Co-morbidity and kidney graft failure—two main causes of malnutrition in kidney transplant patients

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Abstract

Background. Malnutrition is very frequent in chronic renal failure but, after successful kidney transplantation, body weight gain is common and is widely investigated, while malnutrition after transplantation is underestimated. In the present study, the prevalence of malnutrition in kidney transplant patients and the factors which might contribute to its development are analysed.

Method. In a population of 452 kidney transplant patients followed-up regularly at our department, body mass index (BMI) was determined. Out of this population, 47 patients (18 females, aged 13–54 years, post-transplantation period 6–180 months) were randomly selected for more detailed examination of their nutritional status using anthropometry (body weight, the mid-arm muscle circumference, skinfold thickness, BMI) as well as biochemical parameters (serum protein, albumin, cholesterol, red blood cell count). Co-morbidity of the selected patients was assessed using the Index of Coexistent Diseases.

Results. Among 452 kidney transplant patients, 15% had a BMI of <21 kg/m², 45% had a BMI of 21–25 kg/m², and 40% had a BMI >25 kg/m². After more accurate assessment of nutritional status of the selected 47 patients, a comparison between those who were malnourished (11 patients) and those who were well nourished (20 patients) was made. No significant difference was found in age at transplantation, pre-transplantation time on dialysis, donor origin, early post-transplant course, immunosuppressive therapy, number of rejection episodes or post-transplant period between these two groups. However, malnutrition appeared significantly more frequently in females, and malnourished patients had significantly higher serum creatinine levels. Co-morbidity conditions, assessed by the Index of Disease Severity and Index of Physical Impairment combined peak scores resulting in the final Index of Coexistent Disease, were more frequent and more severe in malnourished patients as compared with well-nourished patients.

Conclusion. In a population of kidney transplant patients regularly followed-up at our clinic, 15% had malnutrition. Malnutrition is more frequent in females, but kidney graft failure and co-morbidity had a significant role in its development.

Keywords: co-morbidity; graft function; kidney transplantation; malnutrition

Introduction

Malnutrition is one very frequent co-morbid factor in chronic renal failure (CRF) and its prevalence both in the pre-dialysis period and during maintenance haemodialysis (HD) is high [1–3]. As weight gain during the post-transplant period is marked and common, a great deal of attention is paid to obesity in kidney transplant patients [4,5]. In contrast, the prevalence of malnutrition in kidney transplant patients and its effects on the outcome of kidney transplantation are underestimated.

In order to contribute to better knowledge of malnutrition in kidney transplant patients, the present study was undertaken to determine the prevalence of malnutrition in kidney transplant patients and to analyse the factors which might contribute to its development.

Subjects and methods

At the out-patient department of our clinic, 452 kidney transplant patients are followed-up regularly and their body mass index (BMI) is calculated. Out of this population,
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47 patients (18 females, aged 13–54 years) were selected randomly for a more detailed examination of their nutritional status. The selected patients had received a kidney graft 6–180 months previously, the majority from living related donors. The immunosuppression consisted of cyclosporin, steroids and azathioprine.

Nutritional status was determined by anthropometric parameters (body weight, the mid-arm muscle circumference, skinfold thickness, BMI) as well as by determination of several biochemical parameters (serum protein, albumin, cholesterol, red blood cell count).

Co-morbidity of the examined patients was assessed using the Index of Coexistent Diseases (ICED) [6].

The results of the assessment of the Index of Disease Severity (IDS) showed that 15% of patients had a value <21 kg/m², indicating malnutrition. A normal BMI between 21 and 25 kg/m² was found in 45% of patients, and 40% of patients had a BMI >25 kg/m², indicating overweight.

The determination of BMI in the selected 47 patients allocated them to three groups: 11 malnourished patients, 20 well-nourished patients and 17 obese patients. In the following analysis, only the malnourished and well-nourished groups were compared. Both mid-arm muscle circumference (24.1 vs 25.5 cm) and all skinfold thickness were significantly lower in the group with BMI <21 kg/m² as compared with the others.

