

# ArtRoCad: Health Resources Utilization and Socioeconomic Impact of Knee and Hip Osteoarthritis.

## I. Methods and Population Characteristics

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**Objective:** The ArtRoCad study analyzes healthcare resource utilization and the socioeconomic impact of knee and hip osteoarthritis in primary care in Spain. The present study describes the methodology of the ArtRoCad study and presents the main characteristics of the population included.

**Methods:** We performed a cross-sectional study of ambulatory patients in primary care, aged  $\geq 50$  years old, with a diagnosis of knee or hip osteoarthritis and a history of pain for 3 months in the previous year. The patients were selected consecutively on a country-wide basis, proportional to the general population aged  $\geq 50$  years. The most important localization for healthcare demand was considered the main affected joint. The study was performed in October and November, 2003. Information on clinical data, quality of life, and resource consumption, sick leave from work or days of disability in the previous 6 months were gathered through 2 structured interviews.

**Results:** 87% of the physicians predicted by sampling participated in the study, accounting for 82% of the predetermined sample size. A total of 1071 patients were interviewed. The distribution of the main affected joint was as follows: knee, 710 (66.3%); hip, 252 (23.5%); and both knee and hip, 109 (10.2%). Seventy-five percent of the sample was aged 65 years or older and 74% were women. Most of the patients had moderate or severe osteoarthritis with a median pain duration of between 6 and 10 years. More than half the patients experienced additional limitations due to musculoskeletal problems other than knee and/or hip osteoarthritis.

**Conclusions:** Participation in the ArtRoCad study was excellent. The sample obtained was representative of the population with symptomatic moderate or severe osteoarthritis of the knee and hip in primary care, with substantial comorbidity.

**Key words:** Knee osteoarthritis. Hip osteoarthritis. Costs. Epidemiology. Primary care.

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### Implementación y características de la población del estudio ArtRoCad, una aproximación al consumo de recursos y repercusión socioeconómica de la artrosis de rodilla y cadera en atención primaria

**Objetivo:** El estudio ArtRoCad analiza el consumo de recursos sanitarios y la repercusión socioeconómica de la artrosis de rodilla y cadera en atención primaria en España. En este trabajo se describe la metodología del estudio ArtRoCad, y se presentan las principales características de la población incluida.

**Métodos:** Estudio transversal, de pacientes ambulantes, de 50 o más años, diagnosticados de artrosis de rodilla o cadera y dolor durante 3 meses en el último año en atención primaria; seleccionados de forma consecutiva a escala estatal, de forma proporcional a la población general de 50 o más años. La localización más importante de demanda de atención sanitaria se consideró articulación señal. El estudio se realizó en octubre y noviembre de 2003. Se recogió información acerca de los datos clínicos, de calidad de vida, y consumo de recursos sanitarios y bajas laborales o días de incapacidad en los últimos 6 meses, mediante 2 entrevistas estructuradas.

**Resultados:** Participó el 87% de los médicos previstos por el muestreo, que aportó un 82% del tamaño muestral predeterminado. En total se entrevistaron 1.071 pacientes, con la siguiente distribución por articulaciones señal: rodilla, 710 (66,3%); cadera, 252 (23,5%), y ambas,

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\*At the end of the manuscript the ArtRoCad participants is shown.

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109 (10,2%). El 75% de la muestra tenía 65 o más años y el 74% eran mujeres. La mayoría de los enfermos estaba afectada de artrosis moderada o severa, con una mediana de evolución del dolor de entre 6 y 10 años. En más de la mitad de los casos, los pacientes tenían limitación adicional por problemas osteomusculares distintos a la artrosis de rodilla y/o cadera.

**Conclusiones:** ArtRoCad obtuvo una excelente participación. La muestra obtenida es representativa de la población con artrosis sintomática de rodilla y cadera moderada o grave atendida en atención primaria, con una importante comorbilidad.

**Palabras clave:** Artrosis rodilla. Artrosis cadera. Costes. Epidemiología. Atención primaria.

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## Introduction

Rheumatic disease, among which osteoarthritis must be emphasized, due to its prevalence, generate an important consumption of social and sanitary resources in industrialized countries. They are cause of 10% primary care visits, 10% of emergency room visits and hospital centers, a little more than 15% of temporal job loss, and are the first cause permanent limitation.<sup>1</sup> Attention must be called to the scars number of studies done to evaluate the economic impact of osteoarthritis.<sup>2</sup> The majority of the work done has analyzed the cost-effectiveness of therapeutic interventions, such as exercise programs, drug treatments and surgical treatments. Some authors have estimated the attributed cost of osteoarthritis in an indirect manner from population census, assuming as valid a diagnosis of osteoarthritis referred by the patient or parting from the premise that most people that mention having rheumatic disease have osteoarthritis.<sup>3,4</sup> This focus, which gives useful and orientating data, has notable limitations, as has been well shown.<sup>5</sup> At the same time, the few authors who have analyzed in a specific form the cost of the patients diagnosed osteoarthritis with a greater degree of exactitude have done so in large hospital centers, which also represents an obstacle on the generalization of the results.<sup>6</sup> In a more recent fashion, the costs have been calculated from a general population perspective, parting from epidemiologic databanks,<sup>7</sup> or from patients resource consumption in primary care, though the majority of the time this happens without any reference to the joint localization.<sup>8,9</sup>

