

ORIGINAL ARTICLE

Internet searches by the Spanish population for unqualified information on the treatment of osteoarthritis[☆]



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Received 1 July 2019; accepted 6 October 2019

KEYWORDS

Big data;
Trends;
Osteoarthritis;
Plasma rich in
platelets;
Growth factors

Abstract

Objective: There is a current trend in the population to search the internet for unqualified medical information that may affect the recommendations given in specialist consultation. The aim of this study was to analyse the tendency of the Spanish population to search the internet for unqualified information on current treatments for osteoarthritis.

Material and method: Google Trends was used to analyse the information gathered from the Internet, combining potential key search terms related to the current treatment of osteoarthritis. For each term the Relative Search Volume (RSV) was calculated, and its trend between 2009 and 2019. Spearman's correlation (SC) was used to study the direction of the trend.

Results: All the infiltration methods had increasing trends and no statistically significant differences were found between them ($p = .769$). The term that showed the best correlation over time was "prp" with $SC = .90$, and the term with the highest RSV was "growth factors". Prosthetic treatment generated more interest than conservative treatments, where there was more interest in knee replacement than hip replacement ($p < .001$).

Conclusion: In Spain, the search for unqualified information on the treatment of osteoarthritis has increased over the past 10 years. There is more interest in prosthetic treatment than the more conservative treatments. There is more interest in knee replacement than hip replacement. There are no differences with regard to the different methods of joint injections.

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[☆] Please cite this article as: Novoa-Parra CD, Sanjuan-Cerveró R, Franco-Ferrando N, Lizaur-Utrilla A. Búsqueda en Internet de información no cualificada sobre el tratamiento de la artrosis por la población española. Rev Esp Cir Ortop Traumatol. 2020;64:108–113.

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PALABRAS CLAVE

Big data;
Tendencias;
Artrosis;
Plasma rico en
plaquetas;
Factores de
crecimiento

Búsqueda en Internet de información no cualificada sobre el tratamiento de la artrosis por la población española**Resumen**

Objetivo: Existe una tendencia actual en la población sobre la búsqueda de información médica no cualificada en internet que puede influir sobre las recomendaciones aportadas en una consulta especializada. El objetivo de este estudio fue analizar la tendencia de la población española sobre la búsqueda de información no cualificada en internet respecto de los tratamientos actuales de la artrosis.

Material y método: Para analizar la información recabada en internet se utilizó la herramienta informática Google Trends, combinando potenciales términos clave de búsqueda que se relacionaban con el tratamiento actual de la artrosis. Para cada término, se calculó el Volumen Relativo de Búsquedas (VRB), y su tendencia entre 2009 y 2019. La dirección de la tendencia se estudió mediante la correlación de Spearman (CS).

Resultados: Todos los métodos de infiltración tuvieron tendencias crecientes sin encontrar diferencias estadísticamente significativas entre ellos $p=0,769$. El término que mostraba una mejor correlación a lo largo del tiempo fue "prp", con $CS=0,90$ y el que mayor VRB tuvo fue "factores decrecimiento". El tratamiento protésico generó más interés que los tratamientos conservadores, siendo mayor por la sustitución protésica de rodilla que por la cadera $p < 0,001$.

Conclusión: En España, la búsqueda de información no cualificada sobre el tratamiento de la artrosis se ha incrementado en los últimos 10 años. El interés sobre el tratamiento protésico es mayor que sobre tratamientos más conservadores. La prótesis de rodilla genera mayor interés que la de cadera. No hay diferencias respecto a los distintos métodos de infiltración intraarticular.

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Introduction

A study on the disease burden in Spain classified osteoarthritis as the eleventh condition to affect years lived with disability,¹ with a growing trend since 1990. The annual cost of osteoarthritis of the knee and hip in Spain is 4738 million Euros, of which 46% corresponds to healthcare costs, 22% to sick leave, 13% to hospital admittances, 7% to diagnostic tests and 5% to drugs.² All of this indicates the importance this disease has on Spain's productivity and economy, in addition to the social and health problem it entails. In a recent study,³ it was observed that patients with osteoarthritis desired more information on their diagnosis, its impact on daily life and long term prognosis. Also, evidence shows that patients who have Access to Internet on osteoarthritis tend to take an active part in the management of the disease.⁴

At present, it seems there is an increasing interest from the population for unqualified medical information on certain diseases.^{5,6} Among the different methods described to analyse information taken from Internet, the software tool *Google Trends* has shown its effectiveness in providing valuable information on disease patterns, behaviour and interest from the population.⁵⁻⁷ This tool has been used to monitor different concerns of the population on health, and global risk of suicide,⁸ detection of cancer⁹ or to track seasonal patterns in urinary tract infections.¹⁰ In orthopaedics it has been used to study the interest in residency in orthopaedic surgery,¹¹ to determine new causes of infant morbidity¹² or to relate the use of drugs for the pre-

vention of hip fractures.¹³ However, there are few studies regarding orthopaedic diseases, all of them conducted in the United States (U.S.A.).^{14,15} We believe there are no studies on the trend to search for information on osteoarthritis and its treatments among the Spanish population. Our hypothesis is that such searchers will have increased enormously in the last 10 years.

