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Prevalence of chronic pain and associated factors in the population of Salvador, Bahia

ABSTRACT

OBJECTIVE: To estimate the prevalence of chronic pain, identifying the associated factors.

METHODS: A cross-sectional study was conducted in a population sample of 2,297 individuals aged 20 years or more, in Salvador, Northeastern Brazil, in 1999 and 2000. A standardized questionnaire was administered at the individuals' home to collect data about pain, sociodemographic characteristics, and abdominal circumference measurement. The criterion for chronic pain classification was duration above six months. Prevalence of pain was estimated by adjusted prevalence ratio with confidence interval of 95% and $p < 0.05$ for the univariate analyses and logistic regression.

RESULTS: The presence of chronic pain was found in 41.4% of the population. In the gross analysis, the most frequent associated factors were: sex, age, marital status, smoking and alcohol consumption ($p < 0.05$). In the multivariate analysis, female sex, age, smoking and presence of central obesity were independent predictors, while moderate consumption of alcohol and being single were protectors.

CONCLUSIONS: The presence of chronic pain was predominant in women, elderly individuals, obese individuals, smokers and ex-smokers. Preventive public health strategies are suggested, aiming to disseminate the risks of smoking and obesity for the development of chronic pain. In addition, the periodic monitoring of health is encouraged.

DESCRIPTORS: Pain, epidemiology. Chronic Disease. Socioeconomic Factors. Risk Factors. Questionnaires. Cross-Sectional Studies.

INTRODUCTION

Pain is a multidimensional phenomenon that is hard to understand, referred to as an "unpleasant sensory and emotional experience associated with real damage or described in such terms" (International Association for the Study of Pain Press – IASP).¹¹ When the pain evolves to the chronic status, it becomes a public health problem that causes morbidity, absenteeism, and temporary or permanent disability, generating high costs to the health systems.¹³

IASP classifies chronic pain in three periods: duration of less than one month, from one to six months and, more frequently, more than six months, provided that its duration is longer than the normal remission time that is known for each type of pain.² Although it is suggested that the best cut-off point would be an intermediate period of three months, most studies use the six-month period.¹¹

It is estimated that 7% to 40% of the world's population suffer from chronic pain.^{3,4} The causes may be the adopted classification, the conditions in which

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the studies were developed and pain location.⁶

Few population-based papers have investigated factors that are associated with this morbidity, especially using high methodological rigor and in developing countries. Despite the high occurrence of chronic pain in foreign research, the few Brazilian studies have been conducted in specific situations (workers, elderly individuals, body regions) or in outpatient clinics.^{3,7,15,18} A study carried out by the World Health Organization showed high prevalence in South America (31% in Brazil – Rio de Janeiro and 33% in Santiago, Chile), possibly influenced by cultural differences.⁵

Psychosocial factors like depression, excessive consumption of alcohol and smoking have been associated with the presence of chronic pain. The relation to sociodemographic factors like age, body weight, sex and ethnicity has also been described in the literature. Socioeconomic condition, level of schooling, marital status and practice of physical activity have been frequently presenting positive associations with this morbidity.¹⁹

Epidemiological studies have great potential for offering measures to control chronic pain. However, this potential has not been totally explored yet due to methodological barriers in pain epidemiology research. Besides involving high costs, such studies need standardization and adequate sampling techniques.

The aim of the present study was to estimate the prevalence of chronic pain, identifying the associated factors.

METHODS

The present cross-sectional study used the database of the Project *Monitoramento de Doenças Crônicas da População de Salvador* (MONIT – Monitoring of the Chronic Diseases of the Population of Salvador) in 1999-2000. The methodological procedures of sampling and data collection were described by Lessa et al⁸ (2006).

