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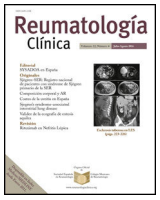

Original Article

Distribution and characteristics of the certification of rheumatologists in Mexico

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ABSTRACT

Objective: Describe the distribution of adult and pediatric rheumatologists with current certification in Mexico and the factors associated with this distribution.
Methods: The databases of the Mexican Council of Rheumatology and the Mexican College of Rheumatology for 2020 were reviewed. The rate of rheumatologists per 100,000 inhabitants by state of the Mexican Republic was calculated. To find out the number of inhabitants by state, the results of the 2020 population census of the National Institute of Statistics and Geography were consulted. The number of rheumatologists with current certification by state, age, and sex was analyzed.
Results: In Mexico, there are 1002 registered adult rheumatologists with a mean age of 48.12 ± 13 years. The male gender prevailed with a ratio of 1.18:1. Ninety-four pediatric rheumatologists were identified with a mean age of 42.25 ± 10.4 years, with a predominance of the female gender with a ratio of 2.2:1. In Mexico City and Jalisco, more than one rheumatologist/100,000 inhabitants were reported in the specialty of adults and only in Mexico City in pediatrics. The current certification is 65%–70% on average and the factors associated with a higher prevalence were younger age, female gender and geographic location.
Conclusions: There is a shortage of rheumatologists in Mexico and in the pediatric area there are underserved regions. It is important that health policies apply measures that allow a more balanced and efficient regionalization of this specialty. Although most rheumatologists have current certification, it is necessary to establish strategies to increase this proportion.

Distribución y características de la certificación de los reumatólogos en México

Palabras clave:
Reumatólogos
Distribución geográfica
Fuerza laboral
Certificación vigente

RESUMEN

Objetivo: Describir la distribución de los reumatólogos de adultos y pediátricos con certificación vigente en México y los factores asociados a esta distribución.
Métodos: Se revisaron las bases de datos del Consejo Mexicano de Reumatología y del Colegio Mexicano de Reumatología de 2020. Se calculó la tasa de reumatólogos por cada 100.000 habitantes por estado de la República Mexicana. Para conocer el número de habitantes por estado, se consultaron los resultados del censo de población del Instituto Nacional de Estadística y Geografía de 2020. Se analizó el número de reumatólogos con certificación vigente por estado, edad y sexo.

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Resultados: En México hay registrados 1.002 reumatólogos de adultos, con una edad promedio de 48,12 ± 13 años. Predominó el género masculino con una relación de 1,18:1. Se identificaron 94 reumatólogos pediatras, con una edad promedio de 42,25 ± 10,4 años, con predominio del género femenino con una relación de 2,2:1. En la Ciudad de México y Jalisco se reportó más de un reumatólogo/100.000 habitantes en la especialidad de adultos y solo en la Ciudad de México en pediátricos. La certificación vigente es de 65 a 70% en promedio y los factores asociados a una mayor prevalencia fueron edad menor, género femenino y ubicación geográfica.
Conclusiones: Existe escasez de reumatólogos en México y en el área pediátrica hay regiones desatendidas. Es importante que las políticas de salud apliquen medidas que permitan una regionalización más equilibrada y eficiente de esta especialidad. Aunque la mayoría de los reumatólogos cuentan con certificación vigente, es necesario establecer estrategias para aumentar esta proporción.

Introduction

Rheumatic diseases (RD) have an important impact because they are associated with physical disability and high costs. As the prevalence of these diseases is increasing, the lack of rheumatologists is becoming more evident, and this problem is shared by many countries worldwide. Because RD have such an important impact, the European Alliance of Associations for Rheumatology designated the years 2000 to 2010 as the decade of bone and joints. Strategies were implemented to reduce this impact, chiefly in diseases such as rheumatoid arthritis (RA), osteoarthrosis and lumbalgia.[1,2] Moreover, in 2003 the WHO published a technical report on the impact of RDs, underlining that they are common diseases which are associated with physical disability, as more than 30% of the individuals of productive age who have arthritis become disabled, giving rise to a high cost.[3] It has been said that the cost in the United States of America may amount to 2.5% of gross domestic product.[3,4] Nevertheless, RD may be effectively controlled if they are diagnosed early and receive appropriate treatment.

