Hong Kong Journal of Nephrology (2015) 17, 28–35

Available online at www.sciencedirect.com

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journal homepage: www.elsevier.com/locate/hkjn

ORIGINAL ARTICLE

Weight change during the first year of peritoneal dialysis: Risk factors and prognostic implications

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Available online 8 October 2015

KEYWORDS
cardiovascular disease;
peritonitis;
renal failure;
survival

Abstract *Background:* Weight gain is common amongst patients who start peritoneal dialysis (PD). However, the prevalence, risk factors, and long-term implications of body weight gain in new PD patients have not been explored.

Methods: We studied 444 consecutive new PD patients. Body weight at the time of initiation of PD and 1 year later, and related clinical factors, were reviewed. Patients were followed for 60.9 ± 32.8 months for survival analysis.

Results: The mean weight change after 1 year of PD was 1.34 ± 3.27 kg; 109 patients (24.6%) had weight gain > 3 kg. Patients without any peritonitis episodes during the 1st year of PD had significantly more weight gain than those who had peritonitis (1.58 ± 3.17 vs. 0.16 ± 3.56 kg, $p = 0.001$). There were no significant correlations between body weight change and glucose load, peritoneal transport characteristics, dialysis adequacy index, or baseline residual renal function. For patients with weight loss > 0.5 kg, weight change within 0.5 kg, weight gain > 0.5–3.0 kg, and weight gain > 3 kg, the patient survival rates at 60 months were 45.0%, 54.8%, 54.0%, and 52.9%, respectively ($p = 0.213$), while technique survival were 28.1%, 40.3%, 40.8%, and 36.7%, respectively ($p = 0.03$).

Conclusion: Weight gain is common among Chinese patients during the 1st year of PD but is not associated with any adverse clinical outcome. In contrast, weight loss during the 1st year of PD is common amongst PD patients who have peritonitis, and is associated with worse technique survival subsequently.

背景：在剛開始腹膜透析(PD)的病人間，體重增加是常見的現象，然而相關的盛行率、危險因子、及對長期預後的影響至今仍然未明。

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http://dx.doi.org/10.1016/j.hkjn.2015.08.001
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方法: 研究對象為連續的 444 位剛開始 PD 的病人，我們對其基線及 1 年後體重、及相關的臨床因素作出分析，存活分析的追蹤期為 60.9 ± 32.8 個月。
結果: 經過第 1 年 PD 後，平均體重變化為 1.34 ± 3.27 kg，其中 109 人 (24.6%) 增幅 > 3 kg。相比於第 1 年內曾發生腹膜炎者，非腹膜炎患者的體重增幅較大 (1.58 ± 3.17 vs. 0.16 ± 3.56 kg，$p = 0.001$)。體重變化與以下因素無明顯相關性：葡萄糖負荷、腹膜運輸特徵、透析適量指數、或基線殘餘腎功能。對於體重下降 > 0.5 kg、體重變化 ≤ 0.5 kg、體重增加 > 0.5 至 3.0 kg、及體重增加 > 3.0 kg 者，60 個月的病人存活率分別為 45.0%、54.8%、54.0%、及 52.9% ($p = 0.213$)；技術有效率則分別為 28.1%、40.3%、40.8%、及 36.7% ($p = 0.03$)。
結論: 對於剛開始 PD 的華裔病人，第 1 年內的體重增加是常見現象，但不會引起任何不良臨床後果；相反，對於第 1 年內曾發生腹膜炎者，體重下降頗為常見，這類病人其後較多發生技術失效的問題。

Introduction

Obesity and overweight are highly prevalent in the general population. In addition to being a social stigma and being unsightly, obesity represents an important risk factor of type 2 diabetes mellitus, hypertension, and cardiovascular diseases. In the general population, it is well reported that overweight and obesity are associated with poor survival and increased all-cause mortality.[1,2]

The prognostic implication of obesity, however, is probably different in patients with end-stage renal disease (ESRD) on dialysis, with whom there is increasing evidence that a high body mass index (BMI) confers a survival advantage, whereas a low BMI and weight loss are associated with increased mortality.[3–8] The reason for this phenomenon of "reverse epidemiology" is not well understood. Several studies suggested that the protective effect that is observed with a high BMI in the dialysis population is the result of a higher muscle build rather than adipose tissue mass.[9,10] However, a recent study found no association between lean body mass (a surrogate measure of muscle mass) and patients survival[3], and it was proposed that a higher body fat mass does *per se* confer a survival advantage to dialysis patients, probably because adipose tissue could act as an energy reserve during catabolic or inflammatory stress. Nonetheless, it remains possible that the relation between body weight and mortality may not be a linear one: a mild degree of overweight could be advantageous, while gross obesity may be associated with increased mortality.

Most of the published studies on the relation between obesity and ESRD focus on hemodialysis patients. Data on patients receiving peritoneal dialysis (PD) are relatively scarce. Previous reports suggest that a considerable proportion of PD patients had substantial weight gain and fat mass accumulation after the initiation of PD.[11–13] However, the exact prevalence, risk factors, and long-term implications of body weight gain amongst new PD patients remain incompletely elucidated.

Patients and methods

Patient selection

This is a retrospective cohort study. We reviewed 643 consecutive Chinese ESRD patients started on PD in our center from 1998 to 2007. Patients who died within 1 year after starting PD, those who were converted to hemodialysis or received kidney transplant within 1 year after starting PD were excluded because the change in body weight could not be determined.

Clinical data

Baseline demographics and clinical information were recorded by chart review. Comorbid conditions, including diabetes mellitus, ischemic heart disease, cerebrovascular accident, peripheral vascular disease, immunological diseases, liver diseases, chronic lung diseases, and underlying malignancy were recorded. A modified Charlson's comorbidity index, which was validated in PD patients, was used to calculate a comorbidity score.[14]

Body weight at the time of initiation of PD and 1 year later, both measured when the patients were clinically euvolemic, were recorded. Edematous and hypovolemic patients were not excluded but treated according to their clinical need before body weight was measured. The change in body weight over 1 year of dialysis was then computed accordingly. The euvolemic body weight was defined as the weight at which the patient was clinically edema-free and below which undesirable clinical signs and symptoms of hypovolemia occur (for example hypotension and muscle cramp).[15] Serum biochemistries, including fasting plasma glucose, HbA1c, fasting lipid profile, hemoglobin, and albumin levels at the time of initiation of PD and 1 year later were also recorded.

Peritoneal transport test

Peritoneal equilibration test (PET) was performed around a month after the initiation of PD therapy. We used the standard PET as described by Twardowski.[16] Dialysate-to-plasma ratios of creatinine (D/P) at 4 hours was calculated after correction of glucose interference.[17] Mass transfer area coefficients of creatinine (MTAC) normalized for body surface area (BSA) was calculated by the formula described by Krediet.[18]

Estimation of glucose load

The daily glucose absorption from PD was calculated from the infused dialysate volumes and glucose concentrations during

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