Body Fat Percentage in Peritoneal Dialysis and Hemodialysis

PERİTON DİYALİZİ VE HEMODİYALİZ HASTALARINDA VÜCUT YAĞ YÜZDESİ

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Summary

In many peritoneal dialysed(PD) and hemodialysed (HD) patients, protein and energy malnutrition are seen with appetite loss.In these patients regulation of body composition and food intake causes variations in body fat percentage (BF%). For this purpose, in this study 27 PD (9 female, 18 male) and 43 HD (12 female, 31 male) patients' BF% values were determined by using Futrex-5000. PD patients have been followed up at least for 6 months and HD patients have dialysed 2 or 3 time dialysis per week. PD and HD patients' mean BF% values were compared and statisticaly analysis were evaluated by using student's t test. PD patients' mean BF% values were 27.3%. These values were significantly higher than those of the HD patients' mean BF% values: 23.2% ($p<0.05$). When PD and HD patients were compared as female and male, mean BF% values of female patients with PD (30.6%) were found higher than female patients wiht HD(25.4%) and mean BF% values of male patients wiht PD (25.6%) were found higher insignificantly than BF% values of male patients with HD (22.3%). It was considered that the cause of higher BF% values of PD patients were positive energy that was formed by high concentration of glucose which is added in peritoneal dialysis solution for ultrafiltration. In PD and HD patients' prognosis can be affected by paying attention to the food intake.

Key Words: Peritoneal dialysed, Hemodialysed, Body fat percentage

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Özet

Protein ve enerji malnütrisyonu olan bir çok peritoneal diyalizli (PD) ve hemodiyaliz/i (HD) hastada iştah kaybıda görülmektedir. Bu hastalarda besin alımı ve vücut kompozisyonun düzenlenmesi vücut yağ yüzdesinde (VY%) değişikliklere yol açmaktadır. Bu amaçla 27 PD'li (9 kadın, 18 erkek) ve 43 HD'li (12 kadın, 31 erkek) hastanın Furex-5000 cihazı kullanılarak VY% değerleri hesaplandı. PD'li hastalar en az 6 aydan beri takip edilmekte ve HD'li hastalar haftada 2 veya 3 kez dializ makinasına bağlanmakta idiler.

PD'li ve HD'li hastaların VY%'si ortalamaları student t testi kullanılarak karşılaştırıldı. PD'li hastaların ortalama VY% değeri %27.3 olarak saptandı. Bu değer HD'li hastaların ortalama VY% değerinden (VY%:%23.2) anlamlı olarak yüksekti ($p<0.05$). PD ve HD'li hastalar kadınlar ve erkekler o/arak ayrı ayrı karşılaştırıldığında ortalama VY% değeri PD'li kadın hastalarda (%30.6), HD'li kadın hastalara (%25.4) göre daha yüksek bulunurken erkek hastaların VY% ortalama değerleri PD'li olanlarda %25.6 ile HD'li hastalara (%22.3) göre daha yüksekti. PD'li hastaların VY% değerlerinin yüksek çıkmasına neden olarak dializ solüsyonuna ilave edilen fazladan enerji kaynağı glukozun gösterilebileceği düşünüldü. PD ve HD'li hastalarda ekstra besin alımının vücut kompozisyonunu ve prognozu etkiliyebileceğinden dikkat etmek gerektiğine karar verildi.

Anahtar Kelimeler: Peritoneal dializ, Hemodiyaliz, Vücut yağ yüzdesi

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Protein-energy malnutrition is a frequently encountered complication in terminal stage renal failure patients. Attendant pathologies such as inadequate dialysis,infections,diet restrictions, hormonal imbalances such as increase in lepton, drugs, vitamin, amino acid and protein losses during dialysis and other factors related to dialysis treatment method may account for this malnutrition (1). In various studies, it has been reported that protein-energy malnutrition that is present at the begining of dialysis tretment or that develops during dialysis is an unfavorable prognostic sign (2-4). For this rea-

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son, evaluation of nutrition status in chronic dialysis patients is very important. No significant differences between the nutritional status of HD and PD patients have been found (5) Among many approaches used for this purpose is the determination of body composition (7).

Many changes may be brought about in energy intake and body composition of patient undergoing hemodialysis (HD) and periton dialysis (PD) (8-10). Such factors as malnutrition, increase in leptin, hydration status and glucose absorption from dialysis solution during periton dialysis may lead to important alterations in body composition (11-13). One of the most important criteria in determining body composition is the measurement of body fat percentage. Of many described methods the measurement of body fat percentage by means of near infrared rays application is a simple and non-invasive method (14,15).