In spite of these data, in Mexico the health authorities have not considered RD to be important. There is no mention of RD in the report sent to the WHO in 2004 on priority health interventions in Mexico.[5] Although there is little information about RD in México, previous publications have described the economic impact of these diseases in México; this is the case for RA, which may cause catastrophic expenses and plunge affected families into poverty.[6–8] A study which included 19,213 individuals in 5 regions of México found a 10.5% prevalence of osteoarthritis, a prevalence of 5.8% of lumbar pain, 3.8% of regional painful syndrome, 1.6% of RA, 0.7% of fibromyalgia and 0.3% of gout.[9] These rates of prevalence varied geographically: for example, the prevalence of RA in Nuevo León, in the north of México, amounts to 0.7%, while it stands at 2.8% in Yucatán, in the south.

One factor which contributes to the problem of the late diagnosis and treatment of RD is the fact that there is no formal course of rheumatology in many universities, so that the doctors who first see patients may not be fully trained in musculoskeletal examination,[10,11] so they will not identify the initial alterations caused by these diseases, delaying diagnosis and referral to a specialist.[12,13] Another important factor is the unequal distribution of rheumatologists within the country, as there are more in the large cities, creating areas that are unattended by medical professionals, so that many patients have to travel long distances to be seen by a rheumatologist.[14–16] A previous study described the distribution of specialists in the country, stating that as a whole there were fewer specialists than is internationally recommended to cover the health needs of the country, although it did not describe the distribution of rheumatologists.[17] A systematic review of the literature found that the estimated number of rheumatologists in different Western countries varied from 0.7 rheumatologists per 100,000 inhabitants in the United Kingdom to 3.5 in Spain.[18] Another review that covered 19 Latin American countries reported densities of rheumatologists from 0.16 per 100,000 inhabitants in Nicaragua to 3.65 in Uruguay. There was only more than one rheumatologist per 100,000 inhabitants in 5 countries (26.32%)[19] (Table 1).

Table 1
The proportion of paediatric rheumatologists per 100,000 inhabitants in certain countries.

Country	Reporting year	Proportion per 100,000 inhabitants
France[18]	2010	3.80
Uruguay[19]	2020	3.65
Argentina[19]	2020	2.48
Spain[23]	2020	2.17
United States[18]	2012	1.78
Cuba[19]	2020	1.40
Italy[18]	2011	1.30
Chile[19]	2020	1.18
Peru[19]	2020	1.05
Brazil[19]	2020	.99
Canada[18]	2013	.97
Germany[18]	2011	.93
Ecuador[19]	2020	.86
United Kingdom[18]	2011	.84
Costa Rica[19]	2020	.81
Mexico[19]	2020	.77
Paraguay[19]	2020	.72
Venezuela[19]	2020	.52
Bolivia[19]	2020	.45
Panama[19]	2020	.43
Colombia[19]	2020	.39
Dominican Republic[19]	2020	.38
El Salvador[19]	2020	.32
Honduras[19]	2020	.21
Guatemala[19]	2020	.18
China[27]	2007	.17
Nicaragua[19]	2020	.16

The *objectives* of this study were to describe the distribution of adult as well as paediatric rheumatologists in México and the factors associated with this distribution, and finally to describe the characteristics of the certification that is currently in force (CIF).

Methods

A cross-sectional study was performed. The information was obtained from a review of the databases of the Mexican Council of Rheumatology and the Mexican College of Rheumatology (CMR). The Mexican Council of Rheumatology is an institution composed of representatives of the community of rheumatologists who are selected for the responsibility of establishing the certification process for doctors who have fulfilled the academic requirements to work as a rheumatologist in México. The CMR is the association composed of professionals to seek academic excellence and leadership in the field of rheumatology. Sociodemographic variables were obtained, such as age, sex, nationality, year of graduation, educational institution, professional domicile, certification valid-

Fig. 1. The proportion of adult rheumatologists per 100,000 inhabitants in the states of the Mexican Republic.

ity and years of experience. The number of rheumatologists per 100,000 inhabitants of each state in the Mexican Republic was calculated. The 2020 population by the National Institute of Statistics, Geography and Computing was consulted to discover the number of inhabitants in each state.[20] The number of rheumatologists with a CIF was calculated for each state, age and sex, and the factors associated with CIF were determined.

