Reumatol Clin. 2021;17(8):440–446

Sociedad Española de Reumatología - Colegio Mexicano de Reumatología

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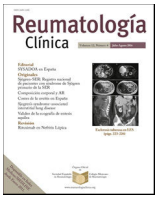

Original Article

Comorbidity burden in terms of disability in patients with osteoarthritis in Mexico. The IMPACTAR registry

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ARTICLE INFO

Article history:
Received 5 February 2020
Accepted 30 March 2020

Keywords:
Osteoarthritis
Disability
Comorbidity
Arthritis
Chronic disease

ABSTRACT

Objective: To determine the comorbidities associated with disability in patients with OA in Mexico (2013–2015).
Material and methods: A cross-sectional, retrospective and multicentre IMPACTAR study ($n = 7703$) in Mexican patients (2013–2015). Comorbidities associated with disability were identified in 4971 patients diagnosed with OA from the IMPACTAR registry ($n = 7073$). An adjusted logistic regression analysis was carried out by demographic, economic, clinical and medical variables.
Results: Mean age was 63 years; and 75% of the patients were women. Subjects with OA and presence of comorbidities are 42% more likely to develop disabilities than patients without associated comorbidity, considering age, sex, family income, OA diagnosis duration, and education level. The highest rate of people with disability (28.9%) was concentrated in Region 7, which corresponds to Mexico City. There are also significant differences between median family incomes, when the income of persons with disability is under $13 000 (IQR: 9000–16 000) Mexican pesos, compared to patients without disability. Almost half of the subjects (49.6%) reported having at least one comorbidity. Arterial hypertension was the risk factor with a statistically significant difference (32.8%) among those with disability (34.7%).
Conclusions: Programs and interventions for OA patients should take into consideration comorbidity factors, being female, family income, and the region of residence as variables that may increase the possibility of developing an OA-associated disability.

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Carga de comorbilidad en términos de discapacidad en pacientes con osteoartritis en México. El registro IMPACTAR

Palabras clave:
Osteoartritis
Incapacidad
Comorbilidad
Artritis
Enfermedad crónica

R E S U M E N

Objetivo: Determinar las comorbilidades asociadas a la incapacidad en pacientes con osteoartritis (OA) en México (2013-2015).
Material y métodos: Estudio IMPACTAR transversal, retrospectivo y multicéntrico (n = 7.703) en pacientes mejicanos (2013-2015). Se identificaron las comorbilidades asociadas a la incapacidad en 4.971 pacientes diagnosticados de OA en el registro IMPACTAR (n = 7.073). Se realizó un análisis de regresión logística ajustada por variables demográfica, económica, clínica y médica.
Resultados: La edad media fue de 63 años, y el 75% de los pacientes eran mujeres. Los sujetos con OA y la presencia de comorbilidades tienen un 42% mayor de probabilidad de desarrollar incapacidades que los pacientes sin comorbilidad asociada, considerando la edad, el sexo familia, los ingresos, la duración del diagnóstico de OA y el nivel educativo. La tasa poblacional con mayor tasa de incapacidad (28,9%) se concentró en la Región 7, que corresponde a Ciudad de México. También existieron diferencias significativas entre los ingresos familiares medios, cuando la renta de las personas con incapacidad se sitúa por debajo de los 13.000 $ (RIC: 9.000-16.000) pesos mejicanos, en comparación con los pacientes sin incapacidad. Casi la mitad de los sujetos (49,6%) reportaron tener al menos una comorbilidad. La hipertensión arterial fue el factor de riesgo con diferencia estadísticamente significativa (32,8%) entre aquellas personas con incapacidad (34,7%).
Conclusiones: Los programas e intervenciones para pacientes con OA deberían considerar los factores de comorbilidad tales como sexo femenino, ingresos familiares y región de residencia como variables que podrían incrementar la posibilidad de desarrollar una incapacidad asociada a OA.

