Prevalence of musculoskeletal conditions in an Italian population sample: results of a regional community-based study. I. The MAPPING study

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Abstract

Objective

The objective of the MAPPING study was to estimate the prevalence of musculoskeletal conditions in an Italian population sample.

Methods

Questionnaires were sent to a random sample of 3664 individuals aged 18 years and over, stratified for age and gender, selected from the practice lists of 16 general practices. Trained rheumatologists carried out structured visits in which subjects were asked about musculoskeletal symptoms and socio-demographic characteristics, and underwent a standardized physical examination. Cases were defined by previously validated criteria.

Results

A total of 2155 subjects participated in the study (response rate 58.8%). The overall prevalence of musculoskeletal conditions in the general adult population was 26.7% (95% CI 25.4-28.5), being significantly higher among women than men ($p < 0.0001$). Disease prevalence increased significantly with age ($p < 0.0001$). The most common disease group was symptomatic peripheral osteoarthritis (SPOA), with a prevalence of 8.95% (95% CI 6.81-10.7), followed by soft tissue disorders – STD (8.81%; 95% CI 7.16-10.29), low back pain - LBP (5.91%; 95% CI 4.89-6.89), and inflammatory rheumatic disease - IRD (3.06%; 95% CI 2.38-3.93). The estimated rates of disease prevalence were as follows: rheumatoid arthritis: 0.46% (95% CI 0.33-0.59); psoriatic arthritis: 0.42% (95% CI 0.31-0.61); ankylosing spondylitis: 0.37% (95% CI 0.23-0.49); polymyalgia rheumatica: 0.37% (95% CI 0.29-0.44); undifferentiated connective tissue disease: 0.14% (95% CI 0.09-0.21); crystal arthropathies, including gout 0.46% (95% CI 0.34-0.57) and chondrocalcinosis: 0.42% (95% CI 0.33-0.58); symptomatic knee osteoarthritis (OA): 5.39% (95% CI 3.41-7.99); hip-OA: 1.61% (95% CI 1.39-1.87); hand-OA: 1.95 (95% CI 1.22-2.48); fibromyalgia: 2.22% (95% CI 1.36-3.19); shoulder tendinitis/adhesive capsulitis: 3.06% (95% CI 2.11-4.09); carpal tunnel syndrome: 1.90% (95% CI 1.06-2.29), localized regional pain syndromes of the neck: 0.88% (95% CI 0.56-1.29), and lateral epicondylitis 0.74% (95% CI 0.47-1.33).

Conclusions

The MAPPING study indicates that musculoskeletal conditions are common in the general adult population of Italy. These data are useful in planning the provision of healthcare.

Key words

Musculoskeletal conditions, prevalence, epidemiology, chronic pain.

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**Members of the MAPPING study are shown in the appendix.*

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Introduction

Musculoskeletal conditions are prevalent and their impact is pervasive (1). They are the most common cause of severe long-term pain and physical disability, and they affect hundreds of millions of people around the world (1-3). The reported disease prevalence of musculoskeletal complaints ranged broadly from 9.8% to 33.2% (4-10), and it has been estimated that 15-45% of general practitioner consultations are for musculoskeletal problems (11, 12). Almost one third of people aged over 75 have a significant musculoskeletal problem, and the prevalence of locomotor disability rises from 3.1% in those aged less than 60 to almost 50% in those aged more than 75 (13,14). This demonstrates that an important part of health care resources is directed to musculoskeletal disorders (15,16), and that this economic burden should not be underestimated (17). Nevertheless, for reasons that are not clear, these conditions are not commonly the target of epidemiologists and thus epidemiological studies on the occurrence and impact of musculoskeletal conditions compared with chronic respiratory disorders, cardiovascular conditions, for instance, are infrequent.

Most of the epidemiological studies on musculoskeletal conditions at the national level come either from a small number of sampling areas considered representative of the country or are secondary from national health surveys in which information about musculoskeletal diseases relies mainly on self-reporting (6).

Relevant data are available on the USA with data from the National Health and Nutrition Examination Surveys (NHANES) (18), and for Population Registry in Scandinavian countries (Sweden, Denmark, Finland, Norway and Iceland), that stands for the exclusive comprehensive registry data available in Europe (19). On a national level, each person has a unique identification code that is used in all registers and allows linking of the data between various populations. These nationwide population-based longitudinal databases provide excellent resources for rheumatology research and a careful description of representative data including information concerning incidence, physical function and work disability of the rheumatic diseases (18, 19). In addition to the epidemiological study, the databases have been used in hundreds of other studies, including those that used the Cancer Registry to evaluate the risk of cancer in patients who have rheumatic diseases, and the Population Registry to obtain age- and sex-matched controls for patients who had rheumatoid arthritis (RA) (18, 19). This type of information provides insight into the possibilities of prevention and into the way in which the general public view and describe musculoskeletal health problems.