Statistical analysis

Central and dispersion tendency measurements were calculated using averages and standard deviation for dimensional variables and frequencies for nominal and ordinal variables. The Student t-test was used for comparisons and ANOVA was used for variables with a normal distribution. The Chi-squared test, Fisher's exact test or the Kruskal–Wallis or Mann–Whitney U test were used for non-parametric variables. The upper limit for statistical significance was set at 0.05. The odds ratios (OR) were used to determine the factors associated with a CIF.

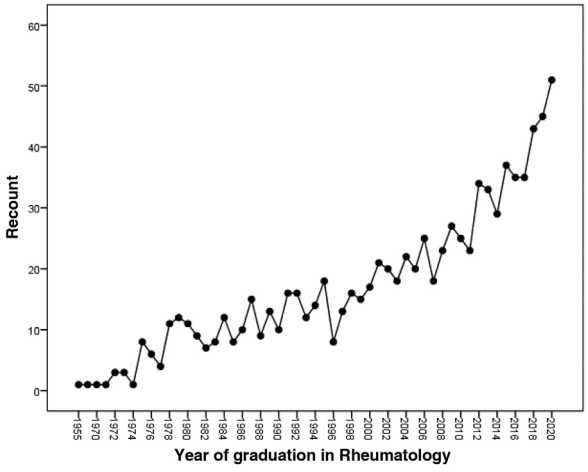

Fig. 2. Number of graduates (recount) per year in adult rheumatology.

Results

Adult rheumatologists

A total of 1002 adult rheumatologists had been certified by 2020 by the Mexican Council of Rheumatology. It was only possible to obtain data on 897 of these. Their average age was 48.12 ± 13 years. 485 (54.1%) of them were men (a male/female ratio of 1.18:1). They had an average of 16 ± 13 years of experience. The women were younger (45.46 ± 11.38 years) than the men (50.49 ± 14 years) ($P < .001$). The last reported location of each doctor was only available in 847 cases (41 had migrated abroad, 5 had died and no information could be found for 4). Until 2020 only 571 adult rheumatologists were members of the CMR. Not all of those who are certified by the Council are CMR members, as the majority of them are foreigners who trained as rheumatologists in México and took the Council certification examination, but who did not need to be members of the CMR or renew their certification when they returned to their country of origin, as they had to comply with the regulations of the latter. Furthermore, some Mexican rheumatologists are not members of the CMR and belong to other academic institutions such as PANLAR, ACR or the European Alliance of Associations for Rheumatology.

A proportion of 0.67 rheumatologists per 100,000 population of the country was found. Table 2 shows the distribution of rheumatologists in the states of the Mexican Republic, as well as the corresponding proportions per 100,000 inhabitants. Only Mexico City and Jalisco were found to have a proportion ≥1 rheumatologist per 100,000 inhabitants, as the other states were lacking in rheumatologists (Table 2 and Fig. 1). Fig. 2 shows the number of rheumatologists who graduate per year, and this has gradually increased over recent years. Additionally, after dividing by quartiles

Table 2
Distribution of rheumatologists per state and proportion per 100,000 inhabitants.

