RMD Open
Rheumatic & Musculoskeletal Diseases

ORIGINAL RESEARCH

Incidence and clinical manifestations of giant cell arteritis in Spain: results of the ARTESER register

Delia Fernández-Lozano ,[1] Iñigo Hernández-Rodríguez,[2] Javier Narvaez ,[3] Marta Domínguez-Álvaro ,[4] Eugenio De Miguel ,[5] Maite Silva-Díaz ,[6] Joaquín María Belzunegui,[7] Clara Moriano Morales,[8] Julio Sánchez,[9] Eva Galíndez-Agirregoikoa,[10] Vicente Aldaroso,[11] Lydia Abasolo,[12,13] Javier Loricera ,[14,15] Noemi Garrido-Puñal,[16] Patricia Moya Alvarado ,[17] Carmen Larena,[18] Vanessa Andrea Navarro,[19] Joan Calvet ,[20,21] Ivette Casafont-Solé,[22] Francisco Ortiz-Sanjuán,[23] Tarek Carlos Salman Monte ,[24] Santos Castañeda ,[25] Ricardo Blanco ,[14,15] on behalf of the ARTESER Project Collaborative Group

To cite: Fernández-Lozano D, Hernández-Rodríguez I, Narvaez J, *et al*. Incidence and clinical manifestations of giant cell arteritis in Spain: results of the ARTESER register. *RMD Open* 2024;**10**:e003824. doi:10.1136/rmdopen-2023-003824

► Additional supplemental material is published online only. To view, please visit the journal online (https://doi.org/10.1136/rmdopen-2023-003824).

Received 11 November 2023
Accepted 1 March 2024

For numbered affiliations see end of article.

Correspondence to
Dr Ricardo Blanco;
rblancovela@gmail.com

ABSTRACT

Objective This study aimed to estimate the incidence of giant cell arteritis (GCA) in Spain and to analyse its clinical manifestations, and distribution by age group, sex, geographical area and season.

Methods We included all patients diagnosed with GCA between 1 June 2013 and 29 March 2019 at 26 hospitals of the National Health System. They had to be aged ≥50 years and have at least one positive results in an objective diagnostic test (biopsy or imaging techniques), meet 3/5 of the 1990 American College of Rheumatology classification criteria or have a clinical diagnosis based on the expert opinion of the physician in charge. We calculated incidence rate using Poisson regression and assessed the influence of age, sex, geographical area and season.

Results We identified 1675 cases of GCA with a mean age at diagnosis of 76.9±8.3 years. The annual incidence was estimated at 7.42 (95% CI 6.57 to 8.27) cases of GCA per 100 000 people ≥50 years with a peak for patients aged 80–84 years (23.06 (95% CI 20.89 to 25.4)). The incidence was greater in women (10.06 (95% CI 8.7 to 11.5)) than in men (4.83 (95% CI 3.8 to 5.9)). No significant differences were found between geographical distribution and incidence throughout the year (p=0.125). The phenotypes at diagnosis were cranial in 1091 patients, extracranial in 337 patients and mixed in 170 patients.

Conclusions This is the first study to estimate the incidence of GCA in Spain at a national level. We found a predominance among women and during the ninth decade of life with no clear variability according to geographical area or seasons of the year.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ A meta-analysis carried out in 2021 estimated the incidence of giant cell arteritis (GCA) in Europe to be 7.26 (6.05–8.47), but most epidemiological studies collected data from specific regions of a country and very few studies included national registries.

⇒ In Spain, there are three epidemiological studies focusing on three specific health areas (Galicia, Catalonia and Andalusia) but no one national incidence study has been done to date.

WHAT THIS STUDY ADDS

⇒ ARTEritis by Sociedad Española de Reumatología is the first study to estimate the incidence of GCA in Spain at a national level.

⇒ Interestingly, no clearly identifiable geographical or seasonal variability in disease incidence was found.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This study shows the incidence of GCA in Spain, estimated at 7.42 (95% CI 6.57 to 8.27) cases per 100 000 people over 50 years of age, which may have a high impact on public health systems attending old people.

⇒ Better knowledge of the epidemiological data of our population, such as the peak incidence, may help us to develop new integrated screening algorithms in the future although more studies are needed to do so.

INTRODUCTION

Giant cell arteritis (GCA) is a systemic vasculitis that affects medium-size and large-size arteries. It is the most common primary vasculitis in North America and Europe, especially in developed countries of North latitude, mainly affecting women with a mean age of 70–80 years at diagnosis.[1 2] The clinical spectrum of GCA is more heterogeneous than previously thought. The disease can present

with cranial involvement, characterised by involvement of branches of the carotid arteries, mainly presenting with headache and jaw claudication, leading to blindness in up to 15%–20% of patients; or extracranial involvement, characterised by involvement of the aorta and/or its main branches, predominantly with polymyalgia rheumatica and claudication of the limbs, although both phenotypes can occasionally overlap.[3 4]

Temporal artery biopsy, the classic diagnostic technique of choice, has been replaced in recent years by imaging techniques such as ultrasound. Furthermore, ultrasound and ^{18}F-fluorodeoxyglucose positron emission tomography/CT (^{18}F-FDG PET/CT) scan or, alternatively, MRI or CT, have led to an improvement in the detection of extracranial vascular abnormalities in GCA.[5–8]

Some of these aspects have been incorporated into the new GCA classification criteria published in 2022 by the American College of Rheumatology (ACR)/European Alliance of Associations for Rheumatology, which could improve the diagnostic accuracy applied in clinical practice compared with those of 1990.[9–12] Most of the previous epidemiological studies do not include these new imaging diagnostic techniques, therefore, GCA may have been underdiagnosed in the past.

The incidence and clinical manifestations of GCA vary considerably across different geographical regions and ethnic groups worldwide.[2 13] In Europe, most epidemiological studies are performed in Northern and central Europe. However, little is known about its epidemiology in the South, including Spain. Furthermore, reported incidence rates vary widely between regions, and no study has collected sufficient data to estimate the national incidence of this disease.[14–16] This observation is in line with most epidemiology studies performed in other parts of Europe, where authors also collect data from specific regions of a country,[17–20] with very few establishing a national registry of GCA.[21 22] Additionally, knowledge of the incidence of the disease is essential to determine its full impact on society and healthcare systems.

Taking all these considerations into account, we present, to the best of our knowledge, one of the largest geographical distributed national epidemiological study of GCA. The primary aims of this study were to estimate the incidence of GCA in Spain and to analyse its distribution by age group, sex, geographical area and season. The secondary objectives were to describe the clinical characteristics of GCA including new imaging diagnostic techniques and associated comorbidities at diagnosis.

PATIENTS AND METHODS

The ARTESER (ARTEritis by Sociedad Española de Reumatología) study, which was sponsored by the Spanish Society of Rheumatology, is a longitudinal observational study based on a review of the clinical registers of patients diagnosed with GCA between 1 June 2013 and 29 March 2019 (date of approval by the Medical Research Ethics Committee of Cantabria) at 26 hospitals of the Spanish National Health System. The hospitals were distributed across 11 autonomous communities providing various levels of healthcare (online supplemental file 1). The centres were chosen based on their ability to recruit patients and carry out research, as well as on their geographical location. It should be noted that the largest number of centres are concentrated in the communities with the highest percentage of population.

