


RESEARCH ARTICLE

Open Access



A patients' view of OA: the Global Osteoarthritis Patient Perception Survey (GOAPPS), a pilot study

Marianna Vitaloni^{1*} , Angie Botto-van Bemden², Rosa Sciortino³, Xavier Carné⁴, Maritza Quintero³, Pedro Santos-Moreno⁵, Rolando Espinosa⁶, Oscar Rillo⁷, Jordi Monfort⁸, Francisco de Abajo⁹, Elizabeth Oswald¹, Marco Matucci¹⁰, Patrick du Souich¹¹, Ingrid Möller¹², Montserrat Romera Baures¹³, Arlene Vinci², Deborah Scotton², Marco Bibas¹, Guy Eakin² and Josep Verges¹

Abstract

Background: Globally, osteoarthritis (OA) is the third condition associated with disability. There is still poor treatment in OA but science holds the key to finding better treatments and a cure. It is essential to learn what's important to patients from them to implement the most effective OA management. The OA Patients Task Force, conducted the Global OA Patient Perception Survey (GOAPPS)-the first global survey made by patients to analyze the quality of life (QoL) & patient perceptions of care. The goal was to collect data on OA patients' perception of OA to understand patients' needs and expectations to improve OA management.

Methods: Observational, cross-sectional study by online survey data collection from six countries, translated into three languages. The questionnaire was comprised of 3 sections: patient demographics and clinical symptomology characteristics; relationship with physicians: perception of attention, treatment, and information provided; and OA impact on daily activity and QoL. The results of the survey were evaluated using the Limited Data Set. The survey results were analyzed using descriptive statistics to characterize the patients' answers. Additionally, Cronbach's alpha was calculated to determine internal consistency validity.

Results: A total of 1512 surveys were completed in 6 countries. 84.2% of respondents reported pain/tenderness and 91.1% experienced limitations to physical activities. 42.3% of patients were not satisfied with their current OA treatment. 86% had comorbidities, especially hypertension, and obesity. 51.3 and 78% would like access to additional drug or additional non-drug/non-surgical treatments respectively. 48.2% of patients perceived their QoL to be affected by OA. The Cronbach's alpha was 0.61.

Conclusions: OA has a significant impact on patients' daily activities and their desire to play an active role in managing this disease. Patients are seeking additional treatments, especially no pharmacological/no surgical treatments stressing the need for investing in clinical research, implementing OA preventive measures, and managing interventions to improve the healthcare value chain in OA.

Keywords: Quality of life, Patient perception, Osteoarthritis, Global survey, Patient organizations

* Correspondence: m vitaloni@oaffoundation.com

¹Osteoarthritis Foundation International (OAFI), Barcelona, Spain
Full list of author information is available at the end of the article



© The Author(s). 2020 **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

Background

Globally, osteoarthritis (OA) is the most common musculoskeletal disorder and it is associated with pain, disability, and quality-adjusted life-year losses [1–4]. From 1990 to 2013, the trend of Years Lived with Disabilities (YLD) in OA increased 75%, being OA the third most rapidly rising condition after diabetes and dementia [1]. Worldwide, around 300 million people suffer from OA. Of these, more than 40 million adults live in Europe, and over 30 million in the United States of America (USA). In Latin America, the numbers of adults with OA are only partially available [1, 5, 6]. Adults afflicted with OA display different degrees of disability, ranging from mild and intermittent pain, with minimal difficulty in performing daily activities, to chronic pain with progressive structural damage and loss of function. Greater disability is often associated with a decrease in mental health and an increase in mortality when a person can no longer walk or live independently [1].

Currently, there is no cure for OA. However, there is increasing interest in developing OA interventions that improve physical health and quality of life (QoL) while reducing opioid or NSAID abuse and associated comorbidities [7–13]. To accomplish this, a consensus about the outcomes that are relevant to OA patients, comorbid populations, and other key stakeholders in OA requires listening to patients' opinions and experiences. Learning what is important to patients from the patients themselves is essential to create a core outcome set to bridge the gap between the patients' needs and the current OA management paradigms.

Integrated people-centered health services, as defined by the World Health Organization, implies putting the comprehensive needs of people and communities, not only the conditions as such, at the center of health systems, and empowering people to have a more active role in their health [14]. To support OA patients, the Osteoarthritis Foundation International (OAFI) (Barcelona, Spain) and the Arthritis Foundation (Atlanta, USA) with participation from important organizations fighting against rheumatic disease worldwide such as the Pan-America League against Rheumatism (PANLAR) created the OA Patients Task Force. This task force is a global alliance working in the fight against OA and representing about 150 million patients.

In 2018, the OA Patients Task Force developed the Global OA Patient Perception Survey (GOAPPS). This was the first international survey developed by patients' organizations to investigate OA patients' perceptions of QoL across many languages and nations/cultures using the same questionnaire. This was a pilot study aims to collect information on OA patients' perceptions regarding the impact of the disease in their lives to help all stakeholders involved in OA healthcare and

management to better understand patients' perceptions, to address patient needs more effectively in terms of prevention, research, and management [15].

