

Impact of osteoporosis-associated vertebral fractures on health-related quality of life in the Mexican population

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ABSTRACT

Objective. To measure the impact on the health-related quality of life (HRQoL) of a sample of Mexicans with vertebral fractures. **Material and methods.** One hundred fifteen subjects with vertebral fractures were interviewed and compared with 135 subjects similar in age without the fracture. Subjects were men and women > 50 years of age with osteoporosis confirmed by bone mineral densitometry and with at least 1 vertebral fracture verified by vertebral morphometry and X-rays. The sample was recruited from two sources: The Clínica de Osteoporosis at the Instituto Nacional de Rehabilitación and a random sample from the Latin American Osteoporosis Study. The Quality of Life Questionnaire of the European Foundation for Osteoporosis (QUALEFFO) validated in Spanish for the Mexican population was applied. Descriptive statistics were used for demographic and clinical aspects of the sample, as well as χ^2 for categorical variables and Student t test for independent samples for continuous variables. A multiple linear regression (LR) was conducted to characterize predictive variables related to quality of life. **Results.** Two hundred fifty subjects were interviewed; 64% of them were women. The average age of those interviewed was 73.4 ± 11.4 years; 46% of the sample had vertebral fractures; of them 43% of were lumbar and 57% thoracic; the most frequent site was L1-T12. Significant changes were found in the group with fractures in pain, physical function, social function, and mental function ($p < 0.05$); in women, pain and social function were different between groups ($p < 0.05$); and those over 70 years also presented differences in physical, social, and mental function ($p < 0.05$); differences were found associated with the place of recruitment being worse in their quality of life those coming from the Clínica de Osteoporosis. Two or more fractures, age, being female and widowed were significant predictors for greater deterioration of HRQoL with the LR. **Conclusion.** This is the first study looking at the HRQoL in

Impacto de las fracturas vertebrales asociadas a osteoporosis en la calidad de vida relacionada con la salud en población mexicana

RESUMEN

Objetivo. Medir el impacto en la calidad de vida relacionada con la salud (CVRS) en una muestra de mexicanos con fracturas de vértebras. **Material y métodos.** Ciento quince sujetos con fracturas vertebrales fueron entrevistados y comparados con un grupo de 135 sujetos similares en edad sin fractura. El grupo de fractura correspondió a hombres y mujeres > 50 años, con osteoporosis confirmada por densitometría mineral ósea y con al menos una fractura de vértebra verificada por morfometría vertebral y rayos-X. La muestra se derivó de dos fuentes: de la Clínica de Osteoporosis del Instituto Nacional de Rehabilitación y de la muestra seleccionada al azar reclutada del Estudio de Osteoporosis Vertebral en Latinoamérica. Se utilizó el Cuestionario de Calidad de Vida de la Fundación Europea de Osteoporosis (QUALEFFO) validado en español para población mexicana. Se utilizó estadística descriptiva para aspectos demográficos y clínicos de la muestra, así como la χ^2 para variables categóricas y la prueba t de Student para muestras independientes para variables continuas. Una regresión lineal múltiple (RL) para caracterizar las variables predictivas relacionadas con la calidad de vida. **Resultados.** Doscientos cincuenta personas fueron entrevistadas; 64% fueron mujeres. El promedio de edad fue 73.4 ± 11.4 años; 46% tuvo fracturas vertebrales; 43% fueron fracturas lumbares y 57% fracturas torácicas; el sitio más frecuente fue en L1-T12. Se encontraron cambios significativos en el grupo con fracturas en dolor, función física, función social y función mental ($p < 0.05$); en las mujeres el dolor y función social mostraron diferencias entre los grupos ($p < 0.05$); asimismo, los mayores de 70 años presentaron diferencias en la función física, social y mental

osteoporosis related fractures in Mexicans were quality of life deterioration on physical, social, and emotional functioning was demonstrated in subjects with two vertebral fractures. Age is a determining factor for greater deterioration in all studied domains. Differences between the samples obtained at the Clínica de Osteoporosis at the Instituto Nacional de Rehabilitación and the random population exemplifying that asymptomatic fractures are common and not diagnosed. It is important to scrutinize vertebral fractures at the first level because their timely detection allows for their evaluation and treatment and diminishes the probability of a second fracture. Our results can be generalized to men and women over 50 who live in the central megalopolis and in other states of the Valley of México.

