668	61	13	31	656	1839	1050	19	1219
Monday	97	41	264	11	4	1839	640	16	63	640	2351	952	19	1459
Tuesday	101	36	316	13	7	2045	369	21	235	700	1678	1454	84	1797
Wednesday	66	26	248	14	2	1529	1457	9	55	687	1482	903	22	933
Thursday	106	34	301	12	6	2009	462	21	77	599	2569	1010	18	1711
Total	535	204	1710	70	27	10883	3463	100	604	4326	11863	6458	202	866
Average	89	34	285	11	4	1813	468	16	100	721	1977	1076	33	1443
FAO/WHO	52	46	375	--	--	2800	1000	27	30	--	--	1200	13	1200
Dif. %*	71^{+}	26^{-}	35^{-}	--	--	35^{-}	53^{-}	40^{-}	233^{+}	--	--	10^{-}	153^{+}	20^{+}

Table 6. The average of chemical components (fresh weight basis) of therapeutic diet for boys (16-18) years old.

Days	Protein (gm)	Fat (gm)	Carbo. (gm)	Ash (gm)	Fiber (gm)	Calories	Vitamins			Minerals				
							A (IU)	B (mg)	C (mg)	Na^{+} (mg)	K^{+} (mg)	Ca^{++} (mg)	Fe^{++} (mg)	P^{++} (mg)
Saturday	109	39	310	11	5.8	2076	636	25.4	168	1294	2430	1314	46.80	1862
Sunday	87	40	297	13	3.5	1944	634	15.3	31	781	2126	1286	21.17	1506
Monday	121	58	298	14	5.3	2236	539	20	66	788	2774	1176	21.90	1573
Tuesday	121	45	371	16	10	2444	345	26.7	350	819	2077	1336	110.80	2106
Wednesday	77	31	283	17	3	1810	1487	9.1	78	702	1722	1108	113.90	1039
Thursday	170	37	367	14	7.9	2528	237	2.7	94	697	2885	1154	21.70	1991
Total	645	250	1926	85	35.2	13038	3878	123.5	787	5081	14014	7354	336	10077
Average	107	41	321	14	5.8	2173	646	20	131	846	2335	1225	56	1679
FAO/WHO	54	52	429	--	--	3200	1000	29	30	--	--	1000	14	1000
Dif. %*	98^{+}	21^{-}	25^{-}	--	--	32^{-}	35^{-}	31^{-}	336^{+}	--	--	22.5^{+}	300^{+}	67.9^{+}

FAO/WHO: The daily requirements of food components of Union Committee for FAO / WHO, 1997.

* The percentage of the difference between the average and the FAO & WHO daily requirements.

While, the average of fat intake per day was 41 g which was less than the FAO & WHO (1997) daily recommendation with 21 %.

On the other hand, the intake of calories per day was 2173 calories, which is less than the daily requirement of FAO & WHO (1997) by 32 %. Vitamins and minerals are same results for girls (10-12) (13-15) (16-18) years old.

The average of diets intake for different age periods were consumed during the experimental period for one year.

On the other hand, hemoglobin and sodium were 13.3 (g/dl) and 138 (m.mol/L) for the experimented group more than the group II with 23% and 31%, respectively. While potassium and calcium in the diet had no effect on their content in the blood for both group. For iron, data show that iron was 95 (mg/dl) for group I more than in group II 16 (mg/dl) with 493%.

Regarding in (Tables 7 and 8) children (4-6 years old) after one year increased in weight 46% for group I and 25% for group II and height 9% for group I and 8% for group II.On the other hand hemoglobin was 12.2 (g/dl) in group I more than 8.9 (g/dl) in group II, while sodium was 131 (m.mol/L) in group I less than in group II 134 (m.mol/L) with 37% and 2.2%, respectively. While potassium and calcium in the diet had no effect on their content in blood for both groups. On the other hand, data show that iron was 87 (mg/dl) for group I more than in group II 14 (mg/dl) with 521%.

Data tabulated in Tables (7 and 8) for children (7-9 years old) after one year increased in weight 12.5% for group I and 27% for group II and height 9.5% for both groups. While hemoglobin was 12.8 (g/dl) in group I more than 12.2 (g/dl) in group II. On the other hand, sodium was 135 (m. mol/L) in group I and this result is normal while 102 (m. mol/L) in group II was less than normal. About potassium and calcium, there is no effect for both groups. Data show also, that iron was 93 (mg/dl) for group I more than in group II 69 (mg/dl) with 34.8%.