The census tracts of eight out of the ten river basins in the city of Salvador, Northeastern Brazil, were grouped into 108 research areas, classified as high, mixed and low socioeconomic level. The two excluded basins presented low demographic density and due to this they were not computed in the research areas, to avoid selection bias. This study was carried out in 34 of these areas, which were drawn proportionately to the number of tracts of each social class, encompassing 16,592 households, with approximately 229,162 inhabitants, 112,290 of whom aged 20 years or more. Only pregnant women were excluded, as they present typical pains. Probabilistic sampling was performed in all the adults residing in the drawn households who agreed to participate in the study. For each household, 1.7 individual

was calculated. Prevalence of chronic pain was based on the internationally described mean, which ranges from 11% to 40%, and estimated at 25% for a level with 95% confidence, acceptable error of 2%, which resulted in a sample number of 1,800 individuals to answer this research question. The sample, calculated as 1,800, was overestimated to 2,500 adults, due to the expectation of 20% of losses, resulting from uninhabited dwellings, empty plots of land, non-residential buildings and dwellers' absence because they had travelled, had moved out, were working or were not at home in three consecutive visits. A systematic sample (intervals of ten) of 1,470 households was extracted.

The participants answered the previously tested questionnaire divided into ten modules. Still at their homes, two measurements of the waist were performed with inextensible metallic tape on the skin, adjusted to the body, taking the narrower part of the trunk between the thorax and hips as parameter. All the procedures were performed by the project's team. The final sample of interviewees included 2,297 individuals who answered the questionnaire, which determined the estimate of 25% and the result of 41.4% that was found for this sample. For a 5% significance level, the power of analysis was 80.9%.

The twenty closed questions that composed the pain module included questions about presence of pain and, if the answer was affirmative, questions about duration period, location and limitations deriving from the morbidity in relation to daily life needs, among other data. As the basis for the study of pain, questions extracted from the set of items of IASP and Mooney's body map¹² were used.

The dependent variable was presence of chronic pain. The independent variables were sociodemographic characteristics (sex, age, ethnicity and socioeconomic condition), psychosocial behavior (smoking and alcohol consumption), physical activity and central obesity. Pain location in the body was also characterized. The variables were presented in descriptive form in absolute numbers and in proportions, and prevalence was estimated. For the univariate analysis, the quantitative data were categorized (age and waist circumference) and the chi-square test was applied; then, hierarchic multiple logistic regression was carried out. For the univariate analyses, $p < 0.1$ was considered and for inclusion in the final regression model, $p < 0.05$, both with a 95% confidence interval and presentation of gross and adjusted prevalence ratios. Still in the final model, the hierarchic technique *stepwise forward* was used, according to the *Akaike information criteria* (AIC), in which the best model is the one that has the lowest AIC value.

The criterion used to classify pain as chronic pain was periodicity above six months.¹¹ Age was categorized

into five strata (from 20 to 29, from 30 to 39, from 40 to 49, from 50 to 59 and above 59 years). To define central obesity, the cut-off point of >83 cm was considered for women and >88 cm for men, estimated for the population.¹⁴ Alcohol consumption was categorized as: excessive (consumption on weekends with frequent drunkenness and/or daily consumption with or without drunkenness) or moderate (consumption on weekends), and the others were classified as non-consumers. As for physical activity, we considered moderately active those who mentioned practice during at least three weekly hours of one or more of the following leisure activities: walking, dancing, swimming, cycling, running or other sports activities. Daily training for more than two hours and training for competitions were classified as intense activity. The others were considered sedentary. The skin color parameters (white, mixed-ethnicity, black, yellow and indigenous) were employed according to what is officially used in Brazil's demographic censuses (*Instituto Brasileiro de Geografia e Estatística* – Brazilian Institute of Geography and Statistics). Level of schooling was stratified as low (illiterate subjects, subjects who know how to read and write but never attended school or studied up to the fourth grade of elementary school), medium (subjects who studied from the fifth grade of elementary school up to the second grade of high school) and high (subjects who completed high school or studied in higher education for some time, that is, at least 11 years at school). As for social class, the criterion of *Associação Brasileira de Pesquisa de Mercado* (Abipeme – Brazilian Market Research Association) was adopted: high (upper classes + middle-upper class), middle (middle class) and low (lower classes), generated from a score according to the number of home appliances and electronic equipment, number of rooms in the household and number of employees.

The project was approved by the Medical Ethics Committee of the Regional Council of Medicine of the State of Bahia under number 69.648/99 and all the participants signed the post-informed Consent Document.