In this study, it was our goal to determine and compare the body fat values of patients undergoing HD and PD by using infrared rays

Patients and Method

27 PD and 43 HD patients, who were undergoing dialysis treatment for at least six months in the Ankara University Faculty of Medicine Ibn-i Sina Hospital Nephrology Department, were included in study. The demographic characteristics of the patients are displayed in Table 1.

Body fat percentage (BF%) measurements were carried out, using spectrophotometric method by Futrex 5000 (14). This technique is based on the principle of application of near infrared rays to the skin overlying biceps muscles and measurement of subcutaneus fat thickness after entering the information about the age, height, weight and physical activities of the patients to the device. Measurements were made after dialysis session in HD patients and when there was no dialysis solution intraperitoneally , on the arm at location where there is no vascular access.

Results were presented as mean and standard deviation statistical analysis was made by using non-paired t test.

Results

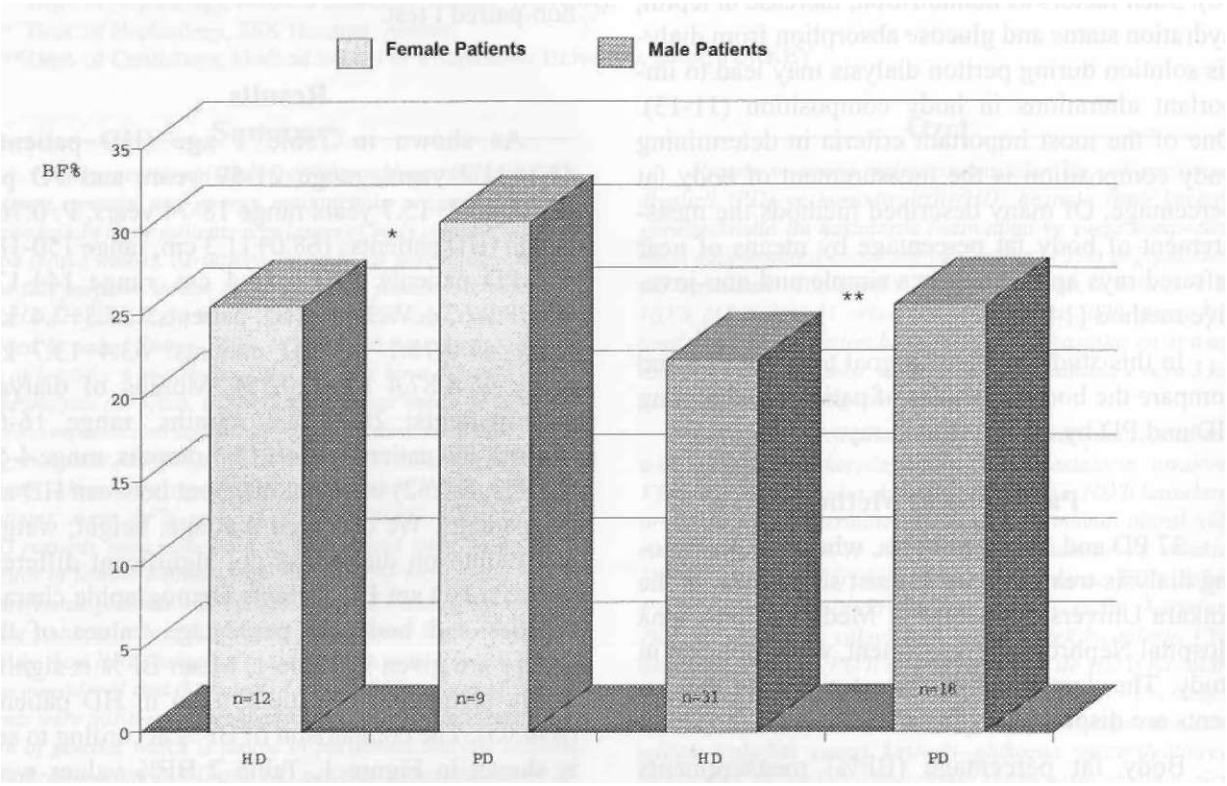
As shown in Table 1 age (HD patients: 41.1+11.7 years, range 21-59 years and PD patients: 45.2+15.7 years range 18-74 years, P: 0.76), height (HD patients: 168.0+11.3 cm, range 150-182 cm, PD patients: 162.1+16.4 cm, range 144-176 cm, P:0.67), Weight (HD patients: 57.3+7.4 kg, range 47.0-76.1 kg, PD patients: 63.4+13.7 kg, range 45.6-87.4 kg, P:0.75). Months of dialysis (HD patients: 20.3+12.7 months, range 16-66 months, PD patients : 16.9+12.7 months, range 4-58 months, P:0.62) were not different between HD ant PD patients. We observed that age, height, weight and month on dialysis is not significant different between HD ant PD patients Demographic characteristics and body fat percentage values of the groups are given in Table 1. Mean BF% is significantly higher in PD patients than in HD patients ($p<0,05$). The comparison of BF% according to sex is shown in Figure 1, Table 2 BF% values were higher in PD group both in female and male patients, while the difference was significant at the limit in females ($p=0,05$), it was not so in males ($p>0,05$).