Population and sample

Since our goal was to analyse the epidemiology of GCA and to determine the incidence data, we included all patients diagnosed with GCA between 1 June 2013 and 29 March 2019 who fulfilled the eligibility criteria, namely, age ≥50 years and at least one of the following criteria:

1. Positive results in an objective diagnostic test such as temporal artery biopsy and/or imaging techniques (accompanied by clinical findings that justify a sufficient pretest probability in the opinion of the clinician), including:
   - Temporal artery ultrasound.
   - ^{18}F-FDG PET/CT scan.
   - CT angiography/MRI angiography.
   - Large-vessel ultrasound.
   - Subclavian ultrasound.
   - Axillary ultrasound.
2. Clinical opinion of the investigator (expert criteria).
3. Meeting three of the five criteria of the 1990 ACR classification.[10]

In order to locate all cases with a diagnosis of GCA during the study period, the research team at each centre reviewed the local administrative and/or clinical databases, as well as the databases of the departments involved in the diagnosis and/or treatment of patients with GCA.

To estimate the incidence of GCA, individuals at risk were selected from the reference population of the health areas corresponding to each of the hospitals that participated in the study, from which subjects of the susceptible age range (≥50 years) were selected, taking as a reference the mean of the distributions by sex and age of the corresponding province for the study period. These data were obtained from the Spanish National Institute of Statistics.

Clinical variables

The patient data analysed at diagnosis were as follows:

Sociodemographic variables

Date of birth, sex, race and ethnicity.

Comorbid conditions

The main comorbidities included were as follows: arterial hypertension, diabetes mellitus (types 1 and 2), dyslipidaemia (hypercholesterolaemia and/or hypertriglyceridaemia), osteoporosis, smoking (current, former, >1 year without smoking, never smoked), obesity (body mass index >30kg/m^2), alcohol consumption, cardiovascular disease, aspirin consumption, chronic kidney failure and history of cancer.

Clinical data at diagnosis

Date of onset of symptoms, date of diagnosis of GCA, presence of headache, temporal artery tenderness or decreased pulsation, hypersensitive scalp, facial pain, jaw claudication, 'amaurosis fugax', permanent blindness, diplopia, confirmed optic neuritis, vertigo, hearing loss, transitory ischaemic accident, stroke, claudication of the upper limbs, claudication of the lower limbs, polymyalgia rheumatica, peripheral synovitis, asthenia, anorexia, weight loss, fever/low-grade fever.

Analytical data

Erythrocyte sedimentation rate (ESR (increased/not increased) using the age-adjusted and sex-adjusted formula (increased if greater than age at diagnosis/2 for men and greater than age at diagnosis +10 years/2 for women)),[23] C reactive protein, haemoglobin, platelets and liver enzymes (alkaline phosphatase, alanine aminotransferase and aspartate aminotransferase).

Statistical analysis

Incidence was expressed as the number of new cases per 100 000 person-years with its 95% CI, assuming a Poisson distribution. Quantitative variables are expressed as mean±SD in the case of an approximately normal distribution and as the median (IQR 25th–75th percentile) in the case of a non-normal distribution. Categorical variables are expressed as absolute frequency and percentage. The statistical analysis was performed by using STATA statistical package, V.13.1 (StataCorp) and SPSS version 21.0 (IBM Released 2012. IBM SPSS Statistics for Windows, V.21.0, Armonk, New York).

RESULTS

Incidence of GCA distributed by age and sex

During the study period (1 June 2013–29 March 2019), a total of 1675 patients were diagnosed with GCA (1178 women (70.3%) and 497 men (29.7%)). The mean age at diagnosis was 76.9±8.3 years, with no significant differences between sexes (p=0.979). Most of the patients were white (99.2%).

The annual incidence was estimated at 7.42 (95% CI 6.57 to 8.27) cases of GCA per 100 000 people ≥50 years. This was greater in women (10.06 (95% CI 8.7 to 11.5)) than in men (4.83 (95% CI 3.8 to 5.9)). Disagreement between centres that were geographically close led us to perform a sensitivity analysis. Five centres with incidence values below 5.5 and significantly lower than those of the neighbouring centres were excluded from the study. Therefore, the final incidence was 7.89 (95% CI 7.48 to 8.31) cases per 100 000 persons-year. Table 1 shows the yearly incidence of GCA in Spain between 2013 and 2019.

The highest incidence by age group was recorded in patients aged 80–84 years (23.06 (95% CI 20.89 to 25.4)). Table 2 shows the distribution of the incidence rate by age group and sex.

Incidence of GCA distributed by season of the year and geographical area

The seasonality-based assessment of the distribution revealed that winter and spring are the seasons with the highest incidence for symptoms initiation. The results are summarised in online supplemental file 1.

We analysed the association between geographical distribution and annual incidence taking the areas of Madrid (centre) and Barcelona (Mediterranean area) as the most widely represented in the study (six hospitals each city). The age-adjusted incidence (adjusted directly for the standard European population in 2013) was 8.08 (6.20–10.07) and 7.22 (4.03–8.57) cases per 100 000 persons ≥50 years per year, respectively. No significant differences were found between the different regions studied throughout the country (p=0.125).

Table 1 Annual incidence of GCA in the ARTESER registry

Annual incidence adjusted by sex (×100 000 people ≥50 years)						
	Men		Women		Total	
Year of diagnosis	N	Incidence (95% CI)	N	Incidence (95% CI)	N	Incidence (95% CI)
2013*	58	5.56 (4.22–7.19)	105	8.43 (6.89 to 10.20)	163	7.12 (6.07 to 8.30)*
2014	54	3.09 (2.88–3.29)	189	9.31 (8.99 to 9.63)	243	6.20 (6.01 to 6.39)
2015	77	4.29 (4.08–4.51)	162	7.97 (7.67 to 8.27)	239	6.04 (5.86 to 6.23)
2016	103	5.78 (5.50–6.05)	218	10.71 (10.33 to 11.08)	321	8.14 (7.91 to 8.37)
2017	82	4.52 (4.30–4.74)	221	10.81 (10.44 to 11.18)	303	7.63 (7.41 to 7.85)
2018	96	5.30 (5.03–5.56)	208	10.07 (9.74 to 10.39)	304	7.59 (7.38 to 7.80)
2019*	27	6.04 (3.98–8.78)	75	14.04 (11.04 to 17.60)	102	10.99 (8.96 to 13.34)*

The annual calculation was estimated from the number of months included in each of those years, so in 2019 the annual incidence was calculated from that obtained in the first 3 months of the year (winter months and early spring), so the annual incidence for that particular year could be slightly overestimated, and with a greater CI.
*In 2013, only cases were collected since 1 June to 31 December, and in 2019 only cases since 1 January to 29 March were included.
ARTESER, ARTEritis by Sociedad Española de Reumatología; GCA, giant cell arteritis.

