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ORIGINAL

PHYSICAL ACTIVITY, ANXIETY AND DEPRESSION IN HEMODIALYSIS PATIENTS

ACTIVIDAD FÍSICA, ANSIEDAD Y DEPRESIÓN EN PACIENTES SOMETIDOS A HEMODIÁLISIS

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ABSTRACT

Purpose: In this analytical cross-sectional study we analyze the relationship that may exist between the prevalence of depression and anxiety in patients who take regular exercise and those who do not, in order to identify which physical activity is a protective factor at the time of depression or anxiety disorders.

Methods: The method involved applying Beck Depression Inventory (BDI-II), the State Trait Anxiety Inventory (STAI), and the international physical activity questionnaire (IPAQ) to 50 patients in the hemodialysis center who met certain inclusion and exclusion criteria. **Results:** The patients who exercise have a lower prevalence of depression and anxiety ($p= 0,015$, $r= -0,341$ and $p=0,047$, $r= -0,283$) respectively. Having reviewed the published literature, we believe that this is the first study performed to demonstrate the existence of such a relationship.

KEY WORDS: Physical exercise, hemodialysis, depression, anxiety, physical activity, kidney disease (renal failure).

RESUMEN

Objetivo: En este estudio descriptivo transversal analítico queremos analizar la relación que pueda existir entre la prevalencia de depresión y ansiedad en pacientes que realizan ejercicio físico habitual y los que no lo realizan, para identificar que la actividad física es un factor protector a la hora de sufrir depresión o trastornos ansiosos. **Metodología:** Para ello se ha aplicado el inventario de depresión de Beck (BDI-II), el inventario de ansiedad estado rasgo (STAI), y el cuestionario internacional de actividad física (IPAQ) a 50 pacientes de un centro de hemodiálisis, que cumplieran unos criterios de inclusión y exclusión determinados. **Resultados:** Los pacientes que realizan ejercicio físico tienen una menor prevalencia de padecer depresión y ansiedad ($p= 0,015$, $r= -0,341$ y $p=0,047$, $r= -0,283$) respectivamente. Revisando la bibliografía publicada y a nuestro entender, éste el primer estudio que se realiza para demostrar la existencia de dicha relación.

PALABRAS CLAVE Ejercicio físico, hemodiálisis, depresión, ansiedad, actividad física, insuficiencia renal.

INTRODUCTION

Renal failure is a non-communicable chronic medical condition which may affect any age and social group causing some devastating impact on the quality of life of patients in terms of its morbidity and high mortality. There are approximately between 3.500 and 4.000 people suffering from Chronic Kidney Disease (CKD) all over the world. In Spain 2.200.000 people suffer from a kidney disease while unaware of that. Hence, 6.000 new people every year have to receive an immediate renal replacement therapy apart from the 24.000 patients who are already subject to it nowadays. 22.600 Spanish patients receive hemodialysis treatment, 2.400 of whom have peritoneal dialysis. Around 310 people in Malaga receive pre-dialysis whereas 850 patients subject themselves to hemodialysis and only 52 patients chose peritoneal dialysis.

The damage of the renal function practically affects all body systems involving very frequent alterations of the cardiovascular and musculoskeletal systems as well as psychosocial disorders. The patients who need to receive highly invasive replacement therapies undergo physical, psychological and social life changes which do not only affect them but also their families.

The different options of renal replacement therapies available (hemodialysis and peritoneal dialysis) have different consequences on people. For hemodialysis (HD) patients, these changes imply serious restrictions and problems against which people take actions to fight them. Some of them manage to lead relatively satisfactory lives whereas others fall into pessimism and neglect.

