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RESEARCH ARTICLE

EFFECT OF NUTRITION EDUCATION PROGRAM ON HEALTH STATUS OF HEMODIALYSIS PATIENTS IN MAKKAH AREA.

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Abstract

Background: Patients with end-stage renal disease are required to undergo long-term hemodialysis. Nutrition education process is an attempt to improve patient health.In order to promote behavior change, it is important to assesswhether patients have adequate knowledge and skills toimplement a fluid limitation and adhere suitable foods outside the dialysis setting.

Objectives: Assess the effect of nutrition education program on health status of hemodialysis patient in Makkah.

Methodology: Thestudy was conducted on 80 patents fromhemodialysis unit of King Faisal hospital and Al Noor Specialist hospital in MakkahAlmukkaramah. All cases had clinical and laboratory evidence of chronic renal disease. Specific questionnaire was used to collect medical, dietary history and knowledge of the patients. Anthropometric measurements were done. Arab food analysis program version 10^{th} was used for nutrient analysis. Statistical analysis was performed using SPSS software version 20.

Results: The obtained data showed a highly significant decrease in serum Na and K between patients after education than before. Serum levels of Ph and PTH was decreased after education but insignificantly than before education. The knowledge of hemodialysis patient was increased after nutrition education program than before.

Conclusion and Recommendation: The present study suggested that intervention using nutrition education program improving knowledge and skills of the hemodialysis patient toward their disease and dietary management to improve their nutritional status.

Introduction:-

The functions of the kidneys include filtering the blood to make urine, enabling the body to get rid of waste and water it doesn't need, also regulating the salts and minerals in the blood [(1).]

People with end-stage renal disease (ESRD) require dialysis or transplantation in order to survive. Ninety-three percent of ESRD patients undergoing dialysis receive treatment in a clinic setting (hemodialysis). This generally

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involves being connected to a dialysis machine for about four hours at a time, three times per week. Dialysis is accompanied by demanding dietary and fluid intake restrictions, fatigue, and other symptoms that may limit one's activities [2].

The incidence and prevalence of ESKD has been rapidly increasing among the Saudi population in the last three decades [3]. There is a growing prevalence of ESKD in all regions of Saudi Arabia, yetthe prevalence is higher in the Western region of Saudi Arabia when compared to the other regions [4, 5, 6]. It is well known that the Western region of Saudi Arabia is a multicultural area with various ethnicities (because of pilgrims to Mecca) who have settled there [7, 8]. Since ethnic and genetic factors are responsible for certain renal diseases.These factors may play a role in the increased prevalence of ESKD in the Western region of Saudi Arabia [9, 10].

In ESRD patients, the diet adherence can influence the serum levels of calcium and phosphorus thus affecting the morbidity and mortality risk in these patients causing ESRD bone disorders [11, 12]. Thus it should be a priority for the physician to keep the levels of these minerals under control. Physicians use calcium-based phosphorus binders to treat both low calcium and high phosphorus levels to keep the phosphate and calcium levels intact along with Dietary restriction, which is considered an underrated measure of controlling mineral serum levels such as phosphate blood levels[13]. Despite all these efforts, controlling the serum levels of these minerals is not an easy task and more often than not, the dietary knowledge and compliance plays a key role in controlling them. For example, it has been found that hyperkalemia is found in 41.2% pre-dialysis, 6.5% post-dialysis and 66.9% before the next session of dialysis [14].

Subjects and methods:-

Subjects:-

Study was conducted on 80 patient of King Faisal Hospitaland Al Noor Specialist hospital in Makkah. All cases had clinical and laboratory evidence of chronic renal disease.

Methods:-

Study design:

This study was divided into two phases; pre and post-nutrition education program. In pre-nutrition education phase structured questionnaire was introduced to identify the nutrition status of hemodialysis patient and thus clarify priorities of the education program. The post-education phase involved the introduction of education program to assess its effect on renal disease and anthropometric measurement as well as behavior of hemodialysis patients.

Data collection:-

Pre – education program: - The data were collected during the period of dialysis by direct interview. The questionnaire was completed by the researchers.

Education method: - Interview, brochures and posters.

The Post –education program: -The same questionnaire was administered two month after the education took place.

