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Chronic Pain Assessment in Moroccan Hemodialysis Population

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ABSTRACT

Introduction: This study aims to assess the prevalence, as well as the impact of chronic pain on the daily life of hemodialysis patients and to determine the associated socio-demographic, clinical-biological, and psychological factors.

Methods: This study was a cross-sectional study that included 441 hemodialysis patients. The characteristics of the chronic pain were collected by the Brief Pain Inventory questionnaire and by the visual analog scale. The anxious and depressed mood was assessed by the Hospital Anxiety and Depression Scale, factors associated with chronic pain were determined through univariate and multivariate analysis.

Results: the prevalence of chronic pain was 72.8%. It was severe in 40.8% of cases and it completely interfered with general activity in 72.9% of cases. The most frequently reported pain site was: lowers extremities (39.9%). Thus, 59.9% of patients reported using analgesics, with a frequent intake in 74.3% of cases. Anxiety and depression were found respectively in 68% and 66% of cases. The chronic pain was significantly associated with depression ($p<0.001$), anxiety ($p<0.001$), living conditions ($p<0.001$), level of studies ($p<0.001$), and marital status ($p=0.020$).

Conclusion: A multidisciplinary approach is recommended for the management of chronic pain, involves Nurses, physiotherapists, psychologists, health educators and family.

Keywords: chronic pain, hemodialysis, assessement, associated factors

INTRODUCTION

Chronic pain is a common, complex, and distressing problem that has a profound impact on individuals and society [1]. Indeed, it's a source of disability, major social and psychological alterations [2], and even more in hemodialysis patients.

The prevalence of chronic pain in hemodialysis patients was up to 82 % and 92 % [3,4], and it is severe to moderate in about 35 % to 70 % of these patients [4].

However, in chronically hemodialyzed population, most patients are not evaluated for these aspects and therefore not sufficiently treated [5]. Health professionals should therefore understand and relieve pain in this population, in order to improve their quality of life and care [4]. Chronic pain must be understood in the context of social, biological, psychological, and physical factors in order to develop treatment plans and prevention strategies [1]. It is important to analyze these different factors for adequate and holistic pain management.

This study aims to assess the prevalence, as well as the impact of chronic pain on the daily life of hemodialysis patients, in order to determine the associated socio-demographic, clinical-biological, and psychological factors.

PATIENTS AND METHODS

Ethics Approval and Consent to Participate

The study has been approved by the ethics committee for biomedical research of the MOHAMMED V Faculty of Medicine and Pharmacy in RABAT (N/R: Folder Number 10/20), and informed consent was obtained from each subject.

Design and Study Area

This is a multicenter cross-sectional study conducted from February 2020 to September 2020 including all hemodialysis patients (n=441) recruited from all public sectors hemodialysis centers (6 centers) in Souss Massa region, Morocco.

Inclusion and Exclusion Criteria

Patients satisfying the following criteria were included in this study consecutively: age greater than 18 years old, Moroccan nationality, time on hemodialysis greater than three months, absence of a recent change in the usual lifestyle, and a prior agreement. They will be excluded in this study: Hemodialysis patients who are comatose, delusional and non-consenting.

Chronic Pain Definition

Pain is defined by duration, it is considered chronic if it persists more than three months [6], From this criterion and based on the pain syndrome, we divided our population into

two groups, according to the presence or absence of chronic pain.

Instrument and Data Collection

Basic demographic data were collected, including information about age, gender, health cover, level of education, marital status, professional one, and living conditions. Baseline clinical, hematological, dialytic, and psychological data of these patients were also collected: clinical (causal nephropathy, associated comorbidities, body mass index, toxics habits, and respect of hygieno-dietetic rules), biological (hemoglobin, phosphatemia, albumin, C-reactive protein, mean calcium level, thyroid assessment), dialytics (duration of hemodialysis, number of dialysis sessions, Interdialytic Weight Gain, Vascular Access, and Renal therapy replacement), and psychological (depression and anxiety).

In this study, the characteristics of the chronic pain were collected by the BPI questionnaire: Brief Pain Inventory (Short Form), with the Arabic version which is already validated [7], (type, intensity, site, frequency, origin, psycho-affective impact on the daily life of hemodialysis patients).

Pain intensity was assessed using the visual analog scale (VAS) allowing patients to choose a number from 0 to 10 to describe the degree of their chronic pain, then it was classified as absent for a score of 0, low for a score from 1 to 3, moderate for a score of 4 to 6, severe for a score of 7 to 9 and unbearable for a score of 10. Regarding the frequency, chronic pain is considered as permanent if it was present continuously without no-pain interval, daily if it occurs at least once a day, intermittent if it occurs less than once a day, and finally, rare when it occurs less than once a week.