Patients with CKD undergo psychological alterations due to their chronic disease which make them dependent on a machine to survive. Depression appears as the second comorbidity condition in patients with severe renal failure who require hemodialysis. The prevalence of psychological disorders is rated between 25 and 50% according to various authors and some reach up to 70%. The differences in the patient selection process, screening and diagnosis methods used may be the factors causing such an important variability. Anxiety is an affective state of fear, uneasiness, stress or alertness at present as well as in the future. Depression, however, is caused by experiences related to the past mainly in terms of losses. The presence of anxiety and depression is not per se a symptom of any mental disorder, yet it may be abnormal when its intensity and duration is disproportionate to the stimulus that causes them. The psychological disorders of renal failure patients are not always taken into account and they influence the production of body symptoms as well as their quality of life. From a nursing perspective where much time is spent on this type of chronic patients, it is certainly not difficult to notice the presence of these symptoms and take the necessary measures that improve the mood. Depression and anxiety can be treated with physical (medicines) as well as psychological interventions, the latter of which prove even more effective in the long run.

The second big set of alterations found in patients with CKD are those affecting the musculoskeletal system, which are the most important impairing factors of their functional capacity. Physical exercise has been used as tool to improve the

health of such patients since 1980. In latter studies, the hypothesis of the relation between physical capacity and depression was suggested and it was mentioned that good results were obtained when physical activity in HD patients was related to the decline of anxiety and depression levels, but no evidence of a significant relation between physical activity and the presence of anxiety and depression was found in this type of patients. Therefore, this study aims to determine the existence of a reverse relation between the evolution of depression and anxiety and the practice of physical activity in patients receiving HD treatment.

METHOD

A descriptive cross-sectional study was conducted with the favorable report of the Ethics Committee of the Faculty of Sciences of the University of Malaga, in which 56 patients of HD center in Malaga, Spain, were selected to take part in this study. The inclusion criteria were: patients of over 18 years who are receiving HD treatment with full mental health and with a minimum of 6 months of treatment. The exclusion criteria were: to show psychotic and neurological disorders or deterioration of physical health.

6 of the 56 patients were ruled out because they did not adapt to the previously mentioned criteria and 50 were included, who signed the informed consent beforehand. Age, sex, weight, occupation and marital status were analyzed as socio-demographic variables. The clinical variables used were the Time spent in HD, number of HD weekly session, number of medicines taken, Kt/V (dialysis efficiency) and depression as well as anxiety as psychological variables. 33.3% of the 50 patients were men and 30.8% were women with an average age of (57.3 ± 16.08) years.

In order to measure physical exercise, depression and anxiety, 3 tools were used: the IPAQ (17) for physical exercise (short version), Beck's inventory (15) for depression (Spanish version by Sanz J, Vázquez C 2003) and the STAI (16) to specify the level of anxiety.

The International Physical Activity Questionnaire (IPAQ) consists of a series of 4 questionnaires. The versions available are: Long (5 areas of activity upon which individual questions are made) and Short (4 generic items) meant to be used via telephone or self-administered. The short version was used in our study. The aim of these questionnaires is to provide common tools that can be used to obtain information about physical activity linked to health. The reliability of the IPAQ short version varies around 0'65 and the validity of $r = 0'67$ (17). The questionnaire for Beck Depression Inventory (BDI-II) is a self-administered questionnaire of 21 items that evaluate a wide range of depression symptoms. 4 alternative answers are systematized for each item, which assess the severity and intensity of the symptom and which are equally presented in an order from mild to severe. Its psychometric indicators were analyzed revealing a good internal consistency (Cronbach's alpha 0.76-0.95). The test-retest reliability varies around $r=0.80$ (15).

Spielberg's Anxiety Inventory (STAI) is a widely used measurement of anxiety which consists of two separate scales of 20 items each aimed at determining the level of state anxiety (situational) and trait anxiety (as a personality trait). It uses a 4 point Likert Scale (0-3), with a global score that may varies between 0 and 60 in each scale and where high scores suggest higher anxiety levels (state-trait). This tool has been standardized for different populations, one of which was developed by Bermúdez (1978) for the Spanish population. Such a validation signals internal consistency values for normal as well as clinical samples similar to the ones obtained in the original studies and which vary between 0.82 and 0.92 like the test-retest values, between 0.70 and 0.80 (16). The other variables were collected through the analysis of each patient and noting them in a data notebook elaborated beforehand.