The study questionnaire: -The questionnaire covering three sections as follows:

Section one: Socio-demographic data include: - sex, age, education level, and medical information.

Section two: Biochemical assessment: -Creatinine, Ca, K, ph, Na and PTH collected from the patient file.

Section three nutrition assessment:-

Anthropometric measurement: In this study height, weight and body mass index (BMI) were measured for the patients.

Dietary assessment: It is a major part of nutritional assessment and plays an essential role in any efficient health care system. The researchers applied the following methods to assess the type and quantity of food intake of sample.

Food record: -The patient recorded their food intakes during 3 consecutive days. The patients were asked to give a detailed description of the food eaten, if possible to give brand name and to estimate the amount using natural measures (e.g. pieces, slices, etc.) orhousehold measure (e.g. spoon, cup, etc.)[15].

Food analysis: -Daily nutrient intake was obtained for three different days and nutritional values of consumed food were calculated using the computer program software for United States Department of Agriculture USDA [16].

Statistical analysis: -All results were tabled with SPSS software 20th edition using T test and frequency. Results were reported as mean ±SD.

Results:-

Demographic, social and economic data of the 80th hemodialysis patient are listed in table (1). The number of female received hemodialysis was higher than male. The number of secondary education was the lowest followed by university education level. Concerning to income level, the patients have ≤ 3000 SR/month and >5000 SR/month were nearly equal.

Table 1:- Socio demographic data of hemodialysis patient.

Parameters	No	%
Gender		
Male	36	45
Female	44	55
Total	80	100
Age		
19-45	52	65
46-65	28	35
Total	80	100
Education level		
Illiterate	22	27.5
Primary	18	22.5
Intermediate	20	25
Secondary	8	10
University	12	15
Total	80	100
Income level/month		
≤ 3000 SR	20	25
300-500 SR	38	47.5
>5000 SR	22	27.5
Total	80	100

Effect of nutrition education program on weight and BMI of hemodialysis patients was illustrated in table (2). It is clearly noticed that weight and BMI showed no significant changes after nutrition education program but slightly increased than before

Table 2:- Effect of nutrition education program on anthropometric measurements of hemodialysis patients (mean ± S.D).

Parameter	Before education	After education	T. calculate	T. table	
				0.05	0.01
Weight (kg)	54.98 ±8.32	56.29 ±7.01	1.94^{NS}	2.44	3.7
BMI (kg/m^2)	22. 9± 5.52	23.45 ±5.18	1.46^{NS}		
Height (m)	156.52± 9.4				

NS non-significant.

Table (3) shows the effect of nutrition education program on serum Na, K, Fe and S.ferritinof hemodialysis patients. There were highly significant decreased (P < 0.01) in serum Na and K between patient after education than before

represented (155.37 ± 5.25 mmol/l vs. 130 ± 6.52 mmol/l) and (4.66 ± 1.18mmol/l vs. 3.99 ± 1.14mmol/l) respectively. The mean ±SD values of serum iron after nutrition education programs was (52.78 ± 16.6Ug/dl) which was insignificantly different than the same value before nutrition education program (50.96 ± 19.38Ug/dl). The same trend was observed in serum S.ferritin which was insignificantly different after and before education.

Table3:- Effect of nutrition education program on serum Na, K, Fe and S. Ferritin of hemodialysispatients (mean ± S.D).

Parameter	Normal range	Before education	After education	T. calculate	T. table	
					0.05	0.01
Na	136-145 mmol/l	155.37 ± 5.25	130 ± 6.52	4.5**	2.44	3.7
K	3.4-5.1 mmol/l	4.66 ± 1.18	3.99 ± 1.14	6.52**		
Fe	33-193 Ug/dl	50.96 ± 19.38	52.78 ± 16,6	0.89 NS		
S. ferritin	> 100	114.7±8.022	164 ± 9.03	0.776 NS		

NS non-significant **P 0.01

As shown in table (4) the mean value of serum creatinine after nutrition education program was significantly (P<0.05) decreased than before nutrition education program represented (7.09 ± 3.01 mg/dl vs. 9.03 ±3.40 mg/dl). Whereas serum uric acid shows insignificantly change after nutrition education program. It is clearly noticed that serum ALB and T.protein shows insignificantly different after and before nutrition education program.

