Impact of a physical exercise program on the mental and physical health of haemodialysis patients

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Introduction

People with Chronic Kidney Disease (CKD) are more sedentary than the healthy population of the same age and this can have a negative impact on their health related to quality of life (QoL) as well as implications for morbidity and mortality. Maintaining physical fitness may be a fundamental factor in preserving mobility and physical independence of this group. It is imperative that healthcare professionals support people with CKD in maintaining a minimum level of physical fitness that allows them to perform their activities of daily living (ADL) independently. The Rehabilitation Nurse is well positioned to support any attempts to increase functional capacity and potentially enhance QoL.

The objective of this study was to understand if a physical exercise program (PEP) could impact QoL for people with CKD specifically in eight dimensions of physical and mental health.

Table 1: 8 Dimensions of Physical and Mental Health assessed from KDQOL- SF36
Physical function (ten items); SF3
Limitations caused by physical health problems (four items); SF4
Limitations caused by emotional health problems (three items); SF5
Social function (two items); SF6 and SF10
Psychological well-being (five items); SF9 b, c, d, f, h
Physical pain (two items), SF7, SF8
Vitality / fatigue (four items); SF9 a, e, g, i
Perceptions of general health (five items); SF1 and SF11

Methods

Prospective and descriptive study in voluntary patients undergoing regular hemodialysis was initiated in December 2015 at the DaVita Gondomar Clinic and in March 2016 at the DaVita Leiria Clinic.

PEP consisted of 15 minutes of warm up exercises (stretching of free superior limb and of the lower limbs), followed by aerobic exercise with cycling during 15 minutes and finished with muscular strengthening [using a halter in free superior limb and ankle weights in the lower limbs (0.5 to 3 kg)], between the second and the third hour of each dialysis session. PEP was implemented in the same way in both facilities; rehabilitation nurses had similar education about the program.

Patients with past history of ischemic heart disease, cerebrovascular disease, heart failure (> class III NYHA), chronic obstructive pulmonary disease, incapacitating arthritis, hemoglobin lower than 8.5 g/dL, decompensated diabetes mellitus, blood pressure higher than 190/110 mmHg and UF volumes higher than 5% dry weight/dialysis session were excluded.

Participants completed the Kidney Dialysis Quality of Life Short Form 36 (KDQOL - SF36) survey before and after 12 months of intradialytic PEP implementation. KDQOL-SF36 is an externally validated QoL survey consisting of 43 questions divided into 11 dimensions, and 36 separate questions in eight dimensions. In this work, the eight dimensions of physical and mental health were analyzed (Table 1). This option is justified by its relation to the physical and cognitive ability to perform the activities of daily living (ADL) autonomously.

The Wilcoxon test for paired samples was used to evaluate changes in the physical and mental health dimensions assessed. The significance level adopted for the statistical tests was 5% ($p < 0.05$).

Results

62 potential participants were selected for PEP. 32 were excluded from the analysis because of early drop-out (reasons explained on Table 2) . There were no significant differences in demographics (Table 3).

Table 2: Reason for patient drop-out in the Dialytic Centers of Gondomar and Leiria

Reason for Drop-out	Gondomar	Leiria
Stopped PPE	1	3
Transplantation	-	4
Uncontrolled Pain	-	5
Did not meet inclusion criteria	-	3
Death	1	7
Missing data on KDQOL	1	2
Follow-up on PEP < 12 months	1	4
Total number of patients	4	28

Table 3: Demographic data

	Gondomar	Leiria	p
Number of Female Patients	4	8	NS
Number of Male Patients	3	15	NS
Mean number of years in hemodialysis (St. Dev.)	4.29 (2.87)	5.96 (1.73)	NS
Comorbidity Index (St. Dev.)	4.57 (1.72)	8.22 (7.81)	NS
Age (mean)	58,14	70,96	

Figure 1 - General Health Perception patients before and after PEP in Gondomar (A) and Leiria (B)