Table 2 Incidence of GCA by age group and sex (results per 100 000 persons-year (95%CI))

Age group (years)	Men	Women	Total
50–54	0.279 (0.10–0.61)	0.325 (0.13–0.67)	0.302 (0.16–0.52)
55–59	0.594 (0.30–1.06)	1.42 (0.94–2.05)	1.02 (0.73–1.39)
60–64	1.6 (1.03–2.36)	2.79 (2.07–3.69)	2.23 (1.75–2.8)
65–69	3.58 (2.65–4.73)	7.45 (6.20–8.89)	5.71 (4.89–6.63)
70–74	6.68 (5.24–8.4)	13.95 (12.09–16)	10.87 (9.63–12.23)
75–79	15.52 (12.88–18.54)	22.33 (19.80–25.08)	19.96 (18.06–22.01)
80–84	21.06 (17.47–25.16)	22.91 (20.35–25.7)	23.06 (20.89–25.4)
85–89	26.23 (20.59–32.93)	15.34 (12.96–18.04)	19.24 (16.78–21.96)
≥90	17.91 (10.43–28.67)	7.6 (5.62–10.04)	10.58 (8.18–13.46)

GCA, giant cell arteritis.

Demographic characteristics and fulfilment of selection criteria

The mean age at onset of symptoms was 76.7±8.2 years, with a mean time to diagnosis of 2.9±5.7 months. Table 3 shows demographic data and fulfilment of the eligibility criteria set out in the Methods section. Most patients fulfilled the 1990 ACR classification criteria (83.6%), and 75.1% had at least one positive diagnostic test result, with temporal artery biopsy being the most common (46.3%), followed by ultrasound (28.8%). As for the remaining diagnostic imaging tests, 377 (22.5%) patients underwent ^{18}F-FDG PET/CT scan. In 245 (65%) of these patients, the images were compatible with GCA at diagnosis. The frequency of this technique increased from 14.8% of patients in 2014 (positive in 58.3%) to 30.3% in 2018 (positive in 66.3%). Only 3.7% of patients diagnosed with GCA in our study did not fulfil the above-mentioned criteria and were included only based on the clinical opinion of the investigator. online supplemental file 1 shows the results of the tests performed to the patients.

Clinical manifestations and GCA phenotypes at diagnosis

The phenotypes at diagnosis, according to vessel size, were consistent with the cranial phenotype in 1091 patients and with the extracranial phenotype in 337 patients. Both cranial and extracranial phenotypes were recorded in 170 patients. There was a discrete increase in the frequency of extracranial involvement over time as shown in figure 1.

The most frequent clinical manifestations were headache (n=1.337; 79.9%), temporal artery tenderness or decreased pulsation (n=824; 49.2%) and polymyalgia rheumatica (n=699; 41.8%). Observing their distribution according to sex, we found that headache, polymyalgia rheumatica and asthenia were more frequent in women with statistically significant differences between sexes (p<0.05). Dysphagia was significantly higher in men (5.0% vs 2.6%; p=0.013).

Regarding comorbidities, arterial hypertension stands out as the most common comorbidity in this population. Data on clinical manifestations and comorbid conditions are shown in tables 4 and 5.

Table 3 Demographic characteristics and fulfilment of selection criteria

	Men	Women	Total
Sex, n (%)	497 (29.7)	1178 (70.3)	1675
Age at diagnosis, years, mean (SD)	76.9 (8.3)	76.9 (8.0)	76.9 (8.1)
Age at onset of symptoms, years, mean (SD)	76.7 (8.3)	76.7 (8.1)	76.7 (8.2)
Fulfilling 1990 ACR classification criteria, n (%)	400 (80.5)	1000 (84.9)	1400 (83.6)
Positive objective diagnostic test, n (%)	384 (77.3)	874 (74.2)	1258 (75.1)
► Positive result, temporal artery biopsy, n (%)	240 (48.3)	536 (45.5)	776 (46.3)
► Positive result, temporal artery ultrasound, n (%)	169 (34.0)	313 (26.6)	482 (28.8)
► Positive result, other diagnostic tests, n (%)	138 (27.8)	290 (24.6)	428 (25.6)
Positron emission tomography, n (%)	69 (13.9)	176 (14.9)	245 (14.6)
CT angiography/angio-MRI, n (%)	18 (3.6)	46 (3.9)	64 (3.8)
1990 ACR classification criteria+positive objective diagnostic test result, n (%)	311 (62.6)	734 (62.3)	1045 (62.4)
Investigator's clinical opinion, n (%)	24 (4.8)	38 (3.2)	62 (3.7)

ACR, American College of Rheumatology.