In Italy, epidemiological studies on musculoskeletal conditions are sparse despite their recognized socioeconomic impact (20, 21). The prevalence of rheumatoid arthritis (RA) has been assessed in one study (22) and the incidence and prevalence of osteoarthritis (OA) in another (23). Population based studies on the prevalence of all musculoskeletal conditions in the general population are practically non-existent (8, 14, 24, 25). For these reasons, we took the initiative in carrying out this cross-sectional, population-based epidemiological study (namely the MAPPING) in an Italian population sample, in order to estimate the prevalence of all musculoskeletal conditions. Exclusively experienced rheumatologists in the Marches, a region located in central Italy, conducted the study.

Patients and methods

Sample and data collection procedures

Marche covers just less than 10,000 square kilometres; according to the 2001 population census its resident population was 1470581 inhabitants (152 inhabitants per square kilometre) (26). The MAPPING study was conducted from April 2004 to June 2004 on 4000 subjects aged 18 years and over, selected from the practice lists of 16 general practitioner-GPs (total target adult population of 20882 individuals). These GPs were representative of the practices in the Marches in terms of size of practice, geographical location, and socio-economic status of those attend-

ing. In Italy, almost all citizens are registered with a National Health System GP. The choice of the GP is made directly by the patient.

The age and sex distribution of the sample were similar to those of the Italian population from the 2001 census (26). The sample for the survey was selected randomly so that there would be equal numbers from each of the age-sex bands (five age-groups ranging from 18-34 years to 75 years and over) and was weighted to ensure an equal representation of patients in each of the subgroups. The GPs were shown the selected list so that they could identify patients unsuitable for the study. No specific criteria for the exclusion of patients were provided. GPs were simply asked to score through the name of anyone whose inclusion they felt would unsuitable or inappropriate.

A total of 336 individuals were excluded through this procedure: 43 individuals had left the practice, 49 had dementia or mental illness, 31 were terminally ill, 114 had died, and 99 individuals had no reason given. The remaining 3664 individuals were sent a standardized self-completion postal questionnaire. The questionnaire included a covering letter from the subject's GP endorsing the study and encouraging the subject to participate. A reply paid envelope was, also, included. Subjects who did not return their questionnaires within three weeks were sent another questionnaire to maximise the response rate. The study protocol was evaluated and approved by appropriate local and central committees.

Definitions and case identification

Individuals with musculoskeletal complaints were identified by affirmative answers to two questions: (i) Are you currently troubled by pain in the joints, bones or muscle? (ii) Have you had this pain for more than 3 months, all the time or on and off? The respondent was considered a "sufferer" when he or she reported pain in the joints, bones or muscles currently or in the past. These subjects were subsequently evaluated (complete medical history and careful clinical examination), a few days later (mean of 5 ± 1.7 days), after arranging appointments, at local GPs' ambulatory, by 12 rheumatologists blinded to the results of the survey. Any available recent and relevant laboratory test results or imaging findings were considered during the diagnostic procedure. In cases where further laboratory investigation was required for confirmation of diagnosis, the required laboratory tests or radiographs were performed after a few days at the rheumatological centre. This was followed by a second visit by the rheumatologist to assess the laboratory test or imaging finding results and to reach a definite diagnosis.

For the purposes of this study, musculoskeletal conditions were classified into 4 diagnostic groups: inflammatory rheumatic diseases (IRD), symptomatic peripheral osteoarthritis (SPOA), low back pain (LBP), and soft tissue disorders (STD).

IRD were further classified into 3 subgroups: (i) connective tissue diseases (CTD), including rheumatoid arthritis (RA), Sjögren's syndrome (SS), systemic lupus erythematosus (SLE), systemic sclerosis (SSc), rheumatic polymyalgia (PMR), undifferentiated connective tissue disease (UCTD); (ii) seronegative spondyloarthritis (SpA), including ankylosing spondylitis (AS), psoriatic arthritis (PsA), reactive arthritis (ReA), arthritis associated with inflammatory bowel diseases (IBD), and undifferentiated SpA (USpA); and (iii) crystal induced arthritis (CrA), including gout and chondrocalcinosis (calcium pyrophosphate dihydrate – CPPD, crystal deposition in joints).

The diagnosis of IRD, was made on the basis of the American College of Rheumatology (ACR, formerly the American Rheumatism Association) criteria (33-36), the criteria of other international study groups (37, 38), or internationally used criteria (39-43).