Methods

This observational, cross-sectional study collected data through an online survey in six countries where member organizations of the OA Patients Task Force were based: Colombia, Spain, Italy, Mexico, the USA, and Venezuela. It was a hypothesis generating research aim to collect a set of data to decipher the relationship and patterns existing between different aspects of patient's perceptions of QoL.

Patients were required to meet the following inclusion criteria to be eligible for this study: (i) being residents of one of the participant countries, (ii) being older than 18 years, and (iii) reporting to have been diagnosed with OA by their physician.

Questionnaire development

The questionnaire was developed by researchers collaborating with the OA Patients Task Force and included expert patients, rheumatologists, clinical pharmacologists, epidemiologists and, patient advocates.

The first version of the questionnaire was written in English, then was translated into Spanish and Italian using a specific protocol of forward translation, back translation, and resolution. The translation process was supervised by the Survey Coordinator designated in each region.

During forward translation, a health professional familiar with relevant terminology, fluent in English but whose mother tongue was the primary language of the target culture, translated the survey from English to the local language. The focus was on conceptual rather than literal translation and the use of natural and acceptable language for the broadest audience. During back translation, a different translator who was a native English speaker translated the survey from the local language to English.

The forward translator, back translator, and Survey Coordinator met to resolve any concerns or discrepancies in the forward translated language. The Survey Coordinator sent the translation documentation to international Project Coordinators to ensure coordination of survey language across participating countries.

The final questionnaire was divided into 3 sections with an acknowledgment statement that read: "By entering the survey, I indicate that I have read the information provided and agree to participate." The first section of the survey included patient demographics and clinical characteristics questions. The second section of the survey focused on patient relationships with physicians and explored the personal perception of attention, treatment, and information received. In the last section of the

survey, patients were asked to evaluate their QoL. Finally, two questions were added to explore the patients' interest in the survey results and their willingness to participate in a future survey on OA.

The OAFI Patients Committee, composed of 15 volunteers OA patients, evaluated the ethical aspects of the final version of the questionnaire. The members of the OAFI Patients Committee approved the questionnaire compliant with patient use.

Cronbach's alpha was used to measure the reliability of the global questionnaire. The Cronbach's alpha was 0.61. Cronbach's alpha value of 0.60 is accepted by the scientific community in the case of exploratory research [16]. Newly developed instruments can be accepted with an alpha value of 0.60 [17].

Survey execution

The engagement with patients occurred in two stages: 1) a pilot test and 2) the online administration.

During the pilot test, the local Survey Coordinators administrate the questionnaire to 10 volunteer patients who met the inclusion criteria to evaluate the questionnaire burden, acceptability, and comprehensibility. As a result, some questions were modified to avoid unfamiliar terms or removed to shorten or avoid repetition (Additional file 1).

The final survey was administered by the Arthritis Foundation using the online secured Qualtrics platform from June to November 2018, a survey software allowing to conduce personalized surveys. The local Survey Coordinator administrated the survey in each country through collaboration with local organizations that promoted access to the survey webpage using social media, brochures, or other promotional materials.

The results of the survey were evaluated using the Limited Data Set. The survey results were analyzed using descriptive statistics to characterize the patients' answers using the IBM SPSS® software.

This survey was considered a pilot study.

Results

Demographic and clinical data

A total of 1683 patients entered the online survey. One thousand five hundred twelve entries were considered correctly completed. The final sample includes patients from the USA, Spain, Colombia, Venezuela, Mexico, Italy. The demographic data of patients surveyed are shown in Table 1.

The survey results indicated the majority of patients were diagnosed with knee OA (60.7%; 918 patients out of 1512). This was followed by hand OA (31.7%; 479 patients out of 1512), spine OA (21.1%; 319 patients out of 1512), and hip OA (8.3%; 126 patients out of 1512) (Fig. 1; Additional file 2). Also, 435 (28.8%) of patients reported

Table 1 Demographic data from completed surveys

	%	No
Questionnaires completed		1512
Sex		
Male	14.5%	219
Female	85.5%	1293
Total	100%	1512
Age		
18–39	1.7%	25
40–59	26.3%	397
60–79	65.5%	991
> 80	6.5%	98
N/A	0.1%	2
Total	100%	1512
Primary country of origin		
USA	82.2%	1243
Venezuela	11.4%	172
Spain	4.0%	60
Colombia	1.9%	29
Mexico	0.4%	6
Italy	0.1%	2
TOTAL	100%	1512

having OA in other joints, mainly feet, shoulder, and ankle (Additional file 3). The survey did not limit the number of OA diagnoses so that patients could select all the OA locations that applied to their case.

Regarding comorbidities, 86% of respondents reported being diagnosed with one or more comorbidities: 27.3% reported having one comorbidity, while 24.6% and 16.5% reported having two and three comorbidities respectively. Arterial hypertension (45.6%) and obesity (36.7%) were the most common comorbidities reported. Gastrointestinal problems (26.1%) were the third most reported comorbidity. Mental health problems, such as depression and anxiety, had a high prevalence, as reported by 25.6 and 20.6% of respondents, respectively. Osteoporosis was associated with OA in 22.6% of patients. Furthermore, 12.4% of OA patients suffered from diabetes. (Fig. 2; Additional file 2).