It could be noticed that data in Tables (7 and 8) for boys (10-12 years old) after one year increased in weight with 7% for group I while was 16 % for group II, these results show that boys in this period for group II no control for their meals. On the other hand, increase 4% in height for group I while 7% for group II. Data in the same Table show that hemoglobin was 13.1 (g/dl) in group I more than 12.4 (g/dl) in group II. About sodium, potassium and iron there is no difference between both groups,whil iron was 88 (mg/dl) in group I more than 36 (mg / dl) in group II with 144.5%

Regarding in Table (7 and 8) boys (13-15 years old) after one year increased in weight 34% for group I and 20 % for group II and increased in height was 9% for group I while 6 % for group II. The increasing in weight and height for group I was more than group II with 14% and 3% respectively. On the other hand, concerning hemoglobin, sodium, potassium and calcium there is no difference between both groups, while iron was 98 (mg/dl) in group I more than 80 (mg/dl) in group II with 22.5 %.

Results in Tables (7 and 8) for boys (16-18 years old) after one year increased in weight 24% for group I and 19 % for group II while the same increasing in height for both groups. On the other hand, hemoglobin was 13.8 (g/dl) for group I more than 12.8 (g / dl) for group II with 7.8 %.

Table 7. Average weight, height and blood analysis for patients consumed therapeutic diet. (group I)

	Age (years)	B.E.T*		A.E.T.P**				Blood analysis				
		Weight (kg)	Height (cm)	Weight (kg)	a	Height (cm)	b	Hb (g/dL)	Na^{+} (mmol/L)	K^{+} (mg/dL)	Ca^{++} (mg/dL)	Fe^{++} (mg/dL)
Children	1 – 3	10	68	17	70	98	44	13.3	138	4.3	9.2	95
	4 – 6	13	94	19	46	103	9	12.2	131	5.1	9.1	87
	7 – 9	24	115	27	12	126	9	12.8	135	4.9	9.3	93
Boys	10 – 12	39	137	42	7	143	4	13.1	139	4.2	8.9	88
	13 – 15	43	144	58	34	157	9	12.9	135	4.4	9.2	98
	16 – 18	53	159	66	24	167	5	13.8	138	4.5	9.1	102

Table 8. Average weight, height and blood analysis for patients consumed routine house meals. (group II)

	Age (years)	B.E.T*		A.E.T.P**				Blood analysis				
		Weight (kg)	Height (cm)	Weight (kg)	a	Height (cm)	b	Hb (g/dL)	Na^{+} (mmol/L)	K^{+} (mg/dL)	Ca^{++} (mg/dL)	Fe^{++} (mg/dL)
Children	1 – 3	9.0	74	16	77	97	31	10.8	76	3.9	9.1	16
	4 – 6	13.5	92	17	25	100	8	8.9	134	4.4	8.5	14
	7 – 9	16.5	105	21	27	115	9	12.2	102	4.5	9.0	69
Boys	10 – 12	18	115	21	16	124	7	12.4	137	4.6	8.8	36
	13 – 15	40	142	48	20	151	6	12.9	138	4.7	8.7	80
	16 – 18	47	150	56	19	158	5	12.8	138	4.7	8.8	95

* B.E.T. : Before experimental treatments.

** A.E.T.P. : After experimental treatments period (for one year).

a: The increasing ratio percentage of weight for one year.

b: The increasing ratio percentage of height for one year.

Data show also, that no effect for sodium, potassium and calcium while iron was 102 (mg/dl) for group I more than 95 (mg/dl) for group II with 7.3%.

It can be concluded from the obtained results that the therapeutic diets for all age periods compared with the routine house meals had clear positive effect on: weight gain, height gain and on the level of hemoglobin, calcium and iron in blood of patients.