For the purposes of the present study, cases of PsA were defined if he or she had psoriatic skin and/or nail involvement and arthritis and/or spinal involvement. Patients with rheumatoid factor positivity and with symmetrical polyarthritis who satisfied the ACR classification criteria for RA were excluded. Information on the presence of psoriasis in familial subjects was also obtained, especially in patients who had features of SpA, such as enthesitis. The diagnosis of UCTD was made on the basis of antinuclear antibody (ANA) positivity with clinical or serological abnormalities not sufficient for a diagnosis of a definite CTD (44).

SPOA and symptomatic knee, hip, and hand OA were diagnosed according to the ACR criteria (45-47). LBP was defined as pain localized in the back area between the lower limits of the chest and the gluteal folds, either radiating or not along a lower extremity (48). Patients with LBP satisfied 3 screening criteria: (i) report of ever having had LBP, (ii) a health care provider visit for LBP in the previous six months, and (iii) LBP that began more than 3 months previously. The STD group included fibromyalgia (FM) and localized regional pain syndromes such as shoulder tendinitis/ adhesive capsulitis, lateral epicondylitis, carpal tunnel syndrome and localized regional pain syndromes of the neck. The diagnosis of FM was made according to ACR criteria (49), while for the remaining STD separate classification criteria based on the main clinical manifestations and in some instances on radiological or ultrasonographic findings were set for the purposes of this study. The diagnosis of carpal tunnel syndrome was supported by clinical examination (Tinel nerve percussion and Phalen test), combined by electrophysiological median neuropathy (50).

Finally, in all patients, the presence of co-morbidities was assessed. These were ascertained through patient's self-reports using additional questions probed for the presence of nine specific co-morbid conditions (hypertension, myocardial infarction, lower extremity arterial disease, major neurologic problem, diabetes, gastrointestinal disease, chronic respiratory disease, kidney disease, and poor vision). The algebraic sum of positive responses was calculated for each subject, giving a co-morbidity factor with a possible range from 0 to 9.

Statistical analysis

Excel (Microsoft), the SPSS (version 11.0) and MedCalc (version 7.4.2) sta-

tistical software packages for Windows XP, were used to perform all analyses. Student's t-test was used to compare mean values, while the comparison of prevalence's was made by chi-square test, and a probability value of $p < 0.05$ was considered significant. Confidence intervals (CI) were calculated using the Poisson distribution. A chi-square analysis was also used to evaluate for differences in demographic characteristics and various health and illness variables between persons with musculoskeletal conditions and those without musculoskeletal conditions. A variety of factors shown by chi-square detection to be significantly associated with prevalence of major rheumatic groups were included in a multiple logistic-regression model for further analysis. All of the models included five independent variables; age (as a continuous variable); sex (as a dichotomous variable; 0 = male; 1 = female); BMI (as a continuous variable); educational level (years of education as a continuous variable); and manual or non-manual occupation (as a dichotomous variable: 1 = manual occupation; 0 = non-manual occupation). Variables were entered simultaneously.

