Burden of Disease Across Chronic Diseases: A Health Survey That Measured Prevalence, Function, and Quality of Life

ESTÍBALIZ LOZA, LYDIA ABÁSOLO, JUAN ANGEL JOVER, LORETO CARMONA, and the EPISER Study Group

ABSTRACT. ***Objective.*** To assess health related quality of life (HRQOL) and functional ability across groups of chronic diseases in Spain.

Methods. A national health survey was conducted during 1999-2000. Participants were randomly selected from city censuses among persons aged over 20 years. All 2192 participants (response rate 73%) completed generic instruments measuring functional ability in activities of daily living [Health Assessment Questionnaire (HAQ)] and HRQOL [Short-Form 12 (SF-12)]. Chronic diseases were defined by self-report and elicited from 2 specific questions: "Have you ever been told you have a chronic disease by a physician?" and "Are you taking any chronic medication?". Only diagnoses present for ≥ 3 months were included as chronic. We estimated mean HAQ and SF-12 scores for the different groups of chronic diseases. We then adjusted the scores for covariates and compared them between diseases by multiple linear regressions.

Results. Over half the population had at least one chronic disease [n = 1276 (58.2%)], and 22.6% had any rheumatic disease. Rheumatic diseases have an adverse effect on daily functioning [HAQ ß-coefficient 0.11 (95% CI 0.06–0.15)] and HRQOL [SF-12 physical ß-coefficient –5.78 (95% CI –6.27 to –4.28); SF-12 mental ß-coefficient –2.61 (95% CI –3.79 to –1.41)]. Thus, the influence of the rheumatic diseases is greater when their prevalence is taken into account.

Conclusion. When the definition of burden of disease includes a measure of function and HRQOL that is weighted by disease prevalence, rheumatic diseases as a group can be ranked alongside neurological, cardiac, or pulmonary conditions as a major disease. (First Release Oct 15 2007; J Rheumatol 2008; 35:159–65)

Key Indexing Terms:
HEALTH RELATED QUALITY OF LIFE FUNCTIONAL ABILITY CHRONIC DISEASE
PREVALENCE RHEUMATIC DISEASE SPAIN

In recent decades, the prevalence of chronic disorders has increased, probably as a result of better recognition and from the overall aging of the population, the latter related to improvements in living conditions and to technological progress[1-3]. Chronic diseases are among the most relevant medical challenges in developing countries, because of their effects on quality of life[4-8] and costs to health and social security systems[9-11].

Rheumatic diseases are prevalent chronic diseases that affect all sectors of society[12,13]. Chronic pain and physical disability — common factors in all rheumatic diseases — impair social functioning and emotional well-being[14,15], seriously affecting quality of life[16-19]. From a societal point of view, rheumatic diseases represent a tremendous burden, as they cause a large number of temporary and permanent work disability claims[20], and also because they are extremely frequent among the elderly[21,22], complicating their self-care and driving them to utilize significant healthcare and social resources[23]. Despite their social impact, rheumatic diseases have not been given the priority they deserve from society, health professionals, and authorities in order to achieve effective prevention, treatment, and focused research. This lack of recognition may be based on the fact that, in general, these diseases may not be life-threatening and are considered a natural consequence of the aging process. Although this underrecognition appears to be changing, as the United Nations and the Word Health Organization have endorsed the Bone and Joint Decade 2000-2010[24], rheumatic patients and those who care for them remain unnoticed.

We analyzed the extent to which rheumatic diseases impair health related quality of life (HRQOL) and functional ability compared to other chronic diseases. This may help to properly recognize these diseases at least at the level of others such as cardiovascular, pulmonary, or even neurological diseases.

From the Rheumatology Unit, Hospital Clínico San Carlos, and the Research Unit, Spanish Foundation of Rheumatology, Madrid, Spain.

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E. Loza, MD; L. Abásolo, MD; J.A. Jover, MD, PhD, Rheumatology Unit, Hospital Clínico San Carlos; L. Carmona, MD, PhD, Research Unit, Spanish Foundation of Rheumatology; and the EPISER Study Group (Appendix).

Address reprint requests to Dr. L. Carmona, Research Unit, Spanish Foundation of Rheumatology, Calle Marqués del Duero 5, 1A, 28001 Madrid, Spain. E-mail: lcarmona@ser.es

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MATERIALS AND METHODS

Study design. The EPISER study was a health survey conducted by the Spanish Society of Rheumatology in 1999-2000 to assess the prevalence and burden of musculoskeletal diseases in the general population of Spain[25].