Table 4:- Effect of nutrition education program on serum creatinine, U.A, ALB and T. protein of hemodialysis patients (mean ± S.D).

Parameter	Normal range	Before education	After education	T. calculate	T. table	
					0.05	0.01
Creatinine	0.7-1.2 mg/dl	9.03 ± 3.40	7.09 ± 3.01	2.53*	2.44	3.7
Uric acid	3.4-7.0 mg/dl	6.49 ± 1.78	6.05 ± 2.62	1.01 NS		
ALB	3.97-4.94 g/dl	3.81 ± 0.75	3.74 ± 0.78	0.81NS		
T. protein		3.42 ± 0.56	3.31 ± 0.61	0.73 NS		

NS non-significant *P 0.05

According to table (5) the mean value of serum PTH after nutrition education program was (4.41 ± 2.09 mg/dl) which was lower than the mean value of serum PTH before nutrition education program which was (4.57 ± 2.12 mg/dl) but insignificantly .In the same table the mean values of serum Ph and Ca after nutrition education program were (1.76 ± 1.05 mg/dl) and (2.51 ± 0.589 mg/dl) respectively, which shows insignificant difference than the mean values of Ph and Ca before nutrition education program which was (2.48 ± 0.77 mg/dl) and (2.24 ± 0.431 mg/dl) respectively.

Table 5:-Effect of nutrition education program on serum PTH, Ph and Caof hemodialysis patients (mg/dl) (mean ± S.D).

Parameter	Normal range	Before education	After education	T. calculate	T. table	
					0.05	0.01
PTH	150-300 mmol/l	457 ± 2.12	441 ± 2.09	0.350 NS	2.44	3.7
Ph	0.81-1.45 mmol/l	2.48 ± 0.77	1.76 ± 1.05	2.1 NS		
Ca	2.15-2.55 mmol/l	2.24 ± 0.431	2.51 ± 0.589	2.05NS		

NS non-significant.

Table (6) illustrates the effect of nutrition education program on blood (HBG and RBCs)of hemodialysis patients. It is clearly noticed that there were insignificantly different between blood (HBG and RBCs) after and before nutrition education program. The result of blood HBG after and before nutrition education program was 10.7 mg/dl and 9.77 mg/dl respectively.

Table 6:-Effect of nutrition education programs on blood RBC and HBG of hemodialysis patients (mean ± S.D).

Parameter	Before education	After education	T. calculate	T. table	
				0.05	0.01
HBG	9.77 ± 1.4	10.7 ± 1.77	2.9 ^{NS}	2.44	3.7
RBCs	3.42 ± 0.56	3.31 ± 0.61	1.13^{NS}		

NS non-significant.

Table (7) illustrates the effect of nutrition education program on the consumption of CHO, protein (from animal and plant sources) and fat (from animal and plant sources) of hemodialysis patients. According to food analysis, the mean values of CHO, fat animal and fat plant intake after nutrition education program were (366.70 ±22.69gm/day), (35.58 ± 7.03 gm/day) and (30.54 ±7.51gm/day) respectively, which were insignificantly different than the same values before education.

Concerning protein intake from plantsource the mean value after nutrition education program was significantly (P <0.05) lower than protein intake from plant source before nutrition education program represented (33.42 ±5.75gm/day vs. 38.38 ± 8.12gm/day), whereas the protein intake from animal source was significantly (P<0.05) increased after nutrition education program than before represented (36.62±7.27gm/day vs. 32±6.57gm/day).

Table 7:-Effect of nutrition education programs on macronutrients intake of hemodialysis patients (g/day) (mean ± S.D).

Parameters	Before education	After education	T. calculated	T. table	
				0.05	0.01
CHO	355.94 ±20.68	366.70±22.69	0.441^{NS}	2.44	3.7
Protein animal	32±6.57	36.62 ±7.27	2.51*		
Protein plant	38.38±8.12	33.42 ±5.75	2.778*		
Fat animal	32.68±5.02	35.58± 7.03	2.321^{NS}		
Fat plant	34.90±6.25	30.54 ±7.51	1.366^{NS}		

NS non-significant *P 0.05

Table (8) illustrates the effect of nutrition education program on Na, Ph, K, Fe and Ca intakeof hemodialysis patients. The obtained data shows that the consumption of Na, Ph and K were significantly (P <0.01) decreased of after nutrition education program than before represented (1830.8 ± 8.59mg/day vs. 1980.72 ± 9.6mg/day), (846.15±11.4 mg/day vs. 1055.2±11.8mg/day) and (2056±7.75mg/day vs. 2549.2±8.12mg/day) respectively.

