The cost of care of rheumatoid arthritis and ankylosing spondylitis patients in tertiary care rheumatology units in Turkey

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Abstract

Objectives

To determine the direct and indirect costs due to rheumatoid arthritis (RA) and ankylosing spondylitis (AS) patients in Turkey.

Methods

An expert panel was convened to estimate the direct and indirect costs of care of patients with RA and AS in Turkey. The panel was composed of 22 experts chosen from all national tertiary care rheumatology units (n=53). To calculate direct costs, the medical management of RA and AS patients was estimated using "cost-of-illness" methodology. To measure indirect costs, the number of days of sick leave, the extent of disability, and the levels of early retirement and early death were also evaluated. Lost productivity costs were calculated using the "human capital approach", based on the minimum wage.

Results

The total annual direct costs were 2,917.03 Euros per RA patient and 3,565.9 Euros for each AS patient. The direct costs were thus substantial, but the indirect costs were much higher because of extensive morbidity and mortality rates. The total annual indirect costs were 7,058.99 Euros per RA patient and 6,989.81 for each AS patient. Thus, the total cost for each RA patient was 9,976.01 Euros and that for an AS patient 10,555.72 Euros, in Turkey.

Conclusion

From the societal perspective, both RA and AS have become burden in Turkey. The cost of lost productivity is higher than the medical cost. Another important conclusion is that indirect costs constitute 70% and 66% of total costs in patients with RA and AS, respectively.

Key words

rheumatoid arthritis, ankylosing spondylitis, cost, Turkey

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Introduction

In Turkey, as elsewhere, musculoskeletal disorders (MSDs) adversely affect work life in general with respect to negative impact on quality-of-life by causing pain as well as compromising daily activities. MSDs, which lower economic output and give rise to compensation claims, increasingly strain budgetary resources. Rheumatoid arthritis (RA) and ankylosing spondylitis (AS) are the prototypical chronic MSDs which are associated with morbidity, long-term disability, and high costs of care, but mortality rate is low compared to that of other disease groups (1).

RA is a relatively common inflammatory disorder afflicting every race and region. Its prevalence has been reported to vary between 0.2% and 1%, and nearly 78% of the patients are females in Turkey (2). RA patients suffer both mentally and physically. The onset of RA is linked to a sense of desperation, a loss of self-confidence, and development of other psychological disorders. In addition, RA may cause depression or anxiety. Moreover, RA affects sleep patterns and the level of general fatigue. Joint deformation, need for joint surgery (*e.g.* artroplasty, hip replacement, knee replacement, etc.), nephropathy, cataract development, cardiac problems are among physical consequences of the disease (3).

As AS may involve both axial and peripheral joints such as the sacroiliac, spine, hip, shoulder, and knee, and cause devastating disabilities, it is considered to be one of the most significant musculoskeletal disorders. Of all AS patients, 90% experience morning stiffness, 83% pain, 62% fatigue, and 54% poor-quality sleep. Half of all patients have concerns about their appearance, 50% worry about the future, and 41% experience medication side-effects (4). AS is very prevalent worldwide affecting 0.1–0.8% of the population. In Turkey, AS prevalence has been reported to vary between 0.49% and 1.5% (5). Similar to RA, AS patients are predominantly (nearly 66%) females in Turkey (6).

In the present study, the impact of RA and AS on the national economy was examined by experts convened from around Turkey to determine direct and indirect costs due to RA and AS in Turkey.

Materials and methods

Estimation of the economic burden of a disease is possible using the cost-of-illness (COI) approach, which defines various categories of cost (7). In such work, direct, indirect, and intangible costs are considered. Direct costs can be defined as the "money" spent by individuals, social security departments, and governments, on the medical care, treatment, and prevention of illness. Such costs reflect resources used during treatment of outpatients and inpatients, the cost of medical supplies, and the costs of all laboratory and screening tests and other medical interventions. Direct costs are generally divided into medical and non-medical costs, depending on whether resources have been directly used in treatment. In the present study, however, non-medical direct costs have been disregarded, because of a lack of data. Indirect costs are societal costs caused by disease, disability, and premature death. For calculation of such costs, the "Human-Capital Approach" has been employed. Productivity losses can be defined as losses caused by premature death or disability. The only parameter for caregivers was considered to be workday loss, since mostly the spouse serves as the caregiver in Turkey. Some health economists include intangible costs (without a monetary value) that consider the impact of the disease on quality-of-life and the psychological well-being of patients and care-givers (proxies). As such costs are almost impossible to calculate, they are frequently ignored, as in the present study.