The HADS scale (Hospital Anxiety and Depressive scale) in its already validated Arabic version [8] is used to detect depression and anxiety in our population. It is a reliable instrument to verify the presence or absence of depression and anxiety and can even measure the severity of anxiety and depressive disorders [9] . It comprises 14 items graded from 0 to 3. Seven questions relate to anxiety (total A) and seven others to the depressive dimension (total D), thus, making it possible to obtain two scores (maximum score for each score = 21). The anxiety score is obtained by adding the scores assigned to the questions on anxiety. A score greater than or equal to 11 defines anxiety. The depression score is obtained by adding the scores assigned to the seven questions on depression. A score greater than or equal to 11 defines depression [9].

Data Management and Statistical Analysis

The qualitative variables were presented as frequency and percentages, and mean ± standard deviation (SD) or median (interquartile range, IQR) for quantitative variables. The Chi-square test (χ2) or Fisher's exact test, were performed according to their particular application conditions, to examine for differences in proportions of categorical variables between two groups (the group with chronic pain and the group that does not complain of any chronic pain). Furthermore, univariate and multivariate logistic regression analyses were done to identify the factors associated with chronic pain. All independent variables with a *P*-value < .25 in the univariate analysis were taken into account in the multivariate logistic regression analysis.

The difference is considered statistically significant for a $P < .05$. Data management and statistical analysis was done using the SPSS for Windows software package (ver. 13.0; SPSS Inc., Chicago, IL, USA).

RESULTS

Characteristics of the Study Population

The total included in the study was 441 of chronic hemodialysis patients, with a mean age of 56.05 (15.67). Elderly subjects (> 65 years) represented 30.6 % of patients (n = 135). The sex ratio M / F was 1.29 (249 M / 192 F), the majority (63.7 %) of the participants was illiterate. 61.2 % of patients were living alone or with one person in their house and almost all of the participants (85 %) were unemployed. There were 300 (68 %) patients who self-reported anxiety, and 291 (66 %) depression. However, only 2.7 % reported using anxiolytics and 2.3 % antidepressants. **Table 1** summarizes all the socio-demographic and psychological characteristics of patients.

The mean body mass index (BMI) was 23.18 (3.6) and the median is 24.03 (21.60–25.90) kg / m^2. The mean and median duration of hemodialysis are 64.84 ± 49.67 months and 56 (IQR 28–84) months, respectively. The etiologies of end-stage

Table 1. Socio-demographic and psychological characteristics of the patients classified according to the presence of chronic pain

Variable	All patients N (%)	Chronic pain N (%)	No Chronic pain N (%)	*P* value
Age	56.05 ± 15.67	57.04 ±15.28	52.40 ± 16.16	< 0.01*
[18-45 years]	113 (25.6)	70 (15.9)	43 (9.8)	
[46-65 years]	193 (43.8)	144 (32.7)	49 (11.1)	
>65 years	135 (30.6)	107 (24.3)	28 (6.3)	
Gender				0.072
Male	249 (56.5)	174 (39.5)	75 (17)	
Female	192 (43.5)	147 (33.3)	45 (10.2)	
Level of studies				< 0.01*
Illiterate	281 (63.7)	206 (64.2)	75 (62.5)	
Primary	79 (17.9)	61 (19)	18 (15)	
Middle school	36 (8.2)	19 (5.9)	17 (14.2)	
Hight school	41 (9.3)	34 (10.6)	7 (5.8)	
Higher Education	4 (0.9)	1 (0.3)	3 (2.5)	
Professional status				0.321
Employee	51 (11.6)	33 (10.3)	18 (15)	
Self employed	12 (2.7)	7 (2.2)	5 (54.2)	
Inactive	375 (85)	279 (86.9)	96 (78)	
Retirement	3 (0.7)	2 (0.6)	1 (0.8)	

* The Chi-square test (x2) or Fisher's exact test; HADS: Hospital Anxiety and Depressive scale

Table 1 (continued). Socio-demographic and psychological characteristics of the patients classified according to the presence of chronic pain

