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Research Article

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# Physical activity and quality of life in home and in center hemodialysis

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## Abstract

**Background:** Home Hemodialysis (HHD) was compared to In Center Hemodialysis (ICHD), in order to evaluate the different degree of Physical Activity and Quality of Life.

**Methods:** Two groups of patients, one on HHD and one on ICHD were compared. Both groups consisted of 9 patients, age between 50 and 60 years, similar dialysis age and basic nephropathy. All patients were given two questionnaires: RAPA test (Rapid Assessment of Physical Activity) for assessing levels of physical activity and the World Health Organization Quality of Life bref test.

**Results:** The Rapa test showed a sedentary lifestyle in the majority of patients in the two groups: only 1 pt on ICHD reached 5 points and 2 pts on HHD 7 points. 3 pts on ICHD did not practice any minimum activity and only 1 pt on HHD group ($p<0.05$).The quality of life test showed that 2 pts on ICHD did not reach the minimum value of 60 points, while only one pt on HHD. The mean score was higher in the HHD group (80 ± 12) vs ICHD (73 ± 13). In addition, the ICHD pts had, during the 12 months of observation, 3 hospitalizations for various clinical reasons, while the HHD pts had only one hospitalization ($p<0.05$).

**Conclusion:** Our study confirms the need to set up an adapted physical activity programme for all dialysis patients. Programme that contributes to improve the quality of life of patients on ICHD and patients on HHD, even if the latter seems to have a better score deriving from a minimal physical activity and a management of the disease.

## Introduction

The quality of life of patients suffering from chronic kidney disease is shaped through social and family relationships. Not only family but also good social relationships are of great importance and are the source of positive feelings and self-esteem and improve the quality of life. As regards the critical moment of arrival on dialysis, what is more important, before the selection of the method of renal replacement therapy, patients should be thoroughly informed of any possible methods of treatment, without pressurizing them to select or reject a particular method. The selection of a method should be an independent, conscious and optimal decision for patients, because, life of patients with chronic kidney disease becomes reorganized and adapted to changes resulting from nature of the disease and the methods of its treatment. What is more, patients are dependent on the dialysis apparatus and the medical personnel. The treatment also involves limitations in the manner of eating and drinking as well as in physical activities that have been demonstrated to improve management of chronic conditions and delay decline in function in older adult populations [1-3]. At this regard patients on Home Hemodialysis (HHD) were compared to In Center Hemodialysis (ICHD), in order to evaluate the different degree of Physical Activity and Quality of Life, since these two aspects significantly affect the health and life of every human being and in this case of patients on chronic dialysis treatment which are already in themselves carriers of numerous morbidity related to basic kidney disease.

## Materials and methods

Two groups of patients on chronic hemodialysis treatment: one group on HHD and the other group on ICHD were compared. Both groups consisted of 9 patients (5 males and 4 females), of an age between 50 and 60 years, similar dialysis age and similar basic nephropathy (Tables 1 and 2). Patients with severe heart failure, severe respiratory failure, solid and liquid malignancies, chronic inflammatory diseases and psychiatric diseases were excluded. All patients were given a questionnaire (Table 3) relating to the self-assessment of physical activity: RAPA test (Rapid Assessment of Physical Activity) developed for assessing levels of physical activity among adults older than 50 years. A nine-item questionnaire assessing strength, flexibility, and level and intensity of physical activity, with the response options of yes or no to questions covering the range of 3 levels of physical activity, from sedentary to moderate and regular vigorous physical activity as well as strength training and flexibility. The instructions for completing the questionnaire provide graphic and text depictions of the types of activities that fall into each category. The total score of the first seven

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**Table 1.** Patients characteristics

| | **ICHD** | **HHD** | **p** |
|---|---|---|---|
| **Sex M/F** | 5/4 | 5/4 | NS |
| **Age (years)** | 58 ± 6 | 58 ± 4,8 | NS |
| **Dialytic age (months)** | 107 ± 61 | 105 ± 73; 14 ± 2 (HHD) | NS |
| **Kidney disease** | glomerulonephritis 2<br>hypertension 2<br>lupus nephritis 1<br>graft rejection 1<br>polycystic kidney disease 1<br>diabetic nephropathy 1<br>interstitial nephritis 1 | glomerulonephritis 2<br>hypertension 2<br>graft rejection 1<br>polycystic kidney disease 1<br>diabetic nephropathy 1<br>interstitial nephritis 2 | |

**Table 2.** Dialysis treatments characteristics and vascular accesses regarding the two groups

| | | |
|---|---|---|
| **HD treatment** | 5 BIC, 2 AFB, 1 HFR, 1 ONLINE HDF | 9 NXSTAGE |
| **Vascular Access** | 1 CVC, 8 AVF | 3 CVC, 5 AVF, 1 PG |
| **HD sessions/week** | 3 | 5 ± 1 |
| **Time on HD min/week** | 720 ± 0 | 884 ± 181 |
| **QB ml/min** | 316 ± 27 | 369 ± 32 |
| **QD ml/min** | 600 ± 100 | 180 ± 30 |
| **Weekly KT/V** | 2.34 ± 0.1 | 2.58 ± 0.08 |

CVC: central venous catheter; AFV: arteriovenous fistula; PG: prosthetic graft.