Regarding OA symptoms, patients could select up to three options. The combination of pain/tenderness, stiffness, and gait/walk disturbance was the commonest symptom reported that most significantly impacted their daily life. 84.2% of patients declared suffering for pain/tenderness, 48.9% for stiffness, and 37.7% of gait/walk disturbance. Also, loss of flexibility, sleep disturbance, fatigue, and swelling were reported as high prevalence symptoms in OA patients (Fig. 3; Additional file 2).

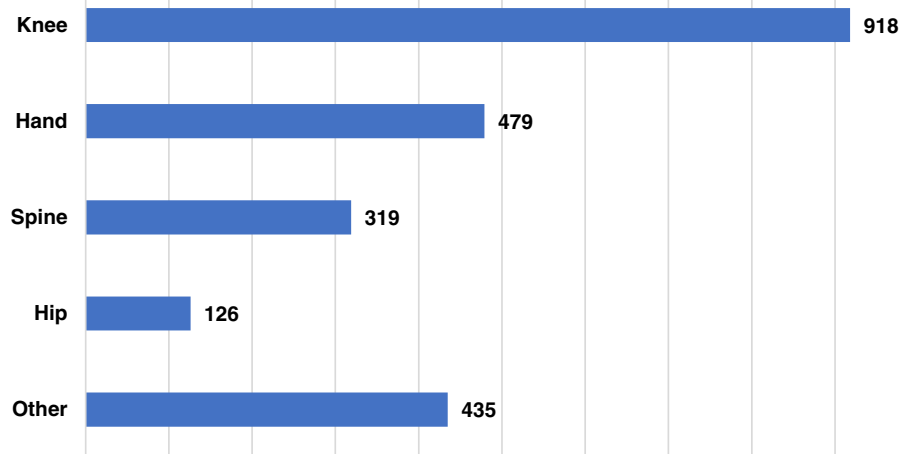


Fig. 1 Joints with OA as reported by patients. Patients could select all the options that apply. Each column represents the localization(s) of OA as diagnosed by their medical doctor. Number of patients answering this question = 1512. Number of answers = 2277

Patient-reported perceptions of patient-physician relationships

When patients were asked about their relationships with their doctors, about 7 in 10 patients (70.8%) agreed or strongly agreed with the statement that their doctors “understand” them when they describe their OA symptoms (versus 13% who disagreed or strongly disagree) and almost 6 in 10 patients (58.3%) agreed or strongly agreed their doctor adequately explained their OA diagnosis and what it represented to them (versus 22.1% disagreed or strongly disagreed). While a little more than half of the patients (53.3%) stated that they understood their OA treatment options and the associated risks, almost one-quarter of patients (24.6%) stated they did not understand their treatment options

and associated risks. Conversely, more than 4 in 10 patients (42.3%) were not satisfied with their current OA treatment, while only about one-quarter of patients (26.8%) stated they were satisfied with their current OA treatment (Additional file 4).

Regarding the possibility of access to additional treatment, the highest proportion of patients (78%) stated they would like to have access to additional non-drug/non-surgical treatments for their OA. This was followed by a little over half of the patients (51.3%) who stated they would like to have access to additional drug treatment options for their OA and more than one-third of patients (35%) who would like access to additional surgical treatment options. About 1 in 5 patients (18.9%) were not interested in additional drug treatment options

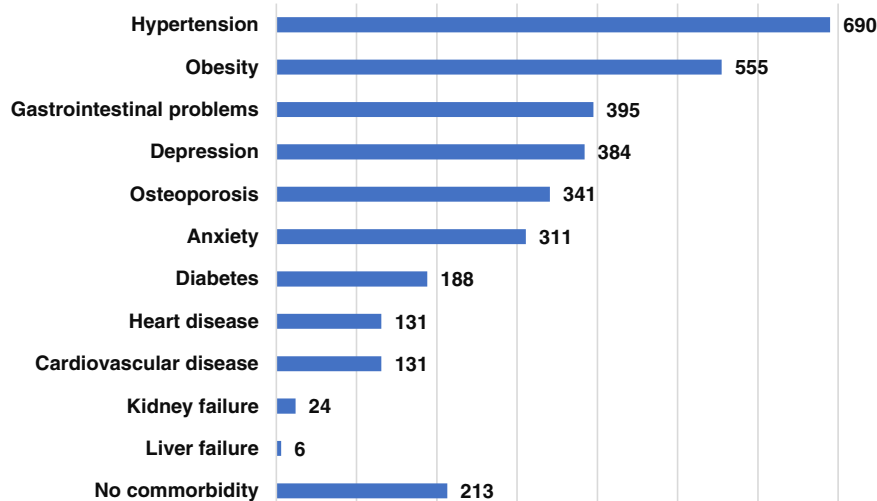


Fig. 2 Patients’ comorbidities as diagnosed by a medical doctor. Patients could select all the options that apply. Number of patients answering this question = 1512. Number of answers = 3369