Table 1. Demographic characteristics and body fat percentage (BF %) of hemodialysis and periton dialysis patients

n (sex)F/M	Hemodialysis Patients 43(12/31)		Perioton Dialysis Patients 27(9/18)		
	X ± SD	(Range)	X ± S D	(Range)	p
Age (Year)	41,1 ± 11,5	21-59	45,2 ± 15,7	18-74	p=0,76
Height (cm)	168,0 ± 11,3	150-182	162,1 ± 16,4	144-176	p=0,67
Weight (kg)	57,3 ± 7,4	47,0-76,1	63,4 ± 13,7	45,6-87,4	P=,75
Period on Dialysis (Months)	20,3 ± 12,7	16-66	16,9 ± 12,7	6-58	p=0,62
BF %	23,2 ± 4,6	10,8-32,4	27,3 ± 7,3	10,5-43,9	p<0,05

Table 2. Comparison of body fat percentage (BF %) in female and male patients according to hemodialysis (HD) and periton dialysis (PD).

	Female Patients			Male Patients		
	HD	PD	p	HD	PD	p
N	12	9		31	18	
BF%	25.5±4.6	30.6±6.8	=0.05	22.3±4.3	25.6±7.2	>0.05



* p=0.05, ** p>0.05

Figure 1. Comparison of body fat percentage (BF %) in female and male patients according to hemodialysis (HD) and periton dialysis (PD).

Discussion

It is known that malnutrition has adverse effect on prognosis in chronic dialysis patients. The most significant factor in malnutrition is the effect of uremic toxins suppressing the appetite and increasing tissue breakdown(l). Indeed, subjective and objective malnutrition findings found prior to dialysis are reversed after dialysis treatment yet, inspite of dialysis, malnutrition remarking of the most important problems in chronic dialysis patients.

Various clinical, biochemical, immunological and antropometric parameters are used for the evalution at nutrition status (7,9). The most frequently employed of these methods is the antropometric measurement determining body composition one of the most critters reflecting nutritional status and body composition is BF% (10,11). BF% is one of the most important criterios that reflecting the nutritional status and body composition. In addition to the formula using height, weight skin fold measur-

ment to determine the BF%, more sensitive methods such as another methods are olso used. In the determination of BF%, in addition to formulas derived from to height, weight and skin fold measurements more accurate methods such as total body potassium, DEXA(dual energy X rays absorbsiometry), BIA (bioelectrical impedance), IRI (infrared interactance) and neutron activation. Of these methods, the cheapest and the most profitable one is the IRI method that we employed in our study (15).

In this study, we observed that BF% was significantly higher in PD patients than in HD patients. Woodrow et all (10) in their study using DEXA method, have determined that body fat was higher in PD patients than in HD patients, particularly in famale patients. In addition to differences between dialysis doses, medications, nutritional habits and basal body composition, that were the factors not controlled in our study, the peritoneal absorbtion at the glucose concentration in dialysis solution in PD patients may also be implicated for the difference between two population. %60-70 of the glucose added to peritoneal dialysis solutions in order to enable ultrafiltration is absorbed from periton and in this manner 50-200 gr glucose is gained per day. Glucose absorbtion may also cause the suppression of appetite in the patients and produce a liability to the development of protein malnutrition as well as causing obesity and increase in body fat via additional colory gain (12). For this reason, the higher BF% in PD patients does not these that there patients have better nutritional status.

In conclusion, BF% which is one of the parameters used in the evaluation of nutritional status can be estimated in a simple and noninvasive fashion by 'infrared interactance' method. Monitoring BF%, apart from other subjective and objective nutritional status indexes may provide valuable information concerning nutritional status and body composition of chronic dialysis patients. In the end, it can be suggested if care is taken for nutritional status in dialysis patients, this may influence prognosis favorable.

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