Key words. Vertebral fractures. Osteoporosis. Quality of life. Impact. Mexican population.

INTRODUCTION

Vertebral fractures (VFX) are considered the most common osteoporosis-associated fractures and only 30% are clinically diagnosed.¹ The risk of having a new vertebral fracture is 3-5 times higher in persons who have experienced a fracture than in individuals without previous VFX; the risk doubles with a hip fracture, and having three or more vertebral fractures increases the risk of having new VFX 10-12 times and triples the risk of a hip fracture.²⁻⁴

In Mexico, the prevalence of VFX after the age of 50 in women is high (19.2%) and is also considerable in men (9.7%). In both genders, the rate increases with age, reaching 37.9 and 21.4% in women and men, respectively, after 80 years of age.^{5,6}

These fractures have great physical and emotional impact and the quality of life (QoL) of these patients is affected to a greater or lesser degree after VFX. Back pain, functional disability (difficulty in walking, bending, carrying out household tasks, going shopping, lifting or carrying objects), physical deformity from kyphosis, abdominal protrusion, diminution of height and weight, and loss of independence are some of the consequences of these fractures.⁷⁻¹¹

The physical changes frequently influence physical functions, causing anxiety, depression, low self-esteem, and stress. Weight loss, increase of kyphosis, combined with the loss of 15-20 cm in height, presence of an abdominal protuberance, and

($p < 0.05$); el lugar de procedencia de la muestra mostró diferencias significativas encontrando una peor calidad de vida en el grupo de la Clínica de Osteoporosis ($p < 0.05$). La RL mostró que dos o más fracturas, la edad, ser mujer y viuda, fueron predictores significativos para un mayor deterioro de la CVRS. **Conclusión.** Éste es el primer estudio que analiza la CVRS en mexicanos con fracturas vertebrales asociadas a osteoporosis, donde el deterioro de la calidad de vida en los dominios físico, social y emocional fue demostrado en sujetos con dos fracturas vertebrales. La edad es un factor determinante para un mayor deterioro en todos los dominios estudiados. Diferencias encontradas entre los grupos de la clínica de osteoporosis del Instituto Nacional de Rehabilitación y la población seleccionada al azar, ejemplifican que las fracturas vertebrales asintomáticas son comunes, pero no diagnosticadas a tiempo. Es importante el escrutinio de las fracturas vertebrales en el primer nivel de atención porque su detección oportuna permite su evaluación y tratamiento y disminuye la probabilidad de una segunda fractura. Los resultados se pueden generalizar a hombres y mujeres mayores de 50 años residentes en la megalópolis central y en otros estados del Valle de México.

Palabras clave. Fracturas vertebrales. Osteoporosis. Calidad de vida. Impacto. Población mexicana.

impediments to physical functioning reduce self-confidence, and the increase in pain transforms daily living activities (DLA), limits mobility and social activities, and threatens the loss of independence.¹²

Anxiety leads to inactivity and panic in order to avoid any situation in which fractures may occur. Women with OP and VFX report problems with sleeping, feelings of sadness, bad moods, appetite loss, and feelings of desperation about the future;¹² multiple fractures diminish self-esteem because of changes in appearance and physical capacity.⁹

In Mexico, there is little information on the impact of multiple fractures on QoL therefore the objective of this study was to measure the impact on QoL in a sample of Mexicans with VFX on dimensions such as pain, physical and social functioning, perception of health, and mental function.

MATERIAL AND METHODS

A cross sectional analytic study was conducted with a sample coming from two sources: The Latin American Vertebral Osteoporosis Study (LAVOS) (65%) and from the Instituto Nacional de Rehabilitación (INR), Clínica de Osteoporosis (OPC) (35%).