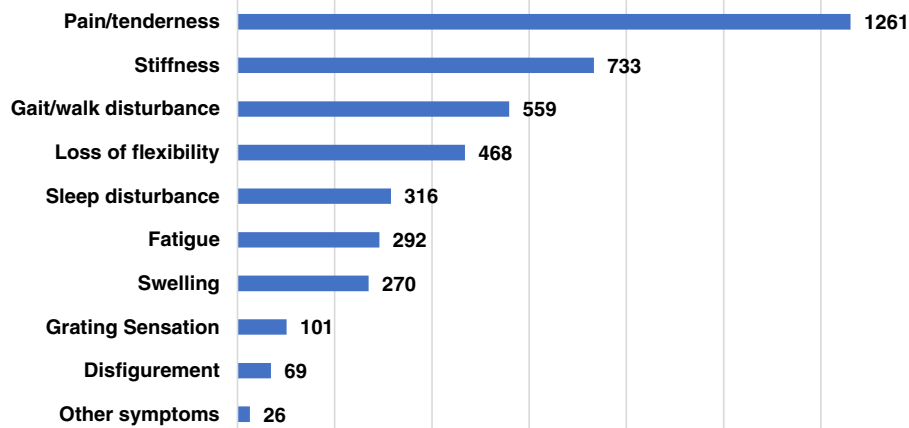


Fig. 3 Clinical symptoms, which have the most significant impact on patients’ daily life as reported by patients. Patients can select up to three options. Number of patients answering this question = 1498. Number of answers = 4095

and more than 1 in 3 patients (36%) were not interested in additional surgical treatment options.

Patients’ perception of QoL

Regarding the limitations experienced due to OA, 91.1% of the patients reported limitations in their everyday life physical activities, followed by 49.1% of patients reporting limitations to their work activities, and 37% in social interactions. OA has emotional, psychological, or mental health consequences in almost one-third of respondents and limited their sex life in 24.9% of patients. (Fig. 4; Additional files 2 and 5).

About half of the patients (51.7%) reported being satisfied with their QoL while the other half were either not satisfied or not sure about their satisfaction with their QoL (48.2%). When asked how their QoL would be if their OA signs and symptoms were eliminated, 94.2% of respondents said that their QoL would be good or very good.

Finally, 74% of patients said that they would like to be informed about the results of this study and 79% would like to participate in future research on OA.

Discussion

OA is one of the most prevalent diseases affecting people globally and is a leading cause of pain and disability among adults [18, 19]. Despite being such a widespread and severe disease, it usually associates with the false belief that it is a normal part of aging and that patients have to accept and live with it. This false myth, for example, makes OA patients least likely to receive exercise therapy and weight loss advice as recommended by international clinical guidelines as a first-line treatment for OA [20].

Empowering patients to have a more active role in their health and engaging them in research are key aspects to ensure the effective implementation of interventions aimed at improving QoL of patients and, consequentially, the current OA management strategies.

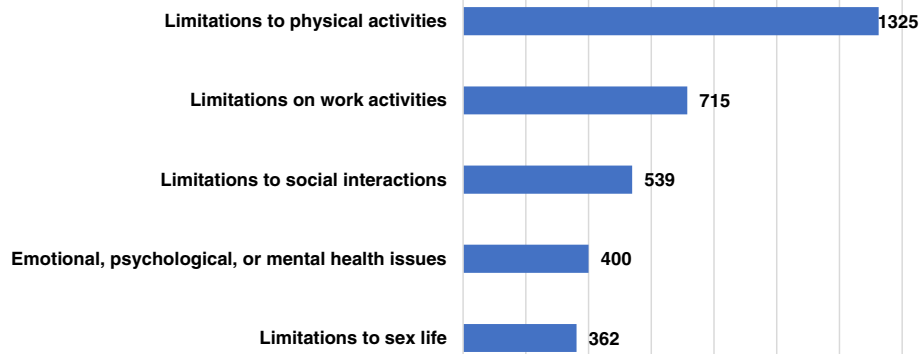


Fig. 4 Limitations or issues experienced by patients due to OA. Number of patients answering this question = 1455. Number of answers = 3341

Patients should be considered as another stakeholder within the health system and patients' organizations should be considered as another healthcare agent, present in real decision making, to make patient voice be heard. It is necessary to know which outcomes are relevant for patients to ensure their participation and satisfaction.

The OA Patients Task Force, an international alliance of patients' organizations, has been working since 2016 on independent projects to make OA more visible and to empower patients. The GOAPPS survey was a pilot study designed to collect and analyze data on OA patients' perceptions regarding their health conditions, OA care, and to explore the impact of OA on daily functioning and QoL. The results aimed at providing a portrait of patients' perceptions of OA to provide a baseline to take better quality performance in the future. As a pilot study, it aimed to capture the necessary information to carry out a large-scale survey able to compare cross-cultural and cross-national data. Also, it was a proof of concept study designed to prove the strength and capacity of patients and their organizations to the scientific community.

