



Original Investigation

Current status of musculoskeletal ultrasound in Colombian rheumatology

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ABSTRACT

Introduction: Ultrasound is very useful in the management of rheumatological pathology today. Despite this, in Colombia, progress towards its implementation is limited and entails great difficulties. This deficit is also related to the difficulties in training new human talent. In Colombia, there is no study that identifies the current status of ultrasound among rheumatologists in the country.

Methods: This is a descriptive cross-sectional study where medical specialists in Rheumatology practising in Colombia were surveyed through an online form. They were asked about general aspects and for their opinion regarding ultrasound in rheumatology and, if they practiced it, they were asked about specific aspects of its application in clinical practice. Additionally, questions were asked of the rheumatologists who are part of the specialist training processes in the country. Closed multiple-choice or Likert scale assessment questions were presented as required. The main objective was to describe the current use and opinion of musculoskeletal ultrasound in Colombian rheumatologists, as well as the limitations for its implementation. Frequency measurements were performed of the categorical variables of nominal type and ordinal type. The intention was to survey all rheumatologists in the country, who according to Colombian Society of Rheumatology data for the end of 2019 totalled 186.

Results: Taking into account the number of rheumatologists of the Colombian Association of Rheumatology (Asoreuma) for 2019 totalling 186, a participation of 139 specialists (74.7%) was obtained, of which 22 of the respondents performed ultrasound in their daily practice (15.8%) the majority in this group being trained in Colombian territory (80.6%). Of the

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139 respondents, 64.7% have received some type of training in ultrasound, generally pre-congress courses (22.5%), EULAR courses (16.7%) and training included in their residency curriculum outside the rheumatology service (9.8%). The acceptance of ultrasound is high among rheumatologists practicing in Colombia, 75.5% consider it important or very important and 84.9% indicated that for a comprehensive rheumatology service it is important or very important to have ultrasound. From the responses, however, they consider that its use could change their behaviour frequently, and very frequently in less than half of the cases at 46.7%. Regarding the opinion on the use of ultrasound in specific pathologies, rheumatoid arthritis (77.7%) and crystal arthropathies (72.7%) were considered the highest and most important, as well as in the performance of procedures at 87%. For decision-making in the inflammatory pathology study, 60.4% would consider performing ultrasound compared to 28.8% who responded MRI. Regarding the limitations for implementation, the lack of training in the country (25.6%), followed by the lack of resources to procure equipment (17.9%) and ignorance and lack of interest on the part of the health entities (17.1%) were the most recognized.

Conclusion: Musculoskeletal ultrasound is only practiced by a minority of rheumatologists practicing in Colombia, even though the majority consider it important. Its importance lies in its use to treat patients with rheumatoid arthritis, crystal arthropathies and psoriatic arthropathy, as well as for the performance of procedures. More than half of the rheumatologists have received some type of training in ultrasound, usually very few hours' education and without practical or informal training, this being the main problem for its implementation.

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Estado actual de la ecografía musculoesquelética en la reumatología colombiana

R E S U M E N

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Introducción: En la actualidad la ecografía es de gran utilidad en el manejo de la patología reumatológica. A pesar de esto, en Colombia los avances para su implementación son escasos y han enfrentado grandes dificultades. Este déficit también se encuentra relacionado con las dificultades para la formación del nuevo talento humano. En Colombia no se dispone de ningún estudio en el que se identifique el estado actual de la ecografía entre los reumatólogos del país.

Métodos: Se trata de un estudio descriptivo de carácter transversal en el cual se encuestó, por medio de un formulario *on-line*, a médicos especialistas en reumatología que hacen su práctica en el territorio colombiano. Se les preguntó acerca de los aspectos generales y su opinión sobre la ecografía en la reumatología, si la practicaban, como también en torno a los aspectos específicos de su aplicación en la práctica clínica. De forma adicional, se formularon preguntas dirigidas a aquellos reumatólogos que hacen parte de los procesos de formación de especialistas en el país; se presentaron preguntas cerradas de opción múltiple o de valoración por escala de Likert según se requiera. El objetivo principal fue describir el uso y la opinión actual sobre la ecografía musculoesquelética en reumatólogos colombianos, así como las limitantes para su implementación. A las variables categóricas de tipo nominal y de tipo ordinal se les hicieron medidas de frecuencia. Se pretendía encuestar a la totalidad de los reumatólogos en el país, los cuales según información de la Asociación Colombiana de Reumatología (Asoreuma) de finales del 2019 eran 186.