Patient sample and data acquisition. A random sample of subjects older than 20 years of age was drawn in 4 stages. In the first stage, Spain, which is formed by 19 autonomous communities, was divided into 8 strata with geographical proximity and homogeneous population size (the Canary Islands were included in the less inhabited stratum). In a second stage, provinces were selected randomly (2 or 3 per stratum depending on the total number of provinces); a city (any town with population > 10,000) or village (< 10,000) was randomly selected in each province, weighting the cities so that the final sample would represent the rural:urban population ratio of 25:75 in Spain. Finally, the city censuses were obtained to draw random samples of the population over age 20, in age and sex strata proportional to the distribution in the general population. The selected subjects were first sent information letters and then appointment letters for health examination, to which subjects were required to bring medications currently taken and any medical reports. Subjects who could not be located or who refused to participate were not replaced.

Twenty rheumatologists, trained in internal medicine, carried out structured interviews at primary care facilities, with permission from the local authorities. Interviews included questions on sociodemographic data, current health status, whether respondents had been diagnosed with any chronic disease by a physician or whether they were taking any medication, and all participants completed the Spanish validated versions of the Medical Outcome Study Short-Form 12-item status survey questionnaire (SF-12)[26] and the Health Assessment Questionnaire (HAQ)[27]. The SF-12 is a generic instrument to assess HRQOL that produces a score ranging from 0 to 100 (from worst to best) in 2 domains or components, physical and mental. The HAQ was a generic questionnaire in its development although it has been used mainly to determine functional ability in rheumatoid arthritis (RA). The HAQ produces a score from 0 to 3 (0 = total capacity to perform daily activities, 3 = complete inability to do any of them). This questionnaire includes 20 questions in 8 categories of functioning that represent a comprehensive set of functional activities (dressing, rising, eating, walking, hygiene, reach, grip, and usual activities).

Subjects with a positive screening in the interview for specific rheumatic diseases [namely RA, systemic lupus erythematosus (SLE), knee or hand osteoarthritis (OA), or fibromyalgia (FM)] were given standardized physical examinations, in order to confirm classification criteria.

Definition of chronic diseases. Chronic diseases were defined by self-report and elicited from 2 specific questions: "Have you ever been told you have a chronic disease by a physician?" and "Are you taking any chronic medication?". The self-reported diagnoses were then confirmed by the interviewer after examining the subject's current medications and medical reports if available. Only diagnoses present for ≥ 3 months were included under the definition of chronic disease. The following categories were extracted from the diseases reported by subjects: (1) rheumatic diseases (any musculoskeletal or connective tissue disorder); (2) hypertension; (3) hypercholesterolemia; (4) digestive diseases (any noninfectious or neoplastic disease involving the gastrointestinal tract, liver, gallbladder, or pancreas); (5) allergies; (6) cardiac diseases (ischemic heart disease, cardiac failure, valvulopathies, and diseases affecting the heart); (7) pulmonary diseases (any noninfectious or neoplastic disease involving the airways from the trachea downwards); (8) diabetes; (9) neurological diseases (including Alzheimer disease and other dementias, migraines and other forms of headache, epilepsy, multiple sclerosis, Parkinson disease, stroke, trigeminal neuralgia, essential tremor, mental retardation, hydrocephalus, syringomyelia facial spasm, facial paralysis, vertebrobasilar syndrome); (10) psychiatric disorders (depression, anxiety disorder, anorexia nervosa, schizophrenia, insomnia); (11) cancer (colon, breast, kidney, bladder, mandible, leukemia, lymphoma); (12) eye diseases (glaucoma, cataract, retinopathy, optic neuritis, myopia, strabismus, traumatic lesions); (13) ear, nose, and throat (ENT) disorders (deafness, chronic otitis, otosclerosis, Meniere's disease and other vertigo syndromes, chronic sinusitis, chronic pharyngitis, chronic laryngitis, laryngectomized); (14) endocrine and other metabolic diseases other than diabetes (hyperthyroidism, hypothyroidism, goiter, thyroid nodules, prolactinoma, obesity, hyperuricemia); (15) non-neoplastic urologic and sex-related disorders (prostatic syndrome, ovarian cyst, fibrocystic mastopathy, genital and urinary chronic infections, endometriosis, urinary papillomatosis, amenorrhea); (16) kidney diseases (renal lithiasis, chronic renal failure, chronic pyelonephritis, nephrectomized, nephropathy); (17) skin diseases (psoriasis, herpetic dermatitis, chronic dermatitis, chronic urticaria, acne, vitiligo, rosacea); (18) non-neoplastic hematological diseases (anemia, thalassemia, polycythemia vera); (19) orthopedic disorders (scoliosis, kyphosis, coxofemoral luxation); (20) vascular diseases (chronic vein insufficiency, arteriosclerosis, arteriopathy, deep vein thrombosis); (21) congenital malformations (Osler-Weber-Rendu disease and others).