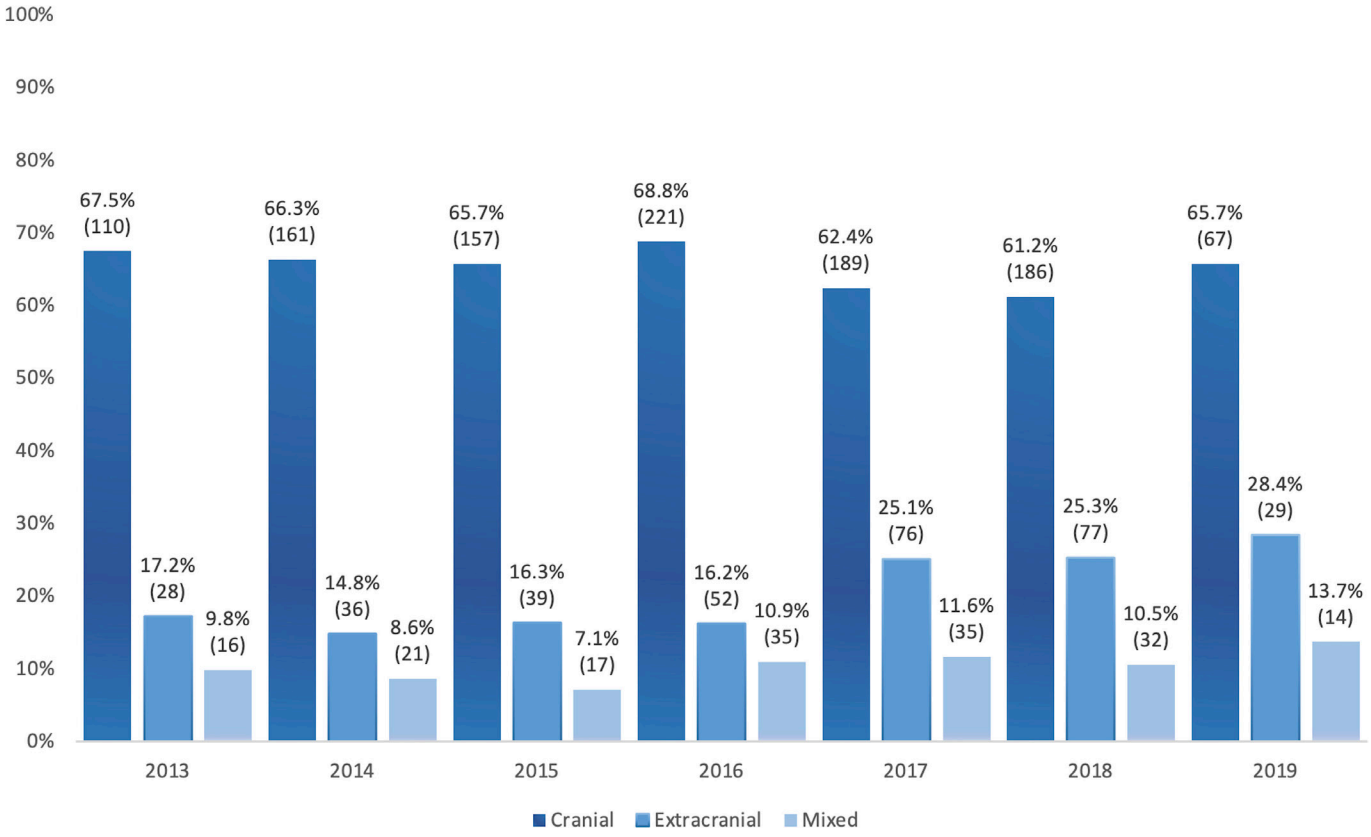

Figure 1 Distribution of GCA phenotypes over the years. GCA, giant cell arteritis.

DISCUSSION

This is the first study to report the epidemiological characteristics of patients diagnosed with GCA throughout Spain during the period 1 June 2013 to 29 March 2019, because until now, the ones we had were focused exclusively on very specific areas of our country. We have observed an incidence rate of 7.42 cases per 100 000 persons-year. This finding was consistent with data recorded in Europe in a 2021 meta-analysis, which estimated the incidence of GCA to be 7.26 (6.05–8.47) cases per 100 000 persons aged >50 years. The limitations of this meta-analysis for estimating incidence included the lack of standardised criteria for the definition of GCA and variability in inclusion criteria from the 1990 ACR classification to biopsy-proven cases. Furthermore, studies not published in English were excluded.[24]

The incidence we report is similar to that reported in Mediterranean countries such as Italy and France, where the incidence of GCA has been reported to be 8.3 (95% CI 7.1 to 9.4) and 9.6 (95% CI 9.5 to 9.8) cases, respectively.[17 20] However, these findings differ considerably from those reported in the North of Europe. In Norway, for example, the annual incidence reported was 16.8 (14.6–19.2) cases per 100 000 persons aged over 50 years, and in the South of Sweden, the incidence reported was 13.3 (12.6–14.0) cases.[17 18] This greater incidence in Scandinavian countries is probably due to a genetic susceptibility that favours the onset of the disease.[13] In Norway, the peak incidence by age group has been recorded in people aged 70–79 years (36.5 (95% CI 29.5 to 45.1) cases), with a mean age at diagnosis of 73.2±8.6 years, whereas in Spain, GCA is diagnosed at a mean of 3.7 years later; thus, the peak incidence was recorded in persons aged 80–84 years.[18] In terms of gender distribution, the highest incidence was found in men aged 85–89 years, and in women aged 80–84 years. Figure 2 shows the updated worldwide incidence of GCA in different countries. The data for the elaboration of the figure are given in online supplemental file 1.

A previous retrospective study conducted in Spain recording data from Northwestern Spain, at Lugo Regional Hospital, analysed the incidence between 1981 and 2005. The authors applied strict diagnostic criteria, requiring a positive temporal artery biopsy for the diagnosis of GCA. They included patients with typical symptoms of GCA and those with symptoms exclusively of polymyalgia rheumatic who were older than 50 years and had constitutional syndrome and/or elevated ESR (>80 mm/hour) at the time of diagnosis. Comparing the incidence recorded in our series with that of the Lugo's study, namely, 10.13 (95% CI 8.93 to 11.46) annual cases per 100 000 persons aged over 50 years, it can be observed that our values are lower.[14] This reduction in annual incidence can also be observed in other areas, such as Scandinavia, where incidence has fallen from 42.3 cases per 100 000 persons over 50 years in 1981 to 13.4 cases in 2017, suggesting that the overall reduction in annual incidence in the abovementioned meta-analysis is 0.41 per 100 000 persons aged over 50 years.[24]

Table 4 Clinical manifestations and laboratory abnormalities at diagnosis in patients with giant cell arteritis

Clinical manifestations	Total	Men	Women	P (men vs women)
Cranial				
Recent-onset headache, n (%)	1337 (79.9)	382 (76.9)	955 (81.1)	**0.028***
Temporal artery tenderness or decreased pulsation, n (%)	824 (49.2)	231 (46.5)	593 (50.4)	0.079
Visual symptoms, n (%)	605 (36.1)	194 (39.0)	411 (34.9)	0.101
Jaw claudication, n (%)	597 (35.7)	172 (34.6)	425 (36.1)	0.621
Hypersensitive scalp, n (%)	451 (26.9)	127 (25.6)	324 (27.5)	0.290
Facial pain, n (%)	213 (12.7)	55 (11.1)	158 (13.4)	0.169
Vertigo, n (%)	127 (7.6)	38 (7.6)	89 (7.6)	0.994
Ischaemic and/or haemorrhagic stroke, n (%)	63 (3.8)	25 (5.0)	38 (3.2)	0.08
Dysphagia, n (%)	56 (3.3)	25 (5.0)	31 (2.6)	**0.013***
Hearing loss, n (%)	45 (2.7)	16 (3.2)	29 (2.5)	0.404
Transitory ischaemic accident, n (%)	32 (1.9)	13 (2.6)	19 (1.6)	0.176
Extracranial				
Polymyalgia rheumatica, n (%)	699 (41.8)	178 (35.8)	521 (44.3)	**0.003***
Claudication—lower limbs, n (%)	157 (9.4)	53 (10.7)	104 (8.8)	0.269
Claudication—upper limbs, n (%)	152 (9.1)	38 (7.6)	114 (9.7)	0.173
Peripheral synovitis, n (%)	86 (5.2)	27 (5.5)	59 (5.1)	0.641
General				
Asthenia, n (%)	873 (52.2)	239 (48.1)	634 (53.9)	**0.035***
Anorexia, n (%)	608 (36.3)	180 (36.2)	428 (36.4)	0.824
Weight loss, n (%)	541 (32.3)	174 (35.0)	367 (31.2)	0.106
Fever/low-grade fever, n (%)	367 (21.9)	113 (22.7)	254 (21.6)	0.728
Laboratory findings at diagnosis				
High ESR, n (%)	1409 (84.12)	404 (81.3)	1005 (85.3)	**0.039***
ESR, mm/hour, mean (SD)	75.9 (33.6)	72.3 (34.7)	77.4 (33.0)	**0.005***
C reactive protein, mg/L, median (IQR)	62.0 (22.0–116.1)	64.3 (25.7–114.5)	61.5 (20.9–116.9)	0.151
Haemoglobin, g/dL, mean (SD)	11.9 (1.6)	12.3 (1.8)	11.6 (1.5)	0.892
Platelets, $\times 10^9$/L, mean (SD)	326.6 (180.0)	302.3 (144.3)	337.0 (192.5)	**<0.001***
Alkaline phosphatase, IU/L, mean (SD)	111.5 (95.9)	109.8 (92.6)	112.3 (97.3)	0.693
Alanine aminotransferase, IU/L, mean (SD)	22.4 (21.0)	24.6 (18.9)	21.4 (21.8)	**0.013***
Aspartate aminotransferase, IU/L, mean (SD)	21.9 (17.0)	23.0 (15.7)	21.5 (17.5)	0.160

Differences according to sex.
*Significant differences in bold=p<0.05.
ESR, erythrocyte sedimentation rate.