Variable	All patients N (%)	Chronic pain N (%)	No Chronic pain N (%)	*P* value
Marital status				< 0.01*
Single	61 (13.8)	33 (7.5)	28 (23.3)	
Married	297 (67.3)	218 (67.9)	79 (65.8)	
Divorced	7 (1.6)	5 (1.6)	2 (1.7)	
Widower	76 (17.2)	65 (20.2)	11 (9.2)	
Living conditions				
living alone	270 (61.2)	161 (50.2)	11 (9.2)	< 0.01*
living with others	171 (38.8)	160 (49.8)	109 (90.8)	
Health coverage				
With assurance	431 (97.9)	311 (96.88)	120 (100)	0.040*
Without assurance	10 (2.3)	10 (0.03)	0	
Anxiety				
Yes (Score HADS ≥11)	300 (68)	267 (83.2)	33 (16.8)	< 0.01*
No (Score HADS <11)	41 (32)	54 (16.8)	87 (72.5)	
Depression				
Yes (Score HADS ≥11)	291 (66)	258 (80.4)	33 (27.5)	< 0.01*
No (Score HADS <11)	150 (34)	63 (19.6)	87 (79.2)	
Use of anxiety medications	12 (2.7)	10 (3.1)	2 (1.7)	0.322
Use of depression medications	10 (2.3)	8 (2.5)	2 (1.7)	0.280

* The Chi-square test (x2) or Fisher's exact test; HADS: Hospital Anxiety and Depressive scale

Table 2. Clinical and diyalitic characteristics of the patients classified according to the presence of chronic pain

Variable	All patients N (%)	Chronic pain N (%)	No chronic pain N (%)	*P* value
Respect of hygieno-dietetic rules	10 (2.3)	8 (2.5)	2 (1.7)	0.459
Toxic Habits	17 (3.9)	17 (5.3)	0 (0)	0.040
Body Mass Index (Kg/m2)	23.18±3.6	23.15±3.53	23.24±3.77	0.798
<18.5	74 (16.8)	52 (16.2)	22 (18.3)	
18.5-24.9	241 (54.6)	175 (54.5)	66 (55)	
25-29.9	126 (28.8)	94 (29.3)	32 (26.7)	
Co-morbidity				
Hypertension	235 (53.3)	177 (55.1)	58 (48.3)	0.121
Diabetes mellitus	165 (37.4)	129 (40.2)	36 (30)	0.031
Cardiovascular diseases	19 (4.3)	16 (5)	3 (2.5)	0.192
System diseases	4 (0.9)	3 (0.9)	1 (0.8)	0.279
Cancer	4 (0.9)	3 (0.7)	1 (0.2)	0.701
Liver diseases	3 (0.7)	2 (0.6)	1 (0.8)	0.615
A prior stroke history	32 (7.3)	26 (8.1)	6 (1.4)	0.183
Causal Nephropathy				
Indeterminate nephropathy	147 (33.3)	92 (28.7)	55 (45.8)	<0 ,01*
Diabetic nephropathy	180 (40.8)	143 (44.5)	37 (30.8)	0,006*
Glomerular chronic	42 (9.5)	32 (10)	10 (8.3)	0,375
Vascular Nephropathy	29 (6.6)	25 (7.8)	4 (3.3)	0,066
Polycystic kidney disease	13 (2.9)	10 (3.1)	3 (2.5)	0,509
Tubulo-interstitial nephritis	20 (4.5)	13 (4)	7 (5.8)	0,285
Eclampsia	4 (0.9)	2 (0.6)	2 (1.7)	0,299
Renal therapy replacement				
Hemodialysis	441 (100)	321 (100)	120 (100)	0.273
Interdialytic Weight Gain /Kg	2.38±1.05	2.46±1.06	2.17±0.98	0.233
< 1	205 (46.5)	146 (45.5)	59 (49.2)	
1—2	155 (35.1)	120 (37.4)	35 (29.2)	
>2	81 (18.4)	55 (17.1)	26 (21.7)	
Duration on hemodialysis /mouths	64.84±49.67	65.64±49.59	62.71±50.02	0.152
<50	208 (47.2)	147 (45.8)	61 (50.8)	
50 -100	152 (34.5)	119 (37.1)	33 (27.5)	
>100	81 (18.4)	55 (17.1)	26 (21.7)	
Number of dialysis sessions / week				
2 Sessions	399 (90.5)	302 (94.1)	97 (80.8)	< 0,01*
3 Sessions	42 (9.5)	19 (5.9)	23 (19.2)	
Vascular Access				
AVF proximal	131 (29.7)	100 (31.2)	31 (25.8)	0.273
AVF distal	293 (66.4)	211 (65.7)	82 (68.3)	
Tunneled jugular catheter	17 (3.9)	10 (3.1)	7 (5.8)	

* The Chi-square test (x2) or Fisher's exact test

chronic renal failure (ESRD) and the list of recorded comorbidities are summarized in **Table 2**. Approximately 90.5 % of patients (n = 399/441) had a frequency of 2 sessions of 4 to 4.5 hours dialysis per week, while the remaining 42 (9.5 %) were