Specific musculoskeletal diseases were classified by validated criteria. SLE, knee OA, hand OA, and FM were defined by their respective American College of Rheumatology (ACR) classification criteria[28-30], and RA by the ACR classification criteria adapted to epidemiological surveys by MacGregor, *et al*[31]. A finger-bone densitometry (AccuDexa, Shick Technologies, Long Island City, NY, USA), a validated instrument to assess bone mineral density[32,33], was performed in the middle finger of the nondominant hand in all subjects. We defined osteoporosis as a T score ≤ –1.6 in the AccuDexa measurement, the cutoff that best discriminates osteoporosis at the lumbar spine[34]. Low back pain was defined as any pain ≥ 4/10 in the lower back, pointed out by the physician interviewer in his own body, as of the interview day. We did not change the self-report definition of rheumatic disease if any given subject was classified for the first time as having any of the target diseases during the survey.

The study protocol was reviewed and approved by the Ethical Committee of La Princesa Hospital and by evaluators of the Health Research Fund of the Ministry of Health.

Data analysis. We estimated the prevalence of the 21 groups of chronic diseases with 95% confidence intervals adjusted by the study design by using specific tools for survey analysis that included specification of strata, primary sampling units, and weights, which were corrected for in all analyses. We described subjects in each chronic disease group by means of the central statistics appropriated to each variable distribution. We did not test differences in the distribution of variables between groups of diseases at this point, because there were subjects with coexisting chronic diseases.

We calculated mean scores adjusted by study design, age and sex and 95% confidence intervals of subjects classified in the different disease groups. The effects of the different chronic diseases on the SF-12 and HAQ were evaluated by multiple linear regression analysis, controlling for study design and covariates found to be associated with the scores of the HAQ and each component of the SF-12. These covariates included age, sex, place of residence (rural or urban), education level (no studies, elementary school, high school, post-high school), social class according to the Spanish Society of Epidemiology classification, based on the subject's or spouse's professional category of longest duration[35], and employment status (if the subject was in the workforce). All chronic diseases tested were included in the models at the same time.

We also performed regression analyses to test whether specific rheumatic diseases, as classified by the survey, had any effect on quality of life or functional ability. In this case, the effect was not adjusted by all other chronic diseases. However, we included all other covariates used in the previous models, and effect was also adjusted by the study design. Results of regression analyses are expressed as ß-coefficients and 95% confidence intervals.

To evaluate the influence of chronic diseases taking into account their prevalence we used analytic weights, which are inversely proportional to the variance of an observation. All analyses were performed using Stata 9.0 statistical software (Stata Corp., College Station, TX, USA).

RESULTS

A total of 2998 subjects were randomly selected from an eli-

gible population of 972,545. The final sample comprised 2192 subjects (response rate 73%) who completed the interview, of whom 1276 (58.2%) reported at least one chronic disease.

Table 1 shows the frequency of the 21 chronic disease groups and provides a detailed sociodemographic description.

The estimated prevalences of the 3 most frequent chronic diseases: rheumatic diseases 22.6% (95% CI 19.2–26.1), hypertension 17% (95% CI 15.2–18.8), and hypercholesterolemia 13.5% (95% CI 9.7–17.4). The estimated prevalence of specific rheumatic diseases[25]: RA 0.5% (95% CI 0.25–0.89), low back pain 14.8% (95% CI 12.2–17.4), knee OA 10.2% (95% CI 8.5–10.9), hand OA 6.2% (95% CI 5.9–6.5), FM 2.4 (95% CI 1.5–3.2), and osteoporosis 10.5% (95% CI 8.9–12.0) [of which, men 8.43% (95% CI 6.39–10.5), women 15.62% (95% CI 12.9–18.4), and women aged ≥ 50 yrs 31% (95% CI 25–37)].

On average, women report having a chronic disease more frequently than men (62% vs 55.2%, respectively; p = 0.001), except for the following groups of diseases: pulmonary, ENT, skin problems, and urogenital diseases. The mean age of the subjects with chronic diseases was 53.6 ± 0.48 years, significantly higher than that of subjects with no chronic condition (37 ± 13 yrs; p < 0.001). Only subjects whose chronic problems were allergies, orthopedic disorders, or skin problems had a mean age below 45 years.

Table 2 shows the mean scores (adjusted by study design, age, and sex) for HAQ and SF-12 components for the 21 disease groups. The worst mean scores from the HAQ are those of the neurological diseases and congenital malformations. Rheumatic diseases are in the seventh position of worst mean HAQ, just after arterial hypertension. In the SF-12, the worst mean scores in the physical component are again those of persons with congenital malformations. Rheumatic diseases occupy the fifth position, after neurological diseases. In the mental component of the SF-12, the worst scores are, as expected, those of psychiatric illnesses, with rheumatic diseases rating fifth.

