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*Comparison between some anthropometric measurements
in adequately treated peritoneal dialysis and hemodialysis patients*

In patients with end-stage renal disease (ESRD) the renal replacement therapy (RRT) is necessary to sustain their lives (1, 2). Most patients begin the RRT with dialysis. Both of them: hemodialysis and peritoneal dialysis are more or less similar in extending patients' lives. In order to describe the clinical status of dialysis patients some anthropometric measurements as well as dialysis adequacy are used (4). Anthropometric measurements which are easy to perform, inexpensive and noninvasive methods are usually used to describe the nutritional status of patients (4). The adequacy of dialysis is usually determined by Kt/V index in order to correct the dose of dialysis (2). The purpose of the present study was the comparison of some anthropometric measurements in adequately dialyzed (from the clinical point of view) patients treated with peritoneal dialysis (PD) and hemodialysis (HD).

MATERIAL AND METHODS

The study was performed on 40 non-diabetic, clinically stable, chronic dialysis patients, without any inflammatory process. The patients were divided into two groups, 20 patients in each: I – peritoneal dialysis (PD-pts); mean age 48.05 ± 17.35 years, and II – hemodialysis patients (HD-pts); mean age 44.25 ± 11.44 years. In each patient some anthropometric measurements and dialysis adequacy were obtained. We determined such anthropometric measurements as: body weight (BW), height (H), body mass index (BMI), total body water (TBW), lean body mass (LBM), fat body mass (FBM), upper limb musculature (ULM), mid-arm circumference in tension and in rest (MAC-t and MAC-r), triceps skinfold thickness (TSF). All peritoneal dialysis patients were treated with continuous ambulatory peritoneal dialysis (CAPD) and received four 2-L dialysis exchanges per day. They were measured in the morning, after their first daily exchange with empty abdomen. All hemodialysis patients received three hemodialyses weekly and were evaluated after their midweek hemodialysis session. In order to minimize variability in the anthropometric measurements all of them were performed by a single investigator. Body weight was determined by using the electronic balance. Body height was measured by using an anthropometer. Mid-arm circumference (MAC) was measured with a flexible steel tape in the right arm (it did not contain a functional vascular access) in tension and in rest. Triceps skinfold thickness was measured with skinfold caliper on the right side of the body (5, 6). The musculature of upper limb (ULM) was evaluated as: maximal arm circumference in tension (cm) – maximal arm circumference in rest (cm) / upper limb length (cm) x 100. BMI was calculated as: body weight (kg) / body height squared (m^2) (5). TBW was estimated from Watson and Watson formula; LBM was estimated as: $LBM (kg) = TBW (kg) / 0.73$, whilst FBM (kg) was calculated as the difference between BW (kg)

and LBM (kg) (9). Dialysis adequacy was evaluated by Kt/V, according to Keshaviah (3). The obtained values were expressed as: mean value \pm SD. The U Mann-Whitney test was applied for comparison between groups; we defined a significance as $p < 0.05$.

RESULTS

Our data showed that some anthropometric parameters such as BMI, TSF, MAC, FBM and LBM, ULM were significantly higher in PD than in HD-pts ($p < 0.01$ and $p < 0.05$ respectively). No significant difference in TBW capacity between both groups was observed; 38.27 ± 7.83 kg in the PD patients vs 33.55 ± 6.18 kg in the HD patients; ($p > 0.05$). The obtained values were shown in Table 1. The mean values of Kt/V for the PD and for the HD patients were: 2.16 ± 0.48 and 1.05 ± 0.35 respectively.

Table 1. Obtained values of anthropometric measurements in peritoneal dialysis patients (PD-pts) and in hemodialysis patients (HD-pts) expressed as: mean \pm standard deviation (SD)

| | BMI | TSF | MAC-r | FBM | LBM | ULM | TBW |
|---------|---------------------|-----------------------|---------------------|----------------------|----------------------|--------------------|---------------------|
| PD-pts | 26.67 ± 5.46 | 142.25 ± 94.97 | 30.13 ± 4.23 | 24.05 ± 11.15 | 52.47 ± 10.99 | 4.4 ± 2.26 | 38.27 ± 7.83 |
| HD-pts | 22.98 ± 3.21 | 59.7 ± 35.23 | 23.95 ± 3.85 | 15.54 ± 6.57 | 44.96 ± 8.57 | 2.33 ± 0.61 | 33.55 ± 6.18 |
| p-value | $p < 0.01$ | $p < 0.01$ | $p < 0.01$ | $p < 0.01$ | $p < 0.05$ | $p < 0.05$ | $p > 0.05$ |

BMI – body mass index (kg/m^2), TSF-triceps skinfold thickness ($\times 0.1\text{mm}$), MAC – r – mid-arm circumference in rest (cm), FBM – fat body mass (kg), LBM – lean body mass (kg), ULM – upper limb musculature, TBW – total body water (kg)