Table 3. Biological characteristics of the patients classified according to the presence of chronic pain

Variable	All patients N (%)	Chronic pain N (%)	No chronic pain N (%)	*P* value
Hemoglobin (g/dl)	9.65±1.58	9.72±1.54	9.46±1.67	0.196
<8	51 (11.6)	34 (10.6)	17 (14.2)	
8-10,9	289 (65.5)	207 (64.5)	171 (66.8)	
≥11	101 (22.9)	80 (24.9)	21 (17.5)	
PTH (mg/ml)	476.17±216.97	482.90±216.94	458.17±216.91	0.884
< 300	136 (30.8)	99 (30.8)	37 (30.8)	
300—600	214 (48.5)	154 (48)	60 (50)	
> 600	91 (20.6)	68 (21.2)	23 (19.2)	
Ca(mmol/l)	51.05±31.46	49.53±30.08	55.12±32.74	0.022*
<90	393 (89.1)	294 (91.6)	99 (82.5)	
90 -105	40 (9.1)	22 (6.9)	18 (15)	
>105	8 (1.8)	5 (1.6)	3 (2.5)	
P04(mg/l)	46.83±16.48	46.99±15.78	46.43±18.28	0.133
<25	17 (3.9)	9 (2.8)	8 (6.7)	
25-45	247 (56)	185 (57.6)	62 (51.7)	
>45	177 (40.1)	127 (39.6)	50 (41.7)	
Albumin (g/l	42.75±14.68	42.78±14.52	42.66±15.18	0.884
<38	136 (30.8)	99 (30.8)	37 (30.8)	
38-50	214 (48.5)	154 (48)	60 (50)	
>50	91 (20.6)	68 (21.2)	23 (19.2)	
CRP (mg/l)	63.27±28.34	64.85±28.38	59.05±27.91	0.321
<6	51 (11.6)	33 (10.3)	18 (15)	
6-50	12 (2.7)	7 (2.2)	5 (4.2)	
50-100	375 (85)	279 (86.9)	96 (80)	
>100	3 (0.7)	2 (0.6)	1 (0.8)	

* The Chi-square test (x2) or Fisher's exact test

dialyzed 3 times per week for 4 hours per session. The mean inter-dialytic weight gain (IDWG) was 2.38 (1.05) kg. **Table 2** summarizes all of the clinical and dialytic parameters collected, the etiologies of end-stage chronic renal failure (ESRD) and the list of recorded comorbidities. **Table 3** shows the biological characteristics of the sample.

Prevalence of Chronic Pain

Of the 441 patients, 321 reported the presence of chronic pain (CP), for a prevalence of 72.8 %. In the group with chronic pain (CP +): The mean age is 57.04 (15.28), the sex ratio is 174H / 147F, 206 patients (64.2 %) were illiterate, 279 (86.9 %) were unemployed, the mean duration of dialysis was 65.64(49.59) months (see **Table 1**). There were 267 (80.4 %) who self-reported anxiety and 211 (65.7 %) depression.

Characteristics of Chronic Pain

Chronic pain intensity was absent, mild, moderate, severe and unbearable in 1 (0.3 %), 69 (21.5 %), 110 (34.3 %), 131 (40.8 %), and 10 (3.1 %) of patients respectively. Its frequency was mostly intermittent (61.7 %). However, pain was only worsened during dialysis sessions in 9.6 % of cases.

The chronic pain described by the patients was in the lowers extremities in 39.9 % of the cases, in the back in 19.3 %, in the head in 14 %, in the abdomen in 11.2 %, multifocal in 10 %, in the shoulders in 5.6 %, and with an average number of painful sites per patient of 4.41 (1.24). Thus, the identified causes of chronic CP are the following: osteoarticular, neurological, vascular, digestive and post-traumatic in respectively 155 (48.3 %), 83 (25.9 %), 45 (14 %), 35 (10.9 %), 3 (0.9 %) (See **Table 4**).

Analgesic Admission

We will retain 191 patients, approximately (59.9 %), had taking analgesics and up to 59.9 % of patients taking analgesics frequently in 74.3 % of cases, daily in 23.6 % of cases and rarely in 2.4 % of cases. 92.1 % of analgesics are level 1 and 7.9 % are level 2 and no level 3 analgesic is used. This admission only allowed complete relief in 6 % of cases and the degree of relief remains low in 131 patients (68.6 %). The consequent analgesic admission is summarized in **Table 4**.

