

Osteoarthritis in older adults: Disability associations and the corona virus

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Abstract

Background: Osteoarthritis, a widespread highly painful oftentimes incapacitating joint disease continues to impose immense personal and societal challenges among adults of all ages, especially older adults.

Objective: This review aimed to describe the extent to which older adults with osteoarthritis may suffer excess disability, compared to healthy age-matched older adults, and why this is important to note and prevent in the context of the novel COVID-19 corona virus pandemic.

Methods: Using the PubMed database and past research data, the degree of disablement commonly experienced by older adults with osteoarthritis was examined. Key points were then reported in narrative form.

Results: Findings show a high level of functional and comorbid disease-related disabilities in older adults with osteoarthritis, which commonly worsen over time. Most common is pain, limited mobility, depression, and cardiovascular conditions and obesity, the most common health conditions found in fatalities of older COVID-19 victims.

Conclusion: Osteoarthritis produces considerable disability among older adults in its own right. Coupled with high rates of cardiovascular disease and obesity, as well as frailty, it is likely a fair percentage of sufferers are at heightened risk for COVID-19. Consequently, optimal self-care strategies appear of increasing importance individually, as well as globally, in an era of massive barriers to regular healthcare opportunities and programs, and the challenges of complying with personal safety measures in the face of pain and joint dysfunction.

Keywords: Coronavirus, COVID-19, Community, Disability, Immune system, Joint, Osteoarthritis, Pain, Prevention, Treatment

Background

Osteoarthritis, the most prevalent joint disease, and one strongly associated with aging, commonly involves the breakdown of key joint structures such as the articular cartilage lining of joints such as the hip, knee, and hand joints. In addition, adults with osteoarthritis commonly suffer from other health conditions, as well as mental health challenges due to the persistent pain and disability associated with this disease.

Hunter and Bierma-Zeinstra [1] confirm that osteoarthritis is a leading cause of disability and source of societal cost in older adults. Moreover, they argue that with an ageing and increasingly obese population, this syndrome is becoming even more prevalent than it was in prior decades.

In addition, this trend is likely to continue given that there is no effective prophylactic against the disease, nor any known cure.

Moreover, medical therapy, while providing some degree of modest benefits in terms of pain reduction and functional improvement; may yield potentially harmful side effects. These include, but are not limited to, cartilage destruction, irritations of the gastro-intestinal tract, or in the case of the

need for opioids, premature death or addiction. Non-steroidal anti-inflammatory drugs (NSAIDs), commonly used to counter pain, may not only inadvertently increase joint degenerative processes, but may heighten susceptibility and severity of COVID-19 illness.

Surgery, often a last resort, and which may be helpful, is not always desired by the patient, and is greatly jeopardized at present in May 2020 by the competing demands and rulings of the Coronavirus (COVID-19) pandemic. In addition, even when available, surgery is not always successful at restoring full function or complete pain relief, especially in the older adult, where multiple joints may be affected simultaneously, or progressive frailty is manifest.

As a result, and as outlined by Vina and Kwok [3], osteoarthritis, which affects many aging adults and which is a leading cause of disability in older adults can be expected to have a highly significant negative impact on the sufferers' physical and mental status, as well as on their ability to work and socialize, in general, but especially in the context of COVID-19 lock downs. In this regard, one can hypothesize that in face of the present state of 'lock down' in the community, where services needed by the person with this condition may not always be available, or severely curtailed, or offered remotely in a medium foreign to many older adults, their disability and distress and risk of disease progression, plus susceptibility towards succumbing to COVID-19 will predictably increase the morbidity and mortality rates among both community dwelling as well as nursing home housed older adults. As well as the suffering involved, one can also anticipate a rise in disease prevalence and severity, plus mortality rates, if the affected individual's many needs are not duly addressed in a timely way, due to current limitations placed on travel, health care services, fiscal restraints, provider morbidity, and direct access to healthy health providers.

In this regard, Glyn-Jones et al. [4] have discussed the possible role of joint-preserving interventions under development, including lifestyle modification and pharmaceutical and surgical modalities, some of which show potential. However, as outlined above, few to date have proven efficacious in arresting, delaying or allaying the progression of this disease.

