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Obesity in Hemodialysis Patients

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Abstract

Obesity is a cardiovascular risk factor in the general population. However, obesity on hemodialysis is associated with better survival. The aim of this study is to determine the prevalence of obesity in our chronic hemodialysis population and to specify the different cardiovascular complications. It is a cross-sectional study with 120 patients older than 18 years on hemodialysis. Abdominal obesity was defined as waist circumference > 94 cm in men and > 80 cm in women. The following were analyzed: socioeconomic and demographic parameters, lifestyle, initial renal disease, duration of hemodialysis, food consumption and body mass index (BMI), biological parameters (C-reactive protein (CRP), albumin, lipid profiles, serum calcium, phosphorus, parathyroid hormone), comorbidities: Diabetes, hypertension, stroke, coronary artery disease. Twenty-four patients had a BMI> 25. The prevalence of abdominal obesity was 20%. The sex Ratio was 0.71. The average age of our patients was 55.97 years [23 - 78 years]. Reduced physical activity was observed in 75% of patients. Duration in hemodialysis was 79 months. Hemoglobin (Hb) average was 8.9 g/dl, serum calcium was 2.25 mmol/l, serum phosphorus was 1.7 mmol/l, parathyroid hormone (PTH) was 412 pg/ml, albuminemia was 30.7 g/l, total cholesterol was 3.75 mmol/l and CRP was 15 U/l. Coronary artery disease was found in 20.8% of cases, stroke in 8.3% of cases, diabetes in 58.33% of cases and hypertension in 75% of cases. There was a high prevalence of abdominal obesity in hemodialysis patients. Obesity is recognized by its association with increased risk of cardiovascular disease and mortality. However in the paradoxical epidemiology, obesity becomes in chronic hemodialysis, a protective factor and is associated with better survival. Our study has a small population and cannot reach such a conclusion; further studies with larger numbers are needed to support this concept.

Keywords

Hemodialysis, Obesity, Metabolic Syndrome, Abdominal Fat

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1. Introduction

A significant number of patients who undergo dialysis are overweight or obese [1] [2]. The presence of excess weight, especially visceral obesity contributes to the increased risk of metabolic and cardiovascular complications in patients with chronic kidney disease (CKD). The relationship between weight and outcome is complex among dialysis patients. The extra weight is usually associated with improved survival in this patient group [3].

2. Patients and Methods

It is a cross-sectional study in the Hemodialysis Unit of the Nephrology Department of Medicine A at the Charles Nicolle Hospital in Tunis in January 2015.

Inclusion criteria: Chronic hemodialysis patients older than 18 years with abdominal obesity defined as waist circumference > 94 cm in men and > 80 cm in women [4].

Exclusion criteria: Patients on hemodialysis for less than 3 months and patients with acute infection, or active neoplasia.

Twenty-four patients were selected for this study. For each patient were analyzed: socioeconomic and demographic parameters, lifestyle, initial renal disease, duration of HD, food consumption and body mass index (BMI), biological parameters: C-reactive protein (CRP), albumin, lipid profiles, serum calcium, phosphorus, parathyroid hormone, comorbidities: Diabetes, hypertension (HT), stroke, coronary artery disease.

3. Results

The prevalence of abdominal obesity was 20%. Twenty-four patients had a BMI > 25. The mean waist circumference was 85 cm in women [80.5 - 95 cm] and 98 in men [94.8 - 102 cm]. The sex Ratio was 0.71. The average age of our patients was 55.97 years [23 - 78 years]. Reduced physical activity was observed in 75% of patients. The prevalence of smoking was 55%.

Duration in HD was 79 months. Seven patients had vascular nephropathy, 10 had diabetic nephropathy, 4 had chronic glomerular nephritis, 2 had chronic interstitial nephropathy and one patient had hereditary kidney disease (tuberous sclerosis of Bourneville). The average time between discovery of kidney failure and the onset of hemodialysis was 20 months.

Hemoglobin (Hb) average was 8.9 g/dl [7.9 - 9.8 g/dl], serum calcium was 2.25 mmol/l [2.08 - 2.55 mmol/l], serum phosphorus was 1.7 mmol/l [1.5 - 2.2 mmol/l]. Secondary hyperparathyroidism was found in 12 patients (50%) with a mean PTH of 412 pg/ml.

The mean albuminimia was 30.7 g/l [27 - 35 g/l] and the mean total cholesterol was 3.75 mmol/l [2.9 - 4 mmol/l].

The inflammatory condition was evaluated using CRP as a marker of inflammation. Sixteen patients (66.6%) had an inflammatory syndrome with a mean CRP of 15 U/l.

Cardiovascular complications noted included coronary artery disease in 20.8% of cases, stroke in 8.3% of cases, diabetes in 58.33% of cases and HT in 75% of cases.