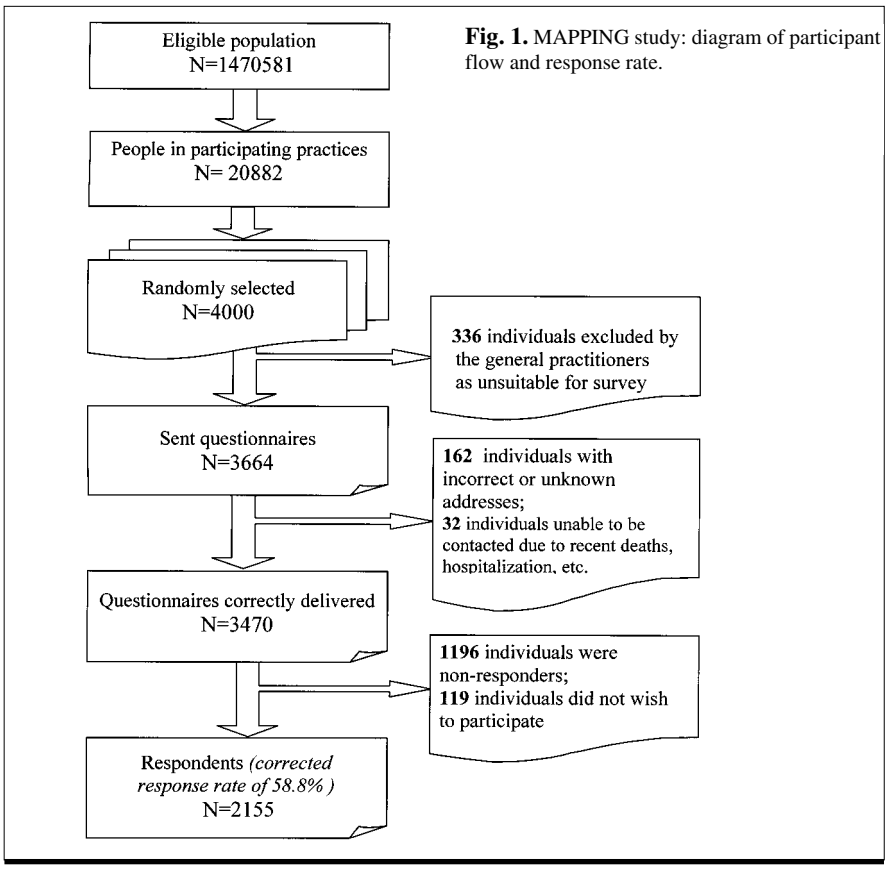

Fig. 1. MAPPING study: diagram of participant flow and response rate.

Results

Response rate

As outlined in Figure 1, out of the 3664 questionnaires mailed, 194 participants could not be contacted because if an unknown address or recent death, absent from the community during the survey, hospitalisation etc. Of 3664 questionnaires delivered, 2155 were returned after two postal reminders, which give response rate of 58.8%. Seventy-six percent of these responses were returned prior to the second mailing. The majority of non-respondents were those who gave no reason for not responding (n = 1196) and those who stated that they did not want to participate (n = 119). An analysis of non-respondents was performed by telephone interviews among 180 randomly selected subjects. There was no significant difference in the mean ages of those completing and refusing to complete the questionnaire, and no significant difference in the proportions of men and women. Lower response rate were also obtained from participants with less education, and participants who were not married. Among the 2155 that completed the questionnaire, the mean age was 57.8 (standard deviation, SD, 18.4, range 18 to 91) years, and 1151 (53.4%) were female. Overall, the questionnaires were well completed by most respondents. Less than 4% of each of the socio-demographic questions had missing values.

Of the 2155 people who completed the questionnaires, 576 subjects were diagnosed as having had a musculoskeletal condition at the time of the study. Subjects, who had pain related to trauma, work-related accidents, sport injury, etc., were not included in the assessment of disease prevalence. Thus the overall crude prevalence of musculoskeletal condition in this study population was 26.7% (95% CI 25.4–28.5).

Demographic characteristics. Differences between sufferers and not sufferers are listed in Table I. In the sufferer group there were 218 males and 358 females, yielding a male:female ratio of 1: 1.6. The mean age (yrs ± SD) of the sufferer was 61.5 years (± 13.5) and was significantly higher than that of the non-sufferers 55.2 years (± 19.2), $p < 0.001$. The BMI was significantly higher ($p < 0.001$) in the sufferers (26.1 ± 4.5), compared to non-sufferers (24.8 ± 3.8). The school education level was generally low in both groups: on the whole, 60.1% had received only a primary school education, and only 13.9% had received a high school education. Sixty-seven percent of the sufferers were married, 42.4% were pensioned or retired, and 7.7% were unemployed. Those in the sufferers group were much more likely to be receiving a government pension or benefit compared to non-sufferer. Being unemployed due to health reason accounted for 9.3% of sufferers and only 3.1% of non-sufferers ($p < 0.001$), a three-fold difference. In addition, there were a significantly higher number of subjects accompanied by physical inactivity (measured by number of days' interference with daily activity in previous 6 months) in the sufferers compared to non-sufferers ($p < 0.0001$). Overall, 55.5% of these subjects reported one and 22% reported

Table I. Socio-demographic and clinical characteristics of the patients suffering or not suffering from muskuloskeletal conditions.

	Non-sufferers N = 1579 no. (%)	Sufferers N = 576 no. (%)	p-value#
Gender, no. (%)			
Female	793 (50.2)	358 (62.2)	< 0.0001*
Male	786 (49.8)	218 (37.8)	
Age (years)			
mean (± SD)	55.2 (19.2)	61.5 (13.5)	< 0.001**
range	18-91	20-89	
Body mass index			
mean (± SD)	24.8 (3.8)	26.1 (4.5)	< 0.001**
range	17.3-39.4	17.1-45.2	
Marital status, no. (%)			
Single	316 (20.1)	64 (11.1)	< 0.0001*
Married	1014 (64.2)	386 (67.1)	
Widowed	152 (9.6)	87 (15.1)	
Divorced/separated	97 (6.1)	39 (6.7)	
Educational level, no. (%)			
Primary school	928 (58.8)	354 (61.5)	P = NS*
Secondary school	418 (26.5)	146 (25.3)	
High school/university	233 (14.7)	76 (13.2)	
Employment status, no. (%)			
Employed	726 (45.9)	186 (32.3)	< 0.001*
Unemployed	49 (3.1)	53 (9.3)	
Pensioned/retired	499 (31.6)	244 (42.4)	
Student	80 (5.1)	20 (3.4)	
Housewife	225 (14.3)	73 (12.6)	
No. of days' interference with daily activities in previous 6 months, no. (%)			
0-6 days	1376 (87.2)	340 (59.0)	< 0.0001*
7-14 days	150 (9.6)	144 (25.0)	
15-30 days	48 (3.1)	51 (8.9)	
30 or more days	5 (0.1)	41 (7.1)	
No of comorbid conditions, no. (%)			
1	334 (21.2)	193 (33.5)	< 0.001*
2	112 (7.1)	62 (10.7)	
3	69 (4.4)	38 (6.6)	
4 or more	33 (2.1)	27 (4.7)	