The detailed LAVOS methodology has been published previously,⁵⁻⁶ but a brief summary as follows: a radiographical survey was designed to estimate the prevalence of vertebral fractures in 413 Mexican men and 400 women from a random population-based sample in Puebla City, México. A random

probability population sample was generated with the advice of the Instituto Nacional de Estadística y Geografía (INEGI) in México using the 2,000 census to build a stratified sample for the following age groupings: 50-59, 60-69, 70-79, and ≥ 80 . The demographic information available from every district and group of households blocks within the city, and the maps and cartography provided by INEGI during the survey were used.

Individuals aged > 50 years who accepted to be included in the study were interviewed and a questionnaire was applied to gather general data, the individual's clinical history, and risk factors for osteoporosis; later, these participants were invited to have an axial densitometry of two regions and lateral X-rays of the lumbar and dorsal spinal column according to the protocol.

People who were selected and refused to participate in the study were replaced by the first man or woman (as appropriate) available in the same stratum of age, making home visits from right to left of the first house on the same block-assigned housing, to find a man or woman who met the study's criteria.

Osteoporosis was defined accordingly with World Health Organization (WHO) criteria established for the disease¹³ and VFX was diagnosed through vertebral morphometry or/and the visualization and report of the lateral X-rays of the dorsal and lumbar spinal column.

We excluded persons who had vertebral fractures < 3 months before the study, those with other fractures that limit mobility and those with another disease that could cause secondary osteoporosis. We also exclude those with malignant illnesses or with one of the cognitive diseases that would have made responding to the questionnaire impossible. We also include a sample from the OPC using the same inclusion and exclusion criteria. In all cases a direct interview was done. In the sample coming from LAVOS a home visit was scheduled and from the sample of the OPC interviews were done at the OPC.

The comparison group was comprised of men and women coming from the LAVOS sample who did not have a vertebral fracture who were 50 years of age or older.

Questionnaire

To evaluate health-related quality of life (HR-QoL), the Spanish-language version of the Quality of Life Questionnaire of the European Foundation for Osteoporosis (QUALEFFO), validated in the

Mexican population was applied in all cases.¹⁴ This is a specific instrument for people with VFX attributed to osteoporosis. It has 41 questions grouped in five domains or dimensions: pain, physical function, social function, general perception of health, and mental function. The lowest score the better QoL.

The instrument was scored according to the format of the original version.¹⁵ The score range is 1-5 and responses were standardized. Scores by domain were calculated by adding up the number of questions included in each domain. Total scores were calculated by adding up all of the scores with a transformation on a scale of 100.

The response rate was 100% since all subjects were contacted and visited. Informed consent was required at the time of the interview. The project was approved by the research and ethical committees of the institutions where this study was conducted.

Analysis

Descriptive statistics for exploring the clinical and demographic variables for the group of participants with VFX as well as for those without the fracture were used. χ^2 for categorical variables and Student's *t* for independent samples were applied to identify differences between:

- Groups with and without VFX.
- Gender (female or male).
- Age (50-69 years *vs.* ≥ 70 years).
- Place of interview application [OPC *vs.* population random sample (LAVOS)]; and the QUALEFFO domains (pain, physical functioning, social functioning, mental functioning, and perception of health).

Significance level was $p \leq 0.05$. Finally, a multiple linear regression was conducted (LR) to identify predictive variables associated with worst QoL ($p \leq 0.05$). We adjusted for variables of age, gender, marital status, education, place of interview application, and number of fractures in the model. Dummy variables were used in the regression analysis as follows: gender; number of fractures (0, 1, 2, and ≥ 3); age (different interval groups, including 50-59, 60-69, 70-79, and > 80 years); marital status, including unmarried, married/in a common-law marriage, divorced, or widow/widower; schooling, including illiterate, literate, primary, secondary, technical career/preparatory, and undergraduate/

graduate degree, and place of questionnaire application (Puebla, Mexico City).