The EPISER study showed that 29% of persons older than 60 had, on the day of the interview, diagnostic criteria of knee osteoarthritis.<sup>10</sup> Some authors have considered knee pain in older persons as the most recent epidemic of the locomotor system.<sup>11</sup> On the other hand, pain has been described in 19% of subjects 65 years or

older.<sup>12</sup> In this way, hip and knee osteoarthritis, due to their high prevalence and frequent associated physical limitation, both related to age, occupy the first place as a cause of physical limitation, especially in older patients, in activities related with standing and moving,<sup>13</sup> and constitute one of the most frequent causes of sanitary attention demand, even if there is scant information about the characteristics of such a process in primary care.

Taking into account the previous information, you need to know, the main characteristics of the patients with hip and knee osteoarthritis, seen by primary care physicians in our country. To that end, the Spanish Society of rheumatology (SER) and the Spanish Society for rural medicine and general practitioners (SEMERGEN) have put into motion a study to evaluate the use of sanitary resources and the social economic repercussions of hip and knee osteoarthritis, also known as the ArtRoCad study. Their specific operative objectives were: to evaluate the direct cost attributed to the illness; to evaluate the repercussion of illness, in terms of quality of life, limitation, psychological repercussion and days of work impairment, and to analyze the relationship between the use of sanitary resources and the social-demographic and clinical variables. The present study has the objective of describing in an ample form the methodology of the ArtRoCad study, with a special emphasis on sample selection, study implementation and types of variables. In results, we present the principal sociodemographic and illness characteristics of the included population.

## Patients and Methods

### Design and Population

A transversal, observational, descriptive, uncontrolled study design was used, done in primary care centers, on a national scale. The inclusion criteria were: ambulatory patients, both sexes, 50 years or older, with hip or knee osteoarthritis according to the criteria proposed by the American College of Rheumatology,<sup>14,15</sup> modified with the objective of augmenting their specificity, as well as the need to present radiographic damage of the knee or the hip<sup>16</sup> as well as a history of a total of 3 months of pain in the past year. A signal joint was defined as the localization of the osteoarthritis (knee, hip, or both) that had all of the criteria and was the most important cause of demand for sanitary attention. Patients with inflammatory arthropathy, lesion, or trauma that caused joint immobilization of the inferior extremity for 3 months or more, excepting patients with interventions (i.e. osteotomy, arthroplasty) caused by knee and/or hip osteoarthritis were excluded.

## Sample Size

A sample size of 1300 patients with predetermined to permit the estimation of proportions for the knee subgroup with an absolute error of  $\pm 3.3\%$ , and for the hip subgroup with an absolute error of  $\pm 5.7\%$ , with a level of confidence of 95% ( $Z_{\alpha/2}=1.96$ ), for the worst of the cases in which  $P=Q=.5$  ( $\pi=[1-\pi]=0.5$ ), and taking into account a relationship of 3/1 between the hip and the knee. Patient selection was done on a national scale, in proportion to the general population of persons 50 or older, according to the census, after excluding Canarias, Baleares, Ceuta, and Melilla for logistical reasons. During selection, the following were taken into account: rural or urban habitat, the socioeconomic level of the population attended by the physician, to maintain the representativity of the sample with respect to the general population.

It was considered that each primary care physician should include 10 consecutive patients (non-probabilistic consecutive sampling), 7 with knee osteoarthritis and 3 with hip osteoarthritis, for which 130 primary care physicians were chosen, distributed over the whole country in a proportional manner to the number of patients assigned to each province.

## Procedures

The study was done at the same time all over the country during 2 predetermined months, October and November 2003. The information was obtained through 2 interviews done with structured questionnaires and separated by a small amount of time. One of them was done by the primary care physician and the other one by a different person will (nurse, another physician), to reduce errors in some of the questions regarding the usage of resources. A primary care physician was in charge of obtaining the information on diagnoses, treatment and consumption of public sanitary resources. The interviewer was in charge of obtaining the information on life habits, quality of life, help needs, the consumption of private sanitary resources, including nonmedical professionals, and social and labor information. The specific health questionnaires included in the interview were complemented in an auto application form by the patients whenever possible. Before starting the study, reunions with the investigators were done, on a national and local scale—in the different areas in which the national territory was divided—to standardize the procedures of data capture.