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Introduction

Rheumatic and musculoskeletal diseases are among the most common non-transmittable chronic diseases.[1] Among these, Osteoarthritis (OA) is the most frequent in young adults and older individuals and is associated with short and long-term disability.[2,3] OA is characterized by joint pain, stiffness, inflammation, and weakness, which lead to physical disability.[4]

In Latin America, by using the COPCORD methodology, OA prevalence varies between 2.3% up to 20.4%; primary or idiopathic OA represents 88.2% of cases,[5] with the knee being the most affected (51.1%) and associated with a Health Assessment Questionnaire (HAQ) > 0.375 (OR 1.9, 95% CI 1.5–2.4); in addition, the inability to kneel is a predictor for patients seeking healthcare visits.[6]

Worldwide, OA is the fourth most frequent cause of years lived with disability (YLDs),[7] whereas in Mexico it ranks 8th among women an 13th in men.[8] Some studies report that up to 50% of patients with symptomatic OA suffer from some degree of disability.[9] According to the World Health Organization (WHO), "disability" is a general term covering impairments, activity limitations, and participation restrictions. An impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while participation restriction is a problem experienced by an individual I involvement in life situations.[10]

Disability increases with age and disease duration, with pain being one of the most important causes of disability in patients with OA[9,11–13]. It has been reported that OA occurs in at least 10% of adults 60 years and older, it can damage any joint, with knee and hip the most affected.[14]

According to several studies, the main co -morbidities that influence OA are: obesity, diabetes mellitus, hypertension, dyslipidemia, metabolic syndrome, gout, and pulmonary diseases,[5,14–18] with obesity and diabetes being the most associated with OA and the presence of disability.[16–19]

In Mexico, patient care with rheumatic and musculoskeletal diseases can vary widely since there a very peculiar health care system, and healthcare coverage is based on patient emplo yment and economic income.[20]

The aim of this study is to determine the association of co -morbidities and their impact on disability, since it represents the most important outcome at the public health level.

Materials and methods

Transverse, analytic and multicenter study of the "Iniciativa Mexicana de pacientes con Osteoartritis y Artritis Reumatoide" (IMPACTAR), in a nationwide sample involving 55 centers in 20 states in Mexico.

This study included 4971 consecutive patients 18 years and older with the diagnosis of OA according to American College of Rheumatology (ACR) classification criteria that received ambulatory care in public, private or social security institutions across Mexico during 2013–2015.

Patients belonged to different federative entities or states from the whole country, in order to classify their origin, we used the socio-economic region classification from the "Instituto Nacional de Estadística y Geografía" (INEGI), an autonomous agency of the Mexican Government to coordinate the National System of Statistical and Geographical Information.[21]

Prior informed consent, each subject completed a questionnaire regarding socioeconomic, clinical, healthcare, and physical disability aspects.

Disability was evaluated using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), which was designed to measure functional capacity in patients with OA and contains 24 items grouped in 3 different domains: pain (0–20), stiffness (0–8) and functional limitation (0–68); each item having 5 levels which are codified from 0 to 4 (none, mild, moderate, severe, and extreme).[22,23] These domains result in an index score ranging from 0 to 12, and from these, two categories were created: absence of disability (<3) and presence of disability (> or =3).[24]

Statistical analysis

A bi-varied analysis was performed to describe the main characteristics of the study population by using disability as a dependent variable. For categorical variables, frequencies and percentages were reported; the Pearson chi squared test was applied to determine statistically significant ($P < .05$) between both groups, and for continuous variables, the median and interquartile range, the Wilcoxon sum of range s was employed to compare medians ($P < .05$). The independent variables considered were: sociodemographics, economics, geographic, comorbidities and some health care related characteristics. Federation entities (states) from which patients were recruited were classified according to the INEGI socio-economic regions, where wellbeing related information is summarized in such aspects as education, employment, occupation, housing and health (7 is de most favorable stratum, and 1 the least favorable).[21] To evaluate the association between co -morbidity and disability, we performed a logistic regression analysis adjusted for biologic co-variables like age, gender, time from diagnosis (three categories: <5 years, 5–10 years and >10 years from the diagnosis of OA up to the year of the IMPACTAR interview), family income (five categories in Mexican pesos: below 2598; between 2598 and 5196; between 5196 and 10,392; between 10,392 and 18,186; and above 18,186), and school grade. Once the statistical model was defined, diagnosis was performed by using a goodness of fit, specificity, and multicollinearity tests. The main predictor of disability variables was the presence of co-morbidity, which was defined as any morbidity in addition to OA in the study patients. Statistical analysis was performed with STATA software version 14.0.

Ethical considerations

This study was approved by the Ethics committee of the University Hospital "Dr. José Eleuterio González" of the Universidad Autónoma de Nuevo León. Registry No. RE14-004 and by the Instituto Mexicano del Seguro Social (IMSS) F-CNIC-2015-113.