State	Population (inhabitants) 2020	Rheumatologists[a] n (%)	Proportion per 100,000 inhabitants	With certification in force n (%)
Aguascalientes	1,425,607	10 (1.1)	.70	6 (60)
Baja California	3,769,020	21 (2.3)	.56	14 (66.7)
Baja California Sur	798,447	5 (0.6)	.63	2 (40)
Campeche	928,363	3 (0.3)	.32	2 (66.7)
Coahuila	3,146,771	23 (2.6)	.73	18 (78.3)
Colima	731,391	5 (0.6)	.68	3 (60)
Chiapas	5,543,828	10 (1.1)	.18	5 (50)
Chihuahua	3,741,869	19 (2.1)	.51	10 (52.6)
Ciudad de México	9,209,944	315 (35.1)	**3.42**	233 (74)
Durango	1,832,650	6 (0.7)	.33	4 (66.7)
Guanajuato	6,166,934	18 (2.0)	.29	13 (72.2)
Guerrero	3,540,685	4 (0.4)	.11	3 (75)
Hidalgo	3,082,841	5 (0.6)	.16	3 (60)
Jalisco	8,348,151	101 (11.3)	**1.21**	68 (67.3)
Estado de México	16,992,418	66 (7.4)	.39	41 (62.1)
Michoacán	4,748,846	17 (1.9)	.36	7 (41.2)
Morelos	1,971,520	10 (1.1)	.51	5 (50)
Nayarit	1,235,456	3 (0.3)	.24	1 (33.3)
Nuevo León	5,784,442	49 (5.5)	.85	43 (87.8)
Oaxaca	4,132,148	11 (1.2)	.27	3 (27.3)
Puebla	6,583,278	24 (2.7)	.36	17 (70.8)
Querétaro	2,368,467	14 (1.6)	.59	12 (85.7)
Quintana Roo	1,857,985	3 (0.3)	.16	3 (100)
San Luis Potosí	2,822,255	24 (2.7)	.85	19 (79.2)
Sinaloa	3,026,943	10 (1.1)	.33	6 (60)
Sonora	2,944,840	15 (1.7)	.51	7 (46.7)
Tabasco	2,402,598	7 (0.8)	.29	6 (85.7)
Tamaulipas	3,527,735	12 (1.3)	.34	3 (25)
Tlaxcala	1,342,977	1 (0.1)	.07	1 (100)
Veracruz	8,062,579	15 (1.7)	.19	4 (26.7)
Yucatán	2,320,898	15 (1.7)	.65	11 (73.3)
Zacatecas	1,622,138	6 (0.7)	.37	4 (66.7)
Total	126,014,024	847 (94.4)	.67	584 (65.1)

The states where there are more than 1 rheumatologist/100,000 inhabitants (México City and Jalisco) are shown in bold type.
Source: INEGI 2020 national census.
[a] 50 rheumatologists (5,6%) were not included, 41 because they were abroad, 5 had died and the data corresponding to 4 were unknown.

a gradual increase in the number of women studying rheumatology becomes evident, as of those over the age of 58 years only 30% were women, while in the range >45 to 58 years they represented 51%, and in the age band from 37 to 45 years the proportion was 49.8%, while in those under the age of 37 years 56.9% are women.

Characteristics of the certification in force for adult rheumatologists

Until 2020 only 584 (65.1%) rheumatologists held CIF. The percentage of holders in the majority of states was higher than 60%. The lowest rates were found in Nayarit, Oaxaca, Tamaulipas and Veracruz (Table 2). The rheumatologists with CIF were younger (44.9 ± 11.8 years) than those who did not have CIF (55.36 ± 12.8 years) ($P < .000$). The rheumatologists who were younger than 50 years were more likely to hold CIF (79.9%) than those over the age of 50 years (51%) ($P < .000$; OR 1.57; CI 95% 1.39–1.76). A higher proportion of rheumatologists who live in Mexico City held CIF (74%), this being the capital city of the country, than those who live in the interior of the Republic (64.7%) ($P = .005$; OR 1.55; CI 95% 1.14–2.11). Women were more likely to hold CIF (70.4%) than men (60.6%) ($P = .002$; OR 1.54; CI 95% 1.17–2.04). No significant differences were found with the other variables analysed.

Paediatric rheumatologists

94 paediatric rheumatologists were certified prior to 2020, and data could only be obtained for 90 of them. Their average age was 42.25 ± 10.4 years. 62 (68.9%) were female (women/men ratio 2.2:1). They had an average of 7.6 ± 6.1 years' experience. There was no significant difference between the ages of the women and men (40.89 ± 9.5 vs. 45.28 ± 11.8 years; $P = .080$). The last reported location of each doctor was only available in 88 cases. The speciality of paediatric rheumatology was created in the country more than 20 years later than adult rheumatology, which explains the lower number of doctors and their shorter range of experience.

Forty-one paediatric rheumatologists are currently members of the CMR. A proportion of 0.21 paediatric rheumatologists per 100,000 of the population was found. Table 3 shows the distribution of paediatric rheumatologists in the different states, as well as the proportion per 100,000 inhabitants. A proportion ≥1 per 100,000 inhabitants was only found in México City (Table 3 and Fig. 3). There are few rheumatologists in the other states, and several states have no paediatric rheumatologist, so they are considered to lack medical care in this speciality. Fig. 4 shows the number of paediatric rheumatologists who graduate per year, with an important peak in 2004 (when adult rheumatologists who had received training and specialized in treating children graduated) with a gradual increase, above all in recent years. Unlike the adult rheumatologists, there is a clear predominance of female doctors in paediatrics. When they were divided by quartiles, 55% of those older than 46.5 years were found to be female doctors; 77.8% of those aged >40 to 46.5 years old were women, as were 60.9% of those aged from 34.5 to 40 years old. The corresponding figure for those under the age of 34.5 years was 85%.