RESULTS

From the original sample of 2,500 individuals, 2,297 (91.9%) were interviewed and the remaining 8.1% were losses due to access difficulties or family refusal. The average age of participants was 40.9 years (sd= 14.7). The sample description can be seen in Table 1: predominance of the female sex (55.4%), the majority belongs to the group of married individuals (64.6%), with medium level of schooling (52.3%) and low social class (55.2%). The largest part of the sample was constituted by mixed-ethnicity individuals according to the self-report of skin color (43.9%) and individuals who do not practice physical activity (71.7%). Smokers and

ex-smokers composed 41.1% of the sample. Excessive consumption of alcohol was observed in 5.5% of the sample, and this variable was predominant in men (10.8% of the overall male population). The average central obesity index, measured by the abdominal circumference, was 81.9 cm (sd= 11.7); this variable was observed in 37.9% of the sample, being predominant in the male sex.

Chronic pain lasting more than six months was observed in 41.4% of the study's overall population. Chronic pain was predominantly located in the lumbar region (16.3%), followed by pain in the knees (11.2%) and thoracic region (9.8%).

In women, the prevalence was higher, affecting 48.3% of chronic pain sufferers (PR= 1.31, CI 95%: 1.24;1.39, p<0.001) and in men, 32.7%. Table 2 presents the univariate analyses for chronic pain sufferers compared to non-sufferers. Single individuals were more protected, while married, separated and widows/widowers were more likely to develop this morbidity, in increasing order (PR= 1.26, CI 95%: 1.16;1.36, p<0.001; PR= 1.44, CI 95%: 1.26;1.59, p<0.001 and PR= 1.58, CI 95%: 1.44;1.70, p<0.001, respectively). Smokers and ex-smokers presented higher association with presence of chronic pain (PR= 1.10, CI 95%: 1.00;1.20, p=0.051 and PR= 1.28, CI 95%: 1.17;1.38, p<0.001, respectively). Consuming alcohol once a week was a protecting factor for chronic pain (PR= 0.76, CI 95%: 0.68;0.85, p<0.001). Chronic pain was significantly associated with all age groups when they were compared to young adults (20 to 29 years), with progressive results as age increased. Individuals with central obesity were more likely to develop this morbidity (PR= 1.19, CI 95%: 1.09;1.28, p<0.001). Socioeconomic condition, level of schooling, skin color and practice of physical activity were not associated with chronic pain.

In the hierarchic multiple logistic regression (Tables 3 to 5), only the variables age (increase according to age – values of greater significance in people in the age group from 40 to 49 years and above 60 years (PR= 1.22, CI 95%: 1.09;1.35, p=0.001 and PR= 1.33, CI 95%: 1.16;1.48, p<0.001, respectively)), sex (female, PR= 1.33, CI 95%: 1.25;1.41, p<0.001), smoking (ex-smokers and smokers) and obesity (PR= 1.13, CI 95%: 1.02;1.23, p= 0.017) remained in the best model. Moderate consumption of alcohol also remained as independent protector (PR= 0.88, CI 95%: 0.79;0.98 p= 0.021). Only the marital status lost association ($X^2= 7.718$; p= 0.052), while the other variables selected in the univariate analysis for the final model did not lose significance after the adjustments, being considered independent predictors for the development of chronic pain.

Table 1. Sociodemographic, environmental and chronic pain-related characteristics. City of Salvador, Northeastern Brazil, 1999-2000. (N=2,297)

Variable	n	%
Sex		
Women	1272	55.4
Men	1025	44.6
Total	2297	100.0
Age (years)		
from 20 to 29	586	25.5
from 30 to 39	596	25.9
from 40 to 49	540	23.5
from 50 to 59	286	12.5
Above 59	289	12.6
Marital status		
Married	1474	64.6
Single	564	24.7
Separated/divorced	111	4.9
Widow/widower	133	5.8
Unknown	15	
Socioeconomic condition		
Low	1248	55.2
Middle	848	37.5
High	166	7.3
Unknown	35	
Level of schooling		
Low	978	42.9
Medium	1193	52.2
High	111	4.9
Unknown	15	
Skin color		
Mixed-ethnicity	1000	43.9
White	662	29.1
Black	614	27.0
Unknown	21	
Smoking		
Smoker	544	23.7
Ex-smoker	399	17.4
Non-smoker	1354	58.9
Unknown	0	
Alcohol consumption		
Excessive	126	5.5
Moderate	801	35.0
Non-consumers	1364	59.5
Unknown	6	
Central obesity		
Yes	858	37.9
No	1408	62.1
Unknown	31	