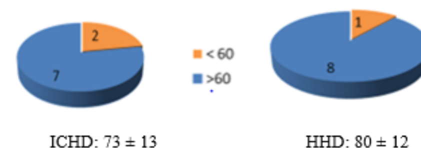
**Table 3.** RAPA test (Rapid Assessment of Physical Activity) for adults older than 50 years

| **Number** | **Activity** | **Yes/ No** |
|---|---|---|
| 1 | I rarely never do physical activities | |
| 2 | I do some light or moderate physical activities, but not every week | |
| 3 | I do light physical activity every week | |
| 4 | I do moderate physical activities every week but less than 30 minutes a day or 5 days a week | |
| 5 | I do vigorous physical activities every week but less than 30 minutes a day or 3 days a week | |
| 6 | I do 30 minutes or more a day of moderate physical activities 3 or more days a week | |
| 7 | I do 20 minutes or more a day of vigorous physical activity 3 or mode days a week | |
| 8 | I do activities to increase muscle strength, such as lifting weights or calisthenics, once a week or more | |
| 9 | I do activities to improve flexibility such as stretching or yoga once a week or more | |

items is from 1 to 7 points, with the respondent's score categorized into one of five levels of physical activity: 1=sedentary, 2=underactive, 3=regular underactive (light activities), 4=regular underactive, and 5=regular active. Responses to the strength training and flexibility items are scored separately, with strength training=1, flexibility=2, or both= 3. A score of 5 or below signifies sub-optimal physical activity and that of 6 or above signifies optimal physical activity. [4-7] In addition we administeredquality of life questionnaire developed by a group of fifteen international field centres, simultaneously, in an attempt to develop a quality of life assessment that would be applicable cross-culturally: World Health Organization Quality Of Life ( WHOQOL) questionnaire on 4 areas (physical, psychic, social, environmental) for a total of 26 questions and with a score for each question from 1 (worst) to 5 (best). The WHOQOL project was initiated in 1991 and the aim was to develop an international cross-culturally comparable quality of life assessment instrument. It assesses the individual's perceptions in the context of their culture and value systems, and their personal goals, standards and concerns. The WHOQOL instruments were developed collaboratively in a number of centres worldwide and have been widely field-tested. The WHOQOL-BREF is a shorter version of the original instrument that may be more convenient for use in large research studies or clinical trials. WHO QOL - BREF, represents the abbreviated form of WHOQOL-100, which explores the subjective perception of the state of health. The average score of the items within each domain is used to calculate the domain score. The average scores can be multiplied by 4 in order to make the domain scores comparable with the scores used in the WHOQOL-100 (Table 4). A total cut-off value<60 for overall quality of life represents a negative predictive value, in association to a probable worse quality of life and dissatisfied with health [8-11]. The statistical differences between the two groups were assessed with the Student's non paired t test to evaluate the significance of statistical differences between numerical means and the Chi square test to evaluate the significance of statistical differences between percentages.

## Results

The ICHD patient group included 5 pts on bicarbonate dialysis, 2 pts on acetate-free biofiltration, 1 patient on hemofiltration with reinfusion and 1 patient on on line hemodiafiltration so we emphasize that 45% of the patients were treated with highly efficient methods ($p<0.008$ significant difference with respect to HHD). On the contrary, the HHD group of patients was treated with the NXStage method, a method with low efficiency enhanced with the increase in the number of weekly dialysis sessions (at least 5 weekly). In addition, the vascular access used, in the ICHD group, was the native arteriovenous fistula in 8 pts and in 1 pt the permanent venous central catheter; while HHD pts used 3 CVCs, 5 native arteriovenous fistulas and 1 prosthesis. Therefore, presenting the latter, greater significant ($p< 0.05$) technical difficulties in the management of blood flows that would allow a significant lower purification efficiency. The Rapa test showed a sedentary lifestyle in the majority of patients in the two groups: only 1 pt reached 5 points in the ICHD group and 2 pts 7 points in the HHD group. However, in the ICHD group 3 pts did not practice any minimum activity while in the HHD group only 1 pt ($p<0.05$). The quality of life test (Figure 1) showed that 2 pts in the ICHD group did not reach the minimum value of 60




