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Chronic Pain in Hemodialysis Patients in Three Reference Centres in Senegal: Prevalence, Psycho-affective Impact and Associated Factors

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Abstract

Introduction: The prevalence of chronic pain is high on hemodialysis patients. It can alter the quality of life of these patients who are already exposed to numerous comorbidities. This study aimed to determine the characteristics, the psycho-affective impact and the chronic pain-related factors.

Patients and Methods: We conducted a cross-sectional, multicentre study of descriptive and analytical purposes in 3 centres in Senegal including 110 chronic haemodialysis patients. Sociodemographic, biological and therapeutic patterns were studied. The pain was considered chronic when it lasted more than 3 months. The intensity of the pain was explored according to the degree of understanding of the patients by different assessment scales.

Results: The mean age of our patients was 48.15 ± 13.71 years and a sex ratio (M/F) of 1.07. The main causative nephropathy was nephroangiosclerosis in 43.6% and the mean duration of haemodialysis was 76 ± 46.4 months. The prevalence of chronic pain was 39.09% (43/110). It was experienced as mild (11.6%), moderate (30.2%), severe (41.9%) and unbearable (16.3%) according to the visual analogue scale (VAS). It was permanent, intermittent, daily and rare in 27.91%, 25.58%, 27.91% and 18.60% respectively. The site of the pain was multiple in 60.47% with a predominance of osteoarticular pain in 81.39%. The psycho-affective impact was certain in 51%. Analgesic use was noted in 55.81%, with the use of level 1 (79.2%) and level 2 (25%). The response of analgesics to chronic pain was unchanged (4.16%), reduced (54.16%) and amended (41.66%). Analgesic dependence was noted in 20.83%. In univariate analysis, only calcium levels were statistically significantly related to chronic pain. In multivariate analysis, the factors associated with pain were age, length of time on haemodialysis and blood calcium.

Conclusion: The prevalence of chronic pain is relatively high. It requires a special attention by all chronic haemodialysis staff. Hence, the use of valid assessment tools in dialysis patients would allow a better estimation of the prevalence.

Keywords: Pain • Hemodialysis • Prevalence • Psycho-affective impact

Introduction

The epidemiology and characteristics of chronic pain in haemodialysis patients remain poorly understood, particularly in sub-Saharan Africa. However, dialysis patients had significantly more body pain than the general population in the United States, considering age and gender [1,2]. Its negative impact on the quality of life and psycho-emotional status is often responsible for impaired compliance with treatment and dietary measures. In a meta-analysis, the prevalence in chronic haemodialysis patients ranges from 33% to 82% and the authors found a significant number of patients with severe pain [3]. Osteoarticular location was the most frequent pattern and some factors associated with chronic pain have been demonstrated [4,5]. In addition, pain management in chronic haemodialysis patients is often neglected in favour of other concerns such as complications of end-stage renal disease (ESRD) and dialysis itself [4]. Our study aimed to determine the characteristics, psycho-affective impact and chronic pain-related factors.

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Patients and Methods

We performed a cross-sectional, multicentre study of descriptive and analytical purposes, carried out in a dialysis centre in Thiès and two centres in Dakar. We included all patients who have undergone haemodialysis for more than six months in these centres with a minimum of two (02) sessions per week; a duration of four (04) hours per session; and who were able to answer our questionnaire. The data were collected using a pre-established form. For each patient, we specified sociodemographic data, causative nephropathy, length of time on haemodialysis, dialysis parameters, biological data and treatment. Pain was considered chronic when it lasted more than 3 months. Pain intensity was assessed according to the patients' level of understanding by using:

- The visual analogue scale (VAS) designed as a ruler: each patient should move the ruler according to the intensity of the pain, the left end corresponds to "no pain" and the right end to "maximum imaginable pain"; the intensity of the pain was mild (score of 1 to 4), moderate (score of 5-6), severe (score of 7 and 8), unbearable (score of 9-10) ;
- The simple verbal scale (SVS) based on the choice of an adjective to define the intensity of the pain: 0 (absent), 1 (mild), 2 (moderate), 3 (severe) and 4 (unbearable);
- The numerical scale: range from 0 to 10, the patient should be able to locate the level of pain.

Thus, the pain was defined as permanent if it is present continuously without interval; daily if it occurs once a day; intermittent if it occurs less than

once a day; and rare when it occurs less than once a week. The duration, type and origin of chronic pain were studied. The psycho-affective impact was assessed by the HAD (Hospital Anxiety and Depression) score by screening anxious and depressive symptoms. Its interpretation is: no symptoms (7 or less), doubtful symptoms (8 to 10), definite symptoms (11 and more).