Resultados: De acuerdo con el número de reumatólogos proporcionado por Asoreuma, de 186 especialistas en el año 2019, se obtuvo una participación de 139 de estos (74,7%), de los cuales 22 realizaban ecografía en su práctica diaria (15,8%), siendo este grupo en su mayoría formado en Colombia (80,6%). De los 139 encuestados, el 64,7% había recibido algún tipo de formación en ecografía, generalmente cursos precongreso (22,5%), cursos EULAR (16,7%) y formación incluida en el pensum de su residencia fuera del servicio de reumatología (9,8%). La aceptación de la ecografía es alta entre los reumatólogos que ejercen en Colombia, el 75,5% la consideraron importante o muy importante. Asimismo, el 84,9% indicó que para un servicio de reumatología integral es importante o muy importante contar con ecografía. Sin embargo, los encuestados consideraron que su uso podría llegar a cambiar su conducta

de forma frecuente, y muy frecuentemente en menos de la mitad de los casos (46,7%). Con respecto a la opinión sobre el uso de la ecografía en patologías específicas, se consideró con importancia y mucha importancia en artritis reumatoide (77,7%) y artropatías por cristales (72,7%), que fueron las más altas, así como para la realización de procedimientos (87%). Para la toma de decisiones en estudio de patología inflamatoria, el 60,4% consideraría realizar ecografía, comparado con 28,8% que se inclina por la resonancia. En relación con las limitaciones para la implementación, la falta de entrenamiento en el país (25,6%), seguida de la carencia de recursos para la consecución del equipo (17,9%) y el desconocimiento y la falta de interés por parte de los entes de salud (17,1%) fueron las más reconocidas.

Conclusiones: La ecografía musculoesquelética solamente es practicada por una minoría de los reumatólogos que ejercen en Colombia, a pesar de que la mayoría la considera importante. Su importancia radica en su uso para tratar a los pacientes con artritis reumatoide, artropatías por cristales y por artropatía psoriásica, así como para la realización de procedimientos. Más de la mitad de los reumatólogos han recibido algún tipo de formación en ecografía, la mayoría de las veces educación de muy pocas horas o sin entrenamiento práctico o no formal, lo cual constituye el principal problema para su implementación.

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Introduction

Musculoskeletal ultrasound has shown to be very useful as a diagnostic and therapeutic aid in pathologies of the locomotor system, both of mechanical and inflammatory origin, with a high cost-effectiveness profile. Practically, its usefulness in rheumatology has been studied for more than 20 years.¹⁻³ Multiple studies that have shown its advantages, such as cost, ease of application, validity and few side effects have been carried out.

For this reason, ultrasound is a fundamental part of the care of rheumatology patients in European countries or in the United States, and also constitutes a fundamental part of the training process for new rheumatologists.

In some countries, studies have been conducted to assess the state of the application of ultrasound through surveys, which has contributed to its implementation.⁴⁻⁶

Unlike the foregoing, the generalization of this practice has not been achieved in Colombia, due to multiple factors, and its development is very poor or minimal.

In Colombia, a developing country with 48,258,494 inhabitants,^{7,8} there are no exact data on how many rheumatologists there are currently or on those who are practicing the profession. However, it is estimated that in 2020 there were 186 of these specialists in the national territory, a figure 5.8 times below the standard suggested by the World Health Organization (WHO).

There are currently seven training schools for the specialization in rheumatology (fellowship) in the country, few of them contemplate ultrasound training, while in those that do it, its application has been very recent.

The Colombian Association of Rheumatology (Asoreuma) has shown interest in training in this area. In 2010, with the support of the pharmaceutical industry and the *Universidad de la Sabana*, the first diploma course in musculoskeletal ultrasound for rheumatologists was achieved, in which eight national and foreign professionals in the areas of rheumatol-

ogy and radiology participated. This allowed to create a second cohort of participants that, later, had to be discontinued due to lack of economic resources.

The Direction of Postgraduate Studies of the Faculty of Medicine of the *Universidad de la Sabana* planned a more ambitious program of specialization in musculoskeletal ultrasound, and the approval was obtained from the University and the Ministry of Education. However, the process could not be concreted because the Ministry of Health considered that the country had too many specialization programs in medicine and the one proposed was not pertinent at the time.