To compare effects on function and HRQOL between the different chronic disease groups, we performed regression models adjusted for study design, age, sex, place of residence (rural or urban), education, social class, and employment status. We included all the chronic diseases in the models. The results of these models, expressed as ß-coefficient for each disease group, are presented in Table 3.

After adjustment, neurological diseases caused the greatest impairment in the HAQ, followed by congenital malformations, pulmonary diseases, and rheumatic diseases. The adjusted SF-12 physical component scores were worst in congenital malformations, followed by rheumatic diseases. In the mental component scores, the worst impairments were in psychiatric disorders, with rheumatic diseases in fourth place.

Table 1. Sociodemographic characteristics of subjects from the general population, by groups of chronic diseases. Values are expressed as number (%), unless otherwise indicated, and correspond to the values of the specific chronic disease in each row .

	Total	Women	Age, yrs, mean ± SD	Living in Cities	No Education or Less Than High School	Low Social Class	Work Workers	Disability
Study population	2192 (100)	1178 (54.0)	46 ± 17	1584 (72.0)	1224 (56.0)	588 (36.6)	1132 (52.0)	65 (2.9)
No chronic disease	916 (41.8)	455 (49.7)	37 ± 13	640 (69.9)	383 (42.1)	26 (32.3)	646 (71.0)	7 (0.7)
Rheumatic conditions	496 (22.6)	309 (62)	58 ± 14	378 (76.2)	376 (76.2)	143 (41.4)	174 (35.1)	31 (6.3)
Arterial hypertension	373 (17.0)	232 (62.2)	63 ± 12	258 (69.2)	309 (82.7)	110 (44)	95 (25.5)	15 (4.1)
Hypercholesterolemia	297 (13.6)	168 (56.6)	58 ± 13	243 (81.8)	223 (75.3)	91 (42.3)	114 (38.4)	16 (5.4)
Digestive tract diseases	216 (9.8)	110 (50.9)	57 ± 16	160 (74.1)	163 (75.4)	61 (39.4)	92 (42.8)	5 (2.3)
Allergies	181 (8.3)	103 (56.9)	42 ± 16	152 (84.0)	72 (39.8)	37 (30.3)	114 (63.7)	6 (3.4)
Cardiac disorders	135 (6.2)	67 (49.6)	66 ± 14	100 (74.1)	108 (80.6)	44 (45.8)	26 (19.3)	11 (8.2)
Pulmonary diseases	133 (6.1)	59 (44.4)	58 ± 16	96 (72.2)	98 (73.7)	36 (39.1)	44 (33.1)	7 (5.3)
Diabetes Mellitus	120 (5.5)	60 (50.0)	65 ± 12	80 (66.7)	103 (85.8)	41 (48.8)	24 (20.0)	6 (5.0)
Psychiatric disorders	80 (3.9)	59 (73.8)	49 ± 16	65 (81.3)	60 (75.0)	26 (46.4)	28 (35.4)	5 (6.3)
Neurological diseases	81 (3.7)	60 (74.1)	54 ± 20	60 (74.1)	54 (66.7)	26 (49.1)	28 (35.0)	2 (2.5)
Vascular diseases	54 (2.5)	37 (68.5)	63 ± 15	30 (55.6)	45 (83.3)	21 (58.3)	12 (22.2)	3 (5.6)
Urogenital disorders	46 (2.1)	14 (30.4)	59 ± 18	36 (78.3)	25 (54.3)	12 (29.3)	15 (32.6)	2 (4.3)
Endocrine diseases	44 (2.0)	29 (65.9)	50 ± 16	32 (72.7)	28 (64.8)	13 (43.3)	21 (47.7)	2 (4.5)
Eye diseases	33 (1.5)	17 (51.5)	54 ± 20	27 (82.0)	23 (69.7)	14 (56.0)	14 (42.4)	3 (9.1)
Skin disorders	32 (1.5)	14 (43.7)	42 ± 14	28 (87.5)	15 (46.8)	9 (40.9)	20 (62.5)	1 (3.1)
ENT disorders	21 (0.9)	8 (38.1)	50 ± 21	17 (81)	10 (47.6)	7 (36.8)	11 (52.4)	0 (-)
Cancer	18 (0.8)	13 (72.2)	57 ± 20	13 (72.2)	12 (66.6)	7 (50.0)	5 (27.8)	0 (-)
Kidney diseases	18 (0.8)	9 (50.0)	55 ± 12	13 (72.2)	11 (61.1)	4 (30.7)	9 (50.0)	0 (-)
Hematological diseases	11 (0.5)	11 (100)	47 ± 19	11 (100)	5 (63.6)	5 (62.5)	5 (45.5)	1 (9)
Orthopedic disorders	7 (0.3)	4 (57.4)	36 ± 13	6 (85.7)	2 (28.6)	1 (20.0)	6 (85.7)	0 (-)
Congenital malformation	6 (0.3)	4 (66.7)	48 ± 15	6 (100)	5 (83.3)	2 (50.0)	2 (33.3)	2 (33.3)

ENT: ear, nose, throat.

