Comparison of cognitive function between patients on chronic hemodialysis who carry out assisted physical activity and inactive ones

Authors

Carmen Tzanno Branco Martins[1]

Geison Stein Meirelles Ramos[1]

Simone Adriana Guaraldo[1]

Clarissa Baia Bargas Uezima[1]

João Paulo Lian Branco Martins[1]

Elzo Ribeiro Junior[1]

[1]Centro Integrado de Nefrologia – CINE; Home Dialysis Center.

Submitted on: 01/27/2010
Approved on: 09/28/2010

Corresponding author:
Carmen Tzanno Branco Martins
Rua Poeta Castro Alves, 173, Vila das Palmeiras
Guarulhos – SP – Brazil
CEP: 07013-150
Phone: 55 11 2358-2067
E-mail: psicologia@hdcdialise.com.br

The present study was conducted at the Centro Integrado de Nefrologia (CINE) and Home Dialysis Center.

Authors declare no conflict of interest.

ABSTRACT

Physical inactivity is a determinant of clinical disorders and psychological problems in patients with chronic kidney disease. In two satellite clinics, a program of physical activity (PA) was offered to 86 patients undergoing hemodialysis. Of those, 49 patients entered the PA program spontaneously and 37 remained inactive. After six months, a satisfaction self-reported questionnaire and the Modified Mini-Mental State (3MS) Examination for assessment of cognitive function were applied. Cognition was compared between inactive patients and those participating in the PA program for at least three months. Regardless of age and duration of dialysis, patients showed a cognitive deficit greater than expected. In the general group, better cognitive function was observed in active patients as compared to the inactive ones ($p < 0.05$). When separated by age groups, active patients over the age of 60 years had better results than the inactive ones ($p < 0.05$). We concluded that patients with better cognitive responses are more physically active and/or physical activity contributes to better cognitive function.

Keywords: cognition, physical educational and training, chronic kidney failure, renal dialysis.

[J Bras Nefrol 2011;33(1): 14-16]

INTRODUCTION

Physical inactivity is one of the factors contributing to the increase in clinical disorders[1] and psychological problems[2] in patients witn chronic kidney disease. Aiming at raising the consciousness of patients about the importance of physical activity and its benefits, a joint work of psychologists and physical trainers was implemented at two satellite clinics, the CINE (Centro Integrado de Nefrologia) and the Home Dialysis Center, in the city of São Paulo, São Paulo state. A physical activity (PA) program with spontaneous patients' entry was elaborated for individuals undergoing hemodialysis (HD) treatment.

PATIENTS AND METHODS

The PA program consists of two weekly 20- to 30-minute sessions of combined strengthening and peripheral muscle resistance exercises and stretching, always preceding the HD sessions. The PA program aims at improving muscle strength and stretching to make patients' daily chores easier. The patients' entry into the PA program is spontaneous.

The PA program was offered to 86 patients who had been in a HD program for at least six months. Forty-nine patients entered the PA program, while 37 remained inactive. To be considered active, patients had to participate in the supervised PA program for at least three months with 100% attendance.

After six months, the modified mini-mental state (3MS)[3] examination was applied aiming at assessing if physically active patients had enhanced cognitive function. The cognitive function of inactive individuals was compared with that of patients participating in the PA program for at least three months. The test was applied within the first hour of the HD session. The results of the cognitive function obtained (average, and below or above average) were compared between active and inactive patients in the general group (n = 86) and according to age bracket. To assess whether the benefit was greater in the elderly group, the

patients were divided into groups according to their ages as follows: Group I, patients under the age of 35 years (n = 11); Group II, patients aged from 35 to 60 years (n = 47); and Group III, patients over the age of 60 years (n = 28). As there were two categorical variables (physical activity and result of the 3MS examination), the Chi-square test and the Fisher exact test were performed.

When comparing the score obtained in the 3MS examination (numerical data), inactive individuals scored lower than active individuals in the general group and in Group III. No difference was observed in the other groups. Mann-Whitney nonparametric test was used.

After the period of six months of the PA intervention, a self-reported questionnaire was applied to assess the patient's satisfaction with the program. It consisted of the following one open and six multiple-choice questions related to body pain, physical and psychic changes, and participation:

1) Have you experienced body pain?
a) Yes b) No

2) Have you noticed any change after beginning to exercise?
a) Yes b) No

3) How do you assess the duration of the exercise sessions?
a) Insufficient b) Fair c) Too long

4) How do you rate the exercises?
a) Light b) Good c) Heavy

5) What do you aim at by exercising?
a) Improvement in life quality and/or physical fitness b) Pain reduction c) Other

6) What do you think about exercising before the HD session?
a) Good b) Bad c) No answer

7) Suggestions:
_____
_____

Results

Gender distribution was similar in the three groups assessed (Tables 1 and 2).

A progressive deficiency in cognitive function related to age was observed (Table 3). When comparing cognitive function and physical activity as categorical variables, patients with average results or results above average showed a tendency towards being the most physically active. This suggests that the number of patients assessed should be increased (Table 4).

