

Bone pain assessment in patients with chronic kidney disease undergoing hemodialysis

Avaliação da dor óssea em pacientes renais crônicos em hemodiálise

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ABSTRACT

BACKGROUND AND OBJECTIVES: The objective of this study was to descriptively evaluate the symptom of pain and its influence on the quality of life in patients with chronic renal failure on hemodialysis treatment.

METHODS: This is a descriptive, cross-sectional exploratory, quantitative approach. We evaluated 50 chronic renal failure patients on hemodialysis treatment through the Brief Pain Inventory and the Kidney Disease and Quality of Life Short Form. The emotional factors were evaluated by the Toronto Alexithymia and Hospital Anxiety and Depression Scales.

RESULTS: The predominant age group was 40 to 60 years. 72% of the patients showed some bone changes and the majority interviewed did not have formal jobs at the time of interview. There was a noticeable increase in the intensity of pain in patients with bone alterations when compared to those without, as well as an increased ambulation impairment. The Hospital Anxiety and Depression Scale showed a slight increase in both parameters in those with bone pain. Regarding the quality of life, physical function and work status were the most affected. There was the absence of alexithymia in most of the interviewees, a positive correlation between pain intensity versus physical function ($r=-0.14$, $p=0.03$), physical function x work status ($r=-0.28$, $p=0.04$) and a negative correlation between alexithymia versus anxiety ($r=0.03$, $p=0.62$) and moderate pain versus overall health ($r=0.06$, $p=0.40$).

CONCLUSION: We found worse outcomes in hemodialysis patients who presented bone alterations, regardless of the source.

Keywords: Affective symptoms, Chronic pain, Chronic renal failure, Metabolic bone disease, Quality of life.

RESUMO

JUSTIFICATIVA E OBJETIVOS: O objetivo deste estudo foi avaliar, de forma descritiva, o sintoma da dor e sua influência na qualidade de vida, de pacientes com insuficiência renal crônica em tratamento de hemodiálise.

MÉTODOS: Trata-se de uma abordagem descritiva, transversal, exploratória e quantitativa. Foram avaliados 50 pacientes renais crônicos em tratamento de hemodiálise, por meio do Inventário de Dor Breve e do questionário específico de doença renal. Os fatores emocionais foram avaliados pelas escalas de Alexitimia de Toronto e Hospitalar de Ansiedade e Depressão.

RESULTADOS: A faixa etária predominante foi de 40 a 60 anos. Setenta e dois por cento dos pacientes apresentaram algumas alterações ósseas, e a grande maioria entrevistada; não tinha empregos remunerados no momento da entrevista. Houve um aumento notável na intensidade da dor em pacientes com alterações ósseas, quando comparado com aqueles sem, bem como um aumento da deficiência de caminhada. Através da escala de Hospitalar de Ansiedade e Depressão, observou-se que houve um ligeiro aumento em ambos os parâmetros naqueles com dor óssea. Quanto à qualidade de vida, a função física e o status de trabalho foram os mais afetados. Houve ausência de alexitimia na maioria dos entrevistados, correlação positiva entre a intensidade da dor versus função física ($r=-0,14$, $p=0,03$), função física versus status do trabalho ($r=-0,28$, $p=0,04$), e correlação negativa entre alexitimia versus ansiedade ($r=0,03$, $p=0,62$), dor moderada versus saúde geral ($r=0,06$, $p=0,40$).

CONCLUSÃO: Encontrou-se resultados piores em pacientes em hemodiálise, que apresentaram alterações ósseas, independentemente da fonte.

Descritores: Doença óssea metabólica, Doença renal crônica, Dor crônica, Qualidade de vida, Sintomas afetivos.

INTRODUCTION

Chronic kidney disease (CKD) is a metabolic syndrome that arises from a gradual and usually slow loss of the excretory capacity of the kidneys¹. What is most alarming about this disease is its visible spread throughout the world. The current situation in the USA is that the occurrence of CKD doubles every 10 years². The information obtained from the Brazilian Nephrology Society (SBN) and the Brazilian Ministry of Health shows a similar picture, with the number of patients needing kidney replacement therapy having doubled over the last 5 years³. SBN data also shows that the number of patients has increased by 9.9% per year³. In Brazil, the total sum spent on the dialysis and kidney transplant programme stands at approximately 1.4 billion Brazilian Reals per year³.