Rheumatologists from SER and specialists from SEMERGEN acted as local coordinators in all phases of the study to insure an adequate function. Lácer laboratories contributed with the financing, organization, preparation, and distribution of the material needed to develop the

study. Data processing was carried out in the research unit of the Spanish Foundation for Rheumatology.

## Variables and Instruments

The following variables were included: *a*) physician data—age, gender, and years in primary care—; *b*) sociodemographic variables—age, date of birth, marriage status, and level of schooling—; *c*) variables related to osteoarthritis—selection of signal joint (see above), radiological damage stage of the signal joint according to the classification proposed by Kellgren and Lawrence<sup>17</sup>, for which an image Atlas served as a model for each level and localization in any anteroposterior x-ray of hip/knee done in the last 2 years, or in the opposite case, an anteroposterior x-ray while standing should be done, time since onset of pain in the knees and hips, and the presence of osteoarthritis in other localizations—; *d*) associated morbidity—number of painful areas, presence of limiting illness, other muscle and joint illness, diseases, or processes classified according to the index of comorbidities of Charlson<sup>18</sup>, which is a validated index and very extended in its use, that only includes significant comorbidity (i.e. Hypertension is not included)—; *e*) risk factors—current weight, height (to calculate the body mass index), maximum weight before 30 years of age and tobacco use—; *f*) variables in the quality of life related to health—the WOMAC questionnaire to specific for hip and knee osteoarthritis, which contains 24 items grouped in 3 subscales that evaluate pain, stiffness, and functional capacity,<sup>19,20</sup> in its Spanish adapted version<sup>21</sup> and the Short-Form 12 (SF-12)<sup>22</sup>, that contains 12 items grouped in 2 scales, one physical and mental, and a version validated for our country<sup>23</sup>—; *g*) anxiety and depression, evaluated through the Hospital Anxiety and Depression (HAD)<sup>24</sup> questionnaire, in a version adapted for our country<sup>25</sup>; *h*) perceived health competence, measured through the Perceived Health Competence Scale,<sup>26</sup> also in the version adapted for our country<sup>27</sup>; *i*) great intensity of chronic pain, using the Grade Chronic Pain Status,<sup>28</sup> which contains 7 items that evaluate intensity of pain and limitation due to pain during the last 6 months, a combination of which establishes four well differenced levels of chronic pain; *j*) physical activity, using a brief questionnaire adapted to Spanish<sup>29</sup>; *k*) use of resources in the last 6 months, according to the public health system or private health system, including: 1) sanitary attention (accessibility to family physician, number of visits done by the family physician and other specialists, type and number of lab tests, the physician who asked for then, days of hospital stay, and use of emergency services); and 2) treatment (pharmacologic—maximum dose, common dose in the number of days that each one—, infiltration, surgery

—hip/knee prosthesis—, physical rehabilitation sessions or physiotherapy, conduct confronting illness and visits to non-sanitary professionals); *l*) number of pain crises in the last 6 months and conduct of the patient towards these; *m*) socioeconomic variables—habitat characteristics, work situation and work activities done throughout life, from which it was determined after words, the social class-based on the British Registrar General classification, according to a methodology validated in our country<sup>30</sup>—; *n*) number of nonworking days were physically incapable of doing the main activity, in patients who do not work, and the number of days of main activity reduction over the last months; *ñ*) need from help from another person to do some basic activities space (walking, shopping, home activities, dressing, and bathing); *o*) economic health due to illness; *p*) satisfaction with respect to the illness and the sanitary attention.

### Statistical Analysis

A descriptive analysis, and statistical parameter estimation was carried out, and data of the sociodemographic and clinical variables were presented of the characteristics of osteoarthritis and its comorbidity. In the present study, only the more general descriptive results of the study population are presented.

### Ethical Aspects

All patients signed informed consent before inclusion in the study. The study was approved by the principal investigators (PI) hospital. The ArtRoCad study has followed the ethical and legal postulates, regulating human research, such as a declaration of Helsinki—updated in 2000—and the Data Protection Law.

### Results

One-hundred and thirteen (87%), primary care physicians participated in the study of the 130 initially considered (Figure 1). The distribution of the 17 physicians not included is homogeneous over all of a national territory, and affects 7 of 15 of the autonomous communities; the other 8 included 100% of the planned physicians (Table 1). Twenty-six local coordinators participated, 11 from SER and 15 from SEMERGEN distributed according to the participating physicians area.