As for geographical distribution, rates vary widely in Spain between regions such as Lugo, in the North of Spain, with an annual incidence of 10.13, and others in the South and Mediterranean area such as Malaga and Sabadell (Catalonia), where the incidence is 2.2 and 4.1, respectively. However, this variation may be due to differences in the methodology applied.[14–16]

Analysis of our data reveals no statistically significant differences between the incidence of the disease in a central region such as Madrid and a Northeastern Mediterranean region such as Barcelona, although it is true that there is little difference in latitude between these both regions. However, in the above-mentioned meta-analysis, a statistically significant positive linear correlation was observed between latitude and incidence.[24] If the incidence recorded in Spain is compared with that recorded in countries at a similar latitude, such as Italy, it can be seen that the incidence rates are comparable (7.4 and 8.3 cases per 100 000 persons older than 50 years, respectively).[17] However, further studies are necessary if more precise information is to be obtained; hence, the conception of the ARTESER registry in Spain.

Table 5 Comorbidities at diagnosis

Comorbidity	Men	Women	Total	P value
Arterial hypertension, n (%)	330 (66.8)	749 (63.7)	1079 (64.6)	0.187
Dyslipidaemia, n (%)	238 (48.3)	563 (47.9)	801 (48.0)	0.772
Smoking status				**<0.001***
Former smokers, n (%)	63 (13.4)	69 (6.3)	132 (8.4)	
Current, n (%)	216 (46.0)	84 (7.7)	300 (19.1)	
Never, n (%)	191 (40.6)	944 (86.1)	1135 (72.4)	
Cardiovascular disease, n (%)	163 (33.1)	204 (17.4)	367 (22.0)	**<0.001***
Diabetes mellitus, n (%)	134 (27.2)	217 (18.6)	351 (21.1)	**<0.001***
Osteoporosis, n (%)	22 (4.5)	260 (22.3)	282 (17.0)	**<0.001***
History of cancer, n (%)	95 (19.3)	109 (9.3)	204 (12.3)	**<0.001***
Chronic kidney failure, n (%)	55 (11.2)	112 (9.6)	167 (10.0)	0.325
Obesity, n (%)	34 (7.0)	115 (9.8)	149 (9.0)	0.162
Alcohol consumption, n (%)	93 (18.9)	26 (2.2)	119 (7.1)	**<0.001***

*Significant differences in bold=p<0.05.

In terms of seasonal distribution, the incidence of symptoms was found to be higher in winter, although the disease was diagnosed more frequently during spring due to a mean delay of diagnosis around 2.9 months from the onset of symptoms. However, no major differences between seasons were found to establish a stable relationship. Published data vary widely, with some authors reporting a higher incidence during spring and summer,[25] and others finding no differences between seasons.[14 26 27] Therefore, it is not possible to identify a strong association between the both variables.

The distribution by phenotype in our registry is somewhat similar to that reported in a study published in 2022 on the epidemiology and clinical characteristics of GCA in Canterbury, New Zealand, where 93% of the patients had a cranial phenotype and 7% an extracranial phenotype. Moreover, the most common clinical manifestations at diagnosis in our study (eg, headache (79.9%), temporal artery tenderness (49.2%) and symptoms of polymyalgia (41.8%)) were similar to those reported elsewhere.[3 28]

The increased use of new diagnostic methods such as ^{18}F-FDG PET/CT scan in hospitals during the study

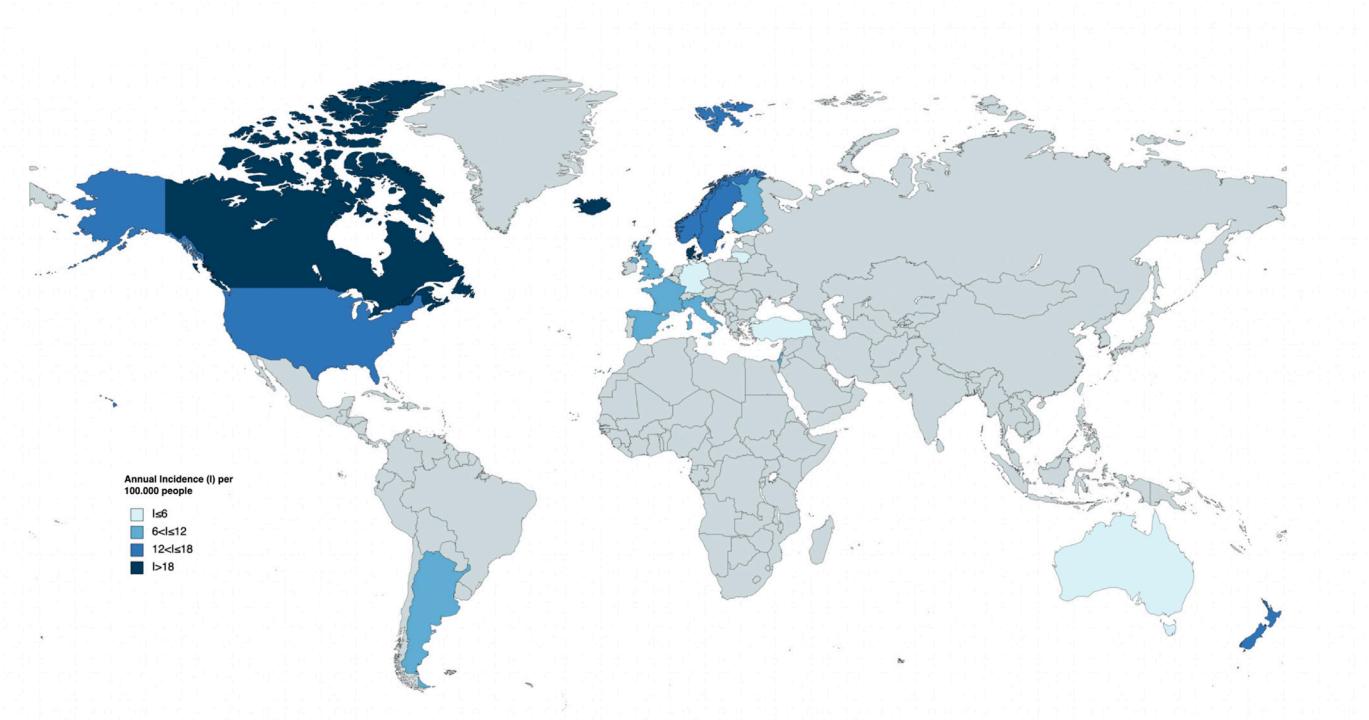

Figure 2 Updated global incidence of giant cell arteritis.