Data confidentiality: The authors declare that they have followed the established protocols in their respective institutions in regards to patient data confidentiality, and that they have followed ethical guidelines or rules to publish with patient informed consent, and that all patients included in this study were provided with sufficient information about this study and gave their informed consent to participate.

Results

The IMPACTAR registry accrued a total of 7073 patients; of these 4971 were selected by having a diagnosis of OA and a complete functional evaluation (WOMAC). Mean age was 63 years, 75% were female, with most having a basic education level (49.9%). Two groups were created: One with presence of disability (41.5%) and the other without (58.5%). (Table 1)

In this study most subjects belonged to region 7 which corresponds to Mexico City, the states of Nuevo León, Coahuila and Jalisco with 28.9% followed by region 5 comprising the states of Baja California Norte, Baja California, Sonora, Chihuahua and Tamaulipas with 21.7%, whereas the least represented region was region 1 which corresponds to the states of Guerrero, Oaxaca, and Chiapas with 1.4%.

The median family income in our cohort was $13 000 MXP (IQR: 9800–16 000) (Table 1).

The median Body Mass Index (BMI) was 28.4 (26.31.6) kg/m^2, and according to the WHO classification, 86.7% of patients were obese or overweight.

The general median to the time of OA diagnosis was 4 years (IQR 1–7 years), and 51.2% of patients had less than 5 years since diagnosis. The most affected joint in OA patients was the knee (88.8%), and up to 13.5% of patients reported history of joint surgery.

When we investigated the different types of medications taken by patients at the time of the interview, we found that 48.1% took non-steroidal anti-inflammatory drugs (NSAIDs).

More than 49% of subjects had at least one co-morbidity, with hypertension being the most prevalent in 32.8% (Table 2)

Regarding the type of health care, the patients belonged to, 14.6% belonged to public institutions, 28.4% to social security and the rest to private medical practice.

Model

From an adjusted model, we found that patients with OA with the presence of co-morbidity had a 42% higher probability of having disability (OR 1.42 [CI 95% (1.15–1.76) $P = .001$], adjusted for age, gender, economic income, time to diagnosis and education level (Table 3).

Additionally, patients with OA whose monthly family income was above $10,392 MXP, had 53% (OR 0.47 (CI 95% (0.26–0.87) $P = .02$) less probability of presenting disability when compared with patients with income below $2598 MXP, adjusted for gender, age, time from diagnosis, co-morbidity and education level (Table 3).

When analyzing WOMAC against the presence or absence of any co-morbidity, the median in the pain domain was 5.2 when a co-morbidity was present and 4.7 versus none ($P = .001$); for the morning stiffness dominion, the medians were 18 vs 1.7 respectively ($P = .02$); and for the function dominion medians were 27.9 vs 16.55 respectively ($P = .001$).

To evaluate the effect of having 2 or more comorbidities vs none or just 1, the medians for the WOMAC pain dominion were 5.3 vs 4.8 respectively ($P = .001$), for function 18.3 vs 16.3 respectively ($P = .001$) and for stiffness 1.8 vs 1.76 ($P = .07$). When analyzing the presence of 3 or more co-morbidities vs 0 to 2 of them, medians for pain were 5.5 vs 4.9 ($P = .001$), function 18.8 vs 17 ($P = .001$) and stiffness 1.8 vs 1.7 ($P = .12$). We found a nonparametric correlation (Rho Spearman) between the pain and the function WOMAC dominions in our patients ($r = 0.82$).

Discussion

The strength of this study is that it offers a global view of the current situation regarding OA patients when being attended by internal medicine, rheumatologists, and orthopedics specialists, whereas other studies exclude these patients or include only those being taken care of by primary care physicians. Furthermore, this analysis comes from a national registry of almost 5000 OA patients, the largest published so far. Our study reflects the characteristics of 4971 OA patients cataloged by 7 socioeconomic regions and different healthcare types and assesses the impact of co-morbidities toward disability through the WOMAC questionnaire. Regarding patient age and gender, our cohort showed similar results to other previously published studies.

Regarding the healthcare professionals that participated in the IMPACTAR study, we presented significant differences with studies previously done in Mexico,[6,12] while Burgos et al. and the PANLAR study reported patients evaluated only by rheumatologists, the IMPACTAR initiative included patients evaluated by physicians from all medical specialties and subspecialties related to the management and treatment of OA which allows for a wider healthcare perspective.[12]

Table 1
Sociodemographic, economic and geographic characteristics associated with disability in patients with OA in Mexico 2013–2015.