This appears unfortunate because many adults younger than 60 years of age and below are found to suffer from disabling osteoarthritis [5], even though many more cases are found among older adults. These older adults are often very frail, and may exhibit various degrees of muscle weakness and poor functional capacity, which are not always treated successfully in the home alone, and may impair the ability to adhere to safely measures such as donning gloves, and masks, cleaning surfaces, and hand washing among other challenging tasks, rendering them highly susceptible to Coronavirus 19 (COVID-19) infections, even when isolated, and especially if their immune system is increasingly compromised by stress and poor nutrition, and lack of social contact. In addition to that, if older adults living at home with a diagnosis of osteoarthritis already have one or more of the comorbid diseases strongly associated with COVID-19 such as obesity, and cardiovascular disease, their risk for infection is likely to be substantively increased, even if they take external precautions to counter viral transmission [6].

To determine the association between the presence of comorbidities and severity of pain and physical dysfunction in people with knee and/or hip osteoarthritis Calders et al. [7] who examined

four electronic databases and grey literature, found evidence of a direct association between comorbidity presence and the severity of self-reported and/or performance-based symptoms of pain and/or physical functioning among cases with knee and/or hip osteoarthritis. As well, moderate quality evidence revealed an association between having one or more comorbidities and worsening of pain, and the presence of cardiac disease and/or hypertension; or back pain, and which predicted the degree to which physical functioning deteriorated. Co-existing diabetes was associated with having worse pain than healthy cases.

In accord with the above findings, Cleveland et al. [8] recently confirmed that osteoarthritis produces significant pain and functional limitations, as well as increased mortality rates. They also mentioned a possible role for excess mortality attributable to the presence of one or more associated comorbidities.

Teirlinck et al. [9] who assessed which factors are predictive of progression in patients with hip osteoarthritis found strong evidence for the presence of one or more comorbidities, as well as for body mass index.

Consequently, while, not currently listed as a risk factor for COVID-19 among older community dwelling adults or those in care homes, it seems plausible to suggest that those older adults who have painful unrelenting osteoarthritis of one or more joints, plus comorbid conditions will in all likelihood have an increased risk of being infected by this viral disease, as well as having more severe disease, especially if they are scheduled for elective surgery that has been postponed or attend therapy regularly in some form. At the same time, if they are hospitalized with COVID-19 they may become even more debilitated due to lengthy hospital stays, and lack of emphasis on physical therapy and related allied non-urgent rehabilitation opportunities.

In this regard, we would strongly argue for much more concerted attention to preventing the excess morbidity and burden associated with this disease that can arise during states of lockdown and isolation during this unanticipated pandemic. Moreover, we would argue that older community dwelling adults should receive priority in this respect, as their condition could not only increase the risk for comorbid illnesses, exacerbate these if they are already present, but act as a stumbling block to preventing COVID-19, while increasing its risk and reducing effective recovery processes.

To support these ideas, we extracted relevant data from the numbers of reports housed in the PubMed database as of May 15, 2020 that have focused on osteoarthritis and the themes displayed over the last 40 years, especially those that focus on the older population, and the topic of comorbid illnesses, as this applies to the clinical profile of these adults, as well as COVID-19 risk. Some data extracted from a prior study that examined various clinical features of end stage hip osteoarthritis patients awaiting surgery are presented as well. Only an overview of this data is provided, and items selected are largely derived from publications listed in the past five years, and were included if they helped to frame the present issue in some way.

Results

General observations

As outlined below, many articles have been published on several

topics of interest to this current review since 1980 (see Table 1), but the numbers here, reflect wide variations in levels of interest or completed research.

PUBMED Search term	Numbers of citations
Osteoarthritis	87924
Osteoarthritis Disability	5730
Osteoarthritis + Obesity	2841
Osteoarthritis + Cardiovascular Disease	2682
Osteoarthritis + Self-care	1511
Osteoarthritis + Comorbid Disease	1203
Cardiovascular Disease + COVID-19	347
Comorbid Disease + COVID-19	218
Obesity + COVID-19	92
Osteoarthritis + COVID-19	5

Table 1: Summary of PubMed postings 1980-May 2020 on topics related to osteoarthritis showing immense general interest, but less interest than other topics related to both osteoarthritis and COVID-19.