period was reflected in a higher incidence of extracranial phenotype throughout the study, with extracranial abnormalities being diagnosed in up to 66.3% of patients who underwent this examination. This value is comparable to that reported in another study performed in Spain, where, using computed axial tomography, the authors found abnormalities in 67.5% of the patients selected.[29] This was somewhat lower than the 83% reported in a Belgian study, in which the authors applied very lax criteria for defining the result as positive.[30]

Comparing comorbidities at diagnosis in our series with the findings of the National Health Survey for 2017 in the general population aged >55 years in Spain,[31] we find higher values in our study for arterial hypertension (66.8% vs 43.3% in men and 63.7% vs 42% in women), osteoporosis (4.5% vs 1.9% in men and 22.3% vs 15.2% in women), diabetes mellitus (27.2% vs 20.6% in men and 18.6% vs 15.9% in women) and active smoking (46% vs 19.6% in men and 7.7% vs 2.4% in women), but lower values for obesity (7% vs 22.4% in men and 9.8% vs 21.3% in women) and ex-smokers (13.4% vs 52.8% in men and 6.3% vs 17.4% in women).

Spain has a universal healthcare system in which public healthcare is free and covers almost 100% of the population. In addition, almost all patients with autoimmune diseases are referred to hospitals for specialist monitoring of their disease. Therefore, when choosing as denominator the reference population over 50 years of age in the health area and as nominator the population diagnosed with GCA in the same area (both outpatients and inpatients settings), we consider that there is scarce possibility of bias in estimating the national incidence of GCA.

However, we consider that our study has some limitations. First, its retrospective design could have led to information bias. We attempted to resolve this issue by designing a questionnaire for data collection based on variables that were specific and common in this disease to ensure that as little information as possible was lost. External monitoring was also performed to ensure adequate control of the quality of the data collected. Second, given the discordance in incidence rates between the five centres previously mentioned, we performed a sensitivity analysis to estimate the incidence without including these centres. No major changes were observed (7.9 in the sensitivity analysis vs 7.4 when all the centres were taken into consideration). Another possible limitation can be found in the categorisation of phenotypes. The implementation of imaging techniques that facilitate extracranial variant diagnosis in recent years may have underestimated the incidence of this phenotype in the years when these techniques were not so extended. Finally, since not all hospitals had a rapid fast-track for diagnosis of GCA, it could lead to underestimate the true incidence of the disease in our country because of some of the patients had been previously treated by emergency or primary care services, without record in rheumatology units.[32]

In conclusion, ARTESER is the first study to estimate the incidence of GCA in Spain, which stands at 7.42 cases per 100 000 persons older than 50 years. This finding is as expected in this part of Europe, being the disease more frequent in women and during the ninth decade of life. Although there is no clearly identifiable variability according to geographical area or season of the year, we found the disease to be more common during the winter months.

Author affiliations
[1]Rheumatology, Hospital Clinico Universitario de Valencia, Valencia, Spain
[2]Rheumatology, Complexo Hospitalario Universitario de Vigo, Vigo, Spain
[3]Rheumatology, Hospital Universitario de Bellvitge, L'Hospitalet de Llobregat, Spain
[4]Research Unit, Sociedad Española de Reumatología, Madrid, Spain
[5]Rheumatology, Hospital Universitario La Paz, Madrid, Spain
[6]Rheumatology, Complexo Hospitalario Universitario A Coruna, A Coruna, Spain
[7]Rheumatology, Hospital of Donostia, San Sebastian, Spain
[8]Rheumatology, Complejo Asistencial Universitario de Leon, Leon, Spain
[9]Rheumatology, Hospital Universitario 12 de Octubre, Madrid, Spain
[10]Rheumatology, Hospital Universitario Basurto, Bilbao, Spain
[11]Rheumatology, Complejo Hospitalario de Navarra, Pamplona, Spain
[12]Rheumatology, Hospital Clinico Universitario San Carlos, Madrid, Spain
[13]Instituto de Investigación Sanitaria del Hospital Clínico San Carlos, Madrid, Spain
[14]Rheumatology, Hospital Universitario Marques de Valdecilla, Santander, Spain
[15]Immunopathology Group-IDIVAL, Santander, Spain
[16]Rheumatology, Hospital Universitario Virgen del Rocío, Sevilla, Spain
[17]Rheumatology, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain
[18]Rheumatology, Hospital Universitario Ramón y Cajal, Madrid, Spain
[19]Rheumatology, Hospital Moises Broggi, Barcelona, Spain
[20]Rheumatology, Parc Taulí Hospital Universitari. Institut d'Investigació i Innovació Parc Taulí (I3PT-CERCA), Sabadell, Spain
[21]Universitat Autònoma de Barcelona, Sabadell, Spain
[22]Rheumatology, Hospital Germans Trias i Pujol, Barcelona, Spain
[23]Rheumatology, Hospital Politécnico y Universitario La Fe, Valencia, Spain
[24]Rheumatology, Hospital del Mar, Barcelona, Spain
[25]Rheumatology, Hospital Universitario de la Princesa. IIS-Princesa, Madrid, Spain

Acknowledgements We would like to thank Daniel Seoane and Fernando Alonso for their support in the preparation of this article. We would also like to thank the Spanish Society of Rheumatology for promoting and covering this study.

Collaborators ARTESER Project Collaborative Group: Elvira Díez Álvarez, Trinidad Pérez Sandoval, Ismael González Fernández (Complejo Asistencial Univ. de León, León); Javier Mendizábal-Mateos, María Concepción Fito Manteca, Natividad del Val del Amo, Loreto Horcada Rubio, Inmaculada Paniagua Zudaire, Laura Garrido Courel, Ricardo Gutiérrez Polo, Juliana Restrepo Vélez, Eduardo Loza Cortina (Complejo Hospitalario de Navarra, Pamplona); Elisa Fernández Fernández, Patricia Carreira, Tomás Almorza (Hospital 12 de Octubre); Leticia Léon Mateos, Luis Rodríguez Rodríguez, Judit Font Urgelles, Pia Mercedes Lois Bermejo (Hospital Clínico San Carlos); Selene Labrada Arrabal (Hospital de Mar); Anne Riveros Frutos, Susana Holgado Pérez, Jordi Camins, (Hospital Germans Trías i Pujol); Clara Molina Almela, Cristina Campos Fernández, Amalia Rueda Cid, Javier Calvo Catalá (Hospital Gral. De Valencia); Rafael Benito Melero, Francisco Maceiras, Nair Pérez, Ceferino Barbazán, José María Pego, Irena Altabás, John Guzman (Comp. Hosp. Univ. de Vigo); Paula Valentina Estrada Alarcón (Hospital Moises Broggi); Héctor Corominas, Iván Castellví, Berta Magallares, Ana Milena Millán (Hospital Santa Creu i Sant Pau); María Alcalde Villar, Ana F. Cruz Valenciano, Félix Cabero del Pozo, Ana Belén Rodríguez Cambrón, Cristina Macia Villa, Eva Álvarez de Andrés (Hospital Severo Ochoa); Antonio Juan Mas, Inmaculada Ros Vilamajó, Mónica Ibáñez Barceló, Elide Toniolo, Ana Paula Cacheda, (Hospital Son Llatzer); María Sagrario Bustabad Reyes, María García González, Alicia García Dorta, Vanesa Hernández Hernández (Hospital Univ. Canarias); Margarida Vasques Rocha, Jaime Calvo Allen (Hospital Univ. De Araba); Elisa Fernández Fernández (Hospital Univ. La Paz); Miren Uriarte-Ecenarro, Cristina Valero Martínez, Esther F. Vicente Rabaneda (Hospital Univ. La Princesa); Carlos García Porrúa, Carlota Laura Iñiguez Ubiaga, Noelia Álvarez Rivas, Tomás Ramón Vázquez Rodríguez, José Alberto Miranda Filloy, Amalia Sánchez-Andrade Fernández (Hospital Univ. Lucus Augusti); Miguel Ángel González-Gay (Hospital Univ. Marqués de Valdecilla, Departamento de Medicina, Universidad de Cantabria); Carlos Galisteo Lencastre Da Veiga (Hospital Univ. Parc Tauli); María Jesús García Villanueva, Patricia Morán Álvarez, Marina