The results of this pilot study confirmed that OA can be considered a gendered disease being more prevalent among women [21–24]. Although, the fact that the majority of respondents were women can also be interpreted as women being more active and willing to participate in these types of surveys. The prevalence of OA increases with age in line with our results showing that the age range with the highest prevalence of OA was 65 to 74 years. However, almost a third of participants were 40 to 59 years indicating that OA also affects younger groups of people like pre-menopausal women, athletes, or injured people [25]. Finally, the majority of the respondents were from the USA. This could be a consequence of the different computer literacy existing among the different countries that participated in the survey. The data could also reflect the importance and strength that patient organizations have in each country which can associate with the structure of national health systems.

The survey results revealed that OA patients are affected by multiple comorbidities, especially arterial hypertension and obesity. Notably, half of this population suffers from depression and/or anxiety. The presence of comorbidities increases the frequency of physical disability in patients with OA, and the impact on the QoL of patients of the combination is greater than that expected for OA alone or each isolated disease [18]. Comorbidities have been reported to be more frequent in patients with OA compared with other diseases and to lead to greater deterioration of physical functions and QoL. OA increases cardiovascular mortality [26],

worsens the prognosis of arthroplasties, and reduces the range of possibilities of pharmacological treatment due to the incompatibility of prescribed drugs to alleviate joint pain and treat comorbidities [4]. Finally, our results revealed a high prevalence of gastrointestinal problems which may be a consequence of the high use of NSAIDs, the oral OA treatment of choice in the majority of the cases that are related to gastrointestinal adverse effects [27].

More than three-quarters of these patients (78%), who are probably already polymedicated, ask for access to additional non-drug/non-surgical treatments for their OA. Non-pharmacological therapies such as physical activity or nutritional programs have been recommended in clinical guidelines and reported to have a positive effect on the health status and QoL of OA patients [7, 28]. It has been shown that exercise therapy may postpone total joint replacement [29]. Physical and occupational therapy-related interventions have proven to reduce pain in patients with hand OA [30, 31]. Additionally, self-management programs have shown to improve mental health and social connectedness, thereby improving many aspects of OA patients' lives [32–34].

The high percentage of respondents asking for access to these interventions is striking considering the existence of such extended literature describing effective interventions for OA management. This may highlight an existing gap between the theory on how to improve OA management and the reality patients have to face when living with their disease. Health systems should invest more in implementing health promotion and intervention programs in OA while partnering with patients' organizations. Similarly, educational programs should be promoted, both for health professionals and patients. Only 58.3% of respondents said their doctors explained adequately their OA diagnosis and only 53.3% understood their OA treatment options. Educational interventions are extremely important tools able to improve patients' ability to self-manage their chronic diseases hence improving their QoL [35, 36].

Almost all patients reported limitations in physical and work activities, as well as enormous limitations in their personal life associated with severe symptomatology (i.e., pain, stiffness, loss of flexibility among others). Pain and other OA-related symptoms can be reduced by rehabilitation programs focused on alleviating pain and maintaining or improving physical and psychological function. Rehabilitation is widely recommended as first-line treatment for OA in evidence-based clinical guidelines [32, 37–39], as they are safer and, in many cases, more effective at reducing pain than the best established pharmacological interventions. Also, regular exercise is considered to be a core treatment for OA and it is universally recommended

amongst treatment guidelines for all individuals with OA [40, 41].

When only 26.8% of respondents report being satisfied with their current treatment plan, it is not surprising that more than half of the respondents would like to have access to additional drug treatments, a request which underlines the urgent need for new medications for OA. Currently, there is no cure for OA and pharmacological treatments can help to relieve symptoms or delay the progression of the disease. However, many of these drugs cannot be used for a long time due to their adverse effects and incompatibility with medications used for OA-associated comorbidities [26, 42–45]. Furthermore, it has been previously reported that OA patients are concerned about possible side effects of medication [46]. This evidence, in association with our results, highlights the need for investment in research for new and more active OA pharmacological treatments.

In this study, only 51.7% of patients reported having a good QoL; whereas 48.2% were either not satisfied with their QoL or not sure about their satisfaction with their QoL. It has to be noted that elderly people can have, in general, lower expectations in terms of QoL than young patients [47]. The age range of our study population was older and this may have been reflected in this survey's QoL responses. Additionally, the false conception that OA is a natural age-related condition may lower the expectations of QoL of OA patients while highlighting the need for patient education programs which may have an impact on OA patients' perception. When patients were asked how they would evaluate their QoL if OA was eliminated, almost 95% of respondents said they would be more satisfied. This data demonstrates the impact of OA on the QoL of people affected by this disease and the urgent need for improvement in OA management strategies.

Limitations of the study

The results of this pilot study present limitations which must be acknowledged. The data used in the analyses were based on patient self-reports, without clinical verification of an OA diagnosis, and thus are subject to the biases that are inherent to this type of data survey. Also, online questionnaires can be associated with gender and age-related biases, as women may be more prompt in using this kind of technology and elderly people may find it difficult to respond to them. There is a huge difference in the number of surveys collected in each of the participant countries that could reflect cultural perceptions of this type of survey and/or technology. Caution should be taken when interpreting these findings, as there is a clear predominance of surveys answered by patients from the USA.