Subsequently, with the support of professors from the European League Against Rheumatism (EULAR), the pharmaceutical industry and trained Colombian rheumatologists, Asoreuma has developed in two occasions the basic training course in musculoskeletal ultrasound of EULAR, with the participation of a good number of rheumatologists members of Asoreuma. Likewise, training events have been organized such as the First Course on Musculoskeletal Ultrasound, in August 2013, and other professional training courses on specific aspects of ultrasound applied to rheumatic diseases.

In Europe and closer to our environment, Spain has made efforts to spread the use of musculoskeletal ultrasound. For this, questionnaires addressed to rheumatologists have been used initially with the intention of making a diagnosis of their opinion on ultrasound, its use in current practice and the degree of training, with which it was possible to identify shortcomings and, subsequently, to take actions. The ultrasound study group was created and it was possible to implement ultrasound in the training program for residents, as well as courses addressed to residents and rheumatologists at five levels, in order to achieve dissemination and accreditation in said area.

In Latin America, the Ultrasound Study Group of the Pan-American League of Associations for Rheumatology (PANLAR) has also conducted similar studies to collect data regarding the use, education, and applicability of ultrasound.

In Colombia, there is no study available in which the current status of this diagnostic procedure is identified; therefore, the objective of this work was to develop a first diagnosis on musculoskeletal ultrasound among the rheumatologists of the country.

Methodology

This is a descriptive cross-sectional study. Medical specialists in rheumatology who were practicing in Colombian territory were surveyed through an online form that could be filled out from any device with Internet access. One or several surveys, built and designed in the first instance to evaluate the general aspects and the opinion about ultrasound at their work as rheumatologists were applied to all the participants in a virtual manner. The main questionnaire was divided into five sections: general data, demographic data, ultrasound training within their specialization in rheumatology or through other courses, and opinion about ultrasound applied in rheumatology and its potential usefulness.

A second survey was applied to those who initially answered that they currently used ultrasound in their daily medical practice. Finally, a special survey was carried out to some residents in rheumatology from different schools in the country. The items in this survey were based on those previously conducted in other countries. Multiple choice closed questions or Likert scale assessment were presented, as required. The surveys were self-administered. A pilot test was carried out with 10 rheumatologists for changes if necessary, whether of drafting or others.

The main objective was to describe the current use and opinion on musculoskeletal ultrasound in rheumatologists who practice in Colombia, as well as the limitations for its implementation, and as secondary objectives, it was raised to know the situation and the characteristics of the rheumatologists who use ultrasound and the state of ultrasound training in the specialty programs at the national level.

A statistical sample size calculation was not performed. Due to the characteristics of the study, it was expected to include the total number of rheumatologists of Colombia or the largest possible number of them.

The categorical and quantitative variables were organized using the IBM SPSS Statistics version 24 program for statistical analysis. Some of these variables, such as the age of the participants, were organized into intervals, to handle easily the large amount of data. Frequency measurements were performed of the categorical variables of nominal type and ordinal type; in this case, point prevalences presented in the corresponding distribution tables were measured. Some of the important variables are located in tables in which the frequencies of one variable with respect to the other are described, without pretending to make a statistical inference, but rather to make a characterization of the set of data obtained.

The acceptance to answer the survey was considered as informed consent. Given that it is a risk-free study, as it does not have sensitive issues for the participants, it was not submitted to an ethics committee. No payments or incentives were offered, respondent confidentiality was maintained, and data was handled only by the researchers.

Results

A participation of 139 specialists (74.7%) of the 186 rheumatologists registered by Asoreuma was obtained, of whom 22 performed ultrasound in their daily practice (15.8%).

The largest records were obtained in the main cities: Bogotá (44.8%), Medellín (16.1%) and Cali (7.7%), which is consistent with the data of higher concentration of rheumatologists, although answers of many other cities of the Colombian territory were obtained, which were grouped into «other cities» since their individual frequency was less than 4%.

The majority of the group was in the age ranges of 40–49 years (35.2%) and 30–39 years (34.5%), while less frequently they were located between 60 and 69 years (17.9%).

Most of the rheumatologists who answered the survey studied in Colombian territory (80.6%), compared with the minority of those trained abroad (19.4%).