Characteristics of certification in force for paediatric rheumatologists

Only 63 paediatric rheumatologists had CIF (70%). The percentage with CIF in the majority of the states with paediatric rheumatologists was higher than 50%, and in many it even reached

Table 3
Distribution of paediatric rheumatologists per state and proportion per 100,000 inhabitants.

State	Population <18 years (inhabitants) 2020	Paediatric rheumatologists n (%)[a]	Proportion per 100,000 inhabitants	With certification in force n (%)
Aguascalientes	517,162	0 (0)	0	0 (0)
Baja California	1,193,942	1 (1.1)	.08	0 (0)
Baja California Sur	262,522	1 (1.1)	.38	1 (100)
Campeche	317,258	0 (0)	0	0 (0)
Coahuila	1,093,564	1 (1.1)	.09	1 (100)
Colima	233,826	1 (1.1)	.43	1 (100)
Chiapas	2,296,653	0 (0)	0	0 (0)
Chihuahua	1,268,656	2 (2.2)	.16	1 (50)
Ciudad de México	2,303,162	47 (52.2)	**2.04**	31 (66)
Durango	676,894	0 (0)	0	0 (0)
Guanajuato	2,187,784	2 (2.2)	.09	2 (100)
Guerrero	1,361,501	0 (0)	0	0 (0)
Hidalgo	1,063,924	0 (0)	0	0 (0)
Jalisco	2,820,248	9 (10.0)	.32	9 (100)
Estado de México	5,598,732	8 (8.9)	.14	5 (62.5)
Michoacán	1,706,067	0 (0)	0	0 (0)
Morelos	635,205	1 (1.1)	.16	1 (100)
Nayarit	435,134	0 (0)	0	0 (0)
Nuevo León	1,853,344	6 (6.7)	.32	6 (100)
Oaxaca	1,505,682	0 (0)	0	0 (0)
Puebla	2,387,904	0 (0)	0	0 (0)
Querétaro	781,604	2 (2.1)	.26	1 (50)
Quintana Roo	604,949	0 (0)	0	0 (0)
San Luis Potosí	980,235	3 (3.3)	.31	1 (33.3)
Sinaloa	1,008,485	0 (0)	0	0 (0)
Sonora	979,563	0 (0)	0	0 (0)
Tabasco	862,293	0 (0)	0	0 (0)
Tamaulipas	1,166,487	0 (0)	0	0 (0)
Tlaxcala	469,123	2 (2.2)	.43	2 (100)
Veracruz	2,642,451	1 (1.1)	.04	0 (0)
Yucatán	747,608	1 (1.1)	.13	1 (100)
Zacatecas	600,012	0 (0)	0	0 (0)
Total	42,561,974	88 (97.8)	.21	63 (70)

The state where there is more than 1 rheumatologist/100,000 inhabitants (México City) is shown in bold type.
Source: INEGI 2020 national census.

[a] Two paediatric rheumatologists were not included as their data were not available.

Fig. 3. The proportion of paediatric rheumatologists per 100,000 inhabitants in the states of the Mexican Republic. The states in grey have no paediatric rheumatologists.

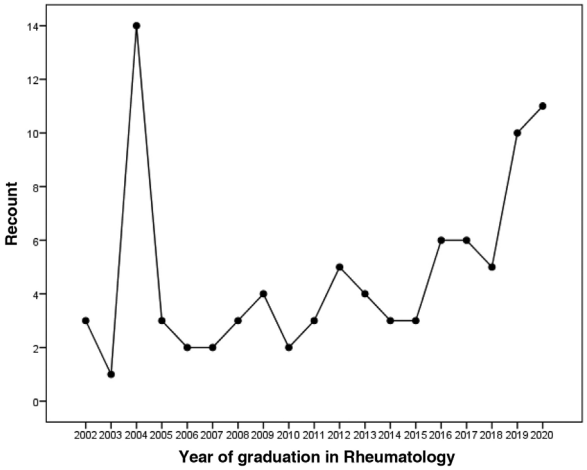

Fig. 4. Number of graduates (recount) per year in paediatric rheumatology.