The questionnaires as well as the study variables were collected during the HD sessions in an absolutely anonymous way and prior to the signing of the informed consent of each participant in the study.

The data were processed in Microsoft Excel sheets and the statistical analysis was performed with the SPSS package for Windows. A descriptive analysis of all the variables through the median and standard deviation for quantitative variables and absolute frequencies and percentages for the qualitative variables was carried out. A 95% confidence interval was established. The Kolmogorov-smirnov's test was performed to determine the normality of the sample. The bivariate correlations were analyzed through Pearson's correlation.

RESULTS

The average time spent on HD treatment was 55.4 months (4 years and 6 weeks) with a typical deviation of 66.7 months and the number of weekly sessions was 2.78 ± 0.46 . The average number of medicines was 7.26 ± 2.85 . The average weight was 70.15 kg with a typical deviation of 11.4 kg. The average Kt/V was established in 1.61 ± 0.32 .

In the study, 18 of the 50 patients showed some depression disorders according to Beck's scale. 15.4% were mild depression disorders and 7.7% was moderate depression. As regards anxiety according to the STAI, 51.3% showed mild anxiety against 12.8% who suffered from moderate anxiety.

The total number of patients who performed any type physical exercise (moderate or intense) was 22.

Table 1. Description of the sample through Frequencies and Percentages.

		Frequency	Percentage
Gender	Man	26	33.3%
	Woman	24	30.8%
Work situation	Active	5	6.4%
	Inactive	45	57.7%

Marital status	Married	36	46.2%
	Single, Widow/er...	14	17.9%
Physical activity (IPAQ)	Sedentary	28	35.9%
	Moderate	17	21.8%
	Active	5	6.4%
Depression (Beck)	No depression	32	41%
	Mild depression	12	15.4%
	Moderate depression	6	7.7%
Anxiety (STAI)	Mild anxiety	40	51.3%
	Moderate anxiety	10	12.8%

Once the descriptive analysis was achieved, we decided to explore the possible impact or links of certain factors or variables.

The hypothesis, previously suggested in the study, that there is a correlation between the practice of physical exercise according to the IPAQ and having a lower prevalence of any type of depression and anxiety disorders according to Beck and the STAI ($p=0.015$ y 0.047 $r= -0.341$ y -0.283) respectively. It is not a correlation of great magnitude but it is significant and reversed in this patient sample ($p \leq 0.05$).

We found that the level of physical exercise is linked to age since older patients get lower scores in the IPAQ ($p=0.015$, $r= -0.341$) but age is not a significant fact when a person suffers from depression or anxiety. However, we found that there is a highly significant correlation between depression and anxiety. Work situation is positively linked to physical activity: professionally active patients get higher scores in the IPAQ than the inactive ones ($p=0.005$, $r=0.392$).

The time spent on dialysis has to do with the weekly sessions: the more time spent on HD, the more weekly sessions of renal replacement therapy ($p=0.047$, $r=0.282$). Furthermore, it is also negatively correlated with physical activity: more time on HD reduces the practice of physical exercise ($p=0.041$, $r= -0.290$). The number of medicines is positively related to age ($p=0.020$, $r=0.329$). We noticed that the more weight, the less Kt/V and this one in turn also decreased in older patients ($p=0.037$, $r= -0.296$).

Table 2. Pearson's Correlation Coefficient (r) and level of significance (p) between the variables of the study.

	HD duration	No. sessions	No. Medicines	Score Beck	Score STAI
No. sesiones	0.282*	0.047			
No. medicines	0.114	-0.440**	0.432	0.001	
Score Beck	-0.164	-0.313*	0.264	0.064	
Score STAI	-0.163	-0.257	0.157	0.744**	0.000
Score IPAQ	-0.290*	-0.157	-0.157	-0.341*	-.0283*
	0.041	0.275	0.277	0.015	0.047

DISCUSSION

At present, we have not found any pieces of evidence that identify the relation of prevalence between the physical exercise according to the IPAQ, depression according Beck and anxiety according to the STAI. As far as we are concerned, this study is the first one to be conducted in order to determine possible effects between them and to establish whether the usual practice of physical exercise bears a significant impact when a person more or less suffers from these two psychological disorders.