Regarding ultrasound training, of the 139 rheumatologists who participated, 64.7% had received some type of education in ultrasound, while 35.3% denied it.

The type of ultrasound studies performed is summarized in [Table 1](#). Among the participants, attendance to pre-congress courses is frequent (22.5%), followed by EULAR courses (16.7%) and training included in their residency curriculum, but outside the rheumatology service (9.8%), that is, they have done rotations in radiology services or external rotations and, in third place, 9.3% stated that they have had training included in the residency curriculum. 7.8% of the rheumatologists had been trained by diploma courses, while in 4.4% of the cases they had taken courses from the Spanish Society of Rheumatology (SER). 24.3% of the respondents indicated that they had not had any training in musculoskeletal ultrasound. Later in [Table 1](#), although some indicated the “pre-congress courses” as the received training, those which contemplated some certification and practice were considered relevant, and therefore, they will be adapted to the current recommendations for ultrasound training.⁹⁻¹¹

Of the specialists who studied in Colombia, 62.5% had received some training in ultrasound, while in the group of specialists educated abroad, 74.1% had received training in ultrasound, with the exception of those who studied in Europe (the majority in Spain), which in 100% of the cases received training during their residency, certified SER courses or EULAR courses.

To ask for the opinion about musculoskeletal ultrasound in rheumatology, Likert scale was used in which 1 was without importance and 5 was very important.

The acceptance of ultrasound is high among the rheumatologists who practice in Colombia, 75.5% consider it important or very important (Likert summation 4 and 5) and 84.9% judge as important or very important that a comprehensive rheumatology service has ultrasound (Likert 4 and 5). 74.1% accept that if they had it in their office they could use it frequently or very frequently (Likert 4 and 5), while 46.7% indicate that its use could change their behaviour frequently or very frequently in less than half of the cases (Likert 4 and 5). The majority consider that their patients would be more satisfied with their care (78.4%) (Likert 4 and 5: satisfied and very satisfied). The results are summarized in [Table 2](#).

Table 1 – Frequency of education in ultrasonography among rheumatologists.

Type of ultrasound training	Absolute frequency	Relative frequency
Pre-congress courses	46	22.5%
EULAR courses	34	16.7%
Training included in their residency curriculum, OUTSIDE the rheumatology service (e.g. external rotation in radiology)	20	9.8%
Training included in the curriculum of their residency WITHIN the same rheumatology service	19	9.3%
Diploma course	16	7.8%
SER (Spanish Society of Rheumatology) courses	9	4.4%
Master's degree	3	1.5%
Own. Autodidact	3	1.5%
Course of the Colombian Association of Rheumatology	2	1.0%
Workshops sponsored by the industry	2	1.0%
PANLAR courses	1	0.5%
None	49	24.0%
Total	204	100.0%

EULAR: European League Against Rheumatism; PANLAR: Ultrasound Study Group of the Pan-American League of Associations for Rheumatology.

Table 2 – Perception of musculoskeletal ultrasound among the Colombian rheumatologists.

	1	2	3	4	5
<i>Importance</i>					
How much usefulness or importance do you see in the use of musculoskeletal ultrasound applied in rheumatology?	1.4%	5.0%	18.0%	33.1%	42.4%
Do you consider it important that a comprehensive rheumatology service have this diagnostic support tool?	1.4%	4.3%	9.4%	28.8%	56.1%
How much importance would you give to the implementation of education in the musculoskeletal ultrasound technique in rheumatology teaching units and by scientific societies in the country?	0.7%	2.2%	9.4%	43.9%	43.9%
Do you consider that the current effort in musculoskeletal ultrasound training is adequate?	20.9%	25.9%	36.7%	10.1%	6.5%
<i>Frequency</i>					
If you had an ultrasound machine in your office and you were trained in ultrasound, would you use it in your clinical practice?	2.2%	7.2%	16.5%	31.7%	42.4%
How often do you think your clinical behaviour would change if you use an ultrasound in your practice?	3.6%	11.5%	38.1%	30.2%	16.5%
<i>Satisfaction</i>					
What degree of satisfaction do you think your patients would have if you relied on the use of ultrasound in your practice?	2.9%	4.3%	14.4%	36.0%	42.4%

1 = without importance/never/no satisfaction, 2 = little importance/very infrequent/little satisfaction, 3 = moderately important/infrequent/moderate satisfaction, 4 = important/frequently/high satisfaction, 5 = very important/very frequent/very high satisfaction.

