Comparison of Body Fat Content and Distribution of Familial Amyloidotic Polyneuropathy Patients versus Healthy Subjects

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Abstract

The deposition of amyloid fibers at the peripheral nervous system can induce motor neuropathy in Familial Amiloidotic Polyneuropathy (FAP) patients. This produces progressive reductions in functional capacity. The only treatment for FAP is a liver transplant, followed by aggressive medication that can affect patients' metabolism. To our knowledge, there are no data on body fat distribution or comparison between healthy and FAP subjects, which may be important for clinical assessment and management of this disease. **Purpose:** To analyze body fat content and distribution between FAP patients and healthy subjects. **Methods:** Body fat content and distribution were measured through Double Energy X-ray Densitometry (DXA) in two groups. Group 1 consisted of 43 Familial Amyloidotic Polyneuropathy patients (19 males, 32 + 8 Yrs, and 24 females, 37 + 5 yrs), who had liver transplant less than 2 months before. Group 2 consisted of 18 healthy subjects of similar age (8 males, 36 + 7 yrs, and 10 females, 39 + 5 yrs). **Results:** Healthy subjects showed higher values than FAP patients for: BMI (24,2+2,3kg/m2 vs 22,3+3,8 kg/m2 respectively, p<0,05), % trunk BF (26,21+8,34kg vs 20,78+9,05kg respectively, p<0,05), % visceral BF (24,43+7,97% vs 19,21+9,30% respectively, p<0,05), % abdominal BF (26,63+8,51% vs 20,63+10,35% respectively, p<0,05), abdominal BF/BF ratio (0,09+0,02 vs 0,08+0,02 respectively, p<0,05) and abdominal BF/trunk BF ratio (0,19+0,03 vs 0,17+0,03 respectively, p<0,05). **Conclusion:** These results showed that FAP patients soon after liver transplantation exhibited a healthier body fat profile compared to controls. However, fat content and distribution varied widely in FAP subjects, suggesting an individualized approach for assessment and intervention rather than general guidelines. Future research is needed to investigate the long term consequences on body fat following liver transplant in this population.

Introduction

Excess body fat or a hazardous fat distribution may be the cause of several metabolic disorders including diabetes, hypertension and fatty liver [1]. Familial Amiloidotic Polyneuropathy (FAP) is a disease characterized by deposition of amyloid fibers at the peripheral nervous system and can induce motor neuropathy and progressively reduce functional capacity [2, 3]. Amiloid fibers in FAP patients are mainly released by the liver. The only treatment for FAP is a liver transplant, followed by aggressive medication that can affect patients' metabolism [4, 5]. To our knowledge, there are no data on body fat distribution or comparison between healthy and FAP subjects, which may be important for clinical assessment and management of this disease.

Purpose

The purpose of this investigation was to analyze body fat content and distribution of FAP patients and to compare with healthy subjects.

Methods

- Sample: Our sample consisted of two groups. Group 1 consisted of 43 Familial Amyloidotic Polyneuropathy patients, 19 males (32+8 years) and 24 females (37+5 years) who had liver transplant less than 2 months before. Group 2 consisted of a matched group of 18 healthy subjects, 8 males (36+7) and 10 females (39+5 years).
- Height was measured to the nearest 0.1 cm, and weight was measured using standard weighing scales (SECA, Hamburg) to the nearest 100 g, both according to Marfell-jones [6].
- Body fat content were estimated using Dual Energy X-ray Absorptiometry (DXA) (QDR-Explorer - Hologic, Waltham, MA; Fan bean mode) whole body scans wich allowed us to access total and regional (trunk fat, appendicular fat, abdominal fat), absolute and relative, body fat. Absolute values were registered to the nearest 0,01kg and the relative values were registered to the nearest 0,01%. All scans were made in the morning with the patients in overnight fasting state. Quality control with spine phantom was made every morning. All procedures, including placing the patients for the scans, were made according to the user's guide of the equipment [7]. All scan analysis were made by the same observer. Each Scan lasted about 7 minutes.
- All Scan were submitted to additional analysis by regions of interest (ROI) to access fat content of the abdominal region. Regions of interest were determined as seem in figure 1, according to Kamel et al. [8] and Park et al. [9].

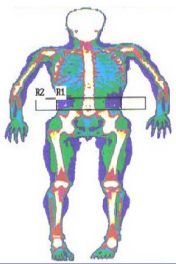

Fig. 1: DXA Scan with marked Regions of Interest

- Body fat distribution variables were calculated using ratios between body fat content absolute values of different fat depots, obtained by DXA. Ratios were registered to the nearest 0,01.
- Descriptive statistics were used and t-test was performed to compare results between groups. The level of significance was set at P<0,05.

Results and Discussion

- Healthy subjects showed higher values than FAP patients for: Body Mass Index (24,2+2,3kg/m2 vs 22,3+3,8 kg/m2 respectively, p<0,05), as shown in table 1.