Table 2. Mean scores of the Health Assessment Questionnaire (HAQ) and the Short-Form 12 questionnaire (SF-12), by group of chronic diseases, adjusted by study design, sex, and age. Values are expressed as mean (95% CI).

	HAQ*	SF-12† Physical	Mental
All subjects	0.26 (0.22-0.30)	50.18 (48.82-51.53)	49.67 (48.43-50.90)
Subjects without chronic diseases	0.13 (0.11-0.14)	53.88 (53.24-54.52)	51.84 (51.53-53.14)
Rheumatic diseases	0.48 (0.39-0.56)	43.55 (40.62-46.48)	46.71 (44.88-48.53)
Arterial hypertension	0.49 (0.39-0.59)	44.60 (41.79-47.41)	47.54 (45.24-49.84)
Hypercholesterolemia	0.37 (0.27-0.49)	45.88 (44.02-47.73)	48.45 (46.39-50.51)
Digestive diseases	0.35 (0.29-0.41)	45.89 (43.21-48.57)	47.13 (45.09-49.18)
Allergies	0.24 (0.19-0.27)	51.55 (49.99-53.12)	47.58 (45.19-49.98)
Cardiac disorders	0.52 (0.35-0.69)	42.13 (39.48-44.78)	49.71 (47.35-52.06)
Pulmonary diseases	0.47 (0.36-0.61)	43.79 (40.29-47.30)	45.79 (44.26-47.32)
Diabetes mellitus	0.54 (0.38-0.71)	43.06 (39.17-46.95)	47.30 (44.81-49.80)
Psychiatric disorders	0.38 (0.21-0.56)	47.94 (43.69-52.19)	37.00 (33.52-40.48)
Neurological diseases	0.79 (0.56-1.01)	43.52 (38.87-48.17)	44.03 (41.53-43.54)
Vascular diseases	0.52 (0.36-0.67)	45.27 (42.63-47.92)	47.97 (45.34-50.60)
Urogenital disorders	0.31 (0.17-0.45)	47.95 (44.70-51.20)	50.21 (46.93-53.50)
Endocrine diseases	0.35 (0.23-0.47)	45.55 (42.05-49.05)	49.97 (46.82-53.11)
Eye diseases	0.41 (0.17-0.65)	47.51 (43.46-51.55)	50.76 (47.58-53.94)
Skin disorders	0.18 (0.12-0.24)	53.59 (51.59-55.60)	47.51 (43.14-51.88)
Ear, nose, throat disorders	0.34 (0.06-0.62)	51.28 (47.02-55.54)	50.67 (47.49-53.85)
Cancer	0.46 (0.20-0.71)	43.64 (38.38-48.91)	46.23 (40.61-51.86)
Kidney diseases	0.26 (0.11-0.42)	50.35 (46.80-53.91)	50.44 (45.45-55.42)
Hematological diseases	0.21 (0.12-0.31)	47.23 (39.45-55.01)	50.29 (44.06-56.52)
Orthopedic disorders	0.34 (0.01-0.69)	49.21 (40.11-58.31)	47.58 (38.60-56.55)
Congenital malformation	0.64 (0.12-1.16)	40.68 (27.54-53.81)	49.76 (42.64-56.87)

† Range 0-100: from worst to best for both components (physical and mental) of the SF-12. * Range 0-3: 0 = total capacity to perform daily activities, 3 = complete inability to do any daily activities.

Table 3. Effect of different self-reported chronic diseases on the Health Assessment Questionnaire (HAQ) and Short-Form 12 (SF-12). Results from multiple regression analyses, adjusted for study design, age, sex, place of residence, education, social class, employment status, and the other chronic diseases. Results are expressed as ß-coefficient (95% CI). Statistically significant coefficients are in bold letters.