The aim of this study was to analyse the trend of the Spanish population on the search for unqualified information in Internet regarding current treatments for osteoarthritis.

Material and method

To analyse the Spanish population trend for information searches on osteoarthritis in the Internet *Google Trends* in Spanish¹⁶ was used on 27/5/2019 by one of the authors (CN), and data for the last 10 years was analysed (from January 2009 to May 2019).

Search strategy

"Spain" was selected as the country of interest, and "health" for the general area of interest. The main search term was "osteoarthritis", together with its potential combinations with the different possible treatments. To improve reproducibility of our study, the method proposed by Nuti et al.⁷ was used (Table 1). In keeping with these authors, the most frequent consultations on osteoarthritis of the knee and hip were identified. Regarding joint injection methods

Table 1 Methodology for search specifications.

1. Subject	Osteoarthritis
2. Country or region	Spain
3. Search period	1/1/2009-27/5/2019
4. Search category	Health
5. Type of search	Web search
6.1. Search term (general)	Osteoarthritis
6.2. Search terms (conservative treatment)	Osteoarthritis + hyaluronic acid Osteoarthritis + prp Osteoarthritis + platelet-rich plasma Osteoarthritis + growth factors Osteoarthritis + corticosteroids
6.3. Search term (conservative treatment with higher RSV vs. prosthesis)	Osteoarthritis + growth factors – facial – lips – aesthetic
6.4. Search term (knee vs. Hip replacement)	Osteoarthritis + prosthesis + prosthesis(with no accent in the Spanish) – dental – finger – hand – thumb Osteoarthritis + prosthesis + prosthesis + knee – dental - finger – hand – thumb Osteoarthritis + prosthesis + prosthesis + hip – dental – finger – hand – thumb

prp: platelet-rich plasma; RSV: relative search volume.

most frequently sought, the terms “platelet-rich plasma” was used, its initials “prp”, “growth factors”, “hyaluronic acid” and “corticosteroids” as the most sought.

Regarding prostheses hip and knee surgery the term “prosthesis” (+ “prosthesis”, (without the accent in Spanish - the erroneous term most commonly used) was used, excluding (–) other anatomical areas.

Variable of result

In *Google Trends*, the main variable of result is the so-called relative research volume (RSV) which represents the rate (scale 0–100) of search of a specific term relating to the total of selected searches (maximum 5 comparisons). The description of data means evaluations in exchange rates and comparison between the terms of search. The computer tool provides the numerical value of the RSV for each interval of time of those search terms which fulfil a minimum threshold of volume.

The search results are proportional to the time and geographic location of a consultation in keeping with the following process¹⁷:

- 1) At each chronological point, the absolute volume of data is divided by the total of geographic searches of the region in the interval of time it represents, to compare relative popularity. In contrast, the places with the highest volume of searches always appear first.
- 2) The value of the RSV is then obtained. For this, the numbers resulting from the previous process are scaled from 0 to 100 depending on the proportion of a term with respect to the total searches over all the terms.
- 3) The searches made for the terms with a very low volume of searches are excluded, or made by very few users, which show a value of ‘0’. Also, the searches made by the same person repeatedly during a brief period of time are excluded.

Table 2 VRR values for osteoarthritis combined with diverse treatments.

Treatment	Median	Range	IQ Range
Hyaluronic acid	64.0	39-98	20.5
Platelet-rich plasma	64.0	41-100	21.0
“prp”	65.1	39-100	23.5
Growth factors	66.0	42-97	20.0
Corticosteroids	64.0	9-41	20.0
Prosthesis (global)	62.0	39-100	23.5
Knee prosthesis	69.0	37-100	26.5

IQC (interquartile) prp: platelet-rich plasma; RSV: relative search volume.

Statistical analysis

Statistical analysis was carried out using the SPSS v.22. programme. Trends for each term were analysed relating to the osteoarthritis according to its RSV value. The RSV values for each term are presented as a median, with their interquartile range (IR) and total range. All trends are assessed observing the correlation between the time and the RSV, using the Spearman coefficient (SC). The RSV values between the different terms were compared using the Mann-Whitney *U* test or the Kruskal-Wallis test. For all analysis statistical significance was considered to be *p* values below .05.