To calculate direct costs, an expert panel was convened from members of 20 clinics that were chosen randomly among 53 rheumatology clinics at tertiary healthcare institutions nationwide, since upon national regulations, anti-TNF agents are reimbursed only if they are prescribed at tertiary healthcare centers by rheumatologists and physical therapy and rehabilitation specialists. Besides, those specialists are managing a wide variety of RA and AS pa-

tients either newly diagnosed or under follow-up. In this method, the per-unit cost, the percentage of documented cases, and unit cost, are multiplied, to yield a total cost (8). The terms used are:
a. unit cost of a health service forming an intervention (C),
b. number of units of each service type required for that intervention (V),
c. number of patients using the health care facility for that service (n).
Total cost of treatment j (Mj) formulation can be written as:

$$M_j = \sum_{i=j}^{s} C_{ij} V_{ij} n_{ij}$$

where "i" represents the level as well as types of services needed for the treatment "j". The equation assumes that there are s-types of services available. If some of the services are not required for treatment j, the values of V will become zero.
For reimbursement of healthcare costs by the Social Security Department of Turkey, each institution uses the procedures of the "Official Health Application Bulletin" (HIG). Reimbursement is paid per service, or is added to the cost of inpatient treatment. HIG lists special requirements for reimbursement of outpatient procedures. The Turkish Ministry of Health, General Directorate of Drugs and Pharmaceuticals, lists the reimbursable costs of medications. For outpatients, average institutional cost is reflected in an admission fee, which includes the cost of medical supplies. The costs of screening tests, which are not covered by the admission fee, have also been included in the present exercise, in line with the guidelines in Appendix 8 of HIG.
Medication costs were calculated using case frequency data. Such costs (including those of generic drugs) were obtained from the list mentioned above, with allowance for discounts offered by pharmaceutical companies. Medication doses were estimated from manufacturers' recommendations, international guidelines, and expert opinion. To calculate the costs of inpatient care, Appendix 9 of HIG was employed. The proportions of inpatients receiving arthroplasty and non-arthroplasty care (in % values), and the ratio thereof, were calculated by the experts, as were the types and proportions of prostheses/orthoses required by those with RA and AS; the prices of Appendix 5C were employed to estimate costs.
In terms of the indirect costs of illness, productivity losses include those caused by mortality and morbidity. Productivity loss during treatment was calculated using the minimum wage, and with consideration of the frequency of health care visits, early retirement, and early death. The General Health Insurance Institution of Turkey requires that 9,000 work days (33.3 years) be completed before a subject is eligible for full retirement. The minimum gross wage is 359.11 Euros per month (9). However, as our calculations were based on annual data, productivity loss cost was 4,309.40 Euros per annum. Such loss during treatment was calculated by assessing the frequencies of health care visits, early retirement, early death, and work disability; the extent of absenteeism; days spent on sick leave; and lost production time caused by illness. The data were gathered by the expert panel. Travel time costs of rural patients were considered. Total lost productivity costs for such patients, which constitute 55% of the population, (4) were calculated separately. All calculations of productivity losses arising from absenteeism were made on the basis of expert opinion, because the required data were not available. Results are expressed in Euro 2011.