	HAQ	SF–12 Physical	Mental
Rheumatic diseases	**0.11 (0.06, 0.15)**	**–5.78 (–6.27, –4.28)**	**–2.61 (–3.79, –1.41)**
Arterial hypertension	0.04 (–0.01, 0.09)	**–1.52 (–2.68, –0.36)**	–1.10 (–2.53, 0.32)
Hypercholesterolemia	–0.06 (–0.11, 0.01)	**–0.05 (–1.21, –1.11)**	–0.41 (–0.97, 1.79)
Digestive tract diseases	–0.08 (–0.14, 0.01)	–1.07 (–2.38, 0.23)	**–1.70 (–3.26, –0.14)**
Allergies	0.01 (–0.06, 0.65)	1.37 (–0.06, 2.81)	–1.58 (–3.29, 0.13)
Cardiac disorders	**0.06 (0.01, 0.13)**	**–3.21 (–4.89, –1.54)**	–0.28 (–2.27, 1.71)
Pulmonary diseases	**0.12 (0.04, 0.19)**	**–3.96 (–5.62, –2.29)**	**–3.73 (–5.72, –1.75)**
Diabetes mellitus	**0.10 (0.01, 0.17)**	**–2.02 (–3.81, –0.24)**	–0.05 (–2.17, 2.08)
Psychiatric disorders	–0.04 (–0.11, 0.19)	–1.78 (–3.84, 0.27)	**–13.9 (–16.3, –11.5)**
Neurological diseases	**0.42 (0.32, 0.51)**	**–5.27 (–7.44, –3.11)**	**–6.18 (–8.76, –3.59)**
Vascular diseases	0.14 (–0.03, 0.26)	–1.22 (–3.80, 1.36)	–1.53 (–4.60, 1.55)
Urogenital disorders	0.01 (–0.10, 0.11)	–0.68 (–3.06, 1.70)	0.29 (–2.55, 1.13)
Endocrine diseases	0.08 (–0.04, 0.20)	**–3.49 (–6.23, –0.75)**	0.99 (–2.27, 4.27)
Eye diseases	**0.04 (0.01, 0.27)**	–2.35 (–5.40, 0.70)	–0.99 (–4.63, 2.64)
Skin disorders	–0.01 (–0.16, 0.13)	2.02 (–1.15, 5.21)	–1.67 (–5.46, 2.11)
Ear, nose, throat disorders	0.11 (–0.04, 0.27)	–0.29 (–3.73, 4.86)	–0.69 (–4.79, 3.41)
Cancer	0.12 (–0.06, 0.30)	**–3.72 (–7.70, –0.46)**	–2.56 (–7.32, 2.19)
Kidney diseases	–0.04 (–0.23, 0.15)	1.75 (–2.36, 5.87)	2.47 (–2.44, 7.39)
Hematological diseases	–0.04 (–0.29, 0.18)	–0.02 (–5.27, 5.24)	1.42 (–4.84, 7.70)
Orthopedic disorders	0.06 (–0.24, 0.37)	–1.03 (–7.64, 5.57)	–4.94 (–12.8, 2.93)
Congenital malformation	**0.33 (0.01, 0.66)**	**–6.78 (–13.2, –1.67)**	–0.27 (–9.14, 9.48)

Regression coefficients for specific rheumatic diseases are shown in Table 4.

Finally, we weighted the effects of individual diseases on the HAQ and the SF-12 by disease prevalence (Figure 1).

DISCUSSION

Our results show that rheumatic diseases are not only prevalent, but also that they disable persons in a way similar to cardiac, neurological, or pulmonary diseases. Moreover, if one takes into account not only the level of impairment, but also the magnitude of the prevalence of the disease, one cannot understand why regulatory authorities have ignored musculoskeletal diseases. The major strength of our study relies on its design and on the sample studied. A population health survey using specific and validated measures of function and generic measures of HRQOL is an adequate method to determine aspects of the burden of disease across diagnoses. Moreover, the EPISER sample has been shown to be representative of the general population of Spain and with an adequate response rate[25], which increases the generalizability of the results.

A weakness of the study could be the diagnosis of chronic diseases, which might not be accurate. However, self-report is the method most widely used to obtain chronic diagnoses in health surveys[36-38], and this survey has the advantage that self-reports were confirmed where possible by the physician interviewers. Data were analyzed homogeneously and explicitly for all groups of diagnoses, therefore allowing comparisons. Moreover, it would be unlikely that a subject with a disabling chronic disease would forget what the diagnosis of his disease was; he will at least remember the commonly used or more general term. Some diagnoses may be easier to remember for some subjects, either because they have an easy or common name, or because they stigmatize the subject (e.g., Alzheimer disease, AIDS, or cancer). Self-report may increase the total prevalence of the rheumatic diseases, but it also may reduce the effect on measures of function and HRQOL. Importantly, we considered rheumatic diseases only by self-report, even though we identified a few subjects who did not know they would be classified as having rheumatic diseases when we undertook the standardized examination in persons who had a positive screening.

We used finger-bone densitometry for the diagnosis of osteoporosis, defined as T-score ≤ –1.6. This cutoff has an estimated sensitivity of 75% and specificity of 77%[34], providing reliable discrimination of respondents with and without osteoporosis.