DISCUSSION

Anthropometric parameters are useful in the assessment of the nutritional status in dialysis patients. Nelson et al. (8) observed in non-diabetic PD patients TSF and MAC values similar to those in the HD patients. Marcen et al. (7), on the other hand, observed fat depletion as well as decrease in TSF and MAC values within a year-long treatment in the HD patients. FBM was in this data also significantly higher in the PD than in HD patients, as observed in our data, as well. Cianciaruso et al. (1), showed in their data significantly reduced body fat contents and skinfolds thickness in HD patients. In our data lower body fat mass (FBM) as well as lower triceps skinfold thickness (TSF) in hemodialysis patients was also found. All these findings indicate a better nutritional status, when we compare peritoneal and hemodialysis patients, which is caused by more liberal diet applied in PD patients. Finally, the mean Kt/V value, we observed in our patients treated with hemodialysis was adequate according to Hakim et al. (2).

CONCLUSION

We conclude that the adequately treated, from the clinical point of view, the PD patients had better anthropometric indicators of the nutritional status than the adequately treated HD patients.

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SUMMARY

Some anthropometric measurements are usually used to estimate the nutritional status of dialysis patients. The aim of our study was the comparison of some anthropometric measurements in patients adequately (from the clinical point of view) treated with peritoneal dialysis (PD) and hemodialysis (HD). The study was performed on 40 chronic dialysis (both: PD and HD), non-diabetic patients, without any inflammatory process. The patients were divided into two groups, 20 patients in each: I – peritoneal dialysis patients (PD-pts), II – hemodialysis patients (HD-pts). In each patient body mass index (BMI), total body water (TBW), lean body mass (LBM), fat body mass (FBM), upper limb musculature (ULM), mid arm circumference in tension and in rest MAC-t and MAC-r, triceps skinfold thickness (TSF) and dialysis index (Kt/V) were determined. The obtained values were analyzed statistically and compared between the groups. In peritoneal dialysis the patients' higher values of BMI, FBM, MAC and TSF ($p < 0.01$), as well as higher LBM and ULM ($p < 0.05$) than those in hemodialysis patients were observed. TBW was not statistically different in the PD and HD patients ($p > 0.05$). Mean Kt/V values observed were as follows: 2.16 ± 0.48 in PD patients vs 1.05 ± 0.35 in the HD patients; ($p < 0.01$). We conclude that adequately treated, from the clinical point of view the PD patients had better anthropometric indicators of nutritional status than the adequately treated HD patients.

Porównanie niektórych parametrów antropometrycznych u pacjentów adekwatnie leczonych dializami otrzewnowymi i hemodializowanych

Niektóre parametry antropometryczne używane są do oceny stopnia odżywienia pacjentów dializowanych. Celem obecnych badań było porównanie wybranych pomiarów antropometrycznych u pacjentów adekwatnie dializowanych (z klinicznego punktu widzenia) otrzewnowo i hemodializowanych. Badaniami objęto 40 chorych bez cukrzycy i bez cech klinicznych aktywnego procesu zapalnego, dializowanych otrzewnowo (PD) i hemodializowanych (HD). Pacjentów podzielono na dwie grupy: I – pacjenci dializowani otrzewnowo i II – pacjenci hemodializowani, po dwudziestu chorych w każdej grupie. U każdego z pacjentów oznaczono: indeks masy ciała (BMI), całkowitą wodę ustroju (TBW), całkowitą masę beztłuszczową (LBM), masę tłuszczową ustroju (FBM), umięśnienie kończyny górnej (ULM), obwód ramienia w napięciu i w spoczynku (MAC-t i MAC-r), grubość fałdu skórno-mięśniowego tricepsa (TSF) i wskaźnik adekwatności dializy (Kt/V). Uzyskane wartości przedstawiono jako: średnia \pm SD oraz opracowano statystycznie i porównano między grupami. U pacjentów dializowanych otrzewnowo obserwowano w porównaniu z pacjentami hemodializowanymi wyższe wartości BMI, FBM, MAC i TSF ($p < 0,01$), jak również wyższe wartości LBM i ULM ($p < 0,05$). Średnie wartości Kt/V obserwowane w obu grupach były następujące: $2,16 \pm 0,48$ w grupie pacjentów dializowanych otrzewnowo vs $1,05 \pm 0,35$ w grupie pacjentów hemodializowanych ($p < 0,01$). Wnioskujemy, że u adekwatnie (z klinicznego punktu widzenia) dializowanych otrzewnowo pacjentów obserwowaliśmy wyższe wartości antropometrycznych wskaźników stopnia odżywienia niż w grupie chorych hemodializowanych.