Data were collected using an Xlsform hosted on the ona.io server and analysis was done with SPSS version 22 software.

Categorical variables were described as headcount, percentage and quantitative variables as mean with standard deviation and extremes. The univariate analysis consisted of a comparison between chronic pain and the other variables. The Chi-square test was used for the percentage comparison and the difference was statistically significant when the p value < 0.05. For the multivariate analysis we used the binary logistic regression method to determine the factors associated with chronic pain. Bottom-up modelling was used. Adjusted ORs with their [95% CI] were determined for each variable retained in the final model. The goodness of fit of the model was investigated using the Hosmer and Lemeshow test to verify its adequacy.

Results

The study included 110 chronic haemodialysis patients with a mean age of 48.15 ± 13.71 years and a sex ratio (M/F) of 1.07. The socio-economic level (SEL) was low in 40.9% and the main causative nephropathy was nephroangiosclerosis in 43.6%. The mean duration of haemodialysis was 76 ± 46.4 months and 94.5% were on dialysis three times a week. The mean inter-dialytic weight gain (IDWG) was 1.5 ± 1.1 kg and the mean Kt/V was 1.4 ± 0.3. Tables 1 and 2 shows the clinical and biological characteristics and dialysis parameters of the patients.

In our study the prevalence of chronic pain was 39.09% (43/110). It was experienced as mild (11.6%), moderate (30.2%), severe (41.9%) and unbearable (16.3%) according to the VAS. Figure 1 shows the pain assessment according to the VAS. The mean intensity of chronic pain according to the numerical scale was 6.6 ± 2.2. The average duration of pain was 23.72 ± 28.29 months and stinging pain was more represented in 32.56% (Table 3). It was permanent, intermittent, daily and rare in 27.91%, 25.58%, 27.91% and 18.60% respectively. The site of chronic pain was multiple in 60.47%, with a predominance of osteoarticular pain in 81.39% (Figure 2). In terms of psycho-affective factors, the average HAD score of the patients was 12 ± 4. Symptomatology was absent in 10 patients (23%), doubtful in 11 patients (26%) and certain in 22 patients (51%). Analgesic use was noted in 55.81% of patients, with the use of level 1 (79.2%) and level 2 (25%) as monotherapy or in combination. The frequency of use was daily, frequent and rare in 25%, 41.7% and 33.3% respectively. The response of analgesics to chronic pain was unchanged (4.16%), reduced (54.16%) and amended (41.66%). Analgesic dependence was noted in 20.83%.

At the end of our descriptive analysis we looked for factors associated with chronic pain in haemodialysis patients. In univariate analysis, only blood glucose was statistically significantly associated with chronic pain (p = 0.027) (Table 2). In multivariate analysis, the factors associated with pain were age, length of time on haemodialysis and blood calcium (Table 4).

Discussion

Chronic pain is common in haemodialysis patients. It is responsible for a further reduction in quality of life [6], poorer survival, and increased use of other medical resources leading to significant health care costs and risk of dialysis discontinuation. It is also associated with high morbidity and mortality [7]. However, dialysis itself can be a potential source of painful events related to the uraemic state with mineral-bone disorders, peripheral neuropathy, etc. Besides, co-morbidities such as peripheral arterial disease, diabetic neuropathy, osteopenia/osteoporosis (due to hypertension, diabetes or old age) cause various types of pain. Furthermore, the method of renal replacement may influence the occurrence of pain, as authors have shown that the prevalence of pain is higher in dialysis patients than in renal transplant patients [8].

In our study the prevalence of chronic pain in haemodialysis patients was 39.09%. This proportion was lower than in the literature. Recently, a meta-analysis reported an overall proportion of 48% of chronic pain in patients with CKD [8]. Davinson in the USA and Bouattar in Morocco found higher rates of 50% and 50.7% respectively [5,9]. Differences in age, duration of haemodialysis or proportion of comorbidities could influence the prevalence of pain between studies. In addition, in most studies, pain was assessed using the Brief Pain Inventory (BPI), which has been shown to be valid in all cultural and linguistic contexts as well as in various clinical situations, including dialysis patients. Furthermore, cultural factors influence the way patients experience and express pain [10,11]. However, the degree of cultural influence on pain found in the literature highly depended on the methodology used. Ethnicity itself had no correlation with pain in the Golan cohort in Israel [12]. In our series, chronic pain was severe in 41.6%. Thus, pain intensity was perceived similarly to other studies by Bouattar and Sabi with percentages of severe pain of 41.86% and 44% respectively [5,13]. It was permanent (27.91%), intermittent (25.58%), daily (27.91%) and rare (18.6%). These results differed from those reported by El Harraqui with a frequency of intermittent pain of 48.4% and daily pain of 28.7% [4]. The pain was of osteoarticular origin in 81.39% and this predominance was in agreement with the literature [4,9,13].