One of the highlights of our study, in agreement with other health surveys in developed countries[39,40], is to acknowledge that a large proportion of the Spanish population aged over 20 years has at least one chronic condition, and that rheumatic diseases represent the most frequent type of chronic condition. The specific significant influence of rheumatic diseases on function and HRQOL has been described[14,16,19,25,41]. However, there are few comparative data between rheumatic diseases and other chronic diseases in the general population[39]. We analyzed the effect of several chronic diseases on measures of function and HRQOL taking disease prevalence into account. Rheumatic diseases, together with the much less prevalent congenital malformations, have a significant effect on daily functioning, as shown by the significant negative effect on the physical component of the SF-12 as well as on the HAQ.

Rheumatic diseases as a whole, however, do not have as great a negative impact on the emotional aspects of daily living as neurological and psychiatric diseases. Nevertheless, as the most prevalent group of diseases, small negative effects increase the burden of disease to a greater extent than large effects for less prevalent diseases. Overall, the impact of rheumatic disease is comparable to that of the so-called "major diseases" such as cardiac, neurological, and pulmonary diseases.

As expected, a confirmed diagnosis of a rheumatic disease, except for osteoporosis, is associated with low scores on the physical component of the SF-12. RA, FM, and knee OA, for instance, have scores nearly twice as low compared with neurological diseases or cancer. On the other hand, the scores of respondents with confirmed FM on the mental component of the SF-12 were similar to those with psychiatric disorders, showing the significant effect of psychological disturbances in patients with FM, as other studies have reported[42,43].

Table 4. Effect of specific diagnoses of rheumatic diseases on the scores of the Health Assessment Questionnaire (HAQ) and the Short-Form 12 (SF-12). Results from the regression analyses, adjusted for study design, age, sex, place of residence, education, social class, and employment status, are expressed as ß-coefficient (95% CI). Statistically significant coefficients are in bold letters.

	HAQ	SF-12 Physical	Mental
Rheumatoid arthritis	**1.01 (0.70, 1.32)**	**–10.5 (–17.7, –3.29)**	2.22 (–6.15, 10.59)
Low back pain	**0.17 (0.13, 0.22)**	**–7.57 (–8.68, –6.47)**	**–4.91 (–6.24, –3.58)**
Knee osteoarthritis	**0.22 (0.15, 0.28)**	**–9.17 (–10.6, –7.72)**	**–2.55 (–4.31, –0.79)**
Hand osteoarthritis	**0.19 (0.12, 0.28)**	**–4.12 (–6.06, –2.17)**	**–3.95 (–6.22, –1.69)**
Fibromyalgia	**0.36 (0.24, 0.48)**	**–9.41 (–12.2, –6.60)**	**–11.06 (–14.3, –7.8)**
Osteoporosis	**0.16 (0.09, 0.23)**	–1.17 (–3.71, 0.29)	–0.43 (–2.73, 1.86)