Table 3 – Perception of the importance of the use of musculoskeletal ultrasound in specific pathologies or conditions.

Perception of the importance of the use of ultrasound by pathology	1	2	3	4	5
Rheumatoid arthritis	2.2%	3.6%	16.5%	37.4%	40.3%
Psoriatic arthropathy	1.4%	7.2%	20.1%	38.8%	32.4%
Microcrystalline arthropathies	4.3%	3.6%	19.4%	36.7%	36.0%
Primary arthrosis	16.5%	18.0%	37.4%	20.9%	7.2%
Scleroderma and mixed connective tissue disease	12.2%	17.3%	36.7%	25.2%	8.6%
Spondyloarthropathies	1.4%	7.2%	22.3%	45.3%	23.7%
Ultrasound guided interventionism	1.4%	2.2%	9.4%	38.1%	48.9%
Systemic lupus erythematosus	11.5%	23.0%	38.1%	22.3%	5.0%
Inflammatory myopathies	10.1%	15.1%	40.3%	24.5%	10.1%
Orientation of non-autoimmune musculoskeletal pain	3.6%	10.1%	22.3%	33.8%	30.2%
Polymyalgia rheumatica	3.6%	8.6%	19.4%	38.1%	30.2%
Large vessel vasculitis	4.3%	6.5%	23.0%	33.1%	33.1%

1 = not important at all, 2 = of little importance, 3 = some importance, 4 = important, 5 = very important.

Table 4 – Frequency of diagnostic tests that rheumatologists would perform in case of doubt about joint inflammatory activity in their patient.

In case of doubt about the joint inflammatory activity of your patient, assuming the case in which semiology and laboratory tests are normal or do not provide information to make a clinical decision, would you choose to perform any of the following diagnostic tests?	Absolute frequency	Relative frequency
Soft tissue ultrasound with power Doppler assessment by rheumatology	84	60.4%
Nuclear magnetic resonance with or without contrast	41	28.8%
I would not perform any other test	7	5.0%
Soft tissue ultrasound by radiology	4	2.9%
Arthrocentesis - biopsy	2	1.4%
I would choose the procedure according to the clinic picture	2	1.4%
Total	140	100.0%

The opinion of rheumatologists on the use of ultrasound in specific pathologies is gathered in [Table 3](#). In this last case, a Likert scale was also applied (1: no importance, 5: very important). The highest rating frequencies in the importance of musculoskeletal ultrasound, that is, Likert summations 4 and 5, are observed in ultrasound-guided interventionism (87%); in the second place, rheumatoid arthritis (77.7%), followed by microcrystalline arthropathy (72.7%) and psoriatic arthropathy (71.2%). The lowest scores, that is, Likert summations 1 and 2, are estimated in systemic lupus erythematosus and primary osteoarthritis, with 35%, followed by scleroderma and mixed connective tissue disease (29.5%) and inflammatory myopathies (25.2%).

Regarding the opinion for decision-making, when asked if there was any doubt about the inflammatory activity of the patients, more than half (60.4%) answered that they would request or perform an ultrasound by rheumatology and, secondly, would carry out a nuclear magnetic resonance with or without contrast as a diagnostic aid (28.8%). A very low percentage would not perform any additional test (5%) and very few would request an ultrasound performed by a radiologist (2.9%). ([Table 4](#)).

When asked about the main limitation in the systematic application of musculoskeletal ultrasound in rheumatology in Colombia, the majority of the respondents opined that it is related to the lack of training in the country (25.6%), followed by the lack of resources for the attainment of the equipment (17.9%), the scant interest of health entities with respect to ultrasound (17.1%) and the lack of tools for its correct billing or charging of fees (15%) ([Table 5](#)).

Of the 139 respondents, 22 rheumatologists stated that they perform ultrasound in their daily practice (15.8%), with no major differences among the age groups of those who practice it: 33.3% in the group between 50 and 59 years, 28.6% in the group between 40 and 49 years and 23.8% in the group between 30 and 39 years.

Regarding the applicability of ultrasound and the exploration of the remuneration context, 50% of the rheumatologists who perform ultrasound have their own ultrasound machine; in 36.4% of the cases the ultrasound scanner belongs to the entity where the specialist works and 13.6% have equipment on loan or rental. The ultrasound machine is used in private practice (44.8%), followed by the use for the public system or for the healthcare providers (24.1%) and with educational and research purposes (20.7 and 10.3%, respectively).