	Absence of disability		Presence of disability		Total	
Variables		*n* = 2910 (58.5%)		*n* = 2061 (41.5%)		*n* = 4971
Sociodemographic characteristics	*n*	%/median (IQR)	*n*	%/median (IQR)	*N*	%/median (IQR)
Female	2170	74.6	1559	75.6	3729	75.0
Age	2790	63(56–69)	2007	63(56–69)	4797	63(56–69)
Age group	2790		2007		4797	
>65 years	1704	61.1	1211	60.3	2915	60.8
Education level	2013		1504		3517	
None	231	11.5	189	12.6	420	11.9
Basic	987	49.0	768	51.1	1755	49.9
High school	441	21.9	307	20.4	748	21.3
Professional	354	17.6	240	16.0	594	16.9
Marital status[a]	2524		1847		4371	
Single	225	8.9	170	9.2	395	9.0
Married	1574	62.4	1083	58.6	2657	60.8
No partner[b]	725	28.7	594	32.2	1319	30.2
Geographic region[a]	2910		2061		4971	
R1	42	1.4	25	1.2	67	1.4
R2	334	11.5	270	13.1	604	12.2
R3	227	7.8	170	8.3	397	8.0
R4	477	16.4	363	17.6	840	16.9
R5	606	20.8	471	22.9	1077	21.7
R6	303	10.4	246	11.9	549	11.0
R7	921	31.7	516	25.0	1437	28.9
Economic and labor characteristics						
Currently works	2814		2027		4841	
Yes	707	25.12	503	24.81	1210	24.99
Family income[c]	1511	14 000(10 000–16 000)	1096	13 000(9000–16 000)	2607	13 000(9800–16 000)
Categorized family income[a]	1511		1096			
<2598	28	1.85	38	3.47	66	2.53
2598–5196	93	6.15	104	9.49	197	7.56
5196–10,392	357	23.63	312	28.47	669	25.66
10,392–18,186	734	48.58	426	38.87	1160	44.5
>18,186	299	19.79	216	19.71	515	19.75

Source: IMPACTAR database.
IQR = interquantile.
[a] x^2 Pearson < 0.05.
[b] No partner includes: divorced, separated, and widow.
[c] Wilcoxon signed-rank test < 0.001.

In our transversal study, 75% of our sample was comprised by women,[25] which is in accordance with other studies of knee OA. It is also in accordance with community -based reports using the COPCORD methodology where the mean OA prevalence in Mexico is 10.5%, although some northern regions like Nuevo León reported 17.3% with also, female predominance. These results coincide with those found by Burgos et al., and others.[5,12,26]

Regarding the most affected anatomical site in different cohorts, in the IMPACTAR registry, 88% was the knee, a similar proportion reported by Burgos et al.,[12] whereas in the PANLAR study the knee represented only 31%. These differences may be explained by the wider population diversity in the PANLAR study. Furthermore, there may be selection, diagnosis and referral bias, since due to its clinical characteristics, knee OA is easier to diagnose, and frequently requires orthopedic and rehabilitation evaluations and less care by rheumatologists, especially if it has already caused disability.

Another contrasting finding was disease latency; Burgos et al.[12] reported a mean duration of 69 months, while in patients in the IMPACTAR registry was 48 months; this may be due to the heterogeneity of medical specialists that took care of patients in our cohort.

It is also worth noting that in the study by Burgos et al.,[12] one quarter of patients had a low WOMAC score and minimal physical limitations despite the diagnosis. In our study, we observed that a larger number of patients (41.5%) from different regions had disability as measured by a WOMAC above or equal to 3, which reflects the type of population that is seen by medical specialists.

Previous OA cohorts in Mexico had not considered adjusting variables like socioeconomic income, education level, socioeconomic region or biochemical profile.[6] We registered these variables and they were evaluated in the statistical model.

Some authors have found an association with two co - morbidities in patients with knee OA.[25] In our study, 49.6% of patients had at least one comorbidity. We report a high prevalence of hypertension (HTN) (32.8%) in our population. Barquera et al.,[27] in the 2006 national health survey, found an HTN prevalence of 31.5% (CI 95% 29.8–33.1) which coincides with our results.