Tortosa Cabañas, Marta Serrano Warleta, Aliuska Palomeque Vargas (Hospital Univ. Ramón y Cajal); Alberto Ruiz Román, Clara Aguilera Cros, Alejandro Muñoz Jimenez (Hospital Univ. Virgen del Rocio); José A. Román Ivorra, Carmen Riesco Bárcena, Anderson Huaylla (Hospital Univ. y Politécnico La Fe); Itziar Calvo Zorrilla (Hospital Universitario Basurto); Judit Lluch (Hospital Universitario de Bellvitge); Jesús A. Valero-Jaimes, Luis López Domínguez, Cesar Antonio Egues Dubuc (Hospital Universitario Donostia); Lucia Silva Fernández (Comp. Hospitalario Universitario de A Coruña).

Contributors DF-L and RB participated in the design of the work, the acquisition and interpretation of data and were major contributors in writing the manuscript, acting as guarantors. JN and SC participated in the design of the work, the analysis and interpretation of data and contributed significantly to the drafting of the manuscript. All authors revised the manuscript critically, and read and approved the final version.

Funding ROCHE FARMA, S.A. contributes to the financial support of this study.

Map disclaimer The depiction of boundaries on this map does not imply the expression of any opinion whatsoever on the part of BMJ (or any member of its group) concerning the legal status of any country, territory, jurisdiction or area or of its authorities. This map is provided without any warranty of any kind, either express or implied.

Competing interests Disclosures that might be interpreted as constituting possible conflict(s) of interest for the study: Ed Research funding/consulting and conferences fees from: Abbvie, Novartis, Roche, Pfizer, Janssen, Lilly, MSD, BMS, UC Pharma, Grünenthal and Sanofi. JL had consultation fees/participation in company-sponsored speaker's bureau from Roche, Galápagos, Novartis, UCB Pharma, MSD, Celgene, Astra Zeneca and Grünenthal and received support for attending meetings and/or travel from Janssen, Abbvie, Roche, Novartis, MSD, UCB Pharma, Celgene, Lilly, Pfizer, Galápagos. Patricia Moya Alvarado had consultation fees/participation in company-sponsored speaker's bureau from Roche, Novartis, Abbvie, MSD, Lilly, Pfizer and Celgene and received support for attending meetings and/or travel from Novartis, Lilly and, Pfizer. SC has received research support from MSD and Pfizer and had consultation fees/participation in company-sponsored speaker's bureau from Amgen, BMS, Eli-Lilly, MSD, Roche, Gedeon-Richter, Grünenthal Pharma and UCB. SC is also assistant professor of the cátedra EPID-Future, funded by UAM-Roche, Universidad Autónoma de Madrid (UAM), Spain. RB received grants/research support from AbbVie, MSD and Roche, and had consultation fees/participation in a company-sponsored speaker's bureau from AbbVie, Pfizer, Roche, Lilly, UCB, Bristol-Myers, Janssen, and MSD. The following authors did not declare financial disclosure: DF-L, IH-R, JN, MD-Á, MS-D, JMB, CMM, JS, EG-A, VA, LA, NG-P, CL, VAN, JC, IC-S, FO-S and TCSM.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by Medical Research Ethics Committee of Cantabria (Santander) (No. 05/2019). Given the primary objective and the retrospective nature of the study, which obviated the need for a clinical interview with the patient, and the approval by the Medical Research Ethics Committee of Cantabria (Santander) (No. 05/2019), it was not necessary to obtain the participants' informed consent. The data were processed confidentially in accordance with the general data protection regulation (GDPR), namely, Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and the free movement of such data.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request.

ORCID iDs
Delia Fernández-Lozano http://orcid.org/0000-0001-9650-1296
Javier Narvaez http://orcid.org/0000-0002-1614-8064
Marta Domínguez-Álvaro http://orcid.org/0000-0002-4057-5971
Eugenio De Miguel http://orcid.org/0000-0001-5146-1964
Maite Silva-Díaz http://orcid.org/0000-0003-1904-011X
Javier Loricera http://orcid.org/0000-0003-4754-0277
Patricia Moya Alvarado http://orcid.org/0000-0001-8339-5420
Joan Calvet http://orcid.org/0000-0002-0888-5152
Tarek Carlos Salman Monte http://orcid.org/0000-0002-4676-0174
Santos Castañeda http://orcid.org/0000-0002-7748-853X
Ricardo Blanco http://orcid.org/0000-0003-2344-2285