The dependent variable was the total score of the QUALEFFO questionnaire, and the independent or predictor variables were marital status, age group, gender, education, number of fractures, and place of questionnaire application. The model excluded the following categories: primary school; the 80-89 age group; married/living in a common-law marriage, and without fracture. We employed the SPSS statistical package (Statistical Package for the Social Sciences ver.10).

RESULTS

We interviewed 250 subjects > 50 years and over; 64% were women; and 46% had at least one

VFx. Average age was 73.4 ± 11.4 years. Table 1 presents the demographic characteristics of the participants according to the fracture and non fracture group: the fracture group was older than the non fracture (77 ± 11.2 vs. 70 ± 10.7 years respectively $p = 0.001$). Marital status and years of formal school were also significant ($p < 0.005$).

From the total sample, 161 were diagnosed with at least one VFx, from which 69 (43%) were lumbar and 92 (57%) were thoracic: L1-T12 level was affected in 25 of the cases and 21 cases.

Table 2 shows the significant variables ($p < 0.05$) for QoL associated with deterioration among the two groups. In table 3, the differences by affected domains are presented between groups: pain ($p = 0.049$); physical functioning ($p = 0.000$);

Table 1. Demographic characteristics without fracture and with fracture by group.

Variable	Without VFx n = 135	With VFx n = 115	P value*
Age group, years (%)			
50 - 59	24 (17.8)	10 (8.7)	0.001
60 - 69	43 (31.9)	21 (18.3)	
70 - 79	36 (26.7)	30 (26.1)	
≥ 80	32 (23.7)	54 (47.0)	
Gender (%)			
Female	80 (50)	80 (50)	Ns
Male	55 (61)	35 (39)	
Marital status (%)			
Unmarried	19 (14.1)	12 (10.4)	0.001
Married/Common-law marriage	79 (58.5)	51 (44.3)	
Divorced	10 (7.4)	3 (2.6)	
Widowed	27 (20.0)	49 (42.6)	
Schooling (%)			
Illiterate/Knows how to read	27 (20.0)	43 (37.4)	0.005
Primary	53 (39.3)	45 (39.1)	
Secondary- technical- preparatory	43 (31.9)	19 (16.5)	
Higher education	12 (8.9)	8 (7.0)	
Occupation (%)			
Working	33 (24.4)	18 (15.7)	
Pensioned/retired	28 (20.7)	15 (13.0)	
Homemaker	69 (51.1)	78 (67.8)	
Unemployed	5 (3.7)	4 (3.5)	
Place of questionnaire application (%)			
OP Clinic (Mexico City)	72 (53.3)	15 (13.0)	0.000
LAVOS (Puebla)	63 (46.7)	100 (87.0)	

* χ^2 test. VFx: vertebral fracture. ns: no significance.

Table 2. Differences in the quality of life (QOL) of persons without and with vertebral fracture (VFX).*