Table 4. Characteristics of chronic pain and Analgesic admission

Variable	Frequency N (%)
Intensity of chronic pain	
Absent: VAS at 0	1 (0.3)
Mild: VAS from 1 to 3	69 (21.5)
Moderate: VAS from 4 to 6	110 (34.3)
Severe: VAS from 7to 9	131 (40.8)
Unbearable: VAS at 10	10 (3.1)
Pain frequency	
Intermittent	198 (61.7)
Daily	73 (22.7)
Permanent	46 (14.3)
Rare	4 (1.2)
Causes of chronic pain	
Osteo-articular	155 (48.3)
Neurologic	83 (25.9)
Vascular	45 (14)
Digestive	35 (10.9)
Post-traumatic	3 (0.9)
Painful region	
Head	45 (14)
Shoulders	18 (5.6)
Abdomen	36 (11.2)
Back	62 (19.3)
Lower limb	128 (39.9)
Multifocal pain	32 (10)

VAS: visual analog scale

Table 4 (continued). Characteristics of chronic pain and Analgesic admission

Variable	Frequency N (%)
Analgesic admission	191 (59.9)
Level 1	176 (92.1)
Level 2	15 (7.9)
Level 3	0
Rhythm analgesic	
Frequent	142 (74.3)
Daily	45 (23.6)
Rare	4 (2.1)
Relief after taking analgesics	
No relief	2 (1)
low	17 (8.9)
Moderate	103 (53.9)
Important	63 (33)
Complete	6 (3.1)
Dependence on analgesic	45 (23.6)

VAS: visual analog scale

Impact of Chronic Pain

The impact of chronic pain on the daily life of patients is summarized in **Table 5**. Note that it completely interfered with general activity, with the ability to walk and usual work in 234 patients (72.9 %), 221 (68.85 %), 230 (71.7 %) respectively. Regarding the mood, the relations with others and the enjoyment of life, chronic pain is completely embarrassing 69.8 % (224 patients), 34 % (109 patients) and 34.6 % (111 patients) of cases respectively.

Factors Associated with Chronic Pain

Univariate analysis

1. Socio-demographic and psychological factors on univariate analysis (See **Table 6**)
2. Clinical factors on univariate analysis (See **Table 7**)
3. Biological and dialytic factors on univariate analysis (See **Table 8**)

Table 5. Impact of chronic pain

	No gene N (%)	Weak gene N (%)	Moderate gene N (%)	Important gene N (%)	Complet gene N (%)
General activity	0	2(0,6)	14 (4,4)	71(22,1)	234(72,9)
Ability to walk	0	1 (0,3)	21(6,5)	78(24,3)	221(68,8)
Usual Work	0	1 (0,3)	19 (5,9)	71(22,1)	230(71,7)
Sleep	1(0,3)	7(2,2)	93 (29)	80 (24,9)	140 (43,6)
Mood	0	2(0,6)	53(16,5)	42(13,1)	224(69,8)
Relations with others people	0	13(4)	140 (31,7)	59(18,4)	109(34)
Enjoyment of life	0	8(2,5)	122(38)	80(24,9)	111(34,6)

Table 6. Socio-demographic and psychological factors associated with chronic pain on univariate analysis

Variable	OR	CI 95%	*P* value
Age			
[18-45 years]	2.34	1.33 -4.12	<0 .01
[46-65 years]	1.30	0.76 -2.20	0.329
>65 years	1	/	/
Sexe			
Male	1.40	0.91 -2.16	0.119
Female	1	/	/
Level of studies			
Illiterate	0.12	0.01-1.18	0.070
Primary	0.09	0.01 -1.00	0.050
Middle school	0.29	0.02 -3.14	0.314
Hight school	0.06	0.00-0.76	0.029
Higher education	1	/	/
Professional status			
Employee	1.09	0.09 -12.87	0.945
Self employed	1.71	0.10- 20.43	0.793
Inactive (unemployed)	0.68	0.06-7.67	0.761
Retirement	1	/	/
Marital status			
Single	5.01	2.22-11.31	<0 .01
Married	2.14	1.07- 4.26	0.030
Divorced	2.36	0.40 -13.73	0.338
Widower	1	/	/
Living conditions			
Living alone	9.84	5.10- 19.00	<0 .01
Living with others	1	/	/
Health coverage			
With assurance	0.17	0.03-0.83	0.99
Without assurance	1	/	/
Anxiety			
Yes (Score HADS ≥11)	13.03	7.93-21.40	<0 .01
No (Score HADS <11)	1	/	/
Depression			
Yes (Score HADS ≥11)	10.79	6.63-17.55	< 0.01
No (Score HADS <11)	1	/	/

OR: Odds Ratio; CI: Confidence interval, HADS: Hospital Anxiety and Depressive scale