REFERENCES

1 Sharma A, Mohammad AJ, Turesson C. Incidence and prevalence of giant cell arteritis and Polymyalgia Rheumatica: A systematic literature review. *Semin Arthritis Rheum* 2020;50:1040–8.
2 Watts RA, Hatemi G, Burns JC, *et al*. Global epidemiology of vasculitis. *Nat Rev Rheumatol* 2022;18:22–34.
3 Dejaco C, Duftner C, Buttgereit F, *et al*. The spectrum of giant cell arteritis and Polymyalgia Rheumatica: revisiting the concept of the disease. *Rheumatology (Oxford)* 2017;56:506–15.
4 González-Gay MA, García-Porrúa C, Llorca J, *et al*. Visual manifestations of giant cell arteritis: trends and clinical spectrum in 161 patients. *Medicine* 2000;79:283–92.
5 Dejaco C, Ramiro S, Bond M, *et al*. EULAR recommendations for the use of imaging in large vessel vasculitis in clinical practice: 2023 update. *Ann Rheum Dis* 2023:ard-2023-224543.
6 Grayson PC, Alehashemi S, Bagheri AA, *et al*. ^{18} F-Fluorodeoxyglucose-positron emission tomography as an imaging biomarker in a prospective, longitudinal cohort of patients with large vessel vasculitis. *Arthritis Rheumatol* 2018;70:439–49. 10.1002/art.40379 Available: Mar;70(3):439-49.doi:10.1002/art.40379
7 Molina-Collada J, Castrejón I, Rivera J, *et al*. The role of ultrasound and FDG-PET/CT to detect Extracranial artery involvement in patients with suspected large vessel vasculitis. *Mod Rheumatol* 2023;33:549–56.
8 De Miguel E, Sanchez-Costa JT, Estrada P, *et al*. Influence of the EULAR recommendations for the use of imaging in large vessel vasculitis in the diagnosis of giant cell arteritis: results of the ARTESER register. *RMD Open* 2022;8:e002507.
9 Ponte C, Grayson PC, Robson JC, *et al*. American college of rheumatology/EULAR classification criteria for giant cell arteritis. *Ann Rheum Dis* 2022;81:1647–53. 10.1136/ard-2022-223480 Available: Dec;81(12):1647-1653.doi:10.1136/ard-2022-223480
10 Hunder GG, Bloch DA, Michel BA, *et al*. The American college of rheumatology 1990 criteria for the classification of giant cell arteritis. *Arthritis & Rheumatism* 1990;33:1122–8. 10.1002/art.1780330810 Available: https://onlinelibrary.wiley.com/toc/15290131/33/8
11 Molina-Collada J, Castrejón I, Monjo I, *et al*. Performance of the 2022 ACR/EULAR giant cell arteritis classification criteria for diagnosis in patients with suspected giant cell arteritis in routine clinical care. *RMD Open* 2023;9:e002970.
12 van Nieuwland M, van Bon L, Vermeer M, *et al*. External validation of the 2022 ACR/EULAR classification criteria in patients with suspected giant cell arteritis in a Dutch fast-track clinic. *RMD Open* 2023;9:e003080.
13 Nordborg E, Nordborg C. Giant cell arteritis: Epidemiological clues to its pathogenesis and an update on its treatment. *Rheumatology (Oxford)* 2003;42:413–21.
14 Gonzalez-Gay MA, Miranda-Filloy JA, Lopez-Diaz MJ, *et al*. Giant cell arteritis in northwestern Spain: A 25-year epidemiologic study. *Medicine (Baltimore)* 2007;86:61–8.
15 Bustamante Maldonado E, Marí Alfonso B, Monteagudo Jiménez M, *et al*. Análisis de una Serie de 55 Pacientes con arteritis de Células Gigantes Confirmada Por Biopsia. *An Med Interna (Madrid)* 2004;21:473–6.
16 Romero-Gómez C, Aguilar-García JA, García-de-Lucas MD, *et al*. Epidemiological study of primary systemic Vasculitides among adults in Southern Spain and review of the main Epidemiological studies. *Clin Exp Rheumatol* 2015;33:S–11.
17 Muratore F, Boiardi L, Mancuso P, *et al*. Incidence and prevalence of large vessel vasculitis (giant cell arteritis and Takayasu arteritis) in northern Italy: A population-based study. *Semin Arthritis Rheum* 2021;51:786–92.
18 Andersen JB, Myklebust G, Haugeberg G, *et al*. Incidence trends and mortality of giant cell arteritis in Southern Norway. *Arthritis Care Res (Hoboken)* 2021;73:409–14. 10.1002/acr.24133 Available: https://acrjournals.onlinelibrary.wiley.com/toc/21514658/73/3
19 Stamatis P, Turkiewicz A, Englund M, *et al*. Epidemiology of biopsy-confirmed giant cell arteritis in southern Sweden-an update on

incidence and first prevalence estimate. *Rheumatology (Oxford)* 2021;61:146–53.
20 Guittet L, de Boysson H, Cerasuolo D, *et al*. Whole-country and regional incidences of giant cell arteritis in French Continental and overseas territories: A 7-year nationwide database analysis. *ACR Open Rheumatol* 2022;4:753–9.
21 Elling P, Olsson AT, Elling H. Synchronous variations of the incidence of temporal arteritis and Polymyalgia Rheumatica in different regions of Denmark; association with epidemics of Mycoplasma pneumoniae infection. *J Rheumatol* 1996;23:112–9.
22 Petri H, Nevitt A, Sarsour K, *et al*. Incidence of giant cell arteritis and characteristics of patients: data-driven analysis of Comorbidities. *Arthritis Care Res (Hoboken)* 2015;67:390–5. 10.1002/acr.22429 Available: https://acrjournals.onlinelibrary.wiley.com/toc/21514658/67/3
23 Miller A, Green M, Robinson D. Simple rule for calculating normal Erythrocyte sedimentation rate. *Br Med J (Clin Res Ed)* 1983;286:266.
24 Li KJ, Semenov D, Turk M, *et al*. A meta-analysis of the epidemiology of giant cell arteritis across time and space. *Arthritis Res Ther* 2021;23:82.
25 Bas-Lando M, Breuer GS, Berkun Y, *et al*. The incidence of giant cell arteritis in Jerusalem over a 25-year period: annual and seasonal fluctuations. *Clin Exp Rheumatol* 2007;25:S15–7.
26 Mohammad AJ, Nilsson J-Å, Jacobsson LTH, *et al*. Incidence and mortality rates of biopsy-proven giant cell arteritis in southern Sweden. *Ann Rheum Dis* 2015;74:993–7.
27 Catanoso M, Macchioni P, Boiardi L, *et al*. Incidence, prevalence, and survival of biopsy-proven giant cell arteritis in northern Italy during a 26-year period. *Arthritis Care Res (Hoboken)* 2017;69:430–8. 10.1002/acr.22942 Available: https://acrjournals.onlinelibrary.wiley.com/toc/21514658/69/3
28 Lyne SA, Ruediger C, Lester S, *et al*. Giant cell arteritis: A population-based retrospective cohort study exploring incidence and clinical presentation in Canterbury, Aotearoa New Zealand. *Front Med (Lausanne)* 2022;9:1057917.
29 Prieto-González S, Arguis P, García-Martínez A, *et al*. Large vessel involvement in biopsy-proven giant cell arteritis: prospective study in 40 newly diagnosed patients using CT angiography. *Ann Rheum Dis* 2012;71:1170–6.
30 Blockmans D, de Ceuninck L, Vanderschueren S, *et al*. Repetitive 18F-Fluorodeoxyglucose positron emission tomography in giant cell arteritis: a prospective study of 35 patients. *Arthritis Rheum* 2006;55:131–7.
31 National Health Survey. National Statistics Institute. 2017. Available: https://www.ine.es/dynt3/inebase/index.htm?type=pcaxis&path=/t15/p419/a2017/p03/&file=pcaxis
32 González García A, Del Arco C, Lucas Fernández D, *et al*. Executive summary on the optimization of the Multidisciplinary and integrated approach to Polymyalgia Rheumatica and giant cell arteritis in Madrid region. *Rev Clin Esp (Barc)* 2024;224:48–56.