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The secondary disorders that come together with CKD are many: low blood pressure (one of the main disorders), cramp, malaise and vomiting, headaches, chest pains, lumbar pains, itching, fever and chills, diarrhoea, allergic reactions, cardiac arrhythmia, gas embolism, gastrointestinal haemorrhage, metabolic problems, convulsions, muscular spasms, insomnia, restlessness, dementia, infections, pneumothorax or haemothorax, ischaemia or oedema in the hand, and anaemia^{4,5}. Out of all these, musculoskeletal ailments appear as significant, affecting the quality of life (QoL) of the patient with chronic kidney disease¹.

Disorders in the homeostasis of calcium, phosphorus, calcitriol and parathormone occur very early in patients with CKD, and play an important role in the physiopathology of bone diseases that afflict these patients, known as mineral and bone disorder (CKD-MBD) and CKD⁶. Among the expressions of CKD-MBD, the most important are: joint pain, painful shoulders, carpal tunnel syndrome, and trigger finger, resulting from deposits of the protein B2-microglobulin on tissues, as well as arthritis caused by crystals, avascular necrosis, septic arthritis, weakness of the muscles, and muscular cramps^{1,6}.

Pain accounts for approximately 40% of the universe of complaints made by patients with CKD during haemodialysis⁷, and many of these painful symptoms have a known physiopathological mechanism, being able to be adequately treated during the course of treatment: the muscular pain which follows cramps, caused by the rapid removal of body fluids; headaches, associated with increases in blood pressure; thoracic pain which occurs in dialyser reaction syndrome, formerly known as first-use syndrome⁶. This situation shows that pain in kidney disease reduces physical and professional function, and one's perception of his or her own health also has a negative impact on levels of energy and vivacity, which could either reduce or limit social interactions and also seriously jeopardise QoL⁷.

In this context, it is very important to identify the types of pain caused by the changes that occur in patients with CKD. When these are bone alterations, grouped under the general theme of Renal Osteodystrophy, they include skeletal disorders that are secondary to changes in the metabolism of calcium and phosphorus, and the resulting bone remodelling that follows¹. These can cause diffuse pains, with the involvement of the spine, knees, ankles and thighs, and could even cause total immobility. Also as a cause of bone and muscular pain, we have musculoskeletal syndrome, which appears in patients who have been undergoing haemodialysis for many years and which could be caused by deposits of amyloid and beta-2-microglobulin^{6,7}. Other types of pain, such as expressions of neuropathic pain caused by nerve lesions, are also present; however, intensity, incapacity, physical injury, emotional factors, and occupational factors related to pain resulting from CKD have not been reported in national literature⁸. In this regard, there is a need to understand the impact of chronic pain and its consequences on CKD, which are often underestimated.

Thus, the purpose of this study was that of appraising bone pain in patients with chronic kidney disease undergoing haemodialysis, considering the global understanding of all processes, in order to also identify the quality of the emotional expression that they show.

METHODS

This is a descriptive, transversal, exploratory study with a quantitative approach. The calculations regarding the sample were made

based on the data regarding the number of patients with kidney disease currently undergoing haemodialysis, admitted in one shift.

These figures vary around 56 people. Based on this datum, a sample with a 95% level of confidence (LC), a maximum error equal to 5%, and considering a proportion estimate of 50% (maximum variance), we obtain a sample size equal to 49 patients⁹. Thus, the sample studied had 50 people interviewed, in order to meet the statistical requirement to validate the study. These patients underwent haemodialytic treatment at the Base Hospital in São Jose do Rio Preto/SP, State of São Paulo, Brazil, between October 2015 and February 2016. The criteria for inclusion were the following: people with CKD undergoing haemodialytic treatment and without any cognitive deficit; also, through consultation made to the electronic files, there was verification of comorbidities presented with regard to bone alterations (painful shoulder, cramp, osteodystrophy, bone deformities, and osteoporosis, among others).