ICHD: 73 ± 13 HHD: 80 ± 12

Number of hospitalizations in the last 12 months: 3 ICHD vs 1 HHD; p<0.05 chi square test

**Figure 1.** Average scores of the sum of the 26 items related to the quality of life test (WHOQOL), in the two groups of patients

**Table 4.** WHO Quality of Life - BREF, represents the abbreviated form of WHOQOL-100, which explores the subjective perception of the state of health

| | |
|---|---|
| Overall quality of life | General health |
| Pain and discomfort | Medical treatment |
| Positive feelings | Self–esteem |
| Thinking, learning, memory and concentration | Freedom, physical safety and security |
| Physical environment | Energy |
| Bodily image and appearance | Financial resources |
| Opportunities for acquiring new information and skills | Participation in and opportunities for recreation/leisure |
| Discomfort | Sleep |
| Ability to perform daily living activities | Capacity for work |
| Satisfy with you | Personal relationships |
| Social support | Sexual activity |
| Home environment | Health and social care: accessibility and quality |
| Transport | Negative feelings |

points, while in the HHD group only one pt. The mean score, however, was higher even if not statistically significant, in the HHD group (80 ± 12) vs ICHD (73 ± 13). In addition, the ICHD pts had, during the 12 months of observation, 3 hospitalizations for various clinical reasons, while the HHD pts had only one hospitalization ($p<0.05$). So, the quality of life was discreet in the majority of patients belonging to the two dialysis treatment groups, but there was a significantly better quality of life in the HHD group. And the last hospitalizations aspect further confirmed the better quality of life linked to home hemodialysis.

## Discussion

The study conducted by us seems to confirm that pts on hemodialysis treatment tend to have a sedentary lifestyle even if it is shown that a greater number of patients in HHD (3 pts) vs ICHD (1pt) had minimal physical activity. Data that surely also have an impact on a higher quality of life score and a significant fewer hospitalizations in the year among HHD patients compared to ICHD patients. In our opinion, a greater management autonomy of the disease seems to have a positive effect on less sedentary lifestyle and quality of life. At this regard we want to underline that life of patients becomes reorganized and on dialysis treatment adapted to changes resulting from the nature of the basic kidney disease and the methods of dialysis treatment. In addition, patients are dependent on the dialysis apparatus and the medical personnel. The treatment also involves limitations in the manner of eating and drinking as well as in physical activities. In turn, the intensity of mental and somatic symptoms largely affects the level of the quality of life (QoL) as perceived by patients. At the same time, the occurrence of the negative symptoms of dialysis therapy (such as pain, sleep disorder, depression, the weakening of fluctuations in blood pressure, and stomach ache) or limitations resulting from the illness, reduce the QoL and cause the illness to be perceived as burdensome. The professional activity of patients changes and also other leisure activities such as sports, travel, social relations are necessarily modified and consequently their material situation worsens. The QoL of patients is shaped through social and family relationships. In summary all these aspects of life are of great importance and are the source of positive feelings and self-esteem and improve the QoL. On the other hand, a lack of support and acceptance from family and friends has a negative influence on patients' health through lower self-esteem, and feelings of hopelessness and helplessness, all of which causes lower mood, depression, feelings of resignation, and a sense of life meaning less. The causes of poor physical capacity in hemodialysis patients are multifactorial. Nevertheless, due to the association of poor physical capacity with adverse outcomes, it becomes imperative to assess physical activity of patients regularly and encourage aerobic exercise in patients. Although this lifestyle is essential, the majority of our patients have suboptimal physical activity and poor handgrip strength. Thus, there is an urgent need for interventions to increase physical activity by skilled physiotherapists. Aerobic and resistance exercise are beneficial not only in improving physical functioning, but also in improving anthropometrics, nutritional status, hematological indices, inflammatory cytokines, depression, and health-related quality of life. This can be done using tools such as recumbent exercise cycle ergometers. Our research showed similar results confirming that patients receiving in center hemodialysis felt limitations related to longer travelling outside the dialysis unit more frequently than patients receiving home hemodialysis. Infact, daily home hemodialysis allows for greater flexibility to work and to take part in leisure and daily activities, as well as maintaining better blood pressure and weight control, with less water intake limitation [11-16].

## Conclusion

In conclusion, our study confirms the need to set up an adapted physical activity program for both HHD and ICHD patients. Program that would certainly contribute to an improvement in the quality of life of patients in ICHD and patients in HHD, even if the latter seem to have a better score deriving from a better minimal physical activity and a management of their disease . In addition, the management of their own disease by HHD patients, compared to ICHD patients, certainly has a better psychological implication that projects itself into a better quality of life.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