Table 1. Epidemiological and clinical patterns of patients.

Parameters	Total	Pain (+)	Pain (-)	p
Mean age (years)	48.15 ± 13.71	45.58 ± 4.03	49.80 ± 3.23	0.117
<50	57 (58.8%)	27 (47.37%)	30 (52.63%)	
≥ 50	53 (41.2%)	16 (30.19%)	37 (69.81%)	0.065
Sex				
Male n (%)	57 (51.8%)	21 (36.84%)	36 (63.16%)	
Female n (%)	53 (48.2%)	22 (41.51%)	31 (58.49%)	0.616
Low SEL n (%)	45 (40.9%)	21 (48.84%)	22 (51.16%)	0.093
Duration of HD	76 ± 46.4	80.07 ± 11.34	73.3 ± 14.67	0.509
<36 (months)	24 (22.4%)	7 (29.17%)	17 (70.83%)	
≥ 36 (months)	83 (77.6%)	35 (42.17%)	48 (57.83%)	0.251
HBP n (%)	73 (66.4%)	31 (42.47%)	42 (57.53%)	0.308
Diabetes n (%)	5 (4.5%)	1 (20.00%)	4 (80.00%)	0.371
BMI (Kg/m²)	20.36 ± 3.8	20.36 ± 8.39	21.06 ± 7.03	0.242
≤ 18	26 (26%)	13 (50.00%)	13 (50.00%)	
18-25	62 (62%)	24 (38.71%)	38 (61.29%)	0.619
≥ 25	12 (12%)	5 (41.67%)	7 (58.33%)	

Table 2. Biological characteristics and dialysis parameters of patients.

Parameters	Total	Pain (+)	Pain (-)	p
Number of sessions				
2	6 (5.5%)	3 (50.00%)	3 (50.00%)	0.573
3	104 (94.5%)	40 (38.46%)	64 (61.54%)	
Route of approach				
AVF n (%)	91 (82.7%)	37 (40.66%)	54 (58.34%)	0.461
Catheter n (%)	19 (17.3%)	6 (31.58%)	13 (68.42%)	
Kt/V	1.4 ± 0.3	1.45 ± 0.82	1.34 ± 0.46	0.266
<1.20	16 (21.6%)	5 (31.25%)	11 (68.75%)	0.225
≥ 1.20	58 (78.4%)	28 (48.28%)	30 (51.72%)	
IDWG (Kg)	1.5 ± 1.1	2.89 ± 1.78	2.48 ± 1.80	0.215
≤ 1	18 (17%)	5 (27.78%)	13 (72.22%)	0.259
> 1	88 (83%)	37 (42.05%)	51 (57.93%)	
Intradialytic HBP n (%)	-41.50%	31 (100%)	44 (95%)	0.23
Hemoglobin	9.6 ± 8.1	8.6 ± 1.73	10.34 ± 10.48	0.284
<12 (g/dl)	98 (89.1%)	40 (40.82%)	58 (59.18%)	0.383
≥ 12 (g/dl)	12 (10.9%)	3 (27.27%)	8 (72.73%)	
Calcemia	88.4 ± 14.3	84.23+/-19.90	90.99 ± 8.68	0.027
≤ 81 (mg/l)	12 (13.1%)	8 (66.67%)	4 (33.33%)	0.028
>81 (mg/l)	80 (86.9%)	27 (33.75%)	53 (66.25%)	
Phosphoremia	40.7 ± 51.4	47.08 ± 134.05	37.12 ± 80.68	0.39
≤ 45 (mg/l)	77 (88.5%)	26 (33.77%)	51 (66.23%)	0.313
>45 (mg/l)	10 (11.5%)	5 (50.00%)	5 (50.00%)	
Vitamin D	25.8 ± 9.7	25.4 ± 10.94	26.09 ± 9.06	0.762
<30 (ng/ml)	57 (71.2%)	21 (36.84%)	36 (63.16%)	0.848
≥ 30 (ng/ml)	23 (28.8%)	9 (39.13%)	14 (60.87%)	
PTHi	1035.6 ± 1071.5	927.62 ± 597.14	1106.99 ± 1293.7	0.42
<500 (pg/ml)	21 (23.9%)	9 (29.03%)	22 (70.97%)	0.139
≥ 500 (pg/ml)	67 (76.1%)	30 (44.78%)	37 (55.22%)	
Ferritinemia (µg/L)	978.7 ± 1165.47	985.64 ± 753.2	975.88 ± 1310.6	0.981