Results

The results reflect the costs of disease progression from the societal perspective. Cost data have been reported as mean annual cost per patient .The numbers of clinical visits made, and the number of units of inpatient care received by patients, as expressed in percentages, may vary. Data on practice, and clinical views on Turkish RA and SA populations, were gathered (Table I). To receive anti-TNF drug reports, patients may have to visit various clinical services, and the numbers of these visits may vary greatly among patients. It is known that the number of clinical services offered, and the number of visits to clinics, vary among tuberculosis patients with clinical lung involvement, who receive a range of therapies from inpatient and outpatient centers, because of the involvement of different organs. HIG requires that the costs of all healthcare service transactions, including analyses, examinations, interventions, operations, and radiological screening, should be included in inpatient bills. Therefore, the costs of physical therapy and rehabilitation, training, and computerised tomography, which are excluded from inpatient bills, have been considered separately. The types and proportions of prostheses/orthoses required by patients with RA and AS were estimated by the experts. Inpatient care costs were determined using the HIG guidelines. Medication costs were calculated by the experts (Table II).
The costs of medication (including generics) were taken from the list of the Turkish Ministry of Health, General Directorate of Drugs and Pharmaceuticals. The direct cost of RA per patient was estimated by addition of the costs of inpatient care, screening tests, services, medication, and prostheses/orthoses. The total direct cost of an RA patient was 2,917.03 Euros annually, whereas that of an AS patient was 3,565.91 Euros (Table III).
Indirect costs are societal costs caused by illness, disability, and premature death or retirement. In the present study, the "Human Capital Approach" was used to calculate productivity loss caused by premature death or disability. Such costs included those of lost working days, sick leave days, early retirement, disability, and early death; the data were gathered by the expert panel. Cost calculation was based on the minimum wage. For each RA patient, the average costs were: lost working days 321.82 Euros; sick leave days 27.49 Euros; early retirement 1,534.13 Euros; early death 1,073.03 Euros; and disability 4,102.52 Euros. The figures for each AS patient were 245.50, 31.38, 2,805.39, 374.05 and 3,533.67 Euros, respectively (Table III).
The total costs of mortality and morbidity indicate individual productivity losses. This cost per RA patient was 4,865.87 Euros, and that for an AS patient 5,116.47 Euros. The costs of pro-

Table I. Percentage of outpatient care visits, interventions and medical supplies provided to RA and AS patients.

	Rheumatoid arthritis	Ankylosing spondylitis
Outpatient	%	%
Rheumatology	85.8	77.12
Ophthalmology	5.7	4.48
Orthopaedics	25.7	8.14
Pulmonology	16.4	13.14
Cardiology	5	0.33
Gastroenterology	4.9	2.14
Physical therapy and rehabilitation	2.9	9.33
Internal medicine	2.1	3.33
Emergency service	4.2	4.38
Endocrinology	1.9	–
Neurology	2.4	–
Dermatology	0.5	–
Cardiovascular surgery	0.2	–
Neurosurgery	0.5	–
Interventions	%	%
Hip arthroplasty	0.95	1.385
Knee arthroplasty	1.43	0.676
Shoulder arthroplasty	0.843	1.09
Elbow arthroplasty	0.843	1.09
Cataract	3.929	0.33
By-pass	0.24	0.07
Gynecological surgery	0.071	0.02
Carpal tunnel syndrome	1.7	–
Angiography	0.004	–
Cholecystectomy	0.0004	–
Arthrodesis		0.04
Kyphoplasty		0.08
Fracture surgery		0.04
Spinal surgery		0.15
Calcaneal spur resection		0.004
Gastroenterological surgery		0.02
Medical supplies	%	%
Walking stick	0.87	0.95
Splint	3.52	–
Walker	0.25	0.95
Wheelchair	0.12	–

Source: Expert opinions.

Table II. Percentage of medications use by RA and AS patients.

	Rheumatoid arthritis	Ankylosing spondylitis
Medications	%	%
NSAIDs	34.52	81.37
PPI	46.95	30.19
Hydroxychloroquine	55.14	0.05
MTX	72.10	13.19
MTX (injectable)	8.76	0.02
Sulphasalazine	31.76	40.24
Leflunomide	20.33	0.004
Infliximab	4.65	8
Etanercept	5.66	8.62
Adalimumab	5.45	8.33
Rituximab	1.39	–
Corticosteroid	39.76	7.52
Calcium-D vitamin	31.81	4.68
Biphosphanate	16.33	2.14
Antihypertensive	3.10	–
Antihiperlipidemic drugs	1.43	–
Cardiovascular drugs	0.95	–

Source: Expert opinions.

ductivity loss by an RA caregiver were 2,193.12 Euros, and 1,873.34 Euros for an AS caregiver. The total costs shouldered by employers were thus 7,058.99 Euros for an RA patient and 6,989.81 Euros for an AS patient (Table III).