One-thousand and seventy-one patients were included, 82% of the predetermined sample size. Of the 229 patients not recruited, 170 (74%) corresponded to the 17 primary care physicians that were not included in the study; while the other 59 were the consequence of lesser recruitment on the part of participating physicians. The 113 physicians included had a mean compliance rate of 94% of convened patients, with the

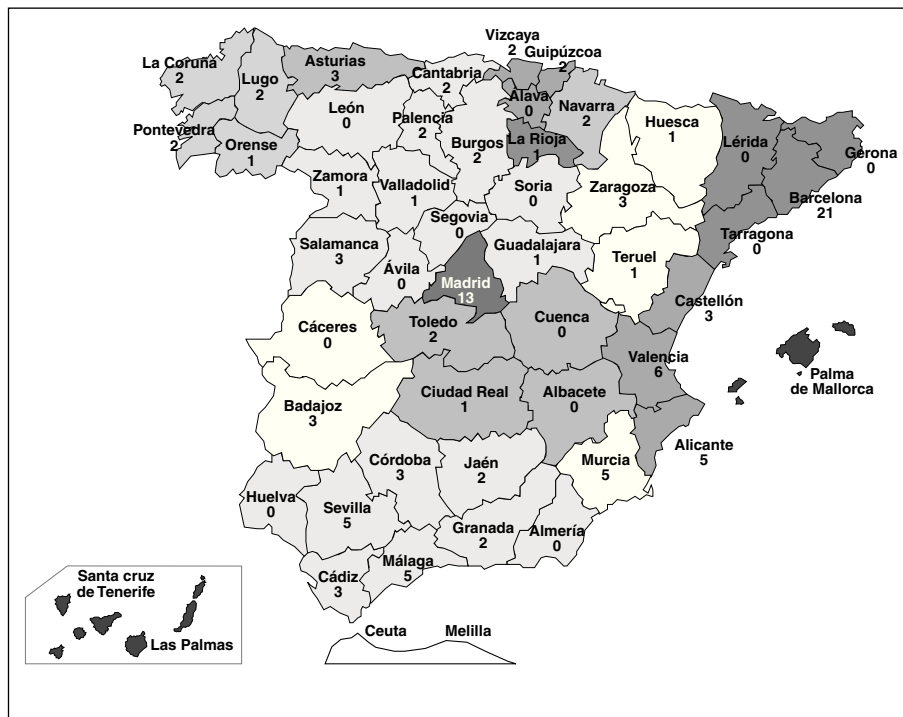


Figure 1. Distribution of the primary care physicians who participated in ArtRoCad according to provinces.

**TABLE 1. ArtRoCad: Population, Physician, and Participant Distribution**

Autonomous Community/Province	Total Population	Over 50 Years	Planned Physicians	Physicians Participating	Interviewed Patients	Percentage of Patients (Seen Over Planned)
Galicia	2 731 900	1 031 082	11	7	62	89
A Coruña	1 108 419	407 617	4	2	19	95
Lugo	365 619	161 536	2	2	20	100
Ourense	345 241	156 047	2	1	8	80
Pontevedra	912 621	305 881	3	2	15	75
Asturias (Principado de)	1 076 567	416 739	4	3	30	100
Cantabria	531 159	185 858	2	2	20	100
País Vasco	2 098 596	731 980	7	6	59	98
Álava	286 497	94 318	1	0		
Guipúzcoa	679 370	236 869	2	2	19	95
Vizcaya	1 132 729	400 792	4	4	40	100
Comunidad Foral de Navarra	543 757	189 076	2	2	19	95
La Rioja	264 178	95 016	1	1	10	100
Cataluña	6 261 999	2 141 724	22	21	210	100
Barcelona	4 736 277	1 615 721	17	21	210	100
Girona	565 599	188 605	2	0		
Lleida	361 590	133 399	1	0		
Tarragona	598 533	203 998	2	0		
Aragón	1 189 909	455 962	5	5	50	100
Huesca	205 430	82 773	1	1	10	100
Teruel	136 473	58 275	1	1	10	100
Zaragoza	848 006	314 913	3	3	30	100
Castilla y León	2 479 118	960 845	10	7	50	71
Ávila	164 991	69 233	1	0		
Burgos	347 240	131 531	1	2	14	70
León	502 155	200 974	2	0		
Palencia	178 316	67 104	1	0		
Salamanca	349 733	136 722	1	3	25	83
Segovia	146 613	57 065	1	0		
Soria	90 911	38 905	0	0		
Valladolid	495 690	169 657	2	1	1	10
Zamora	203 469	89 653	1	1	10	100
Comunidad de Madrid	5 205 408	1 637 553	17	13	129	99
Castilla-La Mancha	1 734 261	594 119	6	4	31	78
Albacete	363 263	117 441	1	0		
Ciudad Real	476 633	163 324	2	1	10	100
Cuenca	201 053	81 175	1	0		
Guadalajara	165 347	58 148	0	1	10	100
Toledo	527 965	174 030	2	2	11	55
Extremadura	1 069 420	359 831	4	3	30	100
Badajoz	661 874	214 163	2	3	30	100
Cáceres	407 546	145 668	2	0		
Comunidad Valenciana	4 120 729	1 351 576	14	14	127	91
Alicante	1 445 144	471 762	5	5	45	90
Castellón de la Plana	474 385	162 520	2	3	30	100
Valencia	2 201 200	717 295	7	6	52	87
Murcia (Región de)	1 149 328	328 871	3	5	47	94
Andalucía	7 340 052	2 114 170	22	20	197	99
Almería	518 229	141 449	1	0		
Cádiz	1 125 105	295 106	3	3	30	100
Córdoba	769 237	240 346	3	3	27	90
Granada	809 004	251 231	3	2	20	100
Huelva	458 998	136 436	1	0		
Jaén	645 711	204 763	2	2	20	100
Málaga	1 278 851	377 839	4	5	50	100
Sevilla	1 734 917	466 999	5	5	50	100
Total*			130	113	1.071	94