Results

For the term “osteoarthritis”, the RSV followed a growing chronological trend, with SC = .86 (*p* < .001). The RSV-osteoarthritis median in the last 10 years was 63 (IR: 19.5; Range: 38–100), with its lowest point in December 2010 and highest point in February 2019 (Fig. 1).

Regarding injection methods as treatment for osteoarthritis (Table 2), they all showed growing trends

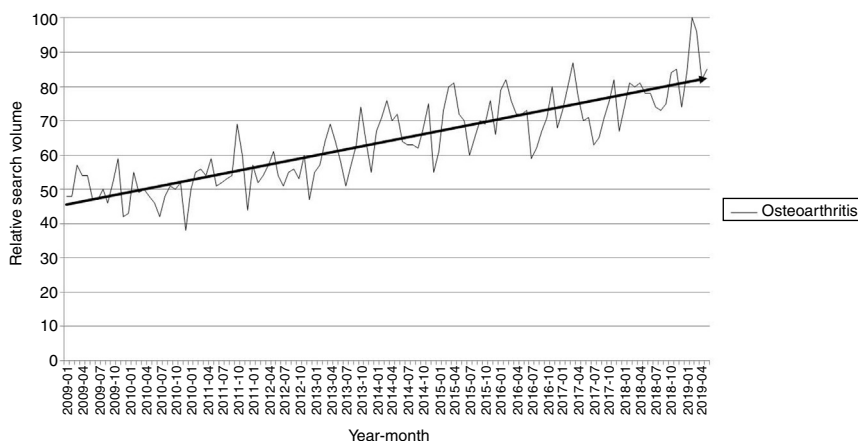


Figure 1 Chronological trend of relative search volume (RSV) of osteoarthritis.

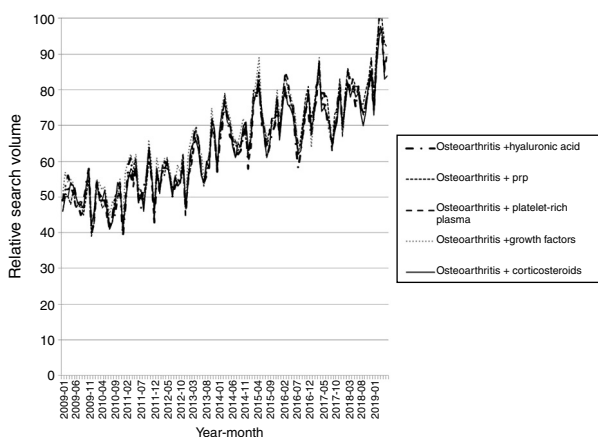


Figure 2 Chronological trend of relative search volume (RSV) of conservative treatments.

throughout the 10 years of study, with high values of medians of their RSV, without finding any statistically significant differences between them ($p = .769$).

The term which showed a better correlation throughout time was ‘prp’ with $SC = .90$ ($p < .001$) (Fig. 2).

Regarding prosthetic treatment (Table 2), the interest in knee replacement was significantly higher than that of hip ($p < .001$) (Fig. 3).

Comparing the medians between the ‘growth factors’ treatment (that of the highest RSV) and the ‘prosthesis’ treatment, we found there was a growing trend for both terms (Fig. 4) with SC of .88 and .90, respectively, although with a RSV significantly higher for the prosthetic treatment ($p < .001$).

Discussion

The results of this study indicate that interest from the Spanish population in the search for unqualified information by Internet on the treatment of osteoarthritis has grown significantly over the last 10 years, especially regarding knee replacement and growth factors.

The increase in the search for unqualified information on knee prostheses is related to the notable increase in this

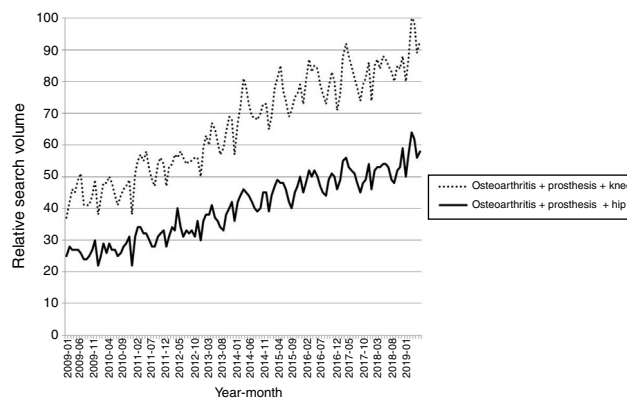


Figure 3 Chronological trend of relative search volume (RSV) of prosthetic treatment of the hip and knee.