Table 1 Distribution according to gender in the groups assessed

	Male sex	Female sex
Total (n = 86)	41 (48%)	45 (52%)
G I < 35 years (n = 11)	7 (64%)	4 (36%)
G II 35 a 60 years (n = 47)	22 (47%)	25 (53%)
G III > 60 years (n = 28)	12 (43%)	16 (57%)

Table 2 Number of physically active and inactive patients according to the group assessed

	Active	Inactive
Total (n = 86)	49 (57%)	37 (43%)
G I < 35 years (n = 11)	6 (54,5%)	5 (45,5%)
G II 35 a 60 years (n = 47)	31 (66%)	16 (34%)
G III > 60 years (n = 28)	12 (43%)	16 (57%)

Table 3 Results of the 3MS in the groups assessed

	3MS < average	3MS ≥ average
Total (n = 86)	45 (52%)	41 (48%)
G I < 35 years (n = 11)	3 (26%)	8 (73%)
G II 35 a 60 years (n = 47)	22 (47%)	25 (53%)
G III > 60 years (n = 28)	20 (71%)	8 (29%)

Table 4 Correlation between physical activity and 3MS results

	3MS < average	3MS ≥ average
Active (n = 49)	22 (45%)	27 (55%)
Inactive (n = 37)	23 (62%)	14 (38%)

Chi-square /Fisher tests: p = 0.08.

The patients' scores obtained in the general group (n = 86) and according to the age bracket were compared. A significant difference was observed in Group III. Physically active patients scored highest in 3MS. A score reduction was observed as age increased both in the active and inactive groups. However, the physically inactive group showed the greatest loss (80 ± 13; 75 ± 19; and 62 ± 15) (Table 5).

The physical activity practice in that population resulted in positive responses in the self-reported questionnaire. In the physically active group, 52% of the patients showed a reduction in pain complaints and

Table 5 Correlation between patients' physical activity and 3MS score

	Total		< 35 years		35 – 60 years		> 60 years	
	N	3MS	n	3MS	n	3MS	N	3MS
Inactive	37	70 ± 17[a]	5	80 ± 13	16	75 ±19	16	62 ± 15[c]
Active	49	80 ±13[b]	6	90 ± 7	31	80 ±12	12	75 ± 15[d]

a x b: p = 0.004; c x d: p = 0.02; a x d p < 0.05.

25% of them provided a positive response regarding an increase in one's perception of health, expressed as well-being and mood enhancement.

The results have been interpreted as satisfactory, and the PA program maintained and encouraged.

Discussion

On average, the prevalence of cognitive deficit in the Brazilian population over the age of 60 years ranges from 5.9% to 29.7%.[4,5] In a meta-analysis assessing 27 studies, Jorm *et al*[6] have reported that the prevalence of dementia doubles every 5.1 years from the age of 60 years. In the sample studied, patients with chronic kidney disease undergoing a HD program showed, regardless of gender and duration of the dialysis treatment, a cognitive impairment above that expected for their respective age bracket (26%, 47%, and 71%). Such findings are corroborated by the study by Yaffe K *et al*[7] demonstrating a reduction in the cognitive response of patients with chronic kidney disease in the pre-dialysis phase.

Cognition is an important factor for determining the therapeutic approach and for assessing adherence to treatment.

Recently, a study conducted by the Group of Cognitive Neurology and Behavior of the Neurology Clinic of the Hospital das Clinicas of the Medical School of the University of São Paulo has shown that more than half of the population has difficulty in understanding information about administration of medication, results of tests, and scheduling of medical visits. The study assessed 312 individuals, 32.4% of whom showed difficulty in understanding phrases and simple texts. Among the elderly, that rate reached 51.6%. Although the study focused on functional illiteracy, the cognitive impairment in the elderly population cannot be excluded as a limiting factor to adherence to treatment.[8]

Considering that 39% of the patients on a chronic HD program in Brazil[9] are over the age of 60 years, and that in the sample studied 71% of the patients had cognitive impairment at that age, we believe that the multiprofessional team should be encouraged to adopt a simpler and more direct approach. In addition, instruction sessions should be provided to caregivers.

Conclusion

We concluded that patients with better cognitive responses are more physically active and/or that physical activity contributes to improve cognitive function.

References

1. Medeiros RH, Pinent CEC. Aptidão física do indivíduo com doença renal crônica. J Bras Nefrol 2002; 24:81-7.
2. Velloso RLM. Efeitos da hemodiálise no campo subjetivo dos pacientes renais crônicos.Cogito. [Epub] 2001; 3:73-82.
3. Moura SM. Contribuições de quatro instrumentos de triagem para o diagnóstico de déficits cognitivos no envelhecimento no Brasil: validade de critério e normas de desempenho, FAFICH-UFMG, Belo Horizonte 2008.
4. Almeida Filho N, Santana VS, Pinho AR. Estudo epidemiológico dos transtornos mentais em uma população de idosos: área urbana de Salvador - BA. J Bras Psiquiatr 1984; 33:114-20.
5. Veras RP, Coutinho E. Prevalência da síndrome cerebral orgânica em população de idosos de área metropolitana da região sudeste do Brasil. Rev Saúde Pública1994; 28: 26-37.
6. Jorm AF, Korten AE, Henderson AS. The prevalence of dementia: A quantitative integration of the literature. Acta Psychiatr Scand 1987; 76:465-79.
7. Yaffe K, Ackerson L, Tamura MK *et al*. Chronic Kidney Disease and Cognitive Function in Older Adults: Findings from the Chronic Renal Insufficiency Cohort Cognitive Study. J Am Geriatric Soc [Epub] 2010; 58:33845.
8. Carthery-Goulart MT, Anghinah R, Areza-Fegyveres R *et al*. Performance of a Brazilian population on the test of functional health literacy in adults. Rev Saúde Pública [Epub] 2009; 43:631-8.
9. Sociedade Brasileira de Nefrologia. Censo SBN 2009. Disponível em: [http://www.sbn.org.br/pdf/censo_SBN_2009_final.pdf].