(p-value between sufferers and non-sufferers: * chi-square test; ** Student's t-test.
Note: Percentages are rounded to the nearest decimal place.

≥ 2 (range 2–5) co-morbid conditions. The most frequently reported co-morbid conditions were cardiovascular disorders (24.6%), chronic pulmonary disease (16.9%), metabolic disorders (11.7%), and gastrointestinal diseases (8.1%). Compared with the non-sufferers, significantly higher prevalence estimates were observed with respect to cardiovascular disorders ($p < 0.001$), chronic pulmonary disease, and gastrointestinal diseases ($p < 0.01$).

Prevalence data. Concerning the 4 major diagnostic groups, the most common was SPOA with a prevalence in this cohort of 8.95% (95% CI 6.81–10.7), followed by STD with 8.81% (95% CI 7.16–10.29), LBP with 5.91% (95% CI 4.89–6.89), and IRD with 3.06% (95% CI 2.38–3.93). The IRD group consisted of 3 subgroups: CTD, SpA, and CrA, with an overall prevalence of 1.12% (95% CI 0.89–1.48), 1.06% (95% CI 0.78–1.38), and 0.88% (95% CI 0.67–1.19), respectively.

CTD were significantly more common among women compared to men in the general population ($p = 0.002$), with a ratio of 3:1. In contrast, the prevalence of SpA was significantly higher among men compared to women ($p = 0.003$), with a ratio of 3.1: 1. Similarly, the prevalence of CrA was significantly higher among men compared to women ($p = 0.01$), with a ratio of 1.7: 1. The most common CTD was RA, with a prevalence of 0.46% (95% CI 0.33–0.59), followed by PMR with 0.37% (95% CI 0.29–0.44), and UCTD with 0.14% (95% CI 0.09–0.21), (Fig. 2). One case of SLE, one case of SS, and one case of SSc were also found. All the cases were female. Because of the limited number we could not calculate reliable prevalence rates of these diseases.

The most common SpA was PsA, with a prevalence of 0.42% (95% CI 0.31–0.61), followed by AS with 0.37% (95% CI 0.23–0.49). Two cases with USpA, 2 with ReA, and 2 with arthritis associated with IBD were also observed (all at percentage of 0.09%, 95% CI 0.04–0.16). Gout was the most common CrA, with a prevalence of 0.46% (95% CI 0.34–0.57), followed by chondrocalcinosis with 0.42% (95% CI 0.33–0.58) (Fig. 2). SPOA, LBP, and STD were significantly more common among women than men (ratio of 1.7:1, $p = 0.002$; 1.5:1, $p = 0.04$; and 2:1; $p = 0.0001$, respectively). The most common site of SPOA was the knee, with a prevalence of 5.39% (95% CI 3.41–7.99), followed by the hands (1.95%, 95% CI 1.22–2.48), and hip (1.61%, 95% CI 1.39–1.87). It is notable, however, that 29.4% of the SPOA patients presented with it in more than one site.

According to the diagnosis made by rheumatologists after interview and physical examination, the prevalence rate of STD was 8.81% (95% CI 7.16–10.29) in the total adult population. Shoulder tendinitis/adhesive capsulitis was the most common STD, with an overall prevalence of 3.06% (95% CI 2.11–4.09), followed by FM with 2.22% (95% CI 1.36–3.19), carpal tunnel syndrome with 1.90% (95% CI 1.06–2.29), localized regional pain syndromes of the neck with 0.88% (95% CI 0.56–1.29), and lateral epicondylitis with 0.74% (95% CI 0.47–1.33) (Fig. 3). SPOA prevalence rate reached their peak after age 75 years,