The positive effect on weight and height gain attributed to the sufficient amount of protein and calories presented in these therapeutic diets. In the same time such consumed amounts covered the daily recommendation of FAO /WHO 1997, while the positive effect for these diets on hemoglobin by increasing its levels returned to the high contents of protein and iron in these therapeutic diet. which has beneficial effect for these patients by increasing the oxygen carrying capacity improving tissue oxygenation with its good impact on the growth rate and parameter of development for these patients. meanwhile covered the daily requirements for the patients under investigation according to the recommendation of FAO/WHO 1997.

In addition, the high levels of calcium and iron in the blood of patients consumed these therapeutic diets revealed to the high ratios of those mineral in consumed diets.

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تغذية الأطفال مرضى القلب

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يعتبر الغذاء هو الأساس الضرورى للتغذية فى الحياه ويقسم على أساس الدراسات العلمية للغذاء وعلاقتها بالصحة. ويجب على الإنسان ان يستهلك غذاء طبيعى وذلك لتغطية احتياجاته الغذائية. وترجع أهمية التنظيم الغذائى أولاً لتغطية المتطلبات الكلية (العلاقة الصحيحة بين الطول والوزن) وتخزين المعادن فى وضعها الطبيعى وهذه الأبحاث صممت لدراسة إعداد وتقييم الغذاء للأطفال مرضى القلب.

يرجع فشل القلب الاحتقانى عادة إلى عدة أسباب من بينها ضغط الدم العالى، الليبدات العالية ، تصلب الشرايين والأوردة وفى مرضى الصمامات (الصمام المترالى والصمام الأورطى) التى تقلل اندفاع الدم فى الاتجاهات الصحيحة، القصور القلبى، مرضى القلب الروماتيزمى الذى سببه عدوى القلب ببكتيريا الاستربتوكوكس والذى يزيد بنشاط الغدة الدرقية.

تم تقييم الغذاء المستهلك بتقدير الرطوبة والبروتين والدهون والكربوهيدرات والرماد والألياف الخام والفيتامينات أ، ب، ج والمعادن (صوديوم ــ بوتاسيوم ــ كالسيوم ــ حديد ــ فوسفور).

وقد تم تقسيم الأطفال لمجموعتين رئيسيتين ، المجموعة الأولى تستهلك الغذاء تحت الدراسة والمجموعة الثانية تستهلك وجبات المنزل العادية.

وقسمت هذه المجاميع إلى ست مراحل عمرية (عمر ١ ــ ٣ سنة) ، (٤ ــ ٦ سنة) ، (٧ ــ ٩ سنة) (١٠ ــ ١٢ سنة)، (١٣ ــ ١٥ سنة) ، (١٦ ــ ١٨ سنة).

وكذلك تم حصر كميات الغذاء التى تغطى الاحتياجات اليومية من المكونات المختلفة طبقاً لتوصيات منظمة الغذاء والزراعة ومنظمة الصحة العالمية سنة ١٩٩٧.

وقد تم تحليل عينات الدم لتقدير الهيموجلوبين والصوديوم والبوتاسيوم والكالسيوم والحديد لكل من المجموعتين تحت الدراسة. دراسة معدل الزيادة فى الطول والوزن لجميع مراحل الأطفال العمرية لكل من المجموعتين. دراسة الارتباط بين المكونات المختلفة فى الغذاء بمثيلتها فى الدم.

ويمكن استخلاص الآتى من النتائج المتحصل عليها من البحث : أن الغذاء العلاجى للأعمار المختلفة مقارناً بالغذاء الروتينى المنزلى ذو تأثير واضح على اكتساب الوزن واكتساب الطول وكمية الهيموجلوبين والكالسيوم والحديد فى دم المريض والتأثير الإيجابى لزيادة الوزن والطول يرجع إلى الكميات الكافية من البروتين والطاقة الموجودة فى الغذاء العلاجى وكذلك النسب العالية من المعادن (الكالسيوم والحديد) .

وكذلك نجد ان التأثير الايجابى للغذاء العلاجى يرفع نسبة الهيموجلوبين فى دم المرضى مما يؤدى الى رفع كمية الاكسجين التى يتم حملها بواسطة الدم وتغذية الانسجه بها فينعكس بشكل جيد على معدل نمو المرضى .

وفى نفس الوقت هذه الكميات غطت التوصيات اليومية لمنظمة الغذاء والزراعة ومنظمة الصحة العالمية عام ١٩٩٧.