To be continued

Table 1 continuation

Variable	n	%
Physical activity		
Intense	15	0.7
Moderate	269	11.7
Light	364	15.9
Sedentary	1644	71.7
Unknown	5	
Presence of chronic pain		
Yes	951	41.4
No	1346	58.6

DISCUSSION

As was observed in this study, 41.4% of the probabilistic sample of the population of Salvador suffer from chronic pain, showing high prevalence and placing Brazil as one of the countries that is most affected by this problem, as was shown by a study that reviewed chronic pain in the international scenario, carried out by Harstall & Ospina.⁶ This figure exceeds the values found in the studies conducted by Mallen,¹⁰ with prevalence of 14.3% in the United Kingdom, and by Smith et al,¹⁷ with 14.1% in Scotland. Population-based studies that are non-specific for segments of workers or elderly individuals have found similar results, like the ones by Wijnhoven et al²¹ (39% in men and 45% in women), and by Webb et al²⁰ (48.5%).

The prevalence of chronic pain in the general population has been higher in women than in men,¹⁶ as the present study showed. A study carried out by Wijnhoven et al²¹ by means of a secondary analysis of two studies with 4,100 individuals showed that this morbidity affected 39% of men and 45% of women. Leveille et al⁹ found in 1,062 elderly individuals a relation of 63% of affected women to 52% of affected men. In addition, Webb et al²⁰ observed in 5,752 individuals that chronic cervical and lumbar pain affected 48.5% of the population and occurred more in women. Picavet et al,¹³ following for 12 months a group of 3,664 individuals to assess the correlation of musculoskeletal pain with body weight, reported prevalence of 53.9%, affecting more the women. Analyzing the impact of chronic pain on the community, Smith et al¹⁷ found in 4,611 individuals that women were more affected. Côté et al¹ found the same predominance in 2,184 individuals with cervical pain and disability. The prevalence of chronic pain that was verified by Kreling et al⁷, who studied a specific group of workers, affected 51.4% of the population of 505 adults, occurring more in women. Only one study, by Mallen et al,¹⁰ did not find differences between sexes; however, their studied population was composed of youths and this fact may have interfered. Hormonal variations, lower pain threshold, less tolerance to pain

Table 2. Univariate analysis of the predicting factors for chronic pain in the overall sample. City of Salvador, Northeastern Brazil, 1999-2000. (N=2,297)

Variable	n	%	gross PR (95% CI)	p ^a
Sex				<0.001
Women	615	48.4	1.31 (1.24;1.39)	
Men	376	32.8	1.00	
Age (years)				<0.001
Above 59	165	57.1	1.54 (1.43;1.64)	
from 50 to 59	134	46.9	1.38 (1.25;1.50)	
from 40 to 49	250	46.3	1.37 (1.26;1.47)	
from 30 to 39	236	39.6	1.25 (1.13;1.36)	
from 20 to 29	166	28.3	1.00	
Marital status				<0.001
Widow/widower	83	62.4	1.58 (1.44;1.70)	
Separated	59	53.2	1.44 (1.26;1.59)	
Married	631	42.8	1.26 (1.16;1.36)	
Single	172	30.5	1.00	
Social Class				0.473
High	76	45.2	1.07 (0.91;1.23)	
Middle	342	40.3	0.97 (0.88;1.06)	
Low	521	41.8	1.00	
Level of schooling				<0.001
Low	463	47.3	1.08 (0.89;1.28)	
Medium	433	36.3	0.86 (0.67;1.05)	
High	48	43.2	1.00	
Skin color				0.502
Black	265	43.2	1.06 (0.95;1.17)	
Mixed-ethnicity	409	40.9	1.02 (0.92-1.12)	
White	265	40.0	1.00	
Smoking				<0.001
Smoker	232	42.6	1.10 (1.00;1.20)	
Ex-smoker	207	51.9	1.28 (1.17;1.38)	
Non-smoker	512	37.8	1.00	
Alcohol consumption				<0.001
Excessive	60	47.6	1.04 (0.86;1.22)	
Moderate	271	33.8	0.76 (0.68;0.85)	
Non-consumer	620	45.5	1.00	
Central obesity				<0.001
Yes	258	48.6	1.19 (1.09;1.28)	
No	681	39.3	1.00	
Physical activity				0.715
Sedentary	735	44.7	1.10 (0.61;1.57)	
Light	150	41.2	1.03 (0.54;1..2)	
Moderate	59	21.9	0.59 (0.25;1.13)	
Intense	6	40.0	1.00	

PR: Prevalence ratio

^a Chi-square with level of significance p<0.05; interval with 95% confidence.