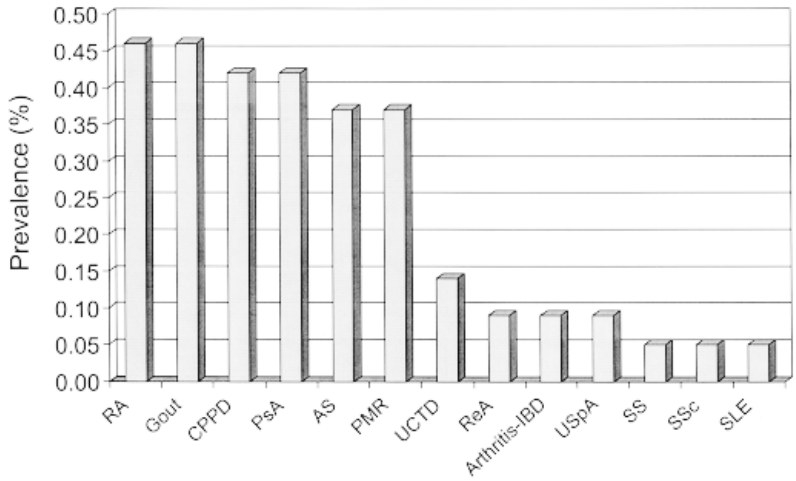

Fig. 2. Prevalence in the general adult population of the inflammatory rheumatic diseases: rheumatoid arthritis (RA), gout, calcium pyrophosphate dihydrate (CPPD), psoriatic arthritis (PsA), ankylosing spondylitis (AS), polymyalgia rheumatica (PMR), undifferentiated connective tissue disease (UCTD), reactive arthritis (ReA), arthritis associated with inflammatory bowel diseases (IBD), undifferentiated SpA (USpA), Sjögren's syndrome (SS), systemic sclerosis (SSc), and systemic lupus erythematosus (SLE).

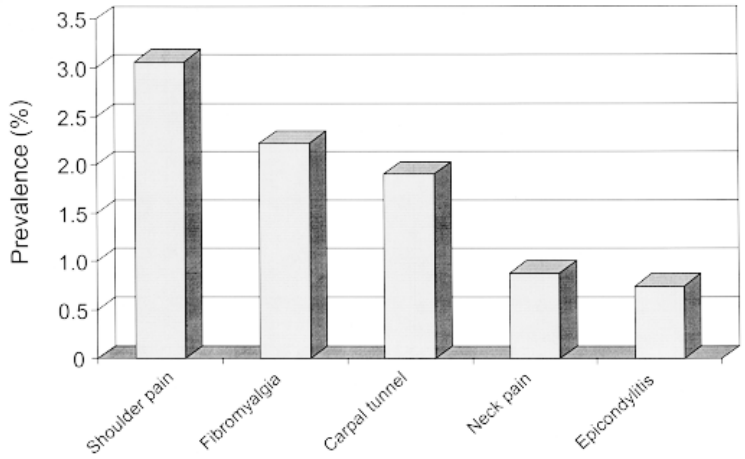

Fig. 3. Prevalence in the total target adult population of the soft-tissue disorders: shoulder pain, fibromyalgia, carpal tunnel syndrome, neck pain, and lateral epicondylitis.

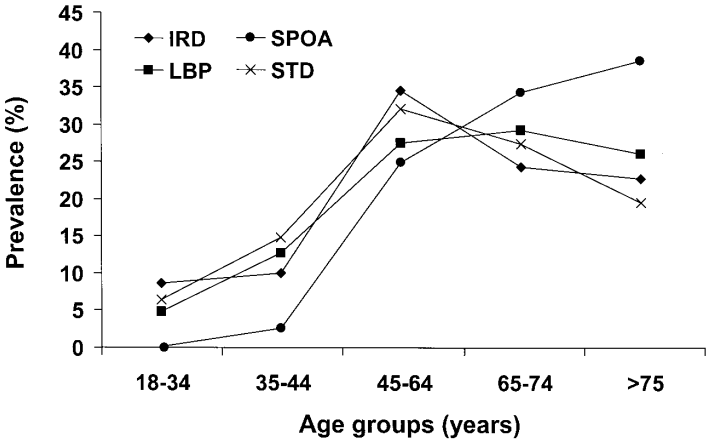

Fig. 4. Prevalence of inflammatory rheumatic diseases (IRD), symptomatic peripheral osteoarthritis (SPOA), low back pain (LBP), and soft-tissue disorders (STD) in the total target adult population by age group.

and was rare under the age of 44 years (Fig. 4).

The prevalence of CrA increased significantly with age ($p<0.0001$). In contrast, the prevalence of SpA increased up to and including the group aged 45-64 years ($p<0.001$), and then decreased. The prevalence of LBP increased with age ($p<0.001$), and reached a plateau in the age group of 65-74 years (Fig. 4). The prevalence of STD increased with age ($p < 0.0005$), and reached a plateau in the age group of 45-64 years, and then declined (Fig. 4).