A study done in Cuba by Friol GJ et al., found that half of patients referred co-morbidities associated with OA, with diabetes mellitus and obesity being the most frequent, either alone or combined; obesity was present in 13.5% of subjects and diabetes mellitus in 9%, even though almost 75% were above 60 years old.[9]

It is expected that when Body Mass Index (BMI) increases, the number of co-morbidities increases and physical activity decreases.[28] In our study, average BMI was 28.3 (26.3–31.6) in patients with OA without disability and there was no significant difference to those who had disability.

The presence of disability was defined as a WOMAC function score ≥3 and was analyzed in a dichotomous manner. It is possible that the cutoff point does not discriminate adequately patients with different types of co-morbidities due to the low quantity of

Table 2
Clinical characteristics, pharmacologic treatment, and healthcare institution associated with disability in patients with OA in Mexico 2013–2015.

	Absence of disability		Presence of disability		Total	
Variables		*n* = 2910 (58.5%)		*n* = 2061 (41.5%)		*N* = 4971
Patient clinical characteristics	*n*	%/median (IQR)	*n*	%/median (IQR)	*N*	%/median (IQR)
BMI	2796	28.3 (26.3–31.6)	1985	28.6 (26.4–31.6)	4781	28.4 (26.3–31.6)
Nutritional status according to BMI	2796		1985		4781	
Underweight or normal	365	13.05	244	12.29	609	12.74
Overweight	1407	50.32	1010	50.88	2417	50.55
Obesity	1024	36.62	731	36.83	1755	36.71
Disease duration in years	1594	4(1–7)	1172	4(1–7)	2766	4(1–7)
Disease duration by category	1594		1172			
<5 years	807	50.63	606	51.71	1413	51.08
5 to 10 years	657	41.22	472	40.27	1129	40.82
>10 years	130	8.16	94	8.02	224	8.1
History of surgery	2910		2061			
Yes	393	13.51	278	13.49	671	13.5
No	2517	86.49	1783	86.51	4300	86.5
Joint localization	280		203		483	
Shoulder	1	0.36	0	0	1	0.21
Hand	15	5.36	10	4.93	25	5.18
Hip	9	3.21	10	4.93	19	3.93
Knee	253	90.36	182	89.66	435	90.06
Spine	1	0.36	1	0.49	2	0.41
Foot	1	0.36	0	0	1	0.21
Pharmacologic treatment	2910		2061		4971	
Yes	1828	62.82	1319	64	3147	63.31
No	1082	37.18	742	36	1824	36.69
Type of medication						
Analgesics	2910		2061		4971	
No	1233	42.4	858	41.6	2091	42.1
Yes	1677	57.6	1203	58.4	2880	57.9
NSAIDs[a]	2910		2061		4971	
No	1554	53.4	1024	49.7	2578	51.9
Yes	1356	46.6	1037	50.3	2393	48.1
Corticosteroids	2910		2061			
No	2855	98.1	2024	98.2	4879	98.2
Yes	55	1.9	37	1.8	92	1.8
Supplements	2910		2061			
No	2274	78.1	1617	78.5	3891	78.3
Yes	636	21.9	444	21.5	1080	21.7
Analgesics/NSAIDs	2910		2061			
No	2837	97.5	1997	96.9	4834	97.2
Yes	73	2.5	64	3.1	137	2.8
Biomarkers						
Glucose	660	103(92–128)	539	106(93–129)	1199	104(92–129)
Cholesterol	447	191(150–218)	378	195.5 (144–221)	825	193(149–220)
Triglycerides	366	170.5 (121–252)	296	165(128–277)	662	168.5 (125–262)
Uric acid	359	5(3.8–6.3)	324	5.1 (3.9–6.35)	683	5(3.8–6.3)
Morbidity						
Comorbidity[a]	2910		2061		4971	
No	1514	52.0	991	48.1	2505	50.4
Yes	1396	48.0	1070	51.9	2466	49.6
Diabetes	2910		2061		4971	
No	2325	79.9	1634	79.3	3959	79.6
Yes	585	20.1	427	20.7	1012	20.4
Hypertension[a]	2910		2061		4971	
No	1996	68.6	1345	65.3	3341	67.2
Yes	914	31.4	716	34.7	1630	32.8
Dyslipidemia	2910		2061		4971	
No	2672	91.8	1872	90.8	4544	91.4
Yes	238	8.2	189	9.2	427	8.6
Respiratory disease	2910		2061			
No	2861	98.3	2025	98.3	4886	98.3
Yes	49	1.7	36	1.8	85	1.7