\*Does not include Canarias, Baleares, Ceuta, and Melilla.

**TABLE 2. Distribution of the Number of Recruited Patients in ArtRoCad According to the Date of the Interview (October-November 2003)**

Week	N	%	Cummulative %
October			
40	60	6.01	6.01
41	192	19.24	25.25
42	190	19.04	44.29
43	124	12.42	56.71
October/November			
44	99	9.92	66.63
November			
45	136	13.63	80.26
46	141	14.13	94.39
47	48	4.81	99.20
48	8	0.80	100.00
Total	998	100.00	

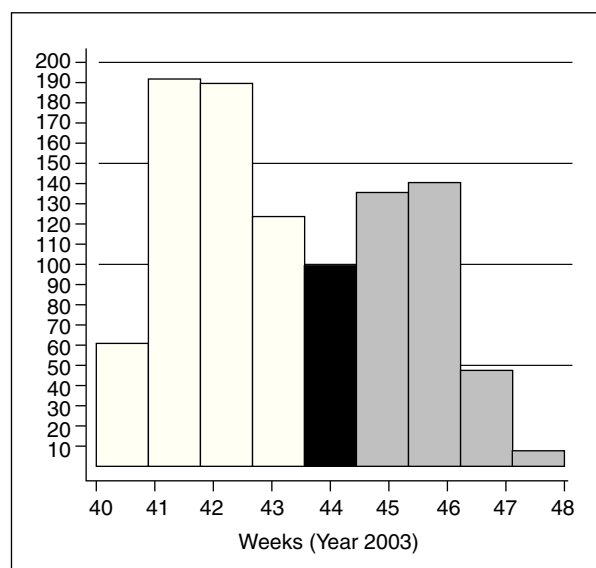
compliance of >95% in 10 autonomous communities. The majority of the interviews (93%; 998/1071) was done in the foreseen amount of time, from October to November 2003. Before the above-mentioned date, 21 (2%) interviews were done—the questionnaire booklets were sent in June 2003. After the planned date, 52 (5%) interviews were done. Within the time designated for the interviews, half was done before the first 4 weeks, as can be seen in Table 2 and Figure 2.

### Description of the Participating Physicians

The mean age ( $\pm$  standard deviation [SD]) of the 113 participating physicians was  $45 \pm 6$  years (limits, 29, 73), mostly males (n=79; 71%). The mean time $\pm$ DE working in primary care was  $17 \pm 8$  years (median, 19; P<sub>25-75</sub>, 12-23; limits: <1, 47).

### Description of the Interviewed Patients

A total of 1071 patients were interviewed, with the following distribution according to signal joint: knee, 710 (66.3%); hip, 252 (23.5%); and both, 109 (10.2%). Table 3 shows their sociodemographic characteristics. The results are expressed in absolute and relative frequencies (in parenthesis), unless another parameter is specified, by signal joint and for the total of the complete sample. 75% of the sample was 65 or older and 74% were women. 62% were married and 29% were widowed. 40% had practically no studies whatsoever, and an additional 26% had completed primary schooling. 58% of the sample described a main work activity, the majority in the service sector and lesser qualified jobs. He same jobs permitted the classification of these patients as mainly middle and lower class. 79% of the



**Figure 2.** Interviews done by week of study. In grays, the weeks corresponding to November and in white the ones from October 2003. The week in black is between both months.

patients said they were non-smokers. In Table 4 the most relevant disease characteristics are described. The majority (80%) of the patients were affected by moderate or severe radiographic osteoarthritis. There are missing radiographs because they did not correspond to the signal joint. The needing an evolution of pain was between 6 and 10 years, according to localization. The patients had osteoarthritis in other localizations, especially the vertebral spine and hands, frequently with pain, because 74% referred at least one other painful area, without taking into account the signal joint. In Table 5 there is a detailed description of the comorbidity of the patients. Emphasis must be placed on hypertension, which affected half of the patients, followed by diabetes and vascular illnesses. The Charlson Index, a validated and very extended method, was calculated that only includes really significant comorbidities (i.e. hypertension is not included), and a comorbidities similar to the patients with knee and hip osteoarthritis was observed. 50% of patients had at least one comorbidity apart from osteoarthritis. At the end of Table 5 other causes of limitation are described, apart from hip and knee osteoarthritis, among which problems of the locomotor system are once again observed, specially back pain.