Risk factors. Being female, older age, BMI and a manual occupation were significantly associated with risk of increased prevalence of SPOA (overall model fit: chi-square 233.1, $p<0.0001$) and LBP (overall model fit: chi-square 52.0, $p < 0.0001$). Moreover, a similar association of female sex, high BMI, low education, and a manual occupation with STD (overall model fit: chi-square 63.8, $p < 0.0001$), as well as of low education, and a manual occupation with IRD were also found (overall model fit: chi-square 26.17, $p = 0.0002$).

Discussion

Very few studies have attempted to estimate the prevalence of musculoskeletal conditions at the population level across all adult age bands. We have found that the prevalence of musculoskeletal conditions in Italy is high. It is diffiicult to compare this finding with previous published prevalence studies because of the well-described and complex interplay of factors which may influence estimates – for example, sampling methods, disease definitions, and the underlying age, sex and disease profile of the population being sampled.

In five recent studies (4, 9, 10, 50, 51), the prevalence of rheumatic disease was markedly lower (ranging from 7.2% to 17.6%) than in our study, while the 22.6% prevalence in a study from Spain (8), the 25% disease prevalence in a study from Taiwan (5), and the 26.9% prevalence in a report from Greece (7) were quite similar to that of our MAPPING study. Other studies (22, 23, 53-57) have investigated the

prevalence of the major rheumatic diseases; their study designs, however, did not encompass an estimate of the overall prevalence of the total disease spectrum in the general population. On the other hand, the prevalence of self-reported symptoms or musculoskeletal conditions has been estimated in other studies as ranging from 12.4 to 44.3% in various adult populations (18, 58-61). A recent Italian study by Cimmino et al. (22) found a 27% prevalence of self-reported joint pain and swelling based on a postal questionnaire.

Inflammatory rheumatic diseases

Concerning the individual disease groups, the prevalence of total IRD was estimated at 3.06% of the general adult population of our study. The RA prevalence in our sample (0.46%) was close to that indicated in studies from other European (0.54–0.8%) (7,8,55,62-66) in an urban population of Izmir-Turkey (0.49%) (67) and some Asian countries (0.55–0.65%) (5), and Brazil (0.46%) (68), but higher than that found in other Asian (0.12–0.34%) (4,9,64) and African countries (70), and lower than the estimated level of roughly 1% in the USA (57, 71) and in elderly nuns in Brittany (1.52%) (72). These estimates are based, however, on data that may no longer be accurate, given recent data suggesting a declining incidence of RA in the USA (73).

Our data are consistent with the results of three well-performed studies published in the 1950s in the Italian literature. In 1956, Neri Serneri and Bartoli reported a 0.38% prevalence in Tuscany (0.54% in women and 0.21% in men) (74). In 1963, Einaudi reported a similar value (0.35%) in Piedmont (0.46% for women and 0.24% for men) (75). In 1967, Marcolongo *et al*. found a prevalence of 0.43% in Tuscany (0.63% in women and 0.25% in men) (76). Recently, Cimmino *et al*. (77) reported a prevalence of 0.33% in the Chiavari study. The prevalence of PMR may equal that of RA in individuals older than 50 years. The two disorders often overlap in clinical presentation, and classification may sometimes present a problem.

The prevalence of PMR in our study (0.37%) was almost equal to those found in the Scottish Highlands (62), and in Greek population (7), but half of those estimated in the USA (71, 78). Salvarani *et al*. (78) investigated the Olmsted County population for incidence of PMR over a 22-year period between 1970 and 1991. Prevalence estimates are higher in women and increase with increasing age. The prevalence of PMR among persons age 50 and older was approximately 0.7% (78). The estimated overall prevalence for the entire spectrum of SpA (1.06%) (37) was higher than that found in studies from other European countries (7, 64), but much lower than in in the USA (71) and in Alaskan Eskimos (2.5%) (79). Most of our SpA cases had PsA or AS (prevalence 0.42% and 0.37%, respectively), while very few cases of ReA, inflammatory bowel disease-associated arthritis, and USpA were found in our study population. Population estimates for PsA prevalence vary from 0.02 to 0.1% (80, 81), while those for AS vary even more, from rare in some Asian countries (0.03–0.37%) (5, 9, 69) to 1.8% in Norwegian Lapps (82). Our data confirms a high prevalence of PsA among an unselected population of Italian patients with psoriasis (83). Prevalence data (0.03–0.1%) for ReA are available for 3 US ethnic populations (79, 84) and represent some of the few reports available worldwide for this disorder. Our study's gout prevalence (0.46%) and was very close to that found in Greece (7), Scottish Highlands (77), Taiwan (5), China (51), and Mexico city (52), but higher than in other Asian countries (0.13–0.16%) (4, 9, 67) and lower than in the USA (0.84%) (71) and UK (1.4%) (85). These data strongly suggest that environmental factors play pivotal roles in the aetiology of gout. In addition, genetic and racial predisposition is also a key causative factor (86-88).