Table 2 (*Continued*)

Variables Patient clinical characteristics	Absence of disability *n* = 2910 (58.5%) *n*	 %/median (IQR)	Presence of disability *n* = 2061 (41.5%) *n*	 %/median (IQR)	Total *N* = 4971 *N*	 %/median (IQR)
Hyperuricemia	2910		2061			
No	2883	99.1	2037	98.8	4920	99.0
Yes	27	0.9	24	1.2	51	1.0
Gout	2910		2061			
No	2903	99.8	2053	99.6	4956	99.7
Yes	7	0.2	8	0.4	15	0.3
Healthcare						
Institution type[a]	2910		2061		4971	
Public	396	13.6	332	16.1	728	14.6
Social security	833	28.6	577	28.0	1410	28.4
Private	1681	57.8	1152	55.9	2833	57.0

BMI = body mass index; IQR = interquantile range; NSAIDs = non-steroidal anti-inflammatory drugs.
Wilcoxon signed-rank test < 0.001.
[a] x^2 Pearson < 0.05.
Source: IMPACTAR database.

Table 3
Factors associated with the presence of disability in patients with OA in Mexico, 2013–2015.

Variable	Presence of disability		
	OR	IC 95%	*P* value
Comorbidity	1.42	(1.15, 1.76)	.00
*Gender**			
Female	1.2	(0.93, 1.54)	.17
Age	1.01	(0.99, 1.02)	.41
*Time since diagnosis****			
5 to 10 years	0.86	(0.67, 1.09)	.21
> de 10 years	0.78	(0.51, 1.21)	.28
Education level			
Basic	0.88	(0.62, 1.25)	.48
High school	0.86	(0.58, 1.29)	.48
Professional	0.91	(0.58, 1.42)	.67
*Monthly family income (Mexican pesos)***			
2598–5196 pesos	0.77	(0.4, 1.49)	.44
5196–10,392 pesos	0.56	(0.3, 1.03)	.06
10,392–18,186 pesos	0.47	(0.26, 0.87)	.02
>18,186 pesos	0.48	(0.25, 0.9)	.02

OR, Odds ratio adjusted for co variables: gender, age, education level (years), income, and time from diagnosis.
Reference category, male.
Reference category, less than 5 years since diagnosis*** Reference category, no formal education level **Reference category, income < 2598 pesos.
Source: IMPACTAR database.

subjects with one severe disability for this cutoff point in the WOMAC scale. Nonetheless, the definition of disability was mostly designed toward detecting patients without disability.

The economic income in patients with disability was lower ($13 000 MXP) (IQR: 9000–16 000) adjusted to relevant co-variables like gender, age, time from diagnosis, co-morbidity and education level. This agrees with previously published data in other studies of musculoskeletal pain where socioeconomic privation has been described as a risk factor for pain in general as well as chronic pain.[26,29,30] Also, the WOMAC pain dominion has been associated with poverty level. Data indicate that disability leads to poverty and poverty is associated with greater disability.[29] We observed a statistically significant difference between patients with or without disability according to the type of institution they received care from, where the group with disability who were taken care for in public hospitals (16.1%) was higher in comparison to those without disability (13.6%), and this may be bound to the former.

We found that 48.1% of patients took NSAIDs, which is very similar to that observed in community-based studies where NSAIDs are the most frequently used medications (up to 60%).[5,26] Moreover, we observed that patients who reported NSAID intake were more likely to be disabled (50.3%) which would reflect in a higher NSAID associated co-morbidity; however, we were unable to establish this association in this study.

Age, education level and time from OA diagnosis were not significantly associated with the presence of disability under an adjusted model, and this may be due to a large proportion of patients having a low education level. In Mexico, we still have low education levels, and in this study, we observed that half of OA patients had only basic schooling level (49.9%). Cleveland et al, found that the WOMAC functional domain and total scores were associated with schooling level, where OA patients with low education levels had more pain and worse function.

We report a significant nonparametric correlation (Rho = 0.82) between the WOMAC pain and function dominions.

It is important to understand the disability process and characterize the changes that occur during its development and establish when it is reaching a critical point in order to incorporate preventive strategies; ideally, this would be during preclinical asymptomatic stages or early asymptomatic radiographic stages.