100%. The lowest proportions with CIF were found in Baja California and San Luis Potosí (Table 3). Likewise, the rheumatologists with CIF were younger (40.12 ± 10.01 years) than those without CIF (47.61 ± 9.4 years) ($P = .003$). A higher proportion of the rheumatologists under the age of 42 years had CIF (87.8%) than those over the age of 42 years (46.9%) ($P < .001$; OR 1.87; CI 95% 1.28–2.75). A lower proportion of rheumatologists who live in the interior of the Republic have CIF (78%) than was the case for those who live in the capital city (66%), although this difference was not statistically significant ($P = .210$; OR 1.84; CI 95% 0.71–4.77). More women than men have CIF (72.6% vs. 64.3%) although this is not statistically significant ($P = .427$; OR 1.47; CI 95% 0.57–3.82). No significant differences were found in any of the other variables analysed.

Discussion

We found that most of the states in the Mexican Republic lack rheumatologists, particularly paediatric rheumatologists. The majority of healthcare systems in the world face the challenge of improving the disparities in medical staffing. Imbalances may be caused by a lack of staff in a specific speciality, geographic factors (rural areas in comparison with urban ones, or regions with differences in their economic growth), or they may be caused by institutional factors due to differences in resources and installations. Imbalances may also arise between the sexes; women in some regions may face greater difficulty in gaining professional work.[14] The regional lack of doctors has been generally identified, and it also exists in several specialities. It seems to be a global problem that also affects rheumatology. Several definitions have been used to determine which areas are poor in medical resources or lack medical staff. The threshold suggested by Lewin of 1.67 professionals/100,000 inhabitants has also been defined in terms of distance (>120.7 km) or travelling time (>90 min), although the standard most often used is one recommended by the WHO of one professional/100,000 inhabitants.[15,16,21] In 2012 a ratio of 0.47 rheumatologists/100,000 inhabitants was reported in México. Although this study found an improved figure of 0.67/100,000, there are still too few rheumatologists to meet the growing demand for care by patients with RD. Moreover, in state terms only México City and Jalisco have a proportion higher than one, and many regions in the country lack rheumatologists. This lack is even more market in the case of paediatric rheumatologists: the proportion of these is only higher than one in México City, and in 16 states there are none. This phenomenon is similar to reports in the literature.[13,22] Table 1 shows the density of rheumatologists/100,000 inhabitants in several countries, and only one third of these (9/27) have a density >1/100,000 inhabitants. Only 4 countries (France, Uruguay, Argentina and Spain) have more than 2 rheumatologists/100,000 inhabitants.[18,19,23] The distribution of rheumatologists is very uneven, and there are more in large cities or close to educational centres, and fewer in small towns or rural areas.

In 2009, Badía Flores and Arévalo Martínez estimated that in 2020, if the number of rheumatologists being created remained constant, there would be 733 specialists in this area but still a deficit, as the ideal would be to have 1157 rheumatologists.[24] Fortunately this estimate was surpassed, and in 2020 there was a total of 1002 rheumatologists, as the number graduating had gradually risen, even though this was insufficient because the population had also increased. In spite of the increase in the training of human resources, there is still a problem with having too few positions for rheumatologists in institutions, as this is considered to be a tertiary care sub-speciality. Positions in secondary care could be created, thereby improving the situation with a better balance between the regions in the speciality.

Certification is a process that seeks to guarantee that medical activity will be beneficial, with a regulatory framework to guide actions. Certification is governed by the General Health Law, and the National Normative Committee of Medical Speciality Councils regulates and unifies the processes for certification and recertification (CIF).[25] It is estimated that 93% of Mexican rheumatologists with CIF are members of the CMR.[26] This percentage is similar to the one reported in Spain (where 95% of rheumatologists are members of the Spanish Society of Rheumatology).[23]. Heinze-Martin et al. report in their study that CIF in adult as well as paediatric rheumatologists as a whole stand at 78% (73.3% in women and 56.4% in men), which is slightly higher than the overall average for specialists, which was 69%.[17] CIF in our study was 65% for adult rheumatologists and 70% for paediatric rheumatologists. The factors associated with a higher probability of CIF were a lower age, female sex and geographical location.