Domain	Without fracture x (sd)**	With fracture x(sd)	p value
A. Pain			
1. How often have you had back in the last week?	2.67 (1.6)	3.03 (1.6)	ns
2. If you have had back pain, for how long did you have back pain in the daytime?	2.27 (1.4)	2.54 (1.5)	ns
3. How severe is your back pain at its work?	2.28 (1.1)	2.63 (1.3)	< 0.05
4. How is your back pain at other times?	1.84 (0.9)	2.03 (0.9)	ns
5. Has the back pain disturbed your sleep in the last week?	1.69 (1.2)	1.83 (1.4)	ns
B. Activities of daily living			
6. Do you have problems with dressing?	1.59 (0.9)	2.02 (1.1)	< 0.005
7. Do you have problems with taking a bath or shower?	1.52 (0.9)	2.12 (1.3)	< 0.001
8. Do you have problems with getting to or operating a toilet?	1.78 (1.0)	2.10 (1.2)	< 0.05
9. How well do you sleep?	2.40 (1.1)	2.49 (1.2)	ns
C. Jobs around the house			
10. Can you do the cleaning?	2.09 (1.2)	2.77 (1.5)	< 0.01
11. Can you prepare meals?	1.66 (1.1)	2.48 (1.5)	< 0.01
12. Can you wash the dishes?	1.76 (1.1)	2.27 (1.4)	< 0.01
13. Can you do your day to day shopping?	2.15 (1.5)	3.09 (1.7)	< 0.01
14. Can you lift a heavy object of 20 lbs (e.g. a crate of 12 bottles of milk, or a one year old child) and carry it for at least 10 yards?	3.28 (1.6)	4.03 (1.5)	< 0.01
D. Mobility			
15. Can you get up from a chair?	1.84 (1.0)	2.17 (1.2)	< 0.05
16. Can you bend down?	2.49 (1.3)	2.73 (1.4)	ns
17. Can you kneel down?	3.13 (1.4)	3.57 (1.5)	< 0.01
18. Can you climb stairs to the next floor of a house?	2.09 (1.1)	2.49 (1.2)	< 0.05
19. Can you walk 100 yards?	1.97 (0.9)	2.55 (1.1)	< 0.01
20. How often have you seen you been outside in the last week?	2.19 (1.5)	2.89 (1.6)	< 0.01
21. Can you use public transport?	2.31 (1.4)	3.24 (1.7)	< 0.01
22. Have you been affected by the changes of your figure due to osteoporosis (for example loss of height, increase of waist measurement, shape of your back)?	1.99 (0.9)	2.50 (1.1)	< 0.01
E. Leisure, social activities			
23. Do you play any sport now?	4.19 (1.5)	4.67 (1.0)	< 0.01
24. Can you do your gardening?	1.33 (1.6)	1.08 (1.8)	ns
25. Do you perform any hobby now?	3.38 (1.8)	3.69 (1.7)	ns
26. Can you visit a cinema, theatre, etc.?	2.31 (1.9)	3.52 (1.9)	< 0.01
27. How often did you visit friends or relatives during the last 3 months?	2.72 (1.5)	3.36 (1.5)	< 0.01
28. How often did you participate in social activities (clubs, social gatherings, church activities, charity, etc) during the last 3 months?	2.87 (1.7)	3.52 (1.8)	< 0.01
29. Does your back pain or disability interfere with intimacy (including sexual activity)?	0.693 (1.0)	.376 (0.8)	< 0.05
F. General health perception			
30. For your age, in general, would you say your health is:	3.15 (1.1)	3.17 (1.1)	ns
31. How would you rate your overall quality of life during the last week?	2.92 (1.0)	3.20 (1.1)	< 0.05
32. How would you rate your overall quality of life compared with 10 years ago?	3.47 (1.1)	3.67 (1.0)	ns
G. Mental function			
33. Do you tend to feel tired?	2.81 (1.2)	3.13 (1.2)	< 0.05
34. Do you feel downhearted?	2.17 (1.3)	2.43 (1.6)	ns
35. Do you feel lonely?	2.04 (1.3)	2.19 (1.6)	ns
36. Do you feel full of energy?	2.54 (1.5)	2.98 (1.6)	< 0.05
37. Are you hopeful about your future?	2.44 (1.4)	2.75 (1.5)	ns
38. Do you get upset over little things?	2.81 (1.1)	2.82 (1.1)	ns
39. Do you find it easy to make contact with people?	2.35 (1.3)	2.37 (1.3)	ns
40. Are you in good spirits most of the day?	2.11 (0.9)	2.03 (0.9)	ns
41. Are you afraid of becoming totally dependent?	2.73 (1.5)	3.00 (1.6)	ns

*Student t test of differences. **: media. sd: standard deviation. ns: no significance.

Table 3. Differences by domain/dimension in health-related quality of life (HRQoL) between with fracture and without fracture.*

Domain	Without VFx (n = 135) x (sd)**	With VFx (n = 115)	p value
Pain	10.67 (5.2)	12.05 (5.7)	0.049
Physical function	36.16 (14.8)	45.36 (18.1)	0.000
Social function	17.47 (5.6)	20.01 (4.7)	0.000
Perception of health	9.54 (2.8)	10.04 (2.5)	0.148
Mental function	21.94 (6.5)	23.61 (7.0)	0.054
Global score	95.74 (26.9)	111.21 (29.8)	0.000

* Student t test of differences. ** x: average. sd: standard deviation.