Symptomatic peripheral osteoarthritis

Our estimated overall prevalence of SPOA (8.95%) was close to that found in the Greece (7.9%) (7), but higher than in the Scottish Highlands (6.5%) (77), Taiwan (5.1%) (5), China (51), Brazil (68) and Philippines (9) (all of 4.1%); nevertheless, it was lower than that in the USA (12.1%) (71) and Thailand (11.3%) (4). Our estimates prevalence's of knee, hand, or hip OA (5.39%, 1.95%, and 1.61%, respectively) were almost equals to those found in Greece (7), but much lower than those reported in a recent Spanish study (63), and in a cross sectional study of the whole community, carried out in Dicomano, a small rural town in Tuscany, Italy (23). In this study, the investigators found that about one-third of this cohort of community dwelling people aged older than 65 was affected by symptomatic OA in one or more peripheral joints. The prevalence estimates were 29.8%, 7.7%, and 14.9% for knee, hip, and hand OA, respectively (23). The high prevalence of OA in Dicomano can probably be attributed to its rural population, because farmers are known to be at higher risk of developing OA than urban dwellers. The older age of the cohort may also contribute to the findings.

Low back pain

The prevalence of LBP has been reported in the literature for different populations. Methodological differences among studies and lack of methodological rigor have made it difficult to draw conclusions from these studies. A review (89) of 26 Nordic studies found that the methodological quality was generally low. For example, these studies used different definitions of pain, various pain sites, and formulations of the question often involving considerably different time spans. Consequently, the present authors point to the difficulties in comparing studies as well as determining the accurate prevalence or incidence rates. LBP prevalence (5.91%) in our study was very close to that estimated in North America by 3 studies reviewed (90-92) and in a suburban community in Mexico City (6.3%) (52). The mean point prevalence rate estimated by Deyo and Tsui-Wu (90) and Lee *et al.* (92) was 5.6%. This estimate is lower than that in other European countries (varying from 11% to 41.8%) (7, 8, 14, 93, 94) probably due to the duration definition used for LBP in each study, whereas in Asian countries

it has been reported at lower levels: from 1.95% in North Pakistan (67) to 5.6% in China (51).

Soft-tissue disorders

The overall 8.81% prevalence of STD that we found is difficult to compare with that of other studies because of the diversity of disorders included in the STD in each individual study. Nonetheless, shoulder and elbow STD prevalence at 3.06% and 0.74% respectively, was very close to that found in Greek adult population (7), but much lower than in Indonesia (14.8% and 6.1%) (19), and in the UK (Walker Bone 2004) (95), whereas carpal tunnel syndrome with a prevalence of 1.90% in our study was less common than in Sweden (2.7%) (50) or USA (3.72%) (96), but more frequent than in the UK (1.2%) (Walker Bone 2004) (95), Philippines (0.17%) (9), and Greece (0.5%) (7). Our estimate prevalence of localized regional pain syndromes of the neck of 0.88% was much lower than those found in Netherlands (20.6%) (94), in Greece (4.8%) (7), and Canada (4.6%) (97). The reasons for these differences are unknown, but may be related to differences in study methodology as well as to occupational and/or non-occupational factors. Our FM prevalence of 2.22% was very close to that found in other separate studies (8, 52, 68, 98), but at least 5-fold higher than that reported from the Greece (7).

Logistic regression showed that in addition to sex and age, other factors such as high BMI, manual occupation, and a low educational level had a positive or negative association with different diagnostic groups.

A possible problem with this study was a selection bias due to non-response. The people with chronic pain are more prone to respond than people without chronic pain, giving a higher estimate of the prevalence (12, 99, 100). In our study, were no significant difference in the mean ages of those completing and refusing to complete the questionnaire, and no significant difference in the proportions of men and women.

In conclusion, MAPPING study provided an estimate of the prevalence of musculoskeletal conditions in Italy and confirmed the great impact of these diseases in the general population, thereby contributing to the body of epidemiological data of the country. Sound knowledge regarding the needs of the population will help in selecting the most appropriate interventions and making the best use of the available resources. Further studies are needed to gain access to the epidemiological data of other localities in Italy, to increase our knowledge so that we may understand the most effective ways to improve the health of the Italian population.

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Appendix

The full members of the MAPPING study given in alphabetical order, are as follows: D. Avaltroni, P. Blasetti, D. Brecciaroli, M. Carotti, A. Cerioni, A. Ciapetti, A. Farina, E. Filippucci, R. De Angelis, P. Del Medico, G. Garofalo, S. Gasparini, W. Grassi, M. Gutierrez, F. Salaffi, C.A. Silvestri, S. Scalini, A. Stancati,

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