The comparison of the biochemical parameters between malnourished and normally nourished patients showed that malnourished patients had significantly lower levels of protein (66 vs 77 g/l), albumin (33 vs 39 g/l) and haemoglobin (102 vs 121 g/l) compared with normally nourished patients.

No significant differences were found in age at transplantation, pre-transplantation time on dialysis, donor origin, early post-transplant course, immunosuppressive therapy, number of rejection episodes and duration of post-transplant period between the malnourished group and well-nourished patients (data not presented). Malnutrition appeared significantly more frequent in females, and malnourished patients had significantly higher serum creatinine levels (Table 1).

The results of the assessment of the Index of Disease Severity (IDS) showed that co-morbidity conditions are more frequent and more severe in malnourished patients. Also, the Index of Physical Impairment (IPI) showed that the majority of malnourished patients were symptomatic due to mild or severe physical impairment. Using an algorithm and combining the peak scores for the IDS and IPI, the final ICED score was determined. Table 1 shows that seven of 11 malnourished patients had an ICED severe score of 3, but none of them scored 0. In contrast, among 20 well-nourished patients, eight had an ICED score of 0, and only three had a moderate score of 2.

Discussion

Weight gain during the post-transplant period is very frequent, and its prevalence is >40% of kidney transplant patients [5,7]. Therefore, numerous investigations have been devoted to the clinical significance of both pre- and post-transplant obesity of kidney graft recipients for the outcome of kidney transplantation [4,5,8,9]. Recently, Chrusciel et al. found malnutrition in >20% of their kidney transplant patients [7]. Thus, although weight gain after transplantation is common, malnutrition is not negligible. Malnutrition is a powerful risk factor for morbidity and mortality of dialysis patients specially due to its relationship to inflammation and atherosclerosis. This triad has a significant impact on the survival of HD patients [3,10].

In the present study, malnutrition was registered in 15% of our kidney transplant patients. In searching for the causes of malnutrition in this population, different parameters were compared between the malnourished and well-nourished group. Only female sex and kidney graft failure were found to be more frequent in malnourished patients, but no significant differences were found in many other donor and recipient pre- and post-transplant variables.

Co-morbid medical conditions are frequent in HD patients. Although those dialysis patients considered fit for transplantation usually have less co-morbidity, these co-morbid conditions may persist in transplant patients. The significance of co-morbidity for kidney transplantation has not been examined sufficiently, and only a few studies have examined the effect of co-morbidity on the quality of life of kidney transplant patients [11,12].

On the other hand, different methods exist for scoring the co-morbidity in patients with end-stage renal disease (ESRD) and therefore comparison of results might be difficult. In the present study, co-morbidity was assessed using the ICED originally designed by Greenfield et al. [6]. The same index was used recently in the Hemodialysis (HEMO) Study, a well-known multicentre trial [13]. The ICED

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**Table 1. Parameters found to be significantly different (P < 0.05) by comparison of the malnourished and well-nourished groups of transplant patients**

<table>
<thead>
<tr>
<th>BMI</th>
<th>Gender</th>
<th>Scr (μmol/l)</th>
<th>ICED score</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;21 kg/m²</td>
<td>7/4</td>
<td>213 ± 103</td>
<td>0</td>
</tr>
<tr>
<td>21–25 kg/m²</td>
<td>7/13</td>
<td>168 ± 48</td>
<td>8</td>
</tr>
<tr>
<td>&gt;25 kg/m²</td>
<td>20</td>
<td>121 ± 30</td>
<td>3</td>
</tr>
</tbody>
</table>

*a*Number of patients.

*b*Mean ± SD.
aggregated two scales: the IDS, which assesses the presence and severity of 19 medical conditions, and the IPI, which assesses 11 physical impairments. The final ICED score was determined by an algorithm combining the peak scores for the IDS and IPI. The ICED score range was from 0 to 3, reflecting increasing severity. Using this method, we found that co-morbid conditions were more frequent and more severe in malnourished patients.

Conclusion

In a population of kidney transplant patients regularly followed-up at our clinic, 15% had malnutrition. Malnutrition was more frequent in females, but kidney graft failure and co-morbidity played a significant role in its development.

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