Table 4. Linear regression multiple (LR). Predictor variables for quality of life deterioration.

Model	B	p value	95% CI for B	
			Lower limit	Upper limit
Constant	112.4	< 0.001	103.6	121.2
Age group, years				
50-59	-28.2	< 0.001	-40.4	-16.0
60-69	-23.1	< 0.001	-33.2	-12.9
70-79	-10.4	< 0.05	-19.6	-1.1
Gender				
Female	13.5	< 0.05	2.0	25.1
Marital status				
Unmarried	-6.7	ns	-17.6	4.0
Divorced	7.9	ns	-8.2	24.1
Widowed	-16.4	< 0.001	-26.7	-6.1
Schooling				
Illiterate	3.2	ns	-6.9	13.4
Knows how to read	1.0	ns	-9.4	11.6
Secondary	-8.9	ns	-21.7	3.8
Preparatory	-4.5	ns	-14.5	5.4
Higher education	-15.7	< 0.05	-28.9	-2.6
Place of questionnaire application				
Puebla	-5.8	ns	-16.6	4.9
Number of fractures				
One fracture	5.0	ns	-3.4	13.5
Two fractures	13.3	< 0.05	0.18	26.5
More three fractures	25.6	< 0.001	7.0	44.2

Dependent variable: quality of life. Independent variables: gender, marital status, number of fractures, age. Excluded variables: primary, the 80-89 year-of-age group, married/living in a common-law marriage, OPC (Mexico City) and without fracture. ns: no significance.

social functioning ($p = 0.000$), and global score ($p = 0.000$) were worst in the fracture group.

Analysis by gender shows that women had less formal years of school (29.5% are illiterate or only know how to read), while almost half of the men had completed primary school (49%) ($p = 0.027$). In terms of marital status, 90% of men were married and 47.5% of women were widows ($p = 0.000$).

QoL showed significant differences between genders in physical functioning as follows: difficulty in bathing ($p = 0.011$), lifting heavy objects ($p = 0.004$), walking one block ($p = 0.023$), and feeling tired ($p = 0.000$). Mental functioning, differences were also observed between the genders: relating to others ($p = 0.005$), being in a good mood ($p = 0.002$), and fear of depending on other persons ($p = 0.041$). There were also significant

differences in practicing some sport ($p = 0.000$) and in pain during sexual relations ($p = 0.001$). The differences between genders were significant in the domains of pain ($p = 0.038$), which affects women to a greater degree, and in social functioning ($p = 0.003$), which exerts a greater impact on males.

Grouping the sample from younger and older than 69 years of age, we found significant differences in subjects ≥ 70 years of age, with greater deterioration in physical function ($p = 0.000$), social function ($p = 0.000$), mental function ($p = 0.008$), and total score ($p = 0.000$).

Analyzing population types (random population *vs.* that of the OPC), we found significant differences in the dimensions of pain ($p = 0.028$), physical function ($p = 0.000$), social function ($p = 0.000$), and global score ($p = 0.001$) having higher scores in the sample from the OPC.

Finally, the LR allowed us to establish that the presence of two or more fractures, age, and being a woman and a widow are significant factors for greater deterioration of QoL (Table 4).

DISCUSSION

Results of the present study clearly indicate that patients with VFX have a worse QoL compared with the group with no fractures. Subjects with a fracture have more pain ($p = 0.049$) and alterations in physical function ($p = 0.000$), social function ($p = 0.000$), and global score ($p = 0.000$). Differences were also observed by gender, where pain ($p = 0.038$) and social function ($p = 0.003$) affected women more than men. Advanced age is associated with deterioration of QoL: subjects ≥ 70 years of age experienced greater difficulties in physical and social function ($p = 0.000$), mental function ($p = 0.008$), and total score ($p = 0.000$) than subjects aged < 70 years. Finally, we found differences by population type (random population in Puebla *vs.* the OPC, INR) in the domains of pain ($p = 0.028$), physical and social function ($p = 0.000$), and global score ($p = 0.001$). Predictive factors for greater deterioration on QoL were presence of two or more fractures ($p < 0.05$), age ($p < 0.05$), gender (females, $p < 0.05$), and widowhood ($p < 0.001$), highlighting the fact that the more advanced the age, the more advanced the deterioration in QoL.