There are weaknesses in our study. One was that we did not evaluate the radiographic OA stage with disability nor the presence of comorbidities. Also, we only included patients that attend to hospitals or medical specialists and thus, it will not reflect the state of disability or presence of co -morbidities in the open population. We could not evaluate nor compare in our study if patients with OA and disability had more hospital admissions, out of pocket expenses, or if comorbidity decompensation resulted in more hospitalizations or physician office visits per year. We were unable to determine if the increased use of these medical services is due specifically to OA or other potential confounding factors.

Conclusion

Patients with OA and presence of co-morbidity have almost a 50% more chance of having disability than those without co-morbidities. Regions in Mexico show different proportions of patients with disability, and a higher economic income was associated with a decreased risk of having disability. There is a need for programs and interventions to decrease disability in OA patients while taking in consideration co-morbidities, female gender, family economic income and geographic region origin as variables that are associated to disability in OA.

Funding information

Colegio Mexicano de Ortopedia y Traumatología, through an unrestricted educational grant from the pharmacological company SANOFI. SANOFI did not participate in the elaboration of this manuscript or in data analysis presented.

Data confidentiality: The authors declare that they have followed the established protocols in their respective institutions in regards to patient data confidentiality, and that they have followed ethical guidelines or rules to publish with patient informed consent, and that all patients included in this study were provided with sufficient information about this study and gave their informed consent to participate.

Conflict of interest

All authors declare to have no conflicts of interest.

Acknowledgements

- Thanks to Collaborators and Co-investigators of the IMPACTAR Study Group (They are included in Annex 1).
- Thanks to Edgar Leonel Gonzalez Gonzalez PhD, Researcher at Mexico's National Institute of Public Health, and to Diana Molina Velez, M.Sc., and also to Concepción Garcia, Master in Public Health from the National Institute of Public Health for their help in the statistical analysis of the Database of the IMPACTAR initiative.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.reuma.2020.03.005.