Conclusion

The results of this pilot study represent an important stepping stone to gain insight into the needs and priorities of OA patients to shape the health care process on the patient's view. The results highlight the severe impact of OA on patients' life due to associated limitations, symptoms, and comorbidities. Importantly, the vast majority of patients expressed an interest in gaining access to non-drug/non-surgical treatment. Health promotion and self-management strategies addressing unhealthy weight and low levels of physical activity may improve the health conditions of patients as well as educational programs incorporating the patient expert role. Also, patients are requesting more pharmacological treatments as an alternative to the symptomatological drugs currently available on the market which can only alleviate OA symptoms and may be associated with unwanted adverse effects. This portrait of patients' perceptions of OA can provide a baseline to evaluate better quality performance in the future. Starting with these results and considering the study limitations, the OA Patients Task Force aims to develop a new international survey that will enable them to reach a larger population and collect more data on the patients' population characteristics (i.e. socioeconomic), perception and patient needs which can allow to the performance of population distribution analyses and the ability to understand the specific needs and characteristics of different demographic and social groups. Depth analysis of the reasons behind the patients' needs may contribute to the design of personalized strategies for OA management and treatment.

Supplementary Information

Supplementary information accompanies this paper at <https://doi.org/10.1186/s12891-020-03741-0>.

Additional file 1. Global Osteoarthritis Patient Perception Survey (GOAPPS) questionnaire. English version.

Additional file 2. Percentages as calculated on the total number of answers and on the total number of respondents.

Additional file 3. Figure showing the joints reported by participants in the category "other". Patients could report OA in joints other than the options offered as an answer (knee, hip, spine, hand). Each column represents the localization(s) of OA as diagnosed by their medical doctor.

Additional file 4. Table showing participants' responses to questions related to the causes of OA and their relationship with their doctor.

Additional file 5. Table reporting the limitations experienced due by OA as reported.

Abbreviations

GOAPPS1: Global OA Patient Perception Survey; NSAIDs: NonSteroidal Anti-Inflammatory Drugs; OA: Osteoarthritis; OAFI: Osteoarthritis Foundation International; PANLAR: Panamerica League against Rheumatism; QoL: Quality of Life; USA: United States of America; YLD: Years Lived with Disabilities

Acknowledgments

We thank all the patients who participated in the survey and the institutions supporting its diffusion. We thank Dr. Helena Marti Soler for her stunning support with the revision of the manuscript.

Authors' contributions

All the authors contributed to the study conception and design. XC, MQ, PSM, RE, OR, JM, FdA, EO, MM, IM, MRB, MB, PdS, GE, JV designed the initial questionnaire. MQ, EO, MM, MB, JV prepared the final version of the questionnaire. MV, MB, AB-vB, MQ, PSM, RE, OR, and MM were the local Survey Coordinators. AV and DS organized online results. MV analyzed the data. MV, AB-vB, RS wrote the first draft of the manuscript. MV prepared the figures and tables. All authors read and comment on the first draft of the manuscript. MV, PdS, XC, DS prepared the final version of the manuscript. All authors read and approved the final version of the manuscript.

Funding

The authors did not receive any funding for the volunteer research work which produced the submitted manuscript.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

This study was approved by the patients' ethics committee of the Osteoarthritis Foundation International. The patients' ethics committee formally approved the survey and the study stating that they believe this research could be an instrument to raise awareness on OA patients' conditions and needs and they did not consider it could cause no harm to patients.

The consent to participate was provided by respondents before taking the survey. The first window of the on-line survey consisted of an information statement and a statement saying "By entering the survey, I indicate that I have read the information provided and agree to participate."

Consent for publication

Not applicable.

Competing interests

Ingrid Möller is a member of the editorial board of the journal.

Author details

¹Osteoarthritis Foundation International (OAFI), Barcelona, Spain. ²Arthritis Foundation, Atlanta, USA. ³De los Andes University, Merida, Venezuela. ⁴Hospital Clinic, Barcelona, Spain. ⁵Biomab - Centro de Arthritis Reumatoide, Bogota, Colombia. ⁶Instituto de Medicina Nacional de Rehabilitación, Ciudad de Mexico, Mexico. ⁷Hospital. I. Pirovano, Buenos Aires, Argentina. ⁸Hospital del Mar, Barcelona, Spain. ⁹University of Alcalá (IRYCIS), University Hospital Principe de Asturias, Madrid, Spain. ¹⁰University of Florence, Florence, Italy. ¹¹University of Montreal, Montreal, Québec, Canada. ¹²Institut Poal, University of Barcelona, Barcelona, Spain. ¹³Hospital de Bellvitge, Hospitalet de Llobregat, Spain.