The annual direct cost of an RA patient was 2,917.03 Euros, and the annual indirect cost 7,058.99 Euros, thus totaling 9,976.02 Euros. The direct annual cost of an AS patient was 3,565.91 Euros, and the indirect annual cost 6,989.81 Euros, making a total cost of 10,555.72 Euros (Table IV).

The annual costs of RA and AS for whole Turkish population are 2,130,424,680 Euro and 2,209,201,904 Euro, respectively. This amount contributes to 0.37% of the gross domestic product (GDP) in Turkey for RA 0.38% of the GDP for AS. Both diseases have a high burden of 4,339,626,584 Euro, which is 0.75% of the whole Turkish GDP.

Discussion

RA is the second most expensive disease in the world in terms of economic burden (10). As patients with RA frequently need costly medication, and should be closely monitored because of the debilitating impact of the disorder, patients and close relatives bear various costs. Studies of such costs yield valuable information on the disorder, which is common in many countries. The annual cost of RA treatment was 4,000 Euros in France, 5,028 Euros in the Netherlands (11, 12), and 9,946 Euros in Belgium (13). In Germany, the direct cost was 2,312 Euros, while in Hungary the cost was 1,877 Euros (14, 15).

The lost productivity cost of RA is very high. About 20–30% of RA patients experience work disability within 2–3 years of diagnosis (16). Pentek *et al*. (2008) found a productivity cost for RA in Hungary of 2,287 Euros (17). In a systematic review of studies conducted in 1999, data were gathered from 14 different countries and RA lost productivity costs were observed to vary between $US1,082 and $US18,422 (1). The Hannover Costing Study found that the indirect cost in Germany was around 11,193 Euros (14). The cost of productivity loss was 974 Euros, 453 Euros of which was attributable to absenteeism caused by

Table III. Mean annual cost per patient with RA and AS (in Euro).

	Rheumatoid arthritis (Euro)	(%)	Ankylosing spondylitis (Euro)	(%)
Direct cost	2,917.03	100	3,565.91	100
Inpatient and outpatient cost	206.82	7.1	239.57	6.7
Medication and prostheses/orthoses cost	2,710.21	92.9	3,326.33	93.3
Indirect cost	7,058.99	100	6,989.81	100
Cost of productivity loss for patients	4,865.87	68.9	5,116.47	73.2
Workday loss	321.82	4.6	245.5	3.5
Sick leave days cost	27.49	0.4	31.38	0.4
Work disability	4,102.52	58.1	3,533.67	50.6
Early retirement	1,534.13	21.7	2,805.39	40.1
Early death	1,073.03	15.2	374.05	5.4
Cost of productivity loss for caregivers (defined as workday loss)	2,193.12	100	1,873.34	100

Results are expressed in Euro 2011 (1 Euro=2.03 TL).

Table IV. Cost of illness of a rheumatoid arthritis and ankylosing spondylitis patient (in Euro).

	Rheumatoid arthritis (Euro)	%	Ankylosing spondylitis (Euro)	%
Direct costs	2,917.03	29.2	3,565.91	33.8
Indirect costs	7,058.99	70.8	6,989.81	66.2
Total cost of illness	9,976.01	100	10,555.72	100

Results are expressed in Euro 2011 (1 Euro=2.03 TL).

the disorder, 63 Euros of which was the cost of reduced workplace productivity, and 454 Euros of which was attributable to the impact of unemployed workers on productivity (17).

Patients with AS are very costly in terms of both the direct costs of medical treatment and the indirect costs of productivity loss. A study on direct costs conducted in England analysed inpatient and outpatient costs, those of technical procedures, and medical costs associated with use of CT, endoscopy, and laboratory tests. Annual direct costs for a patient with AS varied from 101 Euros to 15,973 Euros and average direct costs were 1,852 Euros (18).