Men clearly predominate in the majority of medical specialities (above all in surgical specialities), with an overall ratio of 1.7 men for every woman. This work documents the increasing number of women in this speciality, above all in the last 5 years, and women now predominate over men in adult rheumatology. As Heinze-Martin et al.[17] report in their study, women predominate in paediatric specialities. The study by Sánchez-Piedra et al. also reports the increasing number of women in rheumatology in Spain, with a proportion of 59.7% women that is even higher among the younger specialists.[23] In China women predominate among the specialists aged under 40 years, with a male/female ratio of 1:1.7.[27] Nevertheless, the PANLAR report states that in the majority of Latin American countries men still predominate, with a ratio of 0.97 women for each man; however, they do not report if this changes among the younger specialists.[19] Although women now play an increasingly predominant role in rheumatology, some barriers still have to be overcome. A survey by Serna-Peña et al. of 127 female rheumatologists reported that 54.3% considered that they suffered discrimination due to their sex, and participated less in research activities and medical associations.[28] There is also still a "glass ceiling", as in the CMR, only 4 of its 48 presidents have been women (8.3%), while in the Mexican Council of Rheumatology, only 9 of 41 presidents have been women (21.95%).[29]

The strong points of this study are that as it reviews the databases of the CMR and the Mexican Council of Rheumatology, it gains a clearer record and location of the rheumatologists in the country. It is also important to separate the results of adult and paediatric rheumatologists, without examining them as a whole. The weak points of this study are that it lacks sufficient information to describe the type of care activity (public or private), whether all of the individuals registered are still working, and whether they

work exclusively in rheumatology, given that some work as internal medicine specialists or for the pharmaceutical industry, so that a more detailed survey would be necessary.

To conclude, there is a lack of rheumatologists in the majority of Mexican states, and this is even more pronounced in the paediatric area. It is important for health policies to consider the availability of rheumatology positions in a way that would allow this speciality to work in a more balanced and efficient way, taking into account the economic impact of RD and their association with physical disability. Although the majority of rheumatologists have a CIF, strategies should be implemented to increase this proportion.

Conflict of interests

The authors have no conflict of interests to declare.