### Discussion

ArtRoCad had an excellent rate of participation according to the design previewed and the original protocol. The physicians are representative and the

**TABLE 3. Sociodemographic Characteristics of the ArtRoCad Sample**

Characteristic	Knee (n=710)	Hip (n=252)	Both (n=109)	Total (n=1071)
Age, y				
Mean±SD	71±9	72±9	71±9	71±9
Median (P <sub>25-75</sub> )	71 (65-77)	73 (65-78)	72 (65-78)	72 (65-77)
Range	50-94	50-93	50-99	50-99
Gender, n (%)				
Male	166 (23)	85 (34)	28 (26)	279 (26)
Female	544 (76)	167 (66)	81 (74)	792 (74)
Marital status, n (%)				
Married	422 (62)	153 (62)	65 (63)	640 (62)
Separated/divorced	8 (1)	6 (2)	1 (1)	15 (1)
Single	50 (7)	21 (9)	6 (6)	77 (7)
Widowed	205 (30)	65 (27)	31 (30)	301 (29)
Schooling, n (%)				
No schooling	140 (20)	42 (17)	37 (35)	219 (21)
To 10 years	137 (20)	51 (21)	12 (11)	200 (19)
To 10-13 years	194 (28)	58 (24)	21 (20)	273 (26)
To 14-15 years	145 (21)	52 (21)	23 (22)	220 (21)
To 16-19 years	50 (7)	23 (9)	7 (7)	80 (8)
More studies without going to the university	22 (3)	8 (3)	3 (3)	33 (3)
University studies	8 (1)	9 (4)	4 (4)	21 (2)
Profession (great CON categories), n (%)				
Business directors and public administration	5 (1)	2 (1)	–	7 (1)
Technical and professional scientists and intellectuals	21 (5)	10 (6)	6 (9)	37 (6)
Technical and professional aides	24 (6)	7 (5)	3 (5)	34 (5)
Administrative workers	26 (6)	11 (7)	5 (6)	42 (7)
Restoration, protection, and personal workers and salespersons	53 (13)	18 (12)	6 (9)	77 (12)
Qualified agriculture and fishing workers	30 (7)	10 (7)	11 (17)	51 (8)
Qualified artisans and manufacturing and mining industry workers except the machine or installations operators	70 (17)	21 (13)	14 (21)	105 (17)
Installation and machinery operators and mounters	34 (8)	17 (11)	–	51 (8)
Non qualified workers	141 (35)	57 (37)	21 (32)	219 (35)
Social class, n (%)				
High	26 (6)	12 (8)	5 (8)	43 (7)
Middle	152 (38)	57 (38)	23 (36)	232 (37)
Lower	225 (56)	83 (55)	37 (57)	345 (56)
Social security regiment, n (%)				
Autonomous	51 (8)	23 (10)	12 (13)	86 (9)
Home employees	17 (3)	9 (4)	1 (1)	27 (3)
Public functionaries	19 (3)	9 (4)	3 (3)	31 (3)
General	438 (71)	148 (66)	61 (64)	647 (69)
Agricultural workers	89 (14)	33 (15)	18 (19)	140 (15)
Workers of the sea	3 (0.5)	1 (0.5)	–	4 (0.4)
Smokers, n (%)	101 (15)	53 (22)	17 (16)	171 (17)
Ex smokers	36 (5)	14 (6)	6 (6)	56 (5)

included patients were also assured, both because of the distribution of social and demographic characteristics as for the protocol adaptation to their selection (a strict recruitment period, compliance with inclusion and not the exclusion criteria, selection that took into account the habitat—rural or urban—and the socioeconomic level of the population). We believe that the main characteristics of the samples here presented, are coherent with what would be expected in a population with hip and knee osteoarthritis that demand medical attention. The inclusion criteria were chosen to favor the specificity and to reduce as much as possible of false

positives, which seems to be assured by the sample characteristics. The prevalent criteria was to come up with a very well-defined population with a clear osteoarthritis diagnosis, especially if we take into account that our objective was to assign resource consumption and costs to a specified disease. Counterpoint to this, the form of selection plus the brevity of the selection period favors the presence of the most assiduous, and the necessity to have an x-ray, can favor the inclusion of the most severely-ill patients, though it is difficult to know the reach of the situation. ArtRoCad, contrary to other studies that approached

**TABLE 4. Clinical Description of the Simple: Radiographic, Other Localizations of Osteoarthritis, and Pain in Other Joint Areas**