Received: 29 January 2020 Accepted: 26 October 2020

Published online: 07 November 2020

References

- OARSI. Osteoarthritis: A Serious Disease, Submitted to the U. S. Food and Drug Administration. 2016.
- Hunter DJ, Schofield D, Callander E. The individual and socioeconomic impact of osteoarthritis. *Nat Rev Rheumatol*. 2014;10:437–41.
- Zhang Y, Jordan J. Epidemiology of osteoarthritis. *Clin Geriatr Med*. 2010;26:355–69.
- Valdes AM, Stocks J. Osteoarthritis and Ageing. *Emj Eur Med J*. 2018;3(1):116–23.
- Riñack Ramírez L, Brizuela Arias LA, Reyes Llerena Gil A, Toledano Zoila M, Hernández Cuellar IM. Estudio preliminar de pacientes con diagnóstico de osteoarthritis en servicio de atención ambulatoria del Centro de Reumatología. *Rev Cuba Reumatol*. 2013;79:192–9.
- EULAR study group on OA From clinical problems to pathophysiological research goals. Osteoarthritis Research Agenda From clinical problems to pathophysiological research goals. 2015.
- Skou ST, Roos EM. Good life with osteoArthritis in Denmark (GLAD™): evidence-based education and supervised neuromuscular exercise delivered by certified physiotherapists nationwide. *BMC Musculoskelet Disord*. 2017;18(1):72.
- Jönsson T, Eek F, Dell'Isola A, Dahlberg LE, Hansson EE. The better management of patients with osteoarthritis program: outcomes after evidence-based education and exercise delivered nationwide in Sweden. *PLoS One*. 2019;14(9):e0222657.
- Özkuk K, Uysal B, Ateş Z, Ökmen BM, Sezer R, Dilek G. The effects of inpatient versus outpatient spa therapy on pain, anxiety, and quality of life in elderly patients with generalized osteoarthritis: a pilot study. *Int J Biometeorol*. 2018;62(10):1823–32.
- Lee HJ, Park HJ, Chae Y, Kim SY, Kim SN, Kim ST, et al. Tai chi qigong for the quality of life of patients with knee osteoarthritis: a pilot, randomized, waiting list controlled trial. *Clin Rehabil*. 2009;23(6):504–11.
- Ebnazar J, Bali Y, Nagarathna R, Nagendra H. Effect of an integrated approach of yoga therapy on quality of life in osteoarthritis of the knee joint: a randomized control study. *Int J Yoga*. 2011;4(2):55–63.
- O'moore KA, Newby JM, Andrews G, Hunter DJ, Bennell K, Smith J, et al. Internet cognitive-behavioral therapy for depression in older adults with knee osteoarthritis: a randomized controlled trial. *Arthritis Care Res*. 2018;70(1):61–70.
- Broderick JE, Keefe FJ, Bruckenthal P, Junglaenel DU, Schneider S, Schwartz JE, et al. Nurse practitioners can effectively deliver pain coping skills training to osteoarthritis patients with chronic pain: a randomized, controlled trial. *Pain*. 2014;155(9):1743–54.
- World Health Organization. What are integrated people-centred health services? 2016. <https://www.who.int/servicedeliverysafety/areas/people-centred-care/ipchs-what/en/>.
- Botto-van Bemden A, Eakin G, Sciortino R, Quintero M, Monfort J, Carné X, et al. The global osteoarthritis patient perception survey (GOAPPS): a pilot study. *Osteoarthr Cartil*. 2019;27:S228–9.
- Bagozzi RP, Yi Y. On the evaluation of structural equation models. *J Acad Mark Sci*. 1988;16:74–94.
- Nunnally J. *Psychometric theory*. New York: McGraw-Hill; 1978.
- Lawrence RC, Felson DT, Helmick CG, Arnold LM, Choi H, Deyo RA, et al. Estimates of the prevalence of arthritis and other rheumatic conditions in the United States. Part II. *Arthritis Rheum*. 2008;58(1):26–35.
- Centers for Disease Control and Prevention. Prevalence of Doctor-Diagnosed Arthritis and Arthritis-Attributable Activity Limitation — United States, 2007–2009. *Morbidity and Mortality Weekly Report, Weekly / Vol. 59 / No. 39*, 1261–65.
- Baumbach L, Roos EM, Lykkegaard J, Thomsen KS, Kristensen PL, Christensen AI, et al. Patients with osteoarthritis are least likely to receive lifestyle advice compared with patients with diabetes and hypertension: a national health survey study from Denmark. *Osteoarthr Cartil Open*. 2020;2(3):100067.
- Plotnikoff R, Karunamuni N, Lytvayk E, Penfold C, Schopflocher D, Imayama I, et al. Osteoarthritis prevalence and modifiable factors: a population study. *BMC Public Health*. 2015;15:1195.
- Litwic A, Edwards MH, Dennison EM, Cooper C. Epidemiology and burden of osteoarthritis. *Br Med Bull*. 2013;105:185–99.
- Chaganti RK, Lane NE. Risk factors for incident osteoarthritis of the hip and knee. *Curr Rev Musculoskelet Med*. 2011;4(3):99–104.
- Srikanth VK, Fryer JL, Zhai G, Winzenberg TM, Hosmer D, Jones G. A meta-analysis of sex differences prevalence, incidence and severity of osteoarthritis. *Osteoarthr Cartil*. 2005;13(9):769–81.
- Heidari B. Knee osteoarthritis prevalence, risk factors, pathogenesis and features: part I. *Casp J Intern Med*. 2011;2(2):205–12.
- Mathieu S, Couderc M, Tournadre A, Soubrier M. Cardiovascular profile in osteoarthritis: a meta-analysis of cardiovascular events and risk factors. *Jt Bone Spine*. 2019. <https://doi.org/10.1016/j.jbspin.2019.06.013>.
- Nüesch E, Dieppe P, Reichenbach S, Williams S, Iff S, Jüni P. All cause and disease specific mortality in patients with knee or hip osteoarthritis: population based cohort study. *BMJ*. 2011;342:d1165.
- Xu C, Roberts M, Driban J, McAlindon T, Eaton C, Lu B. Dietary patterns and symptomatic progression of knee osteoarthritis: data from the osteoarthritis initiative. *Osteoarthr Cartil*. 2019;27:S264–5.

