



Socio-economic costs of osteoarthritis: A systematic review of cost-of-illness studies



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ABSTRACT

Objective: The burden of illness that can be attributed to osteoarthritis is considerable and ever increasing. The aim of this systematic review is to analyze currently available data derived from cost-of-illness studies on the healthcare and non-healthcare costs of osteoarthritis.

Methods: PubMed, *Index Medicus Español* (IME), and the Spanish Database of Health Sciences [*Índice Bibliográfico Español en Ciencias de la Salud* (IBECS)] were searched up to the end of April 2013. This study adhered to the PRISMA guidelines. Articles were reviewed and the study quality assessed by two independent investigators with consensus resolution of discrepancies.

Results: We identified 39 studies that investigated the socio-economic cost of osteoarthritis. Only nine studies took a social perspective. Rather than estimating the incremental cost of osteoarthritis, nine studies estimated the total cost of treating patients with osteoarthritis without a control for comorbidity. The other 30 studies determined the incremental cost with or without a control group. Only nine studies assessed a comprehensive list of healthcare resources. The annual incremental healthcare costs of generalized osteoarthritis ranged from €705 to €19,715. The annual incremental non-healthcare-related costs of generalized osteoarthritis ranged from €432 to €11,956.

Conclusions: The study concludes that the social cost of osteoarthritis could be between 0.25% and 0.50% of a country's GDP. This should be considered in order to foster studies that take into account both healthcare and non-healthcare costs.

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Introduction

Osteoarthritis has the highest frequency of all rheumatic diseases and is one of the most prevalent chronic diseases [1–11]. Although its prevalence increases with age, it affects an increasingly significant number of people in the active population. The number of people with osteoarthritis is on the rise because of an ageing population and the increased prevalence of risk factors such as obesity and reduced physical activity. According to the method used in the Global Burden of Disease [12] study,

progressive ageing of the population could make osteoarthritis the ninth cause of disability-adjusted life years (DALYs) in developed countries by the year 2020.

The total number of years lived with disability (YLDs) worldwide caused by knee and hip osteoarthritis increased by 60.2% between 1990 and 2010, and by 26.2% per 1000 people, meaning osteoarthritis has moved up from 15th to 11th in the list of the most frequent causes of disability [13]. In 2010, these two joints alone were responsible for 2.2% of all YLDs on a global scale and 2.7% in the United States (accounting for 0.7% and 1.2% of all DALYs, respectively) [14,15]. These numbers represent an underestimation of osteoarthritis' burden, as they do not include the corresponding data for all other joints aside from knees and hips.

Osteoarthritis is responsible for a very high number of primary healthcare visits as well as knee and hip replacement operations, plus hospital costs in general [1]. However, the socio-economic burden of osteoarthritis is not only limited to the direct costs of healthcare use but also includes significant non-healthcare-related costs. These take the form of productivity losses and the cost of formal and informal care associated with the limited independence of people with osteoarthritis.

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All authors had full access to all the data included in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

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Cost-of-illness studies generate a monetary estimate of the economic impact or cost resulting from the illness, including both direct healthcare costs and non-healthcare-related costs plus labor productivity losses [16]. These studies thus provide an indication of the potential social benefits that would be obtained if the disease were to be prevented or treated more effectively. Until recently, the cost of osteoarthritis received surprisingly little interest and most studies did not deal with osteoarthritis independently, but as part of a group of rheumatic diseases.

Until March 2013, only two systematic reviews of the cost of osteoarthritis were published [17,18]. When the first review was published in 2001 [17], it was limited to Europe, and only one study had been published. The second systematic review [18], which was the only one published until April 2006 that could be considered systematic and comprehensive, mentioned only 10 studies on the cost of osteoarthritis published between 1992 and 2003, five of which estimated only direct healthcare costs. In this second systematic review [18], the cost figures for each study, which were incorrectly adjusted with a 3% discount rate, fluctuated greatly (by up to a factor of 10 for the same country) and were difficult to compare with other studies and data from other countries. In order to transform the observed cost figures for different years to comparable monetary units for a given year, original figures should be adjusted by price changes—i.e., inflation—using a price index or the GDP deflator. A discount rate is not appropriate for this goal given that discounting rates measure time preference—tradeoffs among costs and benefits occurring at different times—but not price changes.