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References

1. Brooks PM. The burden of musculoskeletal disease—a global perspective. Clin Rheumatol. 2006;25:778–81.
2. Woolf AD, Pfleger B. Burden of major musculoskeletal conditions. Bull World Health Organ. 2003;81:646–56.
3. World Health Organization. Scientific Group on the Burden of Musculoskeletal Conditions at the Start of the New Millennium. The burden of musculoskeletal conditions at the start of the new millennium: report of a WHO scientific group. Geneva: World Health Organization; 2003.
4. McIntosh E. The cost of rheumatoid arthritis. Br J Rheumatol. 1996;35:781–90.
5. González-Pier E, Gutiérrez-Delgado C, Stevens G, Barraza-Lloréns M, Porras-Condey R, Carvalho N, Loncich K, et al. Priority setting for health interventions in Mexico's system of social protection in health. Lancet. 2006;368:1608–18.
6. Hernandez-Cruz B, Ariza-Ariza R, Cardiel-Ríos MH. Costs of the standard rheumatology care in active rheumatoid arthritis patients seen in a tertiary care center in Mexico City. Reumatol Clin. 2006;2:124–30.
7. Mould-Quevedo J, Peláez-Ballestas I, Vázquez-Mellado J, Terán-Estrada L, Esquivel-Valerio J, Ventura-Ríos L, et al. Social costs of the most common inflammatory rheumatic diseases in Mexico from the patient's perspective. Gac Med Mex. 2008;144:225–31.
8. Alvarez-Hernández E, Peláez-Ballestas I, Boonen A, Vázquez-Mellado J, Hernández-Garduño A, Rivera FC, et al. Catastrophic health expenses and impoverishment of households of patients with rheumatoid arthritis. Reumatol Clin. 2012;8:168–73.
9. 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.
10. Freedman KB, Bernstein J. The adequacy of medical school education in musculoskeletal medicine. J Bone Joint Surg Am. 1998;80:1421–7.
11. Freedman KB, Bernstein J. Educational deficiencies in musculoskeletal medicine. J Bone Joint Surg Am. 2002;84:604–8.
12. Woolf AD. What healthcare services do people with musculoskeletal conditions need? The role of rheumatology. Ann Rheumatic Dis. 2007;66:281–2.
13. Al Maini M, Adelowo F, Al Saleh J, Al Weshahi Y, Burmester GR, Cutolo M, et al. The global challenges and opportunities in the practice of rheumatology: white paper by the World Forum on Rheumatic and Musculoskeletal Diseases. Clin Rheumatol. 2015;34:819–29.
14. Zurn P, Dal Poz MR, Stilwell B, Adams O. Imbalance in the health workforce. Hum Resour Health. 2004;2:13.
15. Schmajuk G, Tonner C, Yazdany J. Factors associated with access to rheumatologists for medicare patients. Semin Arthritis Rheum. 2016;45:511–8.
16. FitzGerald JD, Battistone M, Brown CR Jr, Cannella AC, Chakravarty E, Gelber AC, et al. American College of Rheumatology Committee on Rheumatology Training and Workforce Issues. Regional distribution of adult rheumatologists. Arthritis Rheum. 2013;65:3017–25.
17. Heinze-Martin G, Olmedo-Canchola VH, Bazan-Miranda G, Bernard-Fuentes NA, Guizar-Sanchez DP. Los medicos especialistas en Mexico. Gac Med Mex. 2018;154:342–51.
18. Dejaco C, Lackner A, Buttgereit F, Matteson EL, Narath M, Sprenger M. Rheumatology workforce planning in Western countries: a systematic literature review. Arthritis Care Res (Hoboken). 2016;68:1874–82.
19. Fernández-Ávila DG, Patino-Hernandez D, Kowalskii S, Vargas-Caselles A, Sapag AM, Cachafeiro-Vilar A, Meléndez-Muñoz L, et al. Current status of the rheumatologists' workforce in Latin America: a PANLAR collaborative study. Clin Rheumatol. 2021;40:2913–20.
20. Instituto Nacional de Estadística y Geografía. Población total por entidad federativa y grupo quinquenal de edad según sexo, serie de años censales de 1990 a 2020. Tabla de población total por entidad federativa [Accessed 16 April 2021]. Available from: https://www.inegi.org.mx/app/tabulados/interactivos/?pxq=Poblacion_Poblacion_01_b0cd5bac-d8a2-4c83-95d5-7e3b97518d1e.
21. Badley EM, Canizares M, Gunz AC, Davis AM. Visits to rheumatologists for arthritis: the role of access to primary care physicians, geographic availability of rheumatologists, and socioeconomic status. Arthritis care Res (Hoboken). 2015;67:230–9.
22. Watad A, Al-Saleh J, Lidar M, Amital H, Shoenfeld Y. Rheumatology in the Middle East in 2017: clinical challenges and research. Arthritis Res Ther. 2017;19:149.
23. Sánchez-Piedra C, Álvaro-Gracia JM, Bustabad-Reyes S, Díaz-González F. Realidad de la reumatología en España y sus comunidades autónomas antes de la pandemia. Reumatol Clin. 2021, http://dx.doi.org/10.1016/j.reuma.2021.07.005, in press.
24. Badia Flores JJ, Arévalo Martínez FG. [Mexican rheumatologists. National distribution in 2007 and projected distribution for 2025] Spanish. Reumatol Clin. 2009;5:140–1.
25. Pascual Ramos V, Medrano Ramírez G, Solís Vallejo E, Bernard Medina AG, Flores Alvarado DE, Portela Hernandez M, et al. Performance of an objective structured clinical examination in a national certification process of trainees in rheumatology. Reumatol Clin. 2015;11:215–20.
26. Ordinola Navarro A, López Luis BA, Vera-Lastra O. Situación de la reumatología en México. Déficit de reumatólogos en el país. Reumatol Clin. 2022, http://dx.doi.org/10.1016/j.reuma.2021.12.002, in press.
27. Zhang F. The China rheumatology workforce: a status report. Int J Rheum Dis. 2009;12:279–82.
28. Serna-Peña G, Colunga-Pedroza IJ, Galarza-Delgado DA, Pacheco-Tena CF, Alpizar-Rodríguez D, Guajardo-Jauregui N. Mujeres en la reumatología: barreras, limitantes y disparidad de género. Reumatol Clin. 2021;17 Suppl 1:148.
29. Guajardo-Jauregui N, Colunga-Pedroza IJ, Alpizar-Rodríguez D, Serna-Peña G, Galarza-Molina R, Galarza-Delgado D, et al. El «techo de cristal» en la reumatología mexicana. Reumatol Clin. 2021;17 Suppl 1:147–8.