In our study, we have confirmed the hypothesis that we suggested earlier. That is to say, the people who perform physical exercise show a low tendency to suffer from depression and anxiety disorders than sedentary patients. The finding in connection with the relation between exercise and depression ($p=0.015$) that is supported by Kouidi E. et al (11) who carries out a study where 2 groups are established: one control and another that follows an exercise program during a year. The significant results that are obtained are an improvement of the VO₂ max, a decrease of the score in the Beck's depression inventory ($p=0.001$), and a decrease of the heart rate before and after the exercise. These results also coincide with Levendoglu F et al (12) who establishes an exercise program of 12 weeks in which we check, in the SF-36 questionnaire, whether there is a significant decrease of the depression score ($p=0.001$) and an increase of VO₂ max as well as quality of life .

In his study, Van Vilsteren M.C.B.A et al (18) carries out a Multivariate Analysis of Variance (MANOVA) that shows that the participation in a low-moderate intensity exercise program linked to the assessment of exercise produces a significant increase in the change of behavior, a lower time reaction, increase of muscular strength and Kt/V and improves 3 components of the life quality questionnaire (vitality, self-perception and heart rate), whereas there are no significant effects on the control group. In our study, as opposed to this one, we have not found any significant evidence in our patients that the Kt/V (HD

efficiency) rises in physically active people ($p=0.81$), but we have found that the Kt/V decreases significantly at a certain age ($p=0.037$) and with great weight ($p=0.000$).

The statistical correlation between the results of the scales used is very significant when a positive relation between the anxiety and depression symptoms ($p=0.000$, $r=0.744$) is established. Moreno et al (7) suggests the same correlation as in our study using Hamilton's anxiety scale and Beck's depression inventory ($p=0.001$, $r=0.578$) and finds that variables like the time spent on dialysis, the number of sessions or overweight do not negatively influence on patients suffering from depression and anxiety. In our study, we did find a significant relation between the number of HD sessions and depression. We can deduce that when a person goes from 2 weekly sessions to 3 they suffer from an emotional shock since they link it to the worsening of their health and the inefficiency of the treatment. He also support the idea that sex and age are influential factors when a person suffers from depression and anxiety, which results do not correspond to the ones obtained in our study.

Páez et al (19) conclude in their study that 56.7% of the participants showed some signs of depression and he also found that the levels of state anxiety positively correlated with those of depression as in our study. In addition, he claims that the level of depression was higher in unemployed patients at an older age than the average but in patients with chronic nephropathy on hemodialysis in our study who were professionally inactive, no differences were found before a higher level of depression and anxiety as opposed to those who were active.

We found that professionally active patients are the ones who get higher score in the IPAQ. We assume that age has a lot to do here as we also found that patients in our study are less active at an older age.

Cobo J.L et al (3) explains that 49% of his participants were depressed and/or anxious at different levels. Like the findings in our study, neither sex nor the level of education was correlated with any Euroqol-5D parameters in connection with the quality of life. The people who were married presented a worse score in anxiety/depression ($p=0.002$) and a worse perception of their health condition. For our patients there is no relation between a different marital status and the levels of anxiety or depression.

Letchmi et al (20) gets a different result in his research from ours through the fatigue, depression, anxiety and stress inventory and notice that there is a positive relation between an older age and the greater feeling of exhaustion due to the psychological changes that occur with age. He also establishes a significant relationship between the length of treatment and the feeling of exhaustion: those who had received a treatment for more than 2 years experienced greater exhaustion. The feeling of exhaustion in patients was heightened by the fact that they had been receiving renal replacement therapy for many years. Thus they are less eager to the practice of physical exercise as a result of that stronger feeling of exhaustion. This result is not confirmed for our patients as we find no relation between the duration of dialysis and the level of

anxiety and depression, but there is a negative relation between a longer renal replacement therapy and the score in the IPAQ. Those who have spent more time receiving HD treatment are more sedentary.