Table 1: Whole Body Composition Variables (Mean ± SD; Min. – Máx.; P value for t test).

	Group 1 (n=43)		Group 2 (n=18)		
Variables	Mean ± sd	Min. – Max.	Mean ± sd	Min. – Max.	P value
Weight (kg)	63,7 ± 13,0	35,6 – 101,2	67,1 ± 8,0	54,1 ± 79,7	0,070
Hight (cm)	169,0 ± 7,8	153,0 – 185,0	166,6 ± 7,9	153,0 – 180,2	0,862
Body Mass Index (kg/m^2)	22,3 ± 3,8	15,2 – 30,9	24,2 ± 2,3	20,8 – 27,6	0,041*
Body Fat Mass (kg)	14,45 ± 7,46	4,88 – 33,83	17,49 ± 5,50	8,04 – 28,31	0,101
% Body Fat (%)	22,47 ± 8,83	10,61 – 38,23	26,42 ± 8,24	11,81 – 39,42	0,323

* Difference between the means of both groups (*p*<0.05)

- Healthy subjects showed higher values than FAP patients for % trunk fat mass (26,21+8,34kg vs 20,78+9,05kg respectively, p<0,05), % visceral fat mass (24,43+7,97% vs 19,21+9,30% respectively, p<0,05) and % abdominal fat mass (26,63+8,51% vs 20,63+10,35% respectively, p<0,05), as shown in table 2.

Table 2: Regional Body Composition Variables (Mean ± SD; Min. – Máx.; P Value for t test).

	Group 1 (n=43)		Group 2 (n=18)		
Variables	Mean ± sd	Min. – Max.	Média ± sd	Min. – Max.	P value
Trunk Fat Mass (kg)	6,75 ± 3,99	1,97 – 17,33	8,43 ± 3,05	3,09 – 14,43	0,118
% Trunk Fat Mass (%)	20,78 ± 9,05	8,83 – 37,15	26,21 ± 8,34	10,10 – 41,04	0,035*
Appendicular Fat Mass (kg)	6,89 ± 3,83	2,13 – 15,33	8,12 ± 2,91	3,09 – 12,98	0,231
% Appendicular Fat Mass (%)	24,67 ± 11,11	9,56 – 42,84	27,54 ± 10,44	11,44 – 43,85	0,358
Abdominal Fat Mass (kg)	1,26 ± 0,85	0,29 – 3,55	1,63 ± 0,65	0,54 – 2,95	0,072
% Abdominal Fat Mass (%)	20,63 ± 10,35	7,34 – 40,67	26,63 ± 8,51	10,50 – 43,29	0,026*
Visceral Fat Mass (kg)	1,05 ± 0,67	0,28 – 2,99	1,33 ± 0,53	0,49 – 2,47	0,120
% Visceral Fat Mass (%)	19,21 ± 9,30	7,01 – 36,41	24,43 ± 7,97	10,10 – 41,21	0,044*

* Difference between the means of both groups (*p*<0.05)

- Healthy subjects showed higher values than FAP patients for abdominal fat mass/ body fat mass ratio (0,09+0,02 vs 0,08+0,02 respectively, p<0,05), abdominal fat mass/trunk fat mass ratio (0,19+0,03 vs 0,17+0,03 respectively, p<0,05) and visceral abdominal fat/abdominal fat ratio (0,19+0,03 vs 0,17+0,03 respectively, p<0,05).

Table 3: Body Fat Distribution Variables (Mean ± SD; Min. – Máx.; P value for t test).

	Group 1 (n=43)		Group 2 (n=18)		
Variáveis	Média ± sd	Min. – Max.	Média ± sd	Min. – Max.	P value
Trunk Fat Mass / Appendicular Fat Mass	1,00 ± 0,20	0,56 – 1,60	1,07 ± 0,32	0,62 – 1,83	0,379
Abdominal Fat Mass / Trunk Fat Mass	0,18 ± 0,03	0,11 – 0,23	0,19 ± 0,02	0,16 – 0,22	0,046*
Abdominal Fat Mass / Body Fat Mass	0,08 ± 0,02	0,04 – 0,12	0,09 ± 0,02	0,06 – 0,13	0,029*
Visceral Abdominal Fat / Abdominal Fat	0,87 ± 0,06	0,70 – 0,98	0,82 ± 0,06	0,71 – 0,94	0,016*

* Difference between the means of both groups (*p*<0.05)

Conclusions

- These results showed that FAP patients soon after liver transplantation exhibited a healthier body fat profile compared to controls. However, fat content and distribution varied widely in FAP subjects, suggesting an individualized approach for assessment and intervention rather than general guidelines. Future research is needed to investigate the long term consequences on body fat following liver transplant in this population.

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