The vast majority of rheumatologists who use ultrasound do not charge any additional fee for using it in their practice (73%).

It is found that of the six rheumatologists (27%) who receive fees for performing musculoskeletal ultrasound, 37.5% do it in their private practice, the same percentage (37.5%) accrues from the healthcare system and 25% (two of the respondents) gets paid for performing ultrasound in the educational context, that is, teaching exclusively.

When asked about the use of ultrasound in daily consultation, the respondents reported that they used it mainly as a diagnostic aid in the evaluation of inflammatory activity in patients with arthritis (34%), followed by diagnosis in non-inflammatory musculoskeletal pain (26%), diagnosis of inflammatory joint pain (20%), to perform guided joint infiltrations (10%) and to perform guided infiltrations in soft tissues (8%) ([Table 6](#)).

The pathologies in which ultrasound is most frequently used are rheumatoid arthritis (30.8%), microcrystalline arthritis (24.6%), spondyloarthropathies and psoriatic arthropathy (13.8%), while it is rarely used in large vessel vasculitis and arthralgia without arthritis, with a frequency of 1.5% in each of these latter cases ([Table 7](#)).

Of those consulted who perform ultrasound in their usual practice, 81.8% do some ultrasound-guided procedure or intervention, being joint infiltrations the most frequent (27.8%), followed by therapeutic arthrocentesis (25%), infiltrations for the rotator cuff syndrome (15%) or of soft tissues (12.5%), as well as for drainage of Baker's cyst (6.9%).

A special section of the survey made reference to musculoskeletal ultrasound seen from the training part of the rheumatology programs ([Table 8](#)).

As described above, more than half of the rheumatologists surveyed have received some type of certified training in ultrasound (64.7%).

There are currently in Colombia seven schools of rheumatology for internists, with a training that lasts two years. Some of the residents of the different training schools were surveyed and it was found that only two programs contemplate studies in musculoskeletal ultrasound within their curriculum, with training times that range from dedicating around 10 h per week to devote 200 h.

In five of the seven programs there are centers of practice in which musculoskeletal ultrasound is performed and it is noted, for example, that within the same program there may

Table 5 – Frequency of those that are considered the greatest limitations for the systematic application of musculoskeletal ultrasound in Colombia.

What do you think is the main limitation in the systematic application of musculoskeletal ultrasound in rheumatology in Colombia? Select several options if you consider it so	Absolute frequency	Relative frequency
Lack of training in the Colombian rheumatology educational programs	99	25.6%
Lack of resources to purchase equipment	69	17.9%
Lack of knowledge and interest of the health entities (rheumatologists and administrators)	66	17.1%
Lack of administrative tools for correct billing	58	15.0%
Lack of dissemination or general education of its advantages and disadvantages	43	11.1%
Obstruction by other medical specialties/guilds	28	7.3%
Lack of interest by the scientific society	16	4.1%
Low professional fees	2	0.5%
There is not unification of criteria for this	2	0.5%
It is necessary to position ultrasound as a procedure performed by a trained rheumatologist	1	0.3%
The duration of the consultation is not enough	1	0.3%
The field is already better covered by radiology	1	0.3%
Total	386	100.0%

Table 6 – Frequency of ultrasound studies applied in rheumatology.

Ultrasound studies applied to rheumatology performed most frequently	Absolute frequency	Relative frequency
Evaluation of inflammatory activity in the patient with arthritis	17	34.0%
Diagnosis in musculoskeletal pain (tendinitis, enthesitis, bursitis, soft tissue tears)	13	26.0%
Diagnosis in joint pain: arthritis	10	20.0%
Guided joint infiltrations	5	10.0%
Guided soft tissue infiltrations (tendonitis, bursitis, blockages, etc.)	4	8.0%
Locate-mark the site of the biopsy (temporal arteritis, muscular, synovial)	1	2.0%
Total	50	100.0%

Table 7 – Pathologies in which ultrasound is most frequently used.