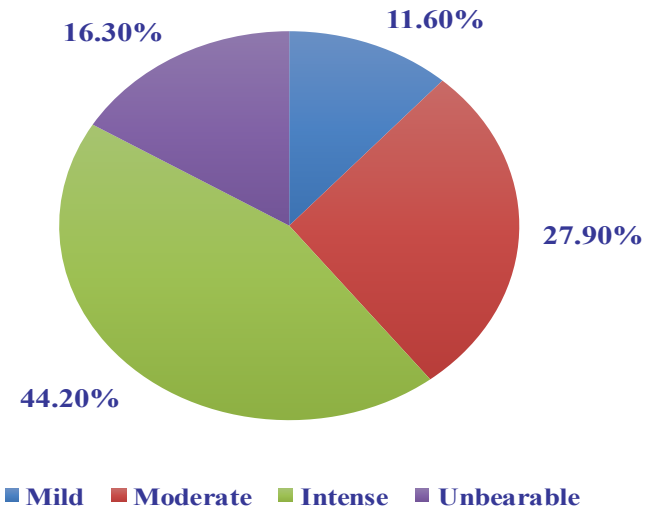

Figure 1. Chronic pain assessment of the 43 patients according to VAS.

Hyperparathyroidism, osteomalacia, adynamic osteopathy or, to a lesser degree, B2-microglobulin amyloidosis would be responsible. In addition, pathological fractures generated by these disorders constitute additional sources of chronic pain. We evaluated the psycho-affective impact of the pain and the symptomatology was definite in 51%. It has been shown that pain is associated with insomnia, depression and a decrease in daily activities and social interactions [14].

In statistical analysis, patients under 50 years of age were 4.03 times more likely to develop chronic pain. In contrast, older age was a risk factor

Table 3. Distribution according to the type of pain of the 43 patients presented with chronic pain.

Types of pain	Number (n)	Percentage (%)
Sting	14	32.56
Gravity	5	11.63
Stretching	5	11.63
Compression	5	11.63
Crushing	4	9.3
Tingling	3	6.98
Burning	3	6.98
Twisting	2	4.65
Cramp	1	2.33
Oppression	1	2.33
Total	43	100

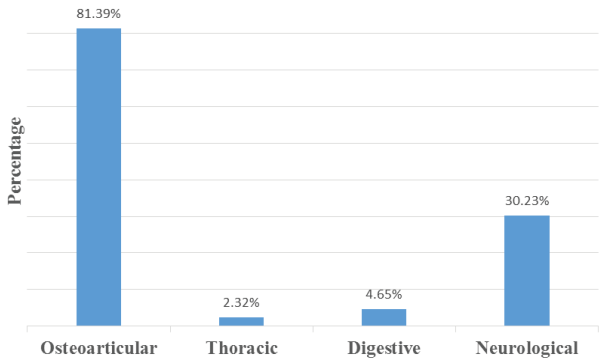

Figure 2. Distribution of the chronic pain of the 43 patients according to their origin.

Table 4. Factors associated to chronic pain on hemodialysis patient according to multivariate analysis.

Parameters	OR [IC à 95%]	p
Age group		
<50 years	4.03 [1.42-11.36]	0.009
≥ 50 years	1	
Duration		
<36 months	1	0.043
≥ 36 months	4.13 [1.10-16.30]	
Calcemia		
≤ 81 mg/l	6.71 [1.40-32.26]	0.017
>81 mg/l	1	

for the occurrence of pain in the majority of studies. This may be related to the young population of haemodialysis patients in our study. We were able to demonstrate that patients with a length of time in HD of more than 36 months were 4.13 times more likely to present chronic pain. This finding has been observed by several authors [5,9,15]. This is explained by the increase in the frequency of complications and comorbidities with age and length of time on haemodialysis. Finally, patients with chronic pain had lower blood calcium levels than those who didn't underwent a pain. Moreover, patients with hypocalcaemia were 6.71 times more likely to have chronic pain. This could be explained by the predominance of osteoarticular pain in our study related to mineral-bone disorders such as secondary hyperparathyroidism generated by hypocalcaemia. Moreover, hypocalcaemia itself is a potential source of osteoarticular pain.

The limitation of our work would be the use of some pain assessment scores that have less accuracy than others that are valid in dialysis patients.

Conclusion

The prevalence of chronic pain in our study is relatively high. It requires special attention from all chronic haemodialysis staff. We were able to demonstrate the impact of certain factors associated with chronic pain. In addition to analgesic treatment, management of risk factors could improve compliance and quality of life of uraemic patients. Thus, the use of valid assessment tools in dialysis patients would allow a better estimation of the prevalence of chronic pain.

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