Among the prevailing data listed above, and consistent with general understandings and observations of others concerning this topic, a recent study by Sun et al. [10] conducted in the middle-aged and elderly population located in China, noted osteoarthritis to be increasingly recognized as a heterogeneous multi-faceted joint disease with multi-tissue involvement of varying severity [11]. It was also noted that osteoarthritis was shown to be of major concern to the study participants. Although Sun et al. [10] then tried to uncover some common themes in the available body of related research, they found however, that most joints that are known to be affected by osteoarthritis are not well studied, with the exception of the knee joint. Moreover, no consistent data were found to emerge, because studies examined were highly heterogeneous. In trying to fill this gap, their extensive literature review showed lumbar osteoarthritis to be most common, followed by the knee, and cervical spine and hand. Hip data were not analyzed though as these were deemed to be too sparse. Women were more affected than men in this analysis, and those who were older were worse off than those who were younger. This group argued for more research, as well as self-management and community-based management efforts, especially to help allay associated features of hypertension and diabetes they observed were linked to osteoarthritis.

In another study, Timmermans et al. [12] who examined within-person pain variability and physical activity in older adults with osteoarthritis from six European countries, the authors found that of all 669 participants, 70.0% were women. They also showed that a sex-stratified multiple linear regression analysis revealed that greater baseline pain severity was cross-sectionally associated with

less physical activity in women, but not in men. Their longitudinal analyses showed a statistically significant inverse association between pain severity at baseline and physical activity at follow-up only in women. Greater pain variability over 12-18 months was associated with more physical activity at follow-up in men, but not in women. These data suggest that there may be gender based differences, as well as physical activity differences that impact osteoarthritis pain and its variability and severity, and women with osteoarthritis may need to be encouraged to be more active. In a parallel study, De Koning et al. [13] showed that more severe and stable joint pain levels were associated with anxiety and depressive symptoms among those cases of osteoarthritis categorized as being in the older age range. These findings indicated that both physical as well as mental health status are highly associated in older adults with this condition, and possibly contribute independently or collectively to physical functioning challenges, low life quality, and disability, regardless of joints affected as reported by Oo et al. [11] and Chen et al. [14], and arguably indicate that both health dimensions should be targeted in efforts to minimize disease progression and disablement.

Earlier, Ling and Bathon [15] who reviewed the clinical and pathophysiologic features of osteoarthritis with regard to peripheral joints, such as the hip and knee, also addressed the contribution of osteoarthritis to falls and functional impairment in older people. While they mentioned that disease markers could help to detect early disease and allow early intervention to ameliorate or slow the disease, these remain presently unavailable or highly limited in availability. Current management strategies should not ignore these data however and should include safe and adequate pain relief using systemic and local therapies, medical and rehabilitative interventions to prevent, or at least compensate for, functional deficits, and falls prevention efforts. As outlined by Cleveland et al. [8], their data as well as those mentioned above do suggest that addressing functional limitations and pain seen with osteoarthritis could potentially reduce the increased mortality that has been observed in these individuals. Scott et al. [16] who found pain to be the strongest predictor of disability, cited joint replacement surgery as a key strategy for relieving the distress in such patients. However, with cancellations and delays in elective surgery, it appears reasonable to propose that other approaches to ameliorate or mitigate osteoarthritis disability need to be examined, for example a role for weight loss and depression and anxiety in hip osteoarthritis cases has been discussed [17-19]. As well, sufficient data point to the potential benefits of minimizing or reducing cardiovascular disease symptoms, as well as obesity, anxiety, and depression manifestations and/or their onset, to mitigate the onset and progression of excess functional limitations [20].

As confirmed by Corsie et al. [5] osteoarthritis is associated with worsening physical function and a high prevalence of comorbid health conditions, especially cardiovascular disease risk. One explanation for this is that the individual's physical function if sufficiently limited may foster the development of this additional health condition. As such, the importance of maintaining or fostering physical activity and other strategies that can assist to both prevent excess functional losses among individuals with symptomatic osteoarthritis that limits activity, as well as fostering cardiovascular health has been stressed [21].

As discussed by Wang et al. [21], as well as Hall et al. [22] the prevalence of cardiovascular disease in patients with osteoarthritis

is indeed clinically significant. Moreover, there appears to be an observed increased risk of incident heart failure and ischaemic heart disease in people with osteoarthritis compared with matched controls. Both Wang et al. [21] and Fernandez et al. [23] further agree that osteoarthritis may be considered as an indirect cause of cardiovascular disease in some cases due to its frequent negative impact on walking ability, as well as the excess usage of analgesic medications such as NSAIDs by patients. Moreover, both conditions are found to share common risk factors, in particular age and body mass index.