Despite the high social burden of the disease, more recent, non-systematic and incomprehensive reviews [19–21] underline the lack of knowledge about the cost of osteoarthritis in countries such as the United Kingdom [21], the wide range of different criteria used to make healthcare and non-healthcare cost estimates [19], and the limited number of studies available that actually provide reliable, up-to-date estimates of the percentage of GDP attributable to osteoarthritis [22].

The aim of this article is to present the results of an up-to-date, comprehensive and systematic review of osteoarthritis cost-of-illness studies published up to March 2013.

Methods

This systematic review of osteoarthritis cost-of-illness studies concentrated on international scientific literature published between January 1992 and March 2013. Inclusion criteria determined that all the cost studies that estimated the healthcare costs and/or non-healthcare costs associated with osteoarthritis published in either English or Spanish would be reviewed. Excluded from the review were any articles that did not refer to osteoarthritis separately or that consisted of financial assessments, review articles, editorials and opinion pieces or letters, works about methodologies, and texts not published in scientific journals.

The articles were independently reviewed by both authors of this study. The following databases were searched: PubMed, *Índice Medicus Español* (IME), and the Spanish Database of Health Sciences [*Índice Bibliográfico Español en Ciencias de la Salud* (IBECS)]. Earlier literature reviews were used to confirm that all relevant references had been included, as were other sources such as Google Scholar. This study adhered to the PRISMA guidelines. Articles were reviewed and the study quality assessed by two independent investigators with consensus resolution of discrepancies.

The search strategy focused on the following keywords: (cost* OR economic* OR expenditure* OR resource* OR informal care* OR indirect cost* OR social cost* OR labour impact* OR sick leave) AND

(arthrosis* OR osteoarthritis). In the case of Spanish IME and IBECS searches, the terms used were (coste* OR recursos) AND artrosis [(cost* OR resources) AND arthrosis/osteoarthritis].

Based on the cost figures from the studies, the annual cost in euros for the year 2011 was estimated by applying the price variation index of each economy (GDP deflator) to adjust to base year 2011 and then applying the corresponding exchange rates for each currency with respect to the euro. We use market exchange rates, as in a previous survey for osteoarthritis costs [18], in order to convert cost figures of a country in national currency terms to a common currency, although they may not always buy the same amount of goods and services in each country.

Results

The initial search identified 1153 articles: of which 954 were in PubMed, 50 in IME and IBECS, 140 were mentioned in the references of other reviews, and nine were found in other sources. After reviewing the abstracts, 62 of these were excluded as repetitions, and another 1005 did not meet the inclusion criteria. Of the remaining 86 articles, another 47 were excluded after reviewing the entire text because they did not meet the criteria, thus giving a final total of 39 publications that complied with the inclusion criteria and were therefore included in this review [23–61] (Fig.).

Synthesis of the literature

The main characteristics relative to the context, population, and method of osteoarthritis cost estimation used in the selected studies are summarized in Table 1. Of the 39 cost studies included in this review, 22 (56%) are from the United States, three are from Canada, two are from Spain, two are from Australia, and two are from Singapore; the remaining seven studies correspond to single, one-off studies in the different countries. Most of the studies selected were conducted after the year 2000 (87%) and 25 of them (64%) are relatively recent, since they were published between 2006 and 2013.

Cost measurement in 11 studies (28%) was based on incremental cost estimates of osteoarthritis patients compared with a control group, in a further 19 studies (49%) the authors quoted an incremental cost estimate but did not use a control group, while the remaining nine studies simply calculated the total cost for all patients with osteoarthritis.

Table 2 describes the different types of resources assessed as either healthcare or non-healthcare-related costs, plus the method for assessing the latter.

Of the 39 studies, only three included all of the healthcare and non-healthcare-related costs that can be attributed to osteoarthritis. In 18 of the studies, only direct healthcare costs were estimated, while four studies assessed only non-healthcare costs. A total of 14 studies included both healthcare and non-healthcare costs, but only partially, as they omitted some costs relevant to the disease.

Labor productivity losses due to work absences were assessed in 16 studies, while 11 reported the cost of formal care (care provided by a paid carer) and ten studies reported on the cost of informal care (care provided by friends and family).

Healthcare costs per patient

Table 3 provides a summary of mean annual healthcare costs per patient (in 2011 euros) classified by the patients' type of osteoarthritis in each of the studies selected for this review (generalized, knee, hip, and type not given). Table 4 provides

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