Characteristics	Knee (n=710)	Hip (n=252)	Both (n=109)	Total (n=1071)
<b>Worse punctuation x-ray knee, n (%)</b>				
Normal x-ray	2 (0.3)	1 (0.4)	–	3 (0.3)
Doubtful, doubtful osteophytes	10 (1)	2 (0.8)	–	12 (1)
Minimal, evident osteophytes with possible impingement of the articular line	82 (12)	1 (0.4)	12 (11)	95 (9)
Moderate	314 (44)	4 (2)	48 (44)	366 (34)
Severe*	293 (42)	5 (2)	37 (34)	335 (32)
Absent data or non evaluated	9 (1)	239 (95)	12 (11)	260 (24)
<b>Worse punctuation x-ray hip, n (%)</b>				
Normal x-ray	8 (1)	–	–	8 (1)
Doubtful, doubtful osteophytes	2 (0.3)	2 (0.8)	1 (1)	5 (0.5)
Minimal, evident osteophytes with possible impingement of the articular line	6 (0.8)	40 (16)	13 (12)	59 (5)
Moderate	7 (1)	99 (39)	39 (36)	145 (13)
Severe*	4 (0.6)	108 (43)	35 (32)	147 (14)
Absent data or non evaluated	683 (96)	3 (1)	21 (19)	707 (66)
<b>Maximum time of pain in signal joint, y</b>				
Mean±DE	9.2±7.4	7.7±7.1	11.1±8.8	9.1±7.6
Median (P <sub>25-75</sub> )	8 (4-12)	6 (2.5-10)	10 (5-15)	7 (3.5-12)
Range	0-40	0-47	0-55	0-55
<b>Diagnosis of osteoarthritis in other areas, n (%)</b>				
Hands	186 (26)	50 (20)	31 (28)	267 (25)
Thumbs	111 (16)	33 (13)	28 (26)	172 (16)
Hip	119 (17)	11 (4)	6 (5)	136 (13)
Knee	46 (6)	96 (38)	11 (10)	153 (14)
Shoulder	102 (14)	36 (14)	33 (30)	171 (16)
Ankles/feet	62 (9)	16 (6)	18 (16)	96 (9)
Spine	377 (53)	138 (55)	69 (63)	584 (55)
<b>Pain in other joints, n (%)</b>				
Hands	137 (19)	34 (13)	30 (28)	201 (19)
Elbows	33 (5)	7 (3)	6 (5)	46 (4)
Shoulders	142 (20)	49 (19)	41 (38)	232 (22)
Hip	98 (14)	9 (4)	12 (11)	119 (11)
Knee	55 (8)	78 (31)	10 (9)	143 (13)
Ankles/feet	85 (12)	13 (5)	15 (14)	113 (11)
Axial pain	384 (54)	141 (56)	65 (60)	590 (55)
Cervical pain	192 (27)	71 (28)	39 (36)	302 (28)
Back pain	101 (14)	23 (9)	25 (23)	149 (14)
Lumbar pain	299 (42)	101 (40)	50 (46)	450 (42)
<b>Total joint areas with pain</b>				
Mean±DE	1.3±1.2	1.3±1.08	1.6±1.3	1.34±1.21
Median (P <sub>25-75</sub> )	1 (0-2)	1 (1-2)	1 (1-2)	1 (0-2)
Range number, %				
0	199 (28)	60 (24)	20 (18)	279 (26)
1	261 (37)	94 (37)	40 (37)	395 (37)
2	146 (21)	71 (28)	24 (22)	241 (22)
3	60 (8)	17 (7)	13 (12)	90 (8)
≥4	44 (6)	10 (4)	12 (11)	66 (6)

\*Includes joints not evaluated due to prosthesis.

osteoarthritis in the global manner, providing detailed information of the impact that the disease has when it affects two key joints for movement and walking. This focus is considered of more interest and relevance from a socio-sanitary perspective. Without forgetting specialized attention, we have tried to analyze the problem from the most probable scenario for this group of patients: primary care. A similar approach has been followed by recent studies, although with smaller

sample sizes and patients that come from primary care and specialized care, which makes the interpretation of their findings difficult.<sup>8,9</sup> Among the limitations of the ArtRoCad study, maybe the most important one is that estimates are based on data provided by the patients themselves and the clinical histories, in a timeframe that took to count the preceding 6 months. This leads to the frequent problem of recall errors, and the overall study trustworthiness. The prospective recollection of