Table 3. Akaike Information Criteria (AIC) of the predicting factors in the final model. City of Salvador, Northeastern Brazil, 1999-2000.

Model ^a	Predictors	AIC	Chi-square	df	p
0	Intercept	961,368			
1	Age	894,315	75,054	4	0.000
2	Sex	846,555	49,760	1	0.000
3	Smoking	835,834	14,721	2	0.001
4	Alcohol	829,162	10,672	2	0.005
5	Obesity	825,526	5,636	1	0.018

^a Stepwise forward method

and greater capacity for discriminating it may explain these differences.

The age factor was an important predictor both in the gross and in the adjusted analyses, indicating that the prevalence of chronic pain increases progressively and proportionately to the increase in age. Many studies have found similar results.^{9,17,20,21} Picavet et al¹³ and Côté et al,¹ however, found higher prevalence in adults aged 45-64 years and 40-49 years, respectively. Nevertheless, the study by Côté et al focused specifically on cervical pain and the one by Picavet et al analyzed body regions, which can hamper comparisons. Thus, it is believed that the presence of pain found in middle-aged adults (40 to 49 years) may be associated with labor activities, since it corresponds to the economically active age group, and that chronic pain in the elderly (above 60 years) derives from the aging process, which increases the risk of chronic-degenerative diseases.

Single individuals presented lower association with the outcome and widows/widowers and separated individuals presented greater risk. These findings are in disagreement with the results of Queiroz et al¹⁵ and Webb et al,²⁰ in which individuals who live alone were most affected. On the other hand, Picavet et al¹³ found higher prevalence of chronic pain among married people. Smith et al¹⁷ point to the risk of greater development of chronic pain in non-stable relationships. Therefore, this lack of consensus among the findings of the studies indicates the need of investigations with more specific variables.

Low income has also been presented in the literature as a predicting factor for the development of chronic pain.^{15,17,20} Côté et al¹ found that low salary level predisposes to this morbidity. Closely related to this variable, the level of schooling has also been presented as being associated, as shown by the studies by Wijnhoven et al²¹ and Smith et al.¹⁷ Low socioeconomic and schooling levels emerge as risk factors for the development of chronic pain in the majority of studies; nevertheless, in our sample, no association was found in the univariate analyses. The sample of the present study, however, was predominantly composed of low socioeconomic

Table 4. Power of the selected variables for the final multiple logistic regression model. City of Salvador, Northeastern Brazil, 1999-2000.

Model ^a	X ²	df	p	Power
Sex	52.606	1	0.000	1.000
Age	33.245	4	0.000	0.999
Smoking	14.073	2	0.001	0.927
Alcohol	10.902	2	0.004	0.835
Obesity	5.636	1	0.018	0.678

^a Stepwise forward method

Table 5. Multiple regression analysis of the predicting factors for chronic pain in the overall population. City of Salvador, Northeastern Brazil, 1999-2000.

Variable	Overall sample Adjusted PR (95% CI)	p ^a
Sex		<0.001
Women	1.33 (1.25;1.41)	
Men	1.00	
Age (years)		<0.001
Above 59	1.42 (1.28;1.54)	
from 50 to 59	1.26 (1.11;1.40)	
from 40 to 49	1.27 (1.14;1.39)	
from 30 to 39	1.19 (1.06;1.31)	
from 20 to 29	1.00	
Smoking		0.001
Smoker	1.14 (1.03;1.24)	
Ex-smoker	1.21 (1.09;1.32)	
Non-smoker	1.00	
Alcohol consumption		0.004
Excessive	1.17 (0.97;1.35)	
Moderate	0.88 (0.79;0.98)	
Non-consumer	1.00	
Central obesity		0.018
Yes	1.13 (1.02;1.23)	
No	1.00	