Table 7. Clinical factors associated with chronic pain on univariate analysis

Variable	OR	CI 95%	*P* value
Respect hygieno-dietetic rules			
Yes	0.89	0.09-8.64	0.921
No	1	/	/
Toxic Habits			
Yes	0.16	0.03-0.17	0.998
No	1	/	/
Body Mass Index (kg/m^2)			
<18.5	0.48	0.65-2.35	0.506
18.5-24.9	0.32	0.67-1.81	0.683
25-29.9	1	/	/
Hypertension			
Yes	1.31	0.86 – 2.00	0.203
No	1	/	/
Diabetes mellitus			
Yes	0.63	0.40 – 1.00	0.050
No	1	/	/
Cardiovascular diseases			
Yes	0.48	0.14 – 1.70	0.262
No	1	/	/
Systemic diseases			
Yes	0.000	0.00-0.71	0.999
No	1	/	/
Cancer			
Yes	0.89	0.09 – 8.64	0.921
No	1	/	/
Liver diseases			
Yes	1.34	0.12– 23.13	0.812
No	1	/	/
A prior stroke history			
Yes	0.59	0.24 – 1.48	0.269
No	1	/	/
indeterminate nephropathy			
Yes	2.10	1.36 – 3.24	<0 .01
No	1	/	/
Diabetic nephropathy			
Yes	0.55	0.35 – 0.86	0.010
No	1	/	/
Glomerular chronic nephropathy			
Yes	0.82	0.39-1.72	0.603
No	1	/	/
Vascular Nephropathy			
Yes	0.40	0.13-1.19	0.103
No	1	/	/
Polycystic kidney disease			
Yes	0.79	0.21-2.94	0.734
No	1	/	/
Tubulo-interstitial nephritis			
Yes	0.57	0.57-3.77	0.426
No	1	/	/
Eclampsia			
Yes	2.70	0.37-19.41	0.323
No	1	/	/

Table 8. Biological and dialytic factors associated with chronic pain on univariate analysis

Variable	OR	CI 95%	*P* value
Dialytic parameters			
Interdialytic Weight Gain (IDWG)			
< 1kg	0.85	0.49- 1.49	0.580
1—2 Kg	0.61	0.33-1.12	0.114
>2Kg	1	/	/
Duration on hemodialysis /mouths			
<50	0.87	0.50 – 1.52	0.645
50 -100	0.58	0.32-1.07	0.084
>10	1	/	/
Number of dialysis sessions / week			
2 Sessions	0.26	0.13-0.50	<0.01
3 Sessions	1	/	/

OR: odds ratio, CI: confidence interval

Table 8 (continued). Biological and dialytic factors associated with chronic pain on univariate analysis

Variable	OR	CI 95%	*P* value
Vascular Access			
AVF proximal	0.44	0.15-1.26	0.127
AVF distal	0.55	0.20-1.50	0.248
Tunneled jugular catheter	1	/	/
Hematology parameters			
Hemoglobin (g/dl)			
<8	1.90	0.89– 4.05	0.094
8-10.9	1.50	0.87– 2.60	0.138
≥11	1	/	/
PTH (pg/ml)			
< 300	1.10	0.60 –2.02	0.746
300—600	1.15	0.65- 2.01	0.320
> 600	1	/	/
Ca(mmol/l)			
<90	0.56	0.13-2.39	0.435
90 -105	1.36	2.28- 6.49	0.697
>105	1	/	/
P04(mg/l)			
<25	2.25	0.82-6.18	0.113
25-45	0.85	0.551-1.31	0.469
>45	1	/	/
Albumin (g/l)			
<38	1.10	0.60-2.02	0.746
38-50	1.15	0.65-2.01	0.620
>50 l	1	/	/
CRP (mg/l)			
<6	1.09	0.09-12.87	0.945
6-50	1.42	0.10-20.43	0.793
50-100	0.68	0.06-7.67	0.761
>100	1	/	/

OR: odds ratio, CI: confidence interval

Table 9. Factors associated with chronic pain on multivariate analysis

Variable	aOR	CI 95%	*P* value
Level of studies			
Hight school	0.01	0.00-0.28	<0.001
Marital status			
Single	8.37	1.40-49.83	0.020
Living conditions			
Alone	24.04	8.46-68.32	<0.001
Anxiety			
Yes	19.91	8.17-48.50	<0.001
Depression			
yes	20.74	9.13-17.10	<0.001

aOR: Adjusted odds ratio, CI: confidence interval

Multivariate analysis

The variables that were included in the regression equation were: age, sexe, education level, marital status, living conditions, duration of hemodialysis, inter-dialytic weight gain, Number of dialysis sessions per week, comorbidities (hypertension, diabetes and cardiovascular diseases), Haemoglobin, Calcemia, indeterminate nephropathy, Diabetic nephropathy, Vascular Nephropathy, vascular access, anxiety and depression.