Pathologies in which ultrasound is most frequently used	Frequency	Percentage
Rheumatoid arthritis	20	30.8%
Microcrystalline arthritis	16	24.6%
Psoriatic arthropathy	9	13.8%
Spondyloarthropathies	9	13.8%
Other non-autoimmune disorders of the locomotor system (e.g. rotator cuff disease, Quervain's tenosynovitis)	5	7.7%
Primary arthrosis	4	6.2%
Arthralgia without arthritis	1	1.5%
Large vessel vasculitis (temporal arteritis-Takayasu)	1	1.5%
Total	65	100.0%

be practice centers where training in musculoskeletal ultrasound is carried out and others where it is not. Of the practice centers, only three have their own ultrasound machine in the rheumatology service, while only on one occasion is it reported that the practices are carried out in the radiology unit of the practice center. Likewise, only in one occasion it is known that the rheumatologist who teaches the subject is certified in this area.

90.6% of the residents surveyed are interested in complementing their training in rheumatology and musculoskeletal ultrasound with an external rotation and have had an interest in learning and using musculoskeletal ultrasound; 100% of them state that they know the advantages of using ultrasound in rheumatology practice. None of the residents have identified or know of any certified training program for musculoskeletal ultrasound in the country at present.

Discussion

Musculoskeletal ultrasound is a technique widely used for more than two decades for the diagnosis and management of patients with pathologies of the locomotor system. Rheumatologists have a fundamental advantage with the use of ultrasound which is being able to correlate the image with the clinical picture of the patient to achieve a more accurate diagnosis and therefore an aid in clinical decision-making,¹²⁻¹⁵ in addition, it is correlated with better indicators of patient satisfaction.¹⁶ With this, its evolution has been seen in rheumatology, being implemented more and more strongly in developed countries; however, in Colombia this has not been easy, so the reason for carrying out this study is to make a first diagnosis regarding its use and the possible factors that limit it.

Table 3 – Summary of responses provided by some residents of the rheumatology postgraduate programs in Colombia.

	UNAL*	U. de La Sabana	U. ICESI	FUCS**	U. de Antioquia	UMNG***	UPB ****	U. El Bosque ^a
Does the main practice center perform musculoskeletal ultrasound?	NO	NO	YES	YES	YES/NO	YES	YES	YES/NO
Does the practice center have its own ultrasound machine?	NO	NO	YES	NO	NO	YES	NO	YES/NO
Ultrasound training included in the curriculum	NO	NO	NO	YES	NO	YES	NO	NO
How many hours of training does the program include?	N/A	N/A	N/A	10 hours/week	N/A	200 hours/total	N/A	N/A
Do you know if the rheumatologists who teach the course are certified in musculoskeletal ultrasound?	N/A	N/A	N/R	YES	N/R	NO	N/R	N/R
If the rheumatology service DOES NOT have its own ultrasound machine for routine practice, where do they perform musculoskeletal ultrasound practices?	N/A	N/A	N/A	N/A	N/A	Radiology Service	N/A	N/A

N/A: there is no information available.

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^a Postgraduate studies in Pediatric rheumatology.

This is the first Colombian study that provides data on the current situation of musculoskeletal ultrasound in the country through the use of a structured questionnaire.

Our main limitation consisted in the lack of exact data on the number of rheumatologists who practice in Colombia today. Administrative entities such as the Colombian Medical College and the Ministry of Health did not provide us with estimated data on the number of rheumatologists at present. Only Asoreuma provided us with the closest data on the actual number of rheumatologists who practice in the national territory, but it must be taken into account that a large number of professionals are not part of said scientific society. Despite this, we were able to obtain responses from more than half of the population of medical specialists registered by the aforementioned entity.

Many of those who responded to the survey are rheumatologists who know or are familiar with ultrasound, which could induce biases, since those who are not related to this imaging method may not be interested in it and, therefore, did not answer the survey.

In our first diagnosis in the Colombian setting, we can see that, even though the technique is quite well accepted among the rheumatologists and could significantly influence clinical decision-making, there is very little use of it in daily practice, compared with other countries, especially European. The

main limiting factors reported in the local environment are the low training offer, the scarce dissemination of its advantages (such as its low cost and the reliability for the administrative health entities that manage the public expenditure), the difficulty in obtaining the equipment and the insufficient or non-existent financial recognition in fees for those who practice it.

These data will be useful to address these problems by the scientific society, the Colombian Study Group of Musculoskeletal Ultrasound in Rheumatology, and with this, to propose improvement plans.

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