Specific Case Observations

As in the above-mentioned observations, prior analyses of a representative sample of over 1000 end-stage hip osteoarthritis cases showed more were women, and most cases were older rather than younger adults. Moreover, many were obese with cardiovascular disease diagnoses, high blood pressure, and diabetes associated conditions [see refs. 17-19,26]. In sampling 15 of these cases selected at random, the main disease characteristics as described on the patient's charts at baseline were:

<p>VARIOUS FORMS OF PAIN</p> <p>Severe aching/stabbing pain*</p> <p>Mild-severe pain*</p> <p>Pain at rest*</p> <p>Increased pain on movement, standing</p> <p>MOBILITY CHALLENGES</p> <p>Trouble walking, limping, bending</p> <p>Needing to use a mobility device</p> <p>Limited walking distance, unable to walk</p> <p>Problems with going up and down stairs, sitting down and standing up</p> <p>FUNCTIONAL LOSSES</p> <p>Limited joint range of motion in multiple directions</p> <p>Strength losses at the hip and knee</p> <p>HEALTH CHALLENGES</p> <p>All had one or more comorbid diseases or were obese</p> <p>Examples=heart conditions, asthma, high blood pressure, chronic obstructive airways disease, hypothyroidism, diabetes</p>
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*Observations by French et al. [24] show the pain to be of the neuropathic type about 23% of the time or higher in similar cases.

Other Observations

- One case expressed anxiety over surgery
- Several had:
 - a depression history
 - a falls history
 - old hip fracture/other fracture history

- Most had
 - leg length discrepancy [one leg shorter than the other]
 - contra-lateral joint disease and/or knee or lumbar spine osteoarthritis
 - overweight/obese/issues
 - required extensive rehabilitation after surgery
 - required revision surgery more than once
- Some had suffered repeated dislocation of a prior surgical repair

Possible Risk factors

- Age
- Being overweight, [underweight]
- Excess use of narcotics/NSAIDs-[possibly leading to joint overloading/joint destruction]
- Female
- High blood pressure
- Leg length differences
- Lower leg mal-alignment deformity
- Occupational stresses-past and ongoing
- Injury related situations
- Multi-morbidity
- Sports or dance related injuries
- Steroid medications

Discussion

Osteoarthritis, a highly prevalent medical condition that clearly causes considerable distress and chronic disability among adults aged 55 years and older is increasing in prevalence. Associated with this costly disease, are substantial activity limitations, the presence of obesity, muscle weakness, and varying degrees of pain. In addition, the presence of one or more comorbid health conditions is common and may impact the severity of osteoarthritis, especially in the higher age ranges, while impairing occupational ability, as well as social activities and life quality.

Indeed, as outlined by Pallazzo et al. [25] osteoarthritis, the 11th most notable cause of disability in the world is not only responsible for immense activity limitations, participation, and low life quality, but adults with this condition, especially those who are older, are also at greater risk of all-cause mortality, particularly for cardiovascular diseases. They must therefore also be at a higher risk for mortality than the general population given the close linkage between COVID-19 and the presence of cardiovascular disease and obesity in the older adult and others, even if this linkage is not one that has been received any due attention to date.

To this end, while very few definitive treatment and preventive strategies for attenuating or reversing osteoarthritis pathology prevail, it does seem that several risk factors for the disease are possibly remediable, in theory, at least, and include, but are not limited to, muscle weakness, obesity and one or more cardiovascular conditions

and excess pain. Thus, rather than awaiting future research, it appears highly relevant to perhaps apply what we do know works to counter any disease associated inflammatory osteoarthritis component, plus general debility that may not only heighten the risk for more rapid disease progression, but also for cardiovascular disease risk, and thus COVID-19 risk, and poor or slow recovery rates from surgery or COVID-19 infection, as well as premature mortality.

In addition, since osteoarthritis can spread from one joint to affect others as a result of poor treatment, self-management, possible sedentary behaviours, exposure to repeated injurious biomechanical stresses, feelings of helplessness, low self-efficacy, and limited stress-coping ability in the face of COVID-19 lock downs and isolation and lack of formal and informal social support, efforts to counter these situations are highly indicated. Countering the possible onset of depression and anxiety that may lead to a more burdensome and excessively painful disease experience can be predicted to be helpful in reducing the risk of premature death due to opioids and other more drastic remedies.