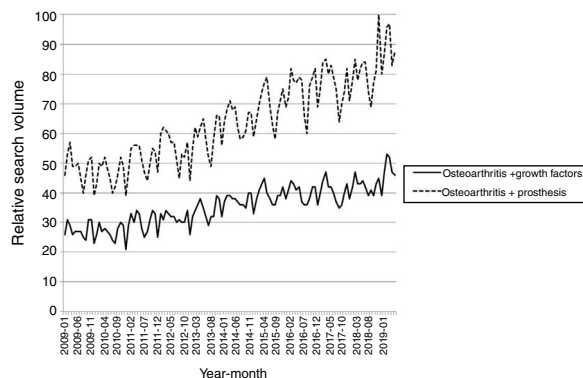


Figure 4 Chronological trend of relative search volume (RSV) of ‘growth factor’ treatment vs. ‘prosthesis’.

type of intervention. In Spain the register for arthroplasties in Catalonia¹⁸ and a study on its use in the National Health System¹⁹ showed there was a major increase in the implantation of knee prostheses. In the international area, the arthroplasty register in Finland²⁰ also observed this increase.

In Spain, during the 2002–2012 period the number of knee and hip replacements increased by 47% and 20%, respectively.^{21,22} According to these studies, in 2012 42,451 knee and 24,868 hip operations were performed. This dif-

ference of 58.5% is similar to the proportional difference of interest observed in this study during the same period, with a RSV mean of knee and hip prostheses of 55 vs. 33, which represents a proportional difference of 60.2%.

It is important to consider the profile of the population who does information searches. The increase in interest in prostheses may be related to the extension of this type of surgery in adults under 60 years of age.²³ The arthroplasty register in Catalonia¹⁸ showed that in patients under 65 there had been 22.2% and 18.1% of primary hip and knee prosthesis implantations respectively. The arthroplasty register in Finland showed an increase of over 20 times in the number of arthroplasties in the age group between 50 and 50 years of age during a period of 20 years.²⁰

With regard to the interest on the emerging treatment with growth factors and its variants, only one study has been published. Strotman et al.¹⁵ observed a notable rise in the volume of consultation relating to stem cells for hip and knee osteoarthritis. The rate of unsatisfied patients with prostheses and the increase risk of revision surgery in these younger patients²⁴ appears to indicate the need to become informed on alternative therapies in the prior stages of the disease.^{25,26}

The search for health information on Internet is particularly important for diseases like osteoarthritis, which may be self-diagnosed.¹⁴ One Australian study showed that 81% of self-diagnosed osteoarthritis patients suffered from the disease.²⁷ Our findings emphasize the important role played by Internet searches in the extension of patient knowledge. One study observed that the majority of patients with osteoarthritis stated that the information provided by their doctor was incomplete.²⁸ Khurana et al.⁴ reported that after visiting a doctor, 69% of patients used the Internet to become further informed on osteoarthritis. Furthermore, the same study found that, after seeking information on osteoarthritis, it was more probable that patients would formulate additional questions on their medication or would be more willing to discuss treatment alternatives.

Equally, it is important to assess the precision of the information the patients find on Internet.¹⁴ One recent study shows that the quality of the information relating to osteoarthritis was highly variable, and depended on the financial and cultural level of the country where the search was made.⁶ As a result of all of this, validating the quality of the health information provided to the patients with osteoarthritis by the search engines was an important step in the process of improving the patient's education.

This study has several limitations. The results may not be considered complete in the areas with limited resources or low access to Internet. A term usually used by patients appears to be that of "stem cells", which was not used in this study because it is a term with lower relative search volume than those analysed and because the search tool does not allow more than 5 terms to be simultaneously compared. We believe that we have considered the non-surgical alternative most commonly sought in our environment for the treatment of osteoarthritis. Also, it is difficult to quantify the number of injections which the patients with osteoarthritis have, given the lack of standardisation, supervision and data collection. We are unaware of any national register which would enable us to study this issue. Since the search activity could not be correlated with the real use of

the different techniques, as these data are not identified, the study could have a sample bias. However, it should be noted that the aim of this study was to represent the interest of the population and not whether a particular opinion associated with osteoarthritis treatments existed.

Conclusion

In Spain, the search for unqualified information on the treatment of osteoarthritis has increased in the last 10 years. Interest on prosthetic treatment is higher than on more conservative treatments. Knee prostheses arouse greater interest than hip prostheses. There is no difference with respect to the different joint injection methods.

Level of evidence

Level of evidence: IV.

Conflict of interests

The authors have no conflict of interests to declare.

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