**TABLE 5. Clinical Description of the Sample: Comorbidity and Limitation Due to Other Process**

Comorbidity, n (%)	Knee (n=710)	Hip (n=252)	Both (n=109)	Total (n=1071)
Hypertension	418 (59)	129 (51)	67 (61)	614 (57)
Myocardial infarction	25 (4)	7 (3)	–	32 (3)
Heart failure	47 (7)	18 (7)	10 (9)	75 (7)
Peripheral vascular disease	99 (14)	35 (14)	28 (26)	162 (15)
Stroke	40 (6)	17 (7)	1 (0.9)	58 (5.4)
Hemiplegia or paraplegia	5 (0.7)	–	1 (0.9)	6 (0.5)
Mild or moderate diabetes	121 (17)	29 (12)	22 (20)	172 (16)
Diabetes with complications	16 (2)	8 (3)	6 (5)	30 (3)
Dementia	7 (1)	7 (2.8)	1 (0.9)	15 (1.4)
Chronic obstructive lung disease	61 (9)	26 (10)	6 (5)	93 (8)
Mild liver disease	10 (1)	3 (1)	–	13 (1)
Moderate or severe liver disease	7 (1)	2 (0.8)	–	9 (0.8)
Moderate or severe kidney disease	11 (2)	4 (2)	3 (3)	18 (2)
Neoplasia	15 (2.1)	9 (3.6)	2 (1.8)	26 (2.4)
Metastatic disease	1 (0.1)	–	–	1 (0.1)
<b>Charlson index</b>				
Incluyes rheumatic comorbidity				
Mean±DE	1.6±0.67	1.58±0.67	1.67±0.66	1.6±0.67
Median (P <sub>25-75</sub> )	2 (1-2)	1 (1-2)	2 (1-2)	2 (1-2)
Range	1-7	1-4	1-3	1-7
Without rheumatic comorbidity				
Mean±DE	0.6±0.67	0.58±0.67	0.67±0.66	0.6±0.67
Median (P <sub>25-75</sub> )	1 (0-1)	0 (0-1)	1 (0-1)	1 (0-1)
Range	0-6	0-3	0-2	0-6
<b>Other causes of limitation, n (%)</b>				
Limitation due to back pain	308 (43)	109 (43)	43 (39)	460 (43)
Limitation due to bone or muscle impairment*	159 (22)	58 (23)	37 (34)	254 (24)
Limitation due to lung process	36 (5)	13 (5)	4 (4)	53 (5)
Limitation due to cardiovascular process	39 (5)	19 (8)	6 (5)	64 (6)
Limitation due to neurological process	25 (4)	12 (5)	2 (2)	39 (4)
Limitation due to eye process	44 (6)	11 (4)	9 (8)	64 (6)
Limitation due to anxiety or depression	4 (0.6)	1 (0.4)	3 (2.7)	8 (0.7)
Limitation due to obesity	25 (4)	4 (2)	2 (2)	31 (3)
Limitation due to other processest	37 (5)	10 (4)	5 (5)	52 (5)

\*Different to osteoarthritis of the signal joint.

tIncludes: osteoporosis (5), digestive processes (8), fracture of the superior extremity (3), disk herniation (3), vertigo (3), diabetes (2), prostatic syndrome (2), flebitis (2), deafness (2), severe hypertension (1), chronic urinary infection (chronic cystitis) (1), headache (1), unspecified dizziness (mild) (1), colon cancer (1), pancytopenia (1), bilateral carpal tunnel syndrome (1), thrombosis right inferior extremity (1), pressure ulcer left talus (1), hepatic cirrhosis (1), dyslipidemia (1), venous insufficiency (1), congenital luxation-agenesia right hip (1).

data through a resource consumption diary, which is filled by the patient himself, seems to be an interesting alternative, though it is not exempt from compliance problems. In general, the quality of data capture seems elevated, something that was reached to careful design of the data collection forms, a standardized course to put special emphasis on a detailed interview and a close follow-up of the evolution of the study. Probably, the fact that all of the investigators selected the patient and did the interviews and a simultaneous form in a short period of time, that closely followed the standardization course, also contributed to good protocol compliance. The role of the interviewer was fundamental to reach a maximum truthfulness of the information, not based on mere remembrance from the patient part but in an active search for information, backed up by other documents when possible, such as the clinical history, physician's reports, and drug consumption. Apart from this, the person in charge of

the second interview was someone different to the family physician of the patient, which permitted a more relaxed environment and reduce some of the response errors. Those not part of the present work, the cost estimation study planned for ArtRoCad presents the same problems as other studies of this kind. Direct costs are assigned prices from the market parting from published or private sources that have been conveniently contrasted. The indirect cost assignment is much more complicated, both because of the activities included in this concept as for the applied prices, both object of major controversy, for which it must be recognized that there exists limitations in this area. Another part of the problem, without a satisfactory answer in the references, is that the frequency post by the attribution of cost to a determinate illness when in reality, the patients often present more than one process is difficult to untangle and often interacts as a source of resource consumption. Here, one must recognize the limitations

of the study, even though we have tried to identify the resource consumption specific for osteoarthritis, reality is probably far from perfect. Despite the above considerations, ArtRoCad represents one of the largest efforts done to know the impact of hip and knee osteoarthritis in our population. It fills a large gap that existed, even though it is a very frequent disease, through the coordinated answer of both rheumatologists and primary care physicians, which will provide an important amount of information.

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