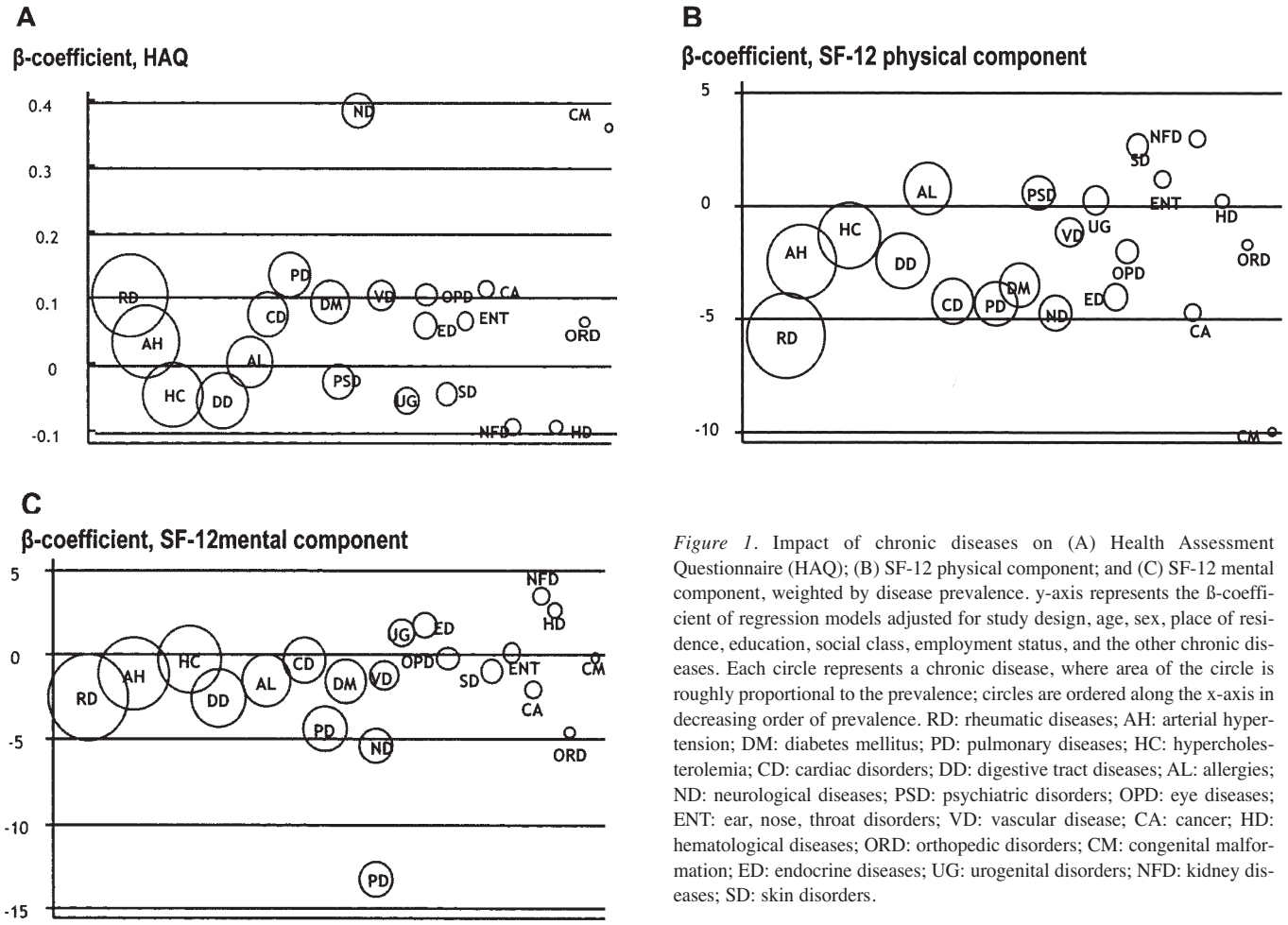

Figure 1. Impact of chronic diseases on (A) Health Assessment Questionnaire (HAQ); (B) SF-12 physical component; and (C) SF-12 mental component, weighted by disease prevalence. y-axis represents the ß-coefficient of regression models adjusted for study design, age, sex, place of residence, education, social class, employment status, and the other chronic diseases. Each circle represents a chronic disease, where area of the circle is roughly proportional to the prevalence; circles are ordered along the x-axis in decreasing order of prevalence. RD: rheumatic diseases; AH: arterial hypertension; DM: diabetes mellitus; PD: pulmonary diseases; HC: hypercholesterolemia; CD: cardiac disorders; DD: digestive tract diseases; AL: allergies; ND: neurological diseases; PSD: psychiatric disorders; OPD: eye diseases; ENT: ear, nose, throat disorders; VD: vascular disease; CA: cancer; HD: hematological diseases; ORD: orthopedic disorders; CM: congenital malformation; ED: endocrine diseases; UG: urogenital disorders; NFD: kidney diseases; SD: skin disorders.

In this population based study, we demonstrate that among chronic diseases in Spain, rheumatic diseases impose the greatest burden in the general population as a result of their effect on HRQOL and functional ability and their high prevalence. There are, therefore, compelling reasons to raise awareness of and priority for rheumatic diseases.

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APPENDIX

The EPISER Study Group: I. Aretxabala, Hospital de Cruces, Bilbao; J. Ballina, Hospital Central de Asturias, Oviedo; J. Beltrán, Hospital General, Castellón; P. Benito, Hospital del Mar, Barcelona; S. Benito, Hospital San Millán-San Pedro, Logroño; M. Calabozo, Hospital de Cruces, Barakaldo; L. Carmona, Spanish Society of Rheumatology, Madrid; J.C. Cobeta, Hospital Obispo Polanco, Teruel; M. Ciria, Hospital del Mar, Barcelona; C. Fernández-Carballido, Hospital Dr. Peset, Valencia; J.A. Fernández, Hospital Central de Asturias, Oviedo; J.L. Fernández-Sueiro, Hospital Juan Canalejo, La Coruña; R. Gabriel, Hospital de La Princesa, Madrid; G. Garrido, Hospital Gregorio Marañón, Madrid; Y. Grandal, Hospital General, Jerez de la Frontera; J. Graña; A. Hernández, Hospital Juan Canalejo, La Coruña; C. Hernández-García, Hospital Clínico San Carlos, Madrid; A. Humbría, Hospital de la Princesa, Madrid; A. Juan Mas, Hospital Son Dureta, Mallorca; A. Laffon, Hospital de la Princesa, Madrid; A. Laiz, Hospital Sant Pau, Barcelona; J. López-Martínez, Department of Social Psychology, Universidad Autónoma, Madrid; V. Villaverde, Hospital La Paz, Madrid.

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