The patients were approached during the sessions of haemodialysis, in which the researcher gave explanations about the research study and, later, carried out the interview. No patient refused the application of the questionnaire. The instruments used were the following: Brief Pain Inventory (BPI)¹⁰, for appraisal of pain, which consists of 15 items subdivided into two parts: the first part appraises the intensity of the pain, while the second assesses how pain interferes with daily life (activities in general, mood, walking ability, sleep, work, interpersonal relationships, and taking opportunities in life). The intensity and interference of pain were assessed based on a numerical scale going from 0 (no pain) to 10 (the worst possible pain). For assessment of the quality of life, the test used was the Kidney Disease and Quality-of-Life Short-Form (KDQOL-SF)¹¹, a specific instrument that assesses CKD. Emotional factors, in turn, were assessed by the Toronto Alexithymia Scale (TAS-20)¹², which makes use of 20 statements as being an instrument of self-evaluation of the difficulty to identify feelings, to describe the feelings of others, and also a style of thought aimed outwards, and also outwards, with the Hospital and Anxiety Depression Scale (HADS)¹³, comprising 14 different statements, of which 7 referring to anxiety and the other 7 to depression, The global point score ranges from zero to 21 points on each subscale.

This study has been approved by the Research Ethics Committee (REC) of the Institution here studied (statement 435,511). All participants have signed the Free and Informed Consent (FICT).

Statistical analysis

The data were registered on special spreadsheets using Microsoft software and then analysing the data through descriptive statistics. For the questions where the variables need to be answered with yes or no, the McNemar test was used to compare the situations before and after, within each group and also between the two groups, with the possible combinations of yes and no being appraised. The quantitative variables were assessed using non-parametric testing, while correlations were analysed using the Pearson coefficient.

RESULTS

The general analysis has shown that, within the population under study, the prevailing age group was that between 40 and 60 years old; the ages of the subjects in the sample ranged from 15 to 84 years old.

Most of the subjects were male. Seventy-two per cent of the sample (n=36) had renal osteodystrophy with bone alterations in the knee and in the ankle (20%), spine (23%), general muscular weakness (25%), cramp (11%), painful shoulder (11%), osteoporosis (5%) and neuropathy (5%). In addition, conditions of comorbidity, including ischaemic peripheral arterial disease, diabetic neuropathy, and osteopenia/osteoporosis (due to long-lasting hypertension, diabetes mellitus (DM) or advanced age, have led to several different types of pain (50% bone pain, 28% joint pain, and 22% muscular pain). All this data has been entered into an electronic file which includes laboratory tests, results of the bone biopsy, biochemical indicators, and radiographic changes. This data allows us to separate those patients subjected to haemodialysis who have also suffered bone changes. Other clinical, social and demographic data is shown in table 1. Table 2 shows the results of the assessment of pain, anxiety, depression, and alexithymia. Here we see a greater rate of complaints with re-

gard to sleep and also concerning the ability to walk, on separation of those individuals who have shown bone alterations (painful shoulder, osteoporosis, neuropathy, among others (n=36)). However, there was the absence of alexithymia among the interviewed majority (n=50). There was no variation within the groups, with and without bone alterations (n=50), with regard to the presence of alexithymia as appraised by the TAS. The study showed that 64% of the people in the sample (n=32) were not alexithymic. In addition, 18% (n=9) were inconclusive and 18% (n=9) self-identified themselves as alexithymic. Regarding QoL, all the patients answered the specific questionnaire for kidney disease (KDQOL-SF). The highest point scores obtained were those for the dimensions related to “stimulation by the haemodialysis team” and “sexual function,” while the lowest were for “labour situation” and “physical function”. Table 3 presents the dimensions, with their respective means and standard deviations.