To this end, and to avert an unprecedented increase in suffering and social costs, we would urge all related health care and rehabilitation personnel who aspire to facilitate the optimal wellbeing of their older osteoarthritis clients to use all their available resources to foster their patient's self-management skills, and address their tangible needs without delay. As outlined more than 10 years ago by van Dijk et al. [31], the importance of acknowledging the role of cardiovascular comorbidities, plus their frequency of occurrence in osteoarthritis cases, is of especially high current import, in efforts to reduce osteoarthritis disability, as well as efforts to counter COVID-19 risk among the older adult.

In this regard, Healey et al. [27] have recommended older adults with osteoarthritis be offered core treatments to attenuate their problems, including attention to any accompanying weight issue, and/or vascular condition. Furthermore, because cases with osteoarthritis may be weaker than healthy adults, as well as depressed, or anxious, or both, and too challenged to visit a provider a carefully designed self-managed care program that is specifically tailored to meet their physical needs should be forthcoming. To reduce pain, and accompanying low life quality experiences, improvements in pain management are also indicated [30]. To this end, helping clients to adopt and adhere to a thoughtfully designed personalized home exercise and management program, plus the provision of patient education materials may prove helpful [14]. These resources should help to highlight the risks of non adherence to program recommendations, plus the possible importance of using and selecting appropriate assistive devices, partaking in sound nutritional practices, the removal of unhealthy foods, and in improving home safety. Appropriate joint protection strategies are also critical and should be adequately highlighted and stressed by providers, as should efforts to address the role of comorbid conditions and their impact [32]. In addition, health policies that take into account upstream causative factors, rather than downstream outcome factors alone, and do not underplay the immense impact of the disability, and its link to a heightened COVID-19 risk, are strongly indicated if reducing the osteoarthritis burden and its high mortality rate, as well as the current COVID-19 among older adults are to be impacted favourably and significantly.

Conclusion

Osteoarthritis, a leading cause of pain and disability among

older adults, and one increasingly in prevalence [11,25], is a chronic disabling health condition with no known cure, and one where current therapeutic regimens are mostly only partially effective and oftentimes toxic [11]. A disease strongly associated with various forms of vascular pathology that may play a mediating role in its pathogenesis, it is plausible to believe that patients with this condition may be at increased risk not only for poor life quality, but for a heightened risk for acquiring COVID-19 infection, as well as delayed recovery rate in those cases who succumb to the virus.

In this regard, it is concluded that to avert an increasing disease burden and costs of this, clinicians can play a key role on behalf of their osteoarthritis clients who may be under 'lock down' or in isolation, by carefully considering the interplay between osteoarthritis and its biological, inflammatory, and immune system linkages [33], plus the role of mental health status and functional ability in this disease process. Those who want to specifically minimize the risk and/or severity associated with acquiring osteoarthritis or limiting its progression and its multiple highly negative health correlates, might consider a role for careful screening, followed by a practical plan with understandable instructions using a variety of educational strategies to help the older community dweller, especially women, who are at higher risk than men, to follow a healthy lifestyle so as to protect their entire well-being as far as is possible [28].

As well, stressing the importance of normalizing high body weights, avoiding foods that have an inflammatory impact, weakness due to lack of exercise, and falls injuries and others may be helpful. At the same time, encouraging appropriate home and personal safety adaptations, highlighting non-pharmacologic strategies to reduce pain and distress may be extremely helpful given the observed association between hypertension and pain, the primary pathology of osteoarthritis, inflammation, cardiovascular diseases and obesity, and COVID-19 and the latter two health states [35].

Indeed, even if only modest benefits accrue, and a return to 'normal' health care practices, and an effective COVID-19 vaccination is forthcoming, more good than harm will have predictably emerged, even if it is only to keep community dwellers in that environment and to prevent them from being housed in nursing homes that are proven to often be unsafe.

To further help older adults remain as active as possible, and until our hypothesis is invalidated, we strongly urge providers to be on call if needed to help clients overcome their current health challenges encountered on their own by fostering their personal agency, and designing strategies for them that can effectively bridge the current services gap, and that are age-appropriate, and tailored to gender, disease, environmental, socioeconomic, and health status. Future researchers can also assist in possibly lowering the prevalence of osteoarthritis in older populations by increased efforts towards providing a better understanding of the molecular drivers and feedback loops of osteoarthritis [33] including its association with metabolic disease and the immune system [34], and the impact of COVID-19 on increasing cardiovascular disease severity [35], as well as osteoarthritis severity [26].

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