29. Svege I, Nordsletten L, Fernandes L, Risberg MA. Exercise therapy may postpone total hip replacement surgery in patients with hip osteoarthritis: a long-term follow-up of a randomised trial. *Ann Rheum Dis*. 2015;74:164–9.
30. Aebischer B, Elsig S, Taeymans J. Effectiveness of physical and occupational therapy on pain, function and quality of life in patients with trapeziometacarpal osteoarthritis– a systematic review and meta-analysis. *Hand Ther*. 2016;21(1):5–15.
31. Roll SC, Hardison ME. Effectiveness of occupational therapy interventions for adults with musculoskeletal conditions of the forearm, wrist, and hand: a systematic review. *Am J Occup Ther*. 2017;71(1):7101180010p1–7101180010p12.
32. National Clinical Guideline Centre (UK). Osteoarthritis Care and Management in Adults NICE Clinical Guidelines, No 177. London: National I; 2014.
33. Sharma A, Kudesia P, Shi Q, Gandhi R. Anxiety and depression in patients with osteoarthritis: impact and management challenges. *Open Access Rheumatol Res Rev*. 2016;8:103–13.
34. Vitaloni M, Botto-van Bemden A, Sciortino R, Scotton D, Bibas M, Quintero M, et al. Global oa management begins with quality of life assessment in knee oa patients: a systematic review. *BMC Musculoskelet Disord*. 2019;20:493.
35. Stoner AM, Cannon M, Shan L, Plewa D, Caudell C, Johnson L. The other 45: improving patients' chronic disease self-management and medical students' communication skills. *J Am Osteopath Assoc*. 2018;118(11):703–12.
36. Kress HG, Aldington D, Alon E, Coaccioli S, Collett B, Coluzzi F, et al. A holistic approach to chronic pain management that involves all stakeholders: change is needed. *Curr Med Res Opin*. 2015;31(9):1743–54.
37. Parmelee PA, Tighe CA, Dautovich ND. Sleep disturbance in osteoarthritis: linkages with pain, disability, and depressive symptoms. *Arthritis Care Res*. 2015;67(3):358–65.
38. The Royal Australian College of General Practitioners. Guideline for the management of knee and hip osteoarthritis. 2nd edn. East Melbourne, Vic: RACGP; 2018.
39. Geenen R, Overman CL, Christensen R, Åsenlöf P, Capela S, Huisinga KL, et al. EULAR recommendations for the health professional's approach to pain management in inflammatory arthritis and osteoarthritis. *Ann Rheum Dis*. 2018;77(6):797–807.
40. McAlindon TE, Bannuru RR, Sullivan MC, Arden NK, Berenbaum F, Bierma-Zeinstra SM, et al. OARSI guidelines for the non-surgical management of knee osteoarthritis. *Osteoarthr Cartil*. 2014;22(3):363–88.
41. Larmer PJ, Reay ND, Aubert ER, Kersten P. Systematic review of guidelines for the physical management of osteoarthritis. *Arch Phys Med Rehabil*. 2014;95(2):375–89.
42. Dubreuil M, Louie-Gao Q, Peloquin CE, Choi HK, Zhang Y, Neogi T. Risk of myocardial infarction with use of selected non-steroidal anti-inflammatory drugs in patients with spondyloarthritis and osteoarthritis. *Ann Rheum Dis*. 2018;77(8):1137–42.
43. Bavry AA, Khaliq A, Gong Y, Handberg EM, Cooper-Dehoff RM, Pepine CJ. Harmful effects of NSAIDs among patients with hypertension and coronary artery disease. *Am J Med*. 2011;124(7):614–20.
44. Zeng C, Dubreuil M, Larochelle MR, Lu N, Wei J, Choi HK, et al. Association of tramadol with all-cause mortality among patients with osteoarthritis. *JAMA*. 2019;321(10):969–82.
45. Lanas A, Boers M, Nuevo J. Gastrointestinal events in at-risk patients starting non-steroidal anti-inflammatory drugs (NSAIDs) for rheumatic diseases: the EVIDENCE study of European routine practice. *Ann Rheum Dis*. 2015;74(4):675–81.
46. Wells RE, Kaptchuk TJ. To tell the truth, the whole truth, may do patients harm: the problem of the placebo effect for informed consent. *Am J Bioeth*. 2012;12(3):22–9.
47. Witjes S, van Geenen R, Koenraadt K, van der Hart C, Blankevoort L, Kerkhoffs G, et al. Expectations of younger patients concerning activities after knee arthroplasty: are we asking the right questions? *Qual Life Res*. 2017;26(2):403–17.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more biomedcentral.com/submissions