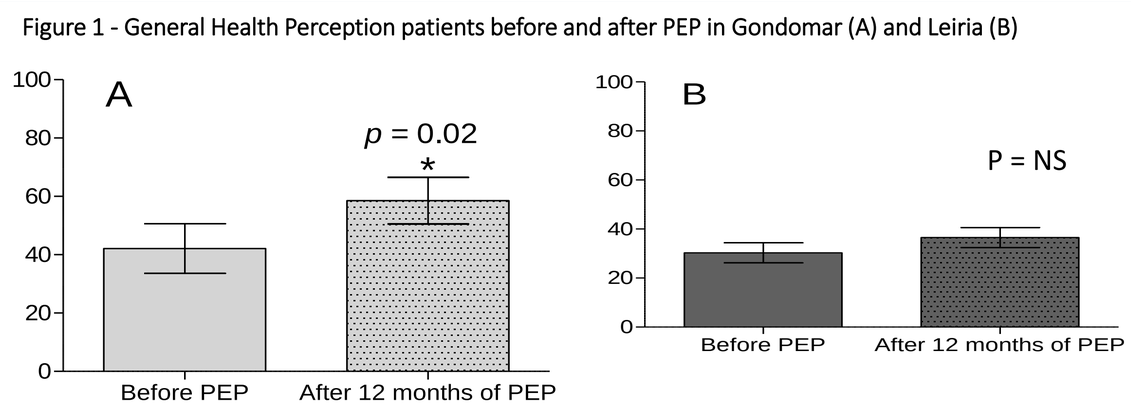

Table 4: Changes in physical and mental health dimensions before and after PEP.

	Gondomar		p	Leiria		p
Dimensions of physical and mental health:	Before PEP	After 12 month of PEP		Before PEP	After 12 months of PEP	
1. Physical function	51.03 ± 20.77	56.43 ± 31.59	NS	56.17±29.18	50.58 ± 32.53	NS
2. Limitations caused by physical health problems	86.11 ± 22.15	100.00 ± 00.00	NS	89.91 ± 22.84	71.05 ± 42.71	NS
3. Physical pain	70.00 ± 25.33	87.50 ± 13.39	NS	56.25 ± 20.42	49.58 ± 32.06	NS
4. General Health Perception	42.14 ± 22.52	58.57 ± 21.16 *	0,02	30.30 ± 18.67	36.55 ± 18.56	NS
5. Psychological well-being	66.50 ± 24.67	75.17 ± 13.24	NS	59.22 ± 18.47	53.78 ± 18.82	NS
6. Limitations caused by emotional health problems	83.33 ± 27.89	100.00 ± 00.00	NS	96.49 ± 15.29	78.96 ± 37.20	NS
7. Social role	83.93 ± 15.67	76.79 ± 29,25	NS	68.42 ± 27.12	61.84 ± 29.01	NS
8. Vitality / Tiredness	55.83 ± 16.56	68.33 ± 11.25	NS	52.78 ± 16.29	48.61 ± 20.28	NS

Conclusions

Related to the database obtained with the analysis of the questionnaires, PEP was shown to be determinant in improving the functional capacity of the patients, which was translated into gains in QoL. Despite the similarities in the implementation of this program in both facilities, there were differences concerning.

DAVITA - GONDOMAR: In general, an improvement was observed in most of the analyzed parameters (except in the social function). However, the Wilcoxon tests for paired samples denoted statistically significant differences only for the General Health Perception dimension.

DAVITA - LEIRIA: Results are not so clear for the center of Leiria, where only one improvement in the "Health in General" parameter highlighted after one year.

The difference observed in the results between the two centers could be related to the higher age, comorbidity index, dialytic vintage and higher dropout rates of patients from DAVITA – LEIRIA.

These findings could support a greater benefit of PEP in younger dialysis patients.

References

- Kosmadakis, G. C., Bevington, A., Smith, A. C., Clapp, E. L., Viana, J. L., Bishop, N. C., & Feehally, J. (2010). Physical exercise in patients with severe kidney disease. Nephron Clin Pract, 115(1), c7- c16. doi: 000286344 [pii] 10.1159/000286344
- Martins, P. (2015). Implementação de um programa de exercício intradialítico de maximização da função em doentes hemodialisados. (Mestrado). Escola Superior de Enfermagem de Coimbra.
- National Kidney Foundation (2002). K/DOQI clinical practice guidelines for chronic kidney disease: evaluation, classification, and stratification.
- Novo, A. (2013). Monitorização das alterações dos parâmetros analíticos da pessoa hemodialisada (efeitos do treino de maximização da funcionalidade) (Mestrado), Escola Superior de Saúde do Instituto Politécnico de Bragança, Bragança. (handle/10198/8207)
- Ordem dos Enfermeiros (2011). Regulamento nº 125/2011 - Regulamento das Competências Específicas do Enfermeiro Especialista em Enfermagem de Reabilitação. Diário da República, 2ª série - Nº 35 - 18 de Fevereiro (pp. 8658-8659).
- Organização Mundial da Saúde. (2004). Classificação Internacional da Funcionalidade, Incapacidade e Saúde (CIF) (Edição Direcção Geral da Saúde).
- Painter, P. (2005). Physical functioning in end-stage renal disease patients: update 2005. Hemodial Int, 9(3), 218-235. doi: 10.1111/j.1492-7535.2005.01136.x
- Painter, P., & Johansen, K. L. (2006). Improving physical functioning: time to be a part of routine care. Am J Kidney Dis, 48(1), 167-170. doi: 10.1053/j.ajkd.2006.05.004

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