References

1. Branco JC, Rodriguez AM, Gouveia N, Eusébio M, Ramiro S, Machado PM, et al. Prevalence of rheumatic and musculoskeletal diseases and their impact on health-related quality of life, physical function and mental health in Portugal: results from EpiReumaPt – a national health survey. RMD Open. 2016;2:e000166.
2. Reginster JY. The prevalence and burden of arthritis. Rheumatology (Oxford). 2002;41 Suppl. 1:3–6.
3. Kurtais Y, Oztuna D, Kücükdeveci AA, Kutlay S, Hafiz M, Tennant A. Reliability, construct validity and measurement potential of the ICF comprehensive core set for osteoarthritis. BMC Musculoskelet Disord. 2011;12:255.
4. Breedveld FC. Osteoarthritis – the impact of a serious disease. Rheumatology (Oxford). 2004;43 Suppl. 1:i4–8.
5. Hernández-Cáceres AE, Rodriguez-Amado J, Peláez-Ballestas I, Vega-Morales D, Garza-Elizondo MA. Factors associated with treatment of osteoarthritis: analysis of a COPCORD study in Nuevo Leon Mexico. Reumatol Clin. 2015;11:204–9.
6. Reginato AM, Riera H, Vera M, Torres AR, Espinosa R, Esquivel JA, et al. Osteoarthritis in Latin America: study of demographic and clinical characteristics in 3040 patients. J Clin Rheumatol. 2015;21:391–7.
7. Bitton R. The economic burden of osteoarthritis. Am J Manag Care. 2009;15 Suppl.:S230–5.
8. Lozano R, Gómez-Dantés H, Garrido-Latorre F, Jiménez-Corona A, Campuzano-Rincón JC, Franco-Marina F, et al. Burden of disease, injuries, risk factors and challenges for the health system in Mexico. Salud Publica Mex. 2013;55:580–94.
9. Friol González J, Carnota Lauzán O, Rodríguez Boza EM, Campo Torres MF, Porro Novo J. Morbidity and physical disability for osteoarthritis in the municipality 10 October. Revista Cubana de Reumatología. 2012;14.
10. Mundial B. Informe mundial la discapacidad. Educación. 2011;218:219.
11. Anyfanti P, Triantafyllou A, Panagopoulos P, Triantafyllou G, Pyrpasopoulou A, Chatzimichailidou S, et al. Predictors of impaired quality of life in patients with rheumatic diseases. Clin Rheumatol. 2016;35:1705–11.
12. Burgos-Vargas R, Cardiel MH, Loyola-Sánchez A, De Abreu MM, Pons-Estel BA, Rossignol M, et al. Characterization of knee osteoarthritis in Latin America. A comparative analysis of clinical and health care utilization in Argentina Brazil, and Mexico. Reumatol Clin. 2014;10:152–9.
13. Thumboo J, Wu LL, Leung YY. Domains of quality of life affecting elderly patients with hand osteoarthritis: a qualitative study in the Asian perspective. Int J Rheum Dis. 2017;20:1105–19.
14. Solis Cartas U, Hernández Cuellar IM, Prada Hernández DM, De Armas Hernández A, Ulloa Alfonso A. Calidad de vida relacionada con la salud en pacientes con osteoartritis. Revista Cubana de Reumatología. 2013;15:153–9.
15. Xie F, Pullenayegum EM, Li SC, Hopkins R, Thumboo J, Lo NN. Use of a disease-specific instrument in economic evaluations: mapping WOMAC onto the EQ-5D utility index. Value Health. 2010;13:873–8.
16. Batsis JA, Zbehlik AJ, Barre LK, Bynum JP, Pidgeon D, Bartels SJ. Impact of obesity on disability, function, and physical activity: data from the Osteoarthritis Initiative. Scand J Rheumatol. 2015;44:495–502.
17. Leite AA, Costa AJ, Lima Bde A, Padilha AV, Albuguerque EC, Marques CD. Comorbidities in patients with osteoarthritis: frequency and impact on pain and physical function. Rev Bras Reumatol. 2011;51:118–23.
18. Prada Hernández DM, Molinero Rodríguez C, Gómez Morejón JA, Hernández Cuellar IM, Porro Novo J, López Cabreja G, et al. Evaluación de la calidad de vida en pacientes con osteoartritis de rodilla y tratamiento rehabilitador. Revista Cubana de Reumatología. 2011;13.
19. Boutron I, Rannou F, Jardinaud-Lopez M, Meric G, Revel M, Poiraudeau S. Disability and quality of life of patients with knee or hip osteoarthritis in the primary care setting and factors associated with general practitioners' indication for prosthetic replacement within 1 year. Osteoarthr Cartil. 2008;16:1024–31.
20. Pineda C, Sandoval H. Defining quality of rheumatologic care: Mexico. JCR. 2017;23:209–11.
21. Clasificación de Entidades Federativas. Niveles de estratificación. Orden descendente de estatros de mayor a menor ventaja relativa. 2017. http://sc.inegi.gob.mx/niveles/index.jsp.
22. Osteoarthritis Research Society International. 2013. https://www.oarsi.org/sites/default/files/docs/2013/womac_questionnaire_information.pdf.
23. Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) 2016. http://www.rheumatology.org/I-Am-A/Rheumatologist/Research/Clinician Researchers/Western-Ontar.
24. Góngora Cuenca YL, Friol González JE, Rodríguez Boza EM, González Roig JL, Castellanos Suárez M, Alvarez Acosta R. Calidad de vida en pacientes con osteoartrosis de cadera y rodilla. Revista Cubana de Reumatología. 2006;8:23–42.
25. Wright EA, Katz JN, Cisternas MG, Kessler CL, Wagenseller A, Losina E. Impact of knee osteoarthritis on health care resource utilization in a US population-based national sample. Med Care. 2010;48:785–91.
26. Peláez-Ballestas I, Sanin LH, Moreno-Montoya J, Alvarez-Nemegyei J, Burgos-Vargas R, Garza-Elizondo M, et al. Epidemiology of the rheumatic diseases in Mexico. A study of 5 regions based on the COPCORD methodology. J Rheumatol Suppl. 2011;86:3–8.
27. Barquera S, Campos-Nonato I, Hernández Barrera L, Villalpando S, Rodríguez-Gilabert C, Durazo- Arvizú R, et al. Hypertension in Mexican adults: results from the National Health and Nutrition Survey 2006. Salud Pública de México. 2010;52:S63–71.
28. Rosemann T, Grol R, Herman K, Wensing M, Szecsenyi J. Association between obesity, quality of life, physical activity and health service utilization in primary care patients with osteoarthritis. Int J Behav Nutr Phys Act. 2008;5:4.
29. Zitko Melo P, Cabieses Valdes B. Socioeconomic determinants of disability in Chile. Disabil Health J. 2011;4:271–82.
30. Brekke M, Hjortdahl P, Kvien TK. Severity of musculoskeletal pain: relations to socioeconomic inequality. Soc Sci Med. 2002;54:221–8.