The results of the multivariate analysis revealed, among all the variables, five factors which had a strong statistical correlation ($P < .05$) with chronic pain in hemodialysis patients: depression, anxiety, education level, marital status and living conditions (See **Table 9**).

DISCUSSION

Prevalence of Chronic Pain

The prevalence of chronic pain in this study is 72.8 %, it is almost similar to 70.9 % in the study of Elharraqui [10], 74.4 % in Sadigova's work [5], 82 % in the Flesherman series [3], while in other series [11-13], this rate does not exceed 50.1 %. This difference may be justified by the difference between the contexts of the assessment and management approaches of chronic pain, but also by the differences in the perception of pain in different countries, different cultures and different ethnicities. Several studies have reported that there are large and complex cultural variations between countries and ethnicities in the prevalence and outcomes of pain-related conditions [14,15], another study showed that the prevalence of chronic pain and its disability is more important in underdeveloped countries than in developed ones [16].

Chronic Pain Assessment

In this study, the identified causes of chronic pain are as follows: osteoarticular, neurological, vascular, digestive and post-traumatic in respectively 155 (48.3 %), 83 (25.9 %), 45 (14 %), 35 (10.9 %), 3 (0.9 %). In fact, 82% of chronic kidney disease patients undergoing dialysis have been reported to have chronic pain [11] due to the frequent osteoarticular, cardiovascular, digestive, and traumatic complications in this population [17]. The main cause of chronic pain in our patients is osteoarticular (48.3 %), as has reported in some trials [13,18]. The pain associated with osteoarticular complications in chronic dialysis patients can be explained by ß2-microglobulin amyloidosis: The presence of amyloid deposits fibrillar mainly in joint tissues and in bones, clinically causes the appearance of osteoarticular pain syndromes [19]. Therefore, early and optimal management of disorders bone mineral linked to Chronic Renal Insufficiency was expected to reduce in part of the occurrence of these difficulties [13]. In our cases, the intensity of the pain was significant with 40.8 % of severe form versus 44 % in the Bouaatar study [12], and 53.3 % in the Ben-Bassat study [20]. Multiple studies indicated a high prevalence of patients with moderate or severe pain [4]. The most common painful site was in the lower limbs in 39.9 % of patients, as reported in other studies [5,13,20], the pain was only worsened during dialysis sessions in 9.6 % of cases.

Analgesic Admission

Although more than half (59.5 %) of patients had regular use of level 1 and level 2 analgesics, complete relief was only noted in 3.1 % of patients. Results of several studies show insufficient relief of Chronic Pain in hemodialysis patients with analgesics [5]. This finding may be justified by the lack of knowledge of the exact mechanism of Chronic Pain for an adequate prescription of analgesics or opioids in chronic hemodialysis patients [21]. However, special considerations should be taking in hemodialysis patients to minimize direct renal complications induced by analgesics and other complications related to drug accumulation due to reduced renal clearance [22].

In addition, studies prove that drug treatment remains insufficient in face of chronic pain in hemodialysis patients. [23,24]. In this regard, other non-pharmacological treatments could improve the pain, depression, anxiety, functionality and quality of life of hemodialysis patients with chronic pain without a major adverse event [24]. It has been proven that there are non-drug analgesic approaches that can alleviate chronic pain in hemodialysis patients such as conscious calming gestures [23], cognitive behavioral therapies [2], and hypnosis: several local experiences have highlighted the benefits of hypnosis for controlling acute and chronic pain in hemodialysis patients [25].

Impact of Chronic Pain on Daily Life

In this study, Chronic pain caused complete discomfort in general activity in 72.9 % of cases versus 62.1 % in the study by El Harraqui [10], on the ability to walk in 68.85 % of cases. This rate varies from 19.1 % to 44.1 % in other studies [12, 13]. Also, usual work is completely hampered by chronic pain in 71.7 % of cases. Indeed, several authors have reported that chronic pain disrupts body patterns, reduces overall activity level, and causes intolerance to physical and/or intellectual effort [2,26], chronic pain is, therefore, a source of disability, and major alterations in daily life [2]. Furthermore, due to chronic pain complete sleep discomfort was noted in 38.01 % of cases, several studies prove that chronic pain is significantly associated with sleep disorders and even insomnia in hemodialysis patients [11,18,27,28]. Chronic pain is a multidimensional phenomenon that has several components: physical, psychological, and social. If left untreated, it can affect several aspects: mood, enjoyment of life, and relationship with others [11]. In our study, these aspects are completely affected in 69.80 %, 34.6 % and 34 % respectively. Chronic pain can therefore only be evaluated in a relevant way if it is listened to, observed, but also analyzed through the repercussions that are personal, physical, and psychological, as well as social and professional [26].