The study of Segura E. et al. informs that there is significant evidence that short-term physical exercise has a positive impact on the quality of life. By setting up a program of exercise for a group and comparing it to another control group, they found that in relation to the quality of life measured with the SF-36 questionnaire, the mental component showed a significant increase in the people who performed the intervention. These results reinforce our hypothesis about the positive relation between physical exercise and depression and anxiety disorders.

Therefore we conclude with the idea that the usual practice of physical activity significantly reduces the possibility of suffering from depression and anxiety disorders and the type of more physically active patients corresponds to older and professionally active patients with a short-term replacement therapy. We can say that depression and anxiety are related and the patients who are prone to suffering from them are those who receive the highest number of weekly HD sessions. In this study, as opposed to the reviewed bibliography, we find no relation between the socio-demographic factors (age, weight, gender, work situation and marital status) and the possibility of suffering from depression or anxiety. Neither do we link it to other factors such as the number of medicines, Kt/V or the duration of HD sessions. Promoting physical exercise among dialysis patients could significantly reduce depression and anxiety disorders commonly experienced by this type of patients.

As regards the weaknesses of the study, it is worth point out the subjective characteristic of the self-administered tools. Future studies could include other objective tools to measure physical activity. The main objection regarding the design of this study would be not having used automatic monitoring procedures since they are subject to less bias than those deriving from self-administered procedures (21). In order for the sample to be more representative of the population we could have classified the patients according to the different stages of the disease and produce stricter exclusion criteria including for example comorbidity. However, this is the first study conducted in order to determine the underlying relation between physical exercise and psychological disorders like depression and anxiety, in which significant results were obtained with a sample of 50 patients. It also leaves the door open for future research on this relation and the influence that the unidentified variables in this study might have.

REFERENCES

1. Fayad S, Escalona R, Feraud G. Ejercicio físico en el tratamiento del enfermo con insuficiencia renal crónica (IRC). Cuadernos de Psicología del deporte. 2005; 5: 2-15. Disponible en: <http://oai.redalyc.org/articulo.oa?id=227017659006> ISSN 1578-8423
2. Segura E, Monblanch MT, Martí A, Martínez JF, Ruescas A, Cardo A et al. Ejercicio de fuerza durante la Hemodiálisis: una forma de mejorar la calidad de vida. Rev Soc Esp Enferm Nefrol [serial online] .2006. XXXIII Congreso comunicaciones: 214-219 Disponible en www.revistaseden.org
3. Cobo JL, Pelayo R, Ibarguren E, Aja A, Saenz de Buruaga A, Incera ME, et al. Factores sociológicos y calidad de vida relacionada con la salud en pacientes en hemodiálisis. Rev Soc Esp Enferm Nefrol. 2011; 14: 98-104. DOI 10.4321/s1139-13752011000200004
4. Kimmel PL Depression in patients with chronic renal disease: What we know and what we need to know. J Psychosom Res. 2002; 53: 951– 956.
5. Burton, H.D, Kline, S.A., Lindsay, R.M., & Heidenheim, P. The relationship of depression to survival in chronic renal failure. Psychosom Med. 1986; 48: 261-269.
6. Segura E, Monblanch MT, Martí A, Martínez JF, Tormo G, Lisón-Párraga J. Programa de ejercicios para pacientes con insuficiencia renal crónica en hemodialis. Estudio Piloto. Rev Soc Esp Enferm Nefrol. 2007; 10: 244-246.
7. Moreno E, Arenas E. Porta L. Escalant MJ. Cantó, G. Castell, F. Et al. Estudio de la prevalencia de trastornos ansiosos y depresivos en pacientes en hemodiálisis. Rev Soc Esp Enfer Nefrol. 2004; 7: 225-233.
8. Amador R, Pons E, Espinosa C. Depresión y ansiedad en pacientes en hemodiálisis: La creatividad para combatirlas. Rev Soc Esp Enferm Nefrol[serial online]. 2009. XXIV Congreso comunicaciones: 30/35 Disponible en <http://www.revistaseden.org>
9. Rabindranath KS, Daly C, Butler JA, Roderick PJ, Wallace S, MacLeod AM. Intervenciones psicosociales para la depresión en pacientes en diálisis (Revisión Cochrane traducida). La Biblioteca Cochrane Plus [serial online]. 2008. Disponible en <http://www.biblioteca-cochrane.com>
10. Hollon, S.D., DeRubeis, R.J., Shelton, R.C., Amsterdam, J.D., Salomon, R.M., O'Reardon, J.P., Lovett, M.L., Young, P.R., Haman, K.L., Freeman, B.B. y Robert Gallop, G. Prevention of relapse following cognitive therapy vs. medications in moderate to severe depression. Arch Gen Psychiatry. 2005; 62, 417-422. DOI:10.1001/archpsyc.62.4.417.
11. Kouidi E, Karagiannis V, Grekas D, Iakovides A, Kaprinis G, Tourkantonis A, et al. Depression, heart rate variability, and exercise training in dialysis patients. Eur J Cardiovasc Prev Rehabil. 2010; 17:160-7. DOI: 10.1097/HJR.0b013e32833188c4
12. Levendoğlu F, Altintepe L, Okudan N, Uğurlu H, Gökbel H, Tonbul Z, et al. A twelve weeks exercise program improves the psychological status, quality of life and work capacity in hemodialysis patients. J Nephrol. 2004; 17:826-32.