Table 1. Social and demographic profiles of the patients assessed (n=50)

Variables	n	Mean and Standard Deviation (±)	% (n)
Gender	50		48 (n=24) 52 (n=26)
Female			
Male			
Marital status	50		24 (n=12) 64 (n=32) 6 (n=3) 8 (n=3)
Single			
Married			
Divorced			
Widowed			
Level of schooling (years)	50	5.8±2.5	26 (n=13) 46 (n=23) 10 (n=5) 8 (n=4) 8 (n=4) 2 (n=1)
Completed primary school			
Did not finish primary school			
Completed high school			
Did not finish high school			
University degree			
Illiterate			
Age (years)	50	49.34±16.06	
Haemodialysis time (months)	50	54.5±8.6	
Labour situation	50		20 (n=10) 80 (n=40)
Active			
Inactive			
Most commonly linked symptoms	50		35 (n=18) 27 (n=13) 11 (n=5) 35 (n=17) 47 (n=23) 45 (n=22)
Itching			
Weakness			
Cramp			
Fatigue			
Drowsiness			
Headaches			

Table 2. Scores obtained on assessment of pain, anxiety, depression, and alexithymia in the appraised sample with bone alterations (n=36) and without (n=14)

Instruments	Mean ± DP n (=14)	Mean ± DP n (=36)	Value of p
Brief Pain Inventory			
Intensity of pain			
Interference of pain on daily activities	4.70±2.50	7.8±2.3	0.048*
Mood	4.12±3.54	5.12±3.54	0.065
Capability of walking	4.66±3.69	7.66±3.69	0.035*
Sleep	4.66±3.69	5.66±3.69	0.054
Work	3.72±4.18	5.72±4.18	0.048*
Personal relationships	1.30±2.65	2.30±2.65	0.055
Making the most out of life	2.50±3.35	4.50±3.35	0.058
Scale of Anxiety and Depression			
Anxiety	11.8±3.8	13.5±3.4	0.048*
Depression	4.7±4.5	5.8±4.8	0.065

* p<0.05 – the difference is statistically significant.

Table 3. Means and standard deviations of the dimensions on the Kidney Disease and Quality-of-Life Short-Form for patients undergoing haemodialysis treatment with bone alterations (n=36) and without these alterations (n=14)

Dimensions	Mean±SD (n=36)	Mean±SD (n=14)	Median (n=36)	Median (n=14)	p-value
Physical function	48.34±18.02	60.20±24.09	55.00	65.00	0.052
Body function	36.54±12.85	56.22±42.71	0,00	0.00	0.038*
Pain	58.95±23.40	67.30±30.12	65.00	70.00	0.045*
General health	52.45±15.08	58.88±23.52	55.00	65.00	0.062
Emotional well-being	63.55±22.35	67.92±29.01	65.00	76.00	0.055
Social function	58.46±35.80	62.59±40.04	56.25	66.67	0.065
Energy/fatigue	48.55±23.80	54.39±26.96	50.00	55.00	0.051
List of symptoms/problems Effects of kidney disease	60.50±25.30	62.56±24.60	65.00	65.63	0.067
Overload of kidney disease	45.80±12.70	51.91±31.59	52.25	56.25	0.055
Work situation	28.57±39.53	45.84±24.80	0.00	0.00	0.048*
Cognitive function	65.52±13.40	74.83±30.59	75.00	86.67	0.065
Quality of social interaction	75.80±20.55	81.63±21.97	80.25	86.67	0.058
Sexual function	74.65±12.40	88.75±21.80	82.25	100.00	0.065
Sleep	58.40±32.50	66.02±26.70	60.20	70.00	0.052
Social support	89.56±18.50	91.07±20.09	82.50	100.00	0.052
Patient satisfaction	73.58±15.80	78.57±19.25	78.50	83.33	0.062
Social function	59.46±20.55	66.94±23.38	60.25	70.00	0.055

*p<0.05 – the difference is statistically significant.

To analyse the impact of pain on patients who have shown some bone alterations (n=36), there was the application of the Pearson Correlation Coefficient for some variables, with a positive correlation being observed: between intensity of pain and physical function ($r=-0.14$, $p=0.03^*$); physical function versus labour situation ($r=-0.28$, $p=0.04^*$). In the meantime, there was an observed negative correlation for alexithymia versus anxiety ($r=0.03$, $p=0.62$) and moderate pain versus general health ($r=0.06$, $p=0.40$).