Bonen *et al*. (2002) comprehensively explored AS costs in Belgium, France, and Germany. The average direct costs were 2,640 Euros, ranging from 1,800 to 2,800 Euros (19). In a study in Spain, the direct costs of an AS patient were 4,472 Euros (20). In a study by Ward, the direct costs of AS were 1,750 Euros, and were 2,522 Canadian dollars in the study of Kobelt (21, 22).

The gradual physical impairment and inflammatory activity associated with AS considerably influence work capacity. In Denmark, 71% of AS patients are working, and 29% thus suffer from an inability to work (23). In Belgium, work disability caused by AS affects 9% of patients (17); in Finland 4% (24); in Germany 9% (25); and in Mexico 27% (26). In the Netherlands, the figures were 5% in the first year of disease, 13% in 5 years; 21% in 10 years; and 31% in 20 years (27). In New Zealand, 6.6% of AS patients do not work (28). In Norway, 3–15% of patients with AS are forced into premature retirement (29); the figure is 4% in England (30). In the USA, only 84% of patients with AS continue to work (31).

The lost productivity costs of each AS patient in Spain were 6,911 Euros in a study conducted by Kobelt *et al*. (20). Bonen *et al*. (2003) found that in Belgium, France, and Germany, individual income losses ranged up to 1,371 Euros. In the same work, it was found that aged patients with lower levels of physical mobility had higher medical costs, and patients with AS may require an extra 75 minutes each day to conduct normal activities (19).

Franke *et al*. (2009) found that the mean cost of RA for each patient was 14,906 Euros and for each AS patient was 9,374 Euros annually in Netherlands (32). An important result of this study was that the productivity costs constitute the largest part of the total cost of illness in RA and AS reflecting the high burden of the disease on work participation that was also supported by our study.

In contrast to other countries, few data on the costs of RA or AS are available in Turkey. Important data on RA morbidity were included in "The Study of the National Burden of Disease in Turkey". In this comprehensive work, DALY (Disability-Adjusted Life Years), a key indicator of health; and morbidity and mortality data; were merged to yield a single index. Of the top 20 diseases, RA was ranked 14th in Turkey, but 16th in women, and carried 1.3% of the overall Burden of Health (33). Also, RA has an adverse impact on life expectancy. In addition to the substantial impact of RA on patient quality-of-life, a caregiver must shoulder the burden of looking after a loved one.

The present study shows that the high prevalence of RA and AS in Turkey, as elsewhere, places a heavy financial burden on both patients and the economy. Although the medical costs are rather high, the costs of lost productivity are much greater, constituting 70% of the total costs of RA and 66% those of AS. Franke *et al*. (2009) and Boonen and Mau (2009) obtained similar results (32, 34). According to Boonen, while the societal valuation of the impact of both diseases on health is similar, the decrease in worker participation is more pronounced in RA and direct and productivity costs are higher. However, since AS starts at an earlier age, the lifetime economic burden might be higher. Although there were some limits of the study such as lack of cross-sectional or prospective data gathering at patient level, and the expert panel was accepted as a reliable source, to the best of our knowledge, this is the first such study to be conducted in Turkey. The present findings should assist in directing healthcare policies, determining productivity losses, and ensuring an effective distribution of scarce resources. From the societal viewpoint,

loss of labour affects not only individual members but disrupts the economic balance. It is difficult to estimate an exact productivity loss. As every worker contributes differently to production, such calculations are problematic. The minimum wage was used to calculate income loss for both wage-earners and employers. Indirect costs profoundly influence society and affect the whole country's economy.

Cost-of-illness studies include pre-calculation of absenteeism losses caused by illness or premature death, the costs of which society must bear. These data enable economic loss estimates to be prepared for governments. Thanks to such work, it is possible to estimate the societal impact of health problems. MSD prevalence is high, and MSD patients may be underproductive at work. Thus, we should also not underestimate losses to employers and reflection of such losses in the economy.

In conclusion, since RA and AS are important health problems that cause both economical burden and also intangible costs; the results of this study will be benefited not only by the medical authorities in terms of public health and preventive medicine and lead to further studies focusing on productivity losses and quality of life, but also by regulatory bodies for healthcare and health economics planning.

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