Factors Associated with Chronic Pain

Multivariate analysis in our study showed a strong correlation between chronic pain and five factors: depression, anxiety, education level, marital status and living conditions. For the first two factors, several authors have reported that the comorbidity of depression and anxiety are common in chronically painful people, and people with chronic pain are more likely to have depressive and anxious symptoms than people without pain [29,30].

Several investigators have estimated that depression occurs in about 20 % to 67 % of dialysis patients [31-34]. This variation would be linked to the use of tools and different methodologies [35]. In our study, the prevalence of depression is 66 % in the whole population, and 80.4 % in the group of chronic pain sufferers, this finding is explained by the causal relationship between depression and chronic pain, several authors have proven that the causal link between chronic pain and depression is bilateral: chronic pain depresses the patient and this depression promotes chronic pain [36,37]. Besides depression, anxiety, is the most prevalent psychological factor associated with chronic pain [38]. A recent study places the prevalence of anxiety in chronic hemodialysis patients at 36.9 % [34], in our study, this rate represents 68 % for the entire population and 83.2 % in the group of chronic pain sufferers.

Studies have shown that anxiety about health is greater in people with pain than in the control group [39]. Along with these studies, many other studies have demonstrated the importance of psychological factors in the management of chronic pain [2]. In our study, the education level is retained also as a factor associated with chronic pain, people with little education are more likely to suffer from chronic pain than those with a higher level of education [1]. Indeed, an advanced level of education protects against chronic pain in hemodialysis patients, probably because of due to the cognitive skills that allow them to accept and manage their pain. These skills based on the level of education allow the patient to observe chronic pain, and understand it and thus to appropriate it [40]. Similarly, illiteracy is identified as a risk factor linked to chronic pain in hemodialysis [10].

The social status is also retained as a factor associated with chronic pain. Loneliness and social isolation increase the perception of chronic pain. Several studies confirm that being integrated into a social network provides support for the painful ordeal and promotes the reduction of the perceived chronic pain. Also, family support positively influences the patient's behavioral and attitude responses to chronic pain. [40,41] On the other way, disappointment in relation to the social support received, favors passive strategies for coping

with pain, increases the negative emotional response to pain; adjustment to chronic pain is therefore less good [38].

In our results, the fifth factor retained in multivariate analysis is marital status. Multiple studies have explored the potential association between marital status and chronic pain in hemodialysis patients [40-42]. One of these studies, found no correlation between pain and marital status [43], while the others confirmed that marital status is significantly associated with chronic pain on hemodialysis [40,41]. In our study, unmarried patients ultimately reported more chronic pain, similar to the work of Binik [43]. In fact, the understanding of the spouse and his real support are preponderant factors, for the chronic pain patient which condition, in a positive way, all his other behavioral responses and his attitudes towards pain [40].

STRENGTHS AND LIMITATIONS

Strengths of our study include its multi-center environment and relatively large sample size. It was also the first study in this region to assess chronic pain, examine its effect on the daily life of hemodialysis patients, and study the social, demographic, clinical and psychological factors associated with it. In addition, the current study used the BPI and HADS scales which are widely accepted assessment tools to study chronic pain symptoms and diagnose depression and anxiety, respectively, in hemodialysis patients. However, this study had some limitations,

The first is that the patients came from a single geographic region; It was conducted in a single population of hemodialysis patients and may not be generalizable to other hemodialysis populations. The second is that the cause of the pain has been determined just by examination of files and the last, is that the confidence intervals of the Odds rations are wide, it shows that the evaluation of the parameters is not so precise due to the size of the sample.

However, we believe that the results provide a solid basis for studies that will further explore this aspect. The ultimate goal should be a better understanding and treatment of chronic pain in hemodialysis patients.

CONCLUSION

Chronic pain on hemodialysis needs to be understood in the context of social, biological, psychological, and physical factors. A multidisciplinary approach is recommended for the management of complex pain syndromes, include both pharmacological and non-pharmacological interventions and that involves nurses, physiotherapists, occupational therapists, psychologists, health educators and family, to ensure a good quality of life for this vulnerable population of hemodialysis patients.

Pain assessment and management need to be incorporated into standard care for these patients.

However, additional research is required to identify the most effective approaches to pain management for long-term hemodialysis patients.

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