DISCUSSION

The epidemiological profile as established in the present study is in line with the Dialysis Census of 2013³, showing a mean of 49.34 years old, while the age bracket in Brazil with the greatest occurrence of patients with haemodialysis is that between 19 and 64 years old. The average age bracket also corresponds to the appearance of risk groups, and diseases considered as basic to CKD¹⁴, such as hypertension, diabetes mellitus, and cardiovascular diseases, that have become more common in adulthood^{8,15}.

In relation to gender, even though the difference is slight, there was a prevalence of the male sex in the present study, in line with other studies^{16,17}, and also in line with studies sponsored by the Brazilian Ministry of Health¹, that have also shown that the male sex is the more afflicted by chronic diseases, including kidney disease.

Stasiak et al.¹⁸ show an anxiety rate of 11.7% and a depression rate of 9.3%, among patients undergoing haemodialysis. In another study¹⁹, there was confirmation of an anxiety rate of 11.4% among women and 7.31% among men. With regard to depression, we found a rate of 11.3% for women and 11.8% for men. The results of the present study were 30% for anxiety and 9% for depression.

This high anxiety rate could be due to the place where the research collection occurred, as the Base Hospital is a reference centre for serious cases and also for patients with multiple comorbidities. Here we must point out that depression and anxiety are mood disorders that are very common among patients who have had haemodialysis, and as such they must be adequately diagnosed and treated, so to improve the QoL of these people.

Regarding the presence of alexithymia, 18% of those interviewed in this study showed inconclusive results and 18% tested positive. The mean was 57.6, which means that the sample can be characterised by lack of alexithymia. In Brazil, cut-off values are no longer available, even though some research studies have brought some indications of what they could be^{20,21}. CKD is a disease that has an important effect on the patient's psychological well-being, having a significant effect, not only in terms of anxiety and depression but also with regard to alexithymia²⁰. Thus, we can comprehend a type of difficulty that is found for expression of its effects in cases of psychosomatic diseases. In the study by Pregnoatto²², patients subjected to haemodialysis show high TAS scores regardless of gender, level of schooling, marital status, professional activities, age, and diagnostic hypothesis, therefore disagreeing from the present study. In the appraisal of the QoL related to health, the worst indicators were obtained for labour state and physical function. These results agreed with the findings of the study by Lopes et al.²³, that suggested a reduction in the ability to carry out daily routine activities, or to work. Some studies have already suggested the implementation of a programme based on taking regular physical exercise, for this population^{13,19}. The highest mean scores were obtained in the domains of cognitive function, sexual function, quality of interaction, and social support. Here, it must be pointed out that one should always

perform assessments of the cognitive function of this population at regular intervals, as several are the factors that could bring a risk of cognitive decline²⁴.

In this study, the mean time spent under treatment through haemodialysis was approximately 54.5±8.6 months (equivalent to 4.5 years). Similar results were obtained in the specialised literature, where a variation in the mean haemodialytic treatment time between 40 and 55 months was observed^{10,15}.

On observing the positive correlation between pain and jeopardised dimensions of QoL, it was observed that the greater the intensity of pain among those patients with bone pain, the greater the harm caused to physical function. Santoro et al.²⁵, in their study, mention that pain is an important health problem within CKD, which affects half of all dialysis patients, most of whom experience moderate to intense pain. However, these authors also stress that the impact of chronic pain and its consequences are often underestimated. Sources of pain related to the environment include renal bone uraemic disease (cystic fibrous osteitis, osteomalacia), osteoarthritis, calcified uraemic arteriopathy, and peripheral neuropathy. A study²⁵ shows that potential consequences of persistent pain include disturbances to sleep, weakening of memory and attention, mood swings (anxiety and depressive disorder), impotence, a poorer general physical state, and reduction in social activities, affecting QoL.

CONCLUSION

This study shows that patients with CKD undergoing haemodialysis as treatment and who have bone pain have the poorest indicators of quality of life (QoL), anxiety, depression, and pain, even though the indicators for alexithymia have been similar. It has also become evident that this segment of the population deserves greater studies and psychological support, and also other health professionals, in order to have a healthier lifestyle.

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