The presence of at least two VFX has implications for several dimensions of a person's life. This finding is in accordance with Gold,¹¹ who found that the psychosocial sequelae of fractures impacts emotional functioning: Increases anxiety levels and fear of

presenting future fractures, as well as depression due to pain and limited mobility. Nearly three-quarters of patients clinically diagnosed with VFX have pain, which limits mobility and physical functioning, basic factors for maintaining independence.¹¹ In our sample, 58% of subjects with fractures had pain and were limited in terms of these functions.

We were able to demonstrate that the greater the number of fractures, the greater the functional deterioration of daily living activities (DLA); this has been demonstrated by others in similar studies in which deterioration of physical and social functioning and the total QoL score was affected.¹⁶⁻¹⁹ The number of VFX is in direct relation to the deterioration of patients' functionality.

Age is also a factor in determining QoL in other studies. In a population-based study in Spain on women with VFX, San Felix-Génoves²⁰ reports that the worst score in the physical dimension was found in groups aged > 70 years.

It is noteworthy to identify that differences between the population types included in our study were present: subjects coming from a random sample of Puebla City (similar in characteristics to the population in general) had less pain and better social function but were greatly affected in their physical dimension in comparison with the group of subjects from the OPC at the INR.

Differences might be explained because subjects from the OPC have a symptomatic and established disease therefore pain intensity was greater (12.36 ± 5.6 *vs.* 10.75 ± 6.3 ; $p = 0.028$). Paradoxically, physical function was more affected in the random sample of Puebla City (34.5 ± 12.1 *vs.* 43.52 ± 18.4 ; $p = 0.000$); as well as greater difficulty in physical functioning such as dressing or bathing, but, despite the limitations in their DLA, their social functioning was better because they participated more in social activities, such as visiting friends and going to the movies or the theater ($p = 0.00$). Pain as a symptom has more of an impact on QoL than the remaining dimensions included in this construct. The majority of asymptomatic VFX did not report pain, and might be the reason why they did not seek medical attention, and probably explain their deterioration in physical functioning as a consequence of their aging. It is beyond of the scope of this study to determine the reasons of these findings and further studies need to be conducted to determine the probable causes of these differences.

The results of this study highlights the importance of the awareness of vertebral fractures in the general population after the age of 50 since vertebral

fractures remain largely undiagnosed and timely diagnoses is needed in order to prevent a second fracture and impairment in the quality of life. The use of instruments as the WHO Fracture Risk Assessment tool (FRAX®), already validated in Mexican population to evaluate with simple clinical factors the absolute risk of having a fracture needs to be spread among general physicians that could identify subjects with greater risk and offers them a treatment to prevention of fractures if needed. These actions will help as well in diminishing the burden at the Health Services in patients with a more advanced disease and one with a greater economic and social cost.

In addition to the limitations inherent in a cross-sectional design our study included only the population from the central megalopolis of Mexico defined by INEGI that represent about one-fourth of the Mexican general population; nonetheless, further studies are needed in northern or southern populations of México.²¹

Among the study's strengths the methods used to ascertain the sample and the validated instrument used, that allows to compare them with similar studies in other populations.

CONCLUSION

This is the first study looking at the QoL in OP related fractures in Mexicans where QoL deterioration on physical, social, and emotional functioning was demonstrated in subjects with two vertebral fractures. Age is a determining factor for greater deterioration in all studied domains. Differences between the samples obtained at the OPC of INR and the random population exemplifying that asymptomatic fractures are common and not diagnosed.

It is important to scrutinize VFX at the first level because their timely detection allows for their evaluation and treatment and diminishes the probability of a second fracture. Our results can be generalized to men and women over 50 who live in the central megalopolis and in other states of the Valley of México.

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