Demographic, clinical and biological characteristics were summarized in **Table 1**.

4. Discussion

In the general population, abdominal obesity is characterized by chronic low grade inflammation with increased serum inflammatory cytokine levels; it is considered to be a risk factor for atherosclerosis, cardiovascular disease, and increased mortality [5].

In obese dialysis patients, the nutritional status may be better, and obesity provides, in the short term, some protection against malnutrition and the associated morbidity. However, some studies suggest that mortality in the long term is directly correlated with excess weight and obesity, which indicates that fat represents a risk factor also in uremia [1] [3]. Observational studies in CKD patients as well as dialysis patients, link abdominal fat with inflammation, insulin resistance, hyperadipokinemia, dyslipidemia, oxidative stress [6]-[9] and cardiovascular events and mortality [10]-[12].

In patients requiring dialysis, disturbances in lipid and carbohydrate metabolism, which are common, have been associated with abdominal fat and may develop into metabolic syndrome (MetS) [13]. There are multiple

Table 1. Demographic, clinical and biological characteristics.

Parameters	
Age (years)	55.97
Smoking	55%
Duration in hemodialysis (months)	79
Time between kidney failure and onset of HD (months)	20
Hemoglobin (g/dl)	8.9
Calcium (mmol/l)	2.25
Phosphorus (mmol/l)	1.7
PTH (pg/ml)	412
Albumin (mmol/l)	30.7
Cholesterol (mmol/l)	3.75
CRP (UI/L)	15

definitions of MetS, and the most current of MetS definitions is the National Cholesterol Education Program/ Adult Treatment Panel III [14]. It recognizes five components: hypertension, impaired fasting glucose, hypertriglyceridemia, abdominal obesity and low high-density lipoprotein cholesterol (HDL-C). The prevalence of MetS in chronic HD patients ranges from 40% - 60%; important relationship between MetS and the development of cardiovascular disease in chronic HD patients is found [15].

Recent evidence suggests that abdominal obesity play a role in peripheral arterial disease in dialysis patients [2]. Carotid artery intima media thickness is associated with waist circumference in peritoneal dialysis patients [16]. These vascular involvements are associated with morbidity in dialysis patients [17]. In our study, coronary artery disease was found in 20.8% of cases, stroke in 8.3% of cases, diabetes in 58.33% of cases and HT in 75% of cases.

Moreover, obesity does not necessarily imply good nutritional status. In patients with chronic kidney disease, there is a loss of muscle mass despite an excess of adipose tissue, which is a condition known as sarcopenic obesity [3] [6]. Malnutrition associated with obesity, including sarcopenic obesity, is the risk factor most closely correlated with morbidity and mortality both in dialysis patients and the general population [3].

BMI is inadequate as a measure of sarcopenic obesity since it cannot define neither muscle mass nor indicate the localization of the fat in the visceral compartment. Other indices must be developed and validated in well performed clinical trials to identify fat localization and the presence of sarcopenia [3].

Observational studies indicate improved survival in obese patients undergoing HD. Thus, it is hypothesized that dialysis patients at high risk of Protein-energy wasting (PEW) are protected by excess weight [18] [19]. The recent observations that waist circumference modifies the mortality risk associated with circulating triglycerides [20], leptin, and adiponectin [21], underscores the overall effect that abdominal obesity has on PEW.

Insulin resistance represents a major target for intervention in PEW. Alterations in glucose metabolism in the face of hyperinsulinemia and diminished tissue sensitivity to insulin are partially correctable by HD [18].

CKD patients have increased expression of proinflammatory cytokines and adipokines in abdominal subcutaneous tissue compared with healthy controls [22]-[24]. In our study, sixteen patients (66.6%) had an inflammatory syndrome. This high rate is explained mainly by oxidative stress. In addition, this inflammation is responsible for the low Hb levels (8.9 g/dl) in addition to the non-availability of recombinant erythropoietin in our hospital.

However, dialysis reverses uremia, residual metabolic derangements, inflammation, comorbid conditions, and the dialysis procedure itself may allow PEW to develop or worsen.

Leptin, and adiponectin, which were not dialyzable, were unfortunately not measured in our laboratory.

5. Conclusion

A good nutritional state is found in some obese dialysis patients, which probably accounts for the improved

survival of the obese group. The results of the present study showed that there was a high prevalence of abdominal obesity in hemodialysis patients but cannot reach such a conclusion. Therefore, further studies are needed to clarify the prognostic effect of abdominal obesity in dialysis patients.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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Abbreviations

Body mass index: BMI
C-reactive protein: CRP
Chronic kidney disease: CKD
Hemodialysis: HD
Hemoglobin: Hb
Hypertension: HT
Metabolic syndrome: MetS
Parathyroid hormone: PTH
Protein-energy wasting: PEW