PR: Prevalence ratio

^a Hierarchic multiple logistic regression with level of significance p<0.05; interval with 95% confidence. (X² = 155.84)

class subjects (55%), and the high social stratum was represented by only 7.3% of the overall sample. Nevertheless, the results allow the extrapolation of the information to the general population of Salvador, as the sample respected the proportionality of the social strata of the included areas. Besides, there was association around 40% among women and 30% among men in the three social strata. The incentive to promote students in elementary and high school and the facilitated entrance to higher education have generated a problem to categorize individuals in relation to the level of schooling. These factors hamper the comparison with other societies, since they do not guarantee teaching quality and knowledge of contents that should be learned in the grade the students are in. Furthermore, the instrument for the official classification of social strata that is currently used needs to be revised, because the growth of the Brazilian economy has allowed the acquisition of many consumer goods by individuals from the lower classes, which may also influence this variable and hampers inferences about this issue.

Similarly to the present study, race and ethnicity have not been mentioned much as factors associated with the presence of chronic pain. Only the study by Webb et al²⁰ found higher risk in Asians. However, we cannot compare it with our study because there was no representativeness of this ethnic group. Anyway, the majority of studies did not find interference of skin color or ethnic aspects in the prevalence of chronic pain.

Central obesity was measured through waist circumference. This aspect is generally criticized in the literature, but in the present sample an evaluation of the agreement between the body mass index (BMI) measures and waist circumference was carried out in 968 individuals and, by means of statistics C, the cut-off points defined in the methodology of our study were found.¹⁴ Obesity was an independent predictor in the overall sample, in accordance with the literature.^{9,13,21} Studies reveal that a BMI higher than 25 has been strongly associated with presence of chronic pain.^{9,20,21} Therefore, overweight is pertinent to health programs, as it predisposes to the emergence of many morbidities, including chronic pain.¹³

It is a consensus in the literature that smokers and ex-smokers have greater predisposition to develop chronic pain,^{9,21} although few studies have evaluated this variable. The analgesic chemical properties of nicotine⁴ can partially explain the fact that ex-smokers present a greater prevalence ratio when compared to current smokers. It is also possible that some

ex-smokers stopped smoking because they presented an associated disease and it was the cause of the pain, superposing this variable.

According to Leveille et al,⁹ excessive consumption of alcohol may predispose, especially males, to the development of chronic pain. Studies that conduct further analyses of these factors are necessary for a better understanding of the phenomenon. Moderate consumption emerged as protector both in the gross and in the adjusted analyses. It is necessary to further investigate the protecting effect of alcohol on chronic pain, as there are few studies on this association.

Regarding the body location of the chronic pain, studies reveal that the lumbar region, the cervical one, the head and lower and upper limbs are the most prevalent regions. Wihjoven et al²¹, studying workers, observed that wrist, hand and knees follow the pain complaints in the lumbar region, shoulders and cervical region. Picavet et al¹³ discovered that the cervical was the most affected region, followed by shoulders, thoracic region, lumbar region, upper limbs and lower limbs. Côté et al¹ studied specifically the spinal column and verified that the lumbar region was the most affected, followed by the cervical. Kreling et al⁷ found prevalence of 26.7% in the head, 19.4% in the lumbar region and 13.3% in the limbs.

Other phenomena have been considered as independent predictors for the development of chronic pain: depressive symptoms and anxiety,^{9,10} unemployment¹⁷ and history of car accident.¹ However, the lack of adequate instruments hindered the evaluation of these variables. The analysis of physical activity connected only with leisure is another limitation, because a population constituted mainly by individuals from the lower classes perform physical activities that are domestic, labor-related and in transportation. In addition, it was difficult to categorize the occupations, as the majority of the interviewees perform non-formal activities, which prevented their analysis. In the same way, limitations inherent in the cross-sectional design about cause-and-effect interpretation of the presented data should also be considered.

We hope that the data can contribute to public health preventive strategies, disseminating the risks of smoking and obesity for the development of chronic pain, as well as encouraging the periodic monitoring of health. Prophylactic measures that compensate for aging and hormonal variations in women can also help to control chronic pain.

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