13. Carney R, Wetzel R, Hagberg J, Goldberg A. The relationship between depression and aerobic capacity in hemodialysis patients. *Psychosom med.* 1986; 48:143-147. DOI:10.1097/00006842-198601000-00013
14. Goldberg A, Hagberg J, Delmez A, Carney R, Mckevitt P, Eshani M.D et al. The metabolic and psychological effects of exercise training in hemodialysis patients. *Am J Clin Nutr.* 1980; 33:1620-1628. DOI:10.1038/ki.1980.194
15. Sanz J, Perdigon A.L, Vázquez C. Adaptación española Del inventario para la depresión de Beck-II (BDI-II): 2. Propiedades psicométricas en la población general. *Clínica y salud.* 2003; 14: 249-280. Disponible en:<http://redalyc.org/articulo.oa?id=180617972001>. ISSN1130-5274 Doi 10.1016/s1130-5474(14)70025-8
16. Cuestionario de autoevaluación Ansiedad Estado / Rasgo (STAI). Versión española adaptada por TEA; 1982.
17. International Physical Study. International Physical Activity Questionnaire [serial online]. 2002. Disponible en: <http://www.ipaq.ki.se/>
18. Van Vilsteren M.C.B.A, De Greef M.H.G, Huisman R.M. The effects of a low-to-moderate intensity pre-conditioning exercise programme linked with exercise counselling for sedentary haemodialysis patients in The Netherlands: results of a randomized clinical trial. *Nephrol Dial Transplant.* 2005; 20:141-146. DOI: 10.393/ndt/gfh560
19. Páez A.E, Jofré M.J, Azpiroz C, De Bortoli M.A. Ansiedad y depresión en pacientes con insuficiencia renal crónica en tratamiento de diálisis. *Univ Pshycol.* 2009; 8: 117-124. DOI: 10.4321/S2254-28842013000500080
20. Letchmi S, Das S, Halim H, Zakariah F.A, Hassan H, Packiavathy R. Fatigue experienced by patients receiving maintenance dialysis in hemodialysis units. *Nursing and health sciences.* 2011; 13: 60-64. DOI 10.5455/j.1442-2018.2011.00579.x
21. p.e. McKinstry, B. et. al. (2013). Activity monitoring in patients with depression: A systematic review. *J Affect Disord.* 2013; 125: 21-28. DOI: 10.1016 /j.jad.2012.07.001.

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