Table 8:- Effect of nutrition education program on Na, Ph, K, Fe and Ca intake of hemodialysis patients (mg/day) (mean ± S.D).

Parameters	Average requirement	Before education	After education	T. calculated	T. table	
					0.05	0.01
Na	2000	1980.72 ± 9.6	1830.8 ±8.59	8.6**	2.44	3.7
Ph	800	1055.2 ±11.8	846.15 ± 11.4	8.24**		
K	2000	2549.2±8.12	2056 ±7.75	11.385**		
Fe		6.83 ±0.16	5.74 ±0 .03	2.114^{NS}		
Ca	1000	1340 ±6.83	1063.9 ± 7.58	11.215**		

NS non-significant **P 0.01

Discussion:-

Our results revealed that, hemodialysis patients were in a desirable weight as a categories of BMI and changes in weight and BMI after nutrition education program were insignificant, these results agree with **Bossola *et al.*,(2006)**[17]and **Carrero*et al.*,(2008)**[18]they found that (4%) HD patients presented BMI values below 18.5 kg/m^2, twenty-four (48%) presented normal values for BMI, (38%) were overweight and (10%) were obese. Anthropometric measurements are regarded as important indicators of an individual's nutritional status. Anthropometry is a convenient and reliable technique whereby changes in the status of nutrition can be evaluated easily [19].

Present data show significant effect on serum Na and Kit is important for hemodialysis patient to adjusted minerals. **Blumenkrantz,(1994)** [20] reported that high serum potassium level, may cause severe and fatal complications such as cardiac arrest. **National Kidney Disease Education Program, (2009)**[21] reported that one of the most important steps for patients with CKD is to control blood pressure by reducing sodium intake blood pressure control reduces the level of protein urea and lowers the risk of developing cardiovascular disease.

The level of serum creatinine was higher than normal individual while serum ALB was lower than normal individual these results agree with **Rambod*et al*., (2008)**[22]**.**

Levels of serum PTH and Ph were slightly decreased after nutrition education program and there is a positive relationship between them as reported by **Melamed*et al.,* (2008)**[23]they found that chronic kidney disease (CKD) patients may develop secondary hyperparathyroidism with rising PTH levels, when the glomerular filtration rate (GFR) falls below 60 mL/min/1.73 m^2 (CKD stage 3) , mechanistically triggered by the accumulation of phosphate, and involving a feedback loop between PTH and fibroblast growth factor (FGF)[23].

Blood RBC and HBG of hemodialysis patients were significantly increased after nutrition education program these results similar with that found by **Luciana *et al.,* (2012)**[24]**.**

Hemodialysis patients should regard their intake of minerals and make efforts to reduce Na, K and Ph intake. The obtained data shows that the consumption of Na, Ph and K were significantly ($P < 0.01$) decreased after nutrition education program.**Blumenkrantz, (1994)**[20]reported that hemodialysis patients usually must restrict their daily potassium intake to 50–75 mEq/day (2–3 g/day) and phosphorus intake needs to be restricted to 0.6–1.2 g/day .The reduction on Na, Ph and K consumption after nutrition education program due to help patients to improve adherence to suitable diet and food items, these results agree with **Coplan *et al.,* (2008)**[25] they reported that the dietetic regime is restrictive (low in salt, phosphorus, potassium and fluid) .

Conclusion:-

The present study suggested that intervention using nutrition education program improving knowledge and skills of the HD patients toward their disease and dietary management to improve their nutritional status.

Recommendations:-

- Using motivational interviewing techniques that tailor advice based on patients' status and laboratory results.
- Nutritional monitoring and intervention improves creatinen, phosphor, PTH, sodium and potassium on HD patient.
- Make other study emphasis on physical activity to reduce weakness, stiffness, muscle wasting, and negative nitrogen balance on HD patient.

Limitations:-

The limitation in this study may be related to the small sample size.

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