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Osteoarthritis and social disadvantage interactions: retrospective overview and emergent findings and health implications

Abstract

Osteoarthritis, a widespread arthritic disease commonly resulting in considerable pain and functional disability is often found to vary among those deemed affected. While age, gender, and genetics commonly explain this, what does the research show specifically in terms of extrinsic factors such as social disadvantage? This report aimed to update what is known about the social context and its role as a possible remediable osteoarthritis disability determinant if suboptimal. Using the **PUBMED** data base and others, osteoarthritis studies published between January 1, 2000 and March 20, 2024 concerning possible social disadvantage linkages were sought and carefully examined. As well, data drawn from the researcher's repository were reviewed. The search results revealed a growing interest in this topic where osteoarthritis can be observed to be negatively influenced in the face of one or more forms of social deprivation. Yet, very few clinical trials prevail to either test the validity of this idea or apply these understandings to preventing suffering. In light of the increasing osteoarthritis burden, despite years of research, it appears that to maximize wellbeing for all, and to limit or obviate unwanted osteoarthritis associated health and disability costs, more resounding research along with a focus on advancing social equity and mitigating all forms of social deprivation is strongly indicated.

Keywords: aging, disability, economics, equity, evidence, osteoarthritis, social deprivation, social disadvantage, pain

Volume 9 Issue 1 - 2024

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Received: March 05, 2024 | **Published:** March 22, 2024

Introduction

Osteoarthritis, the most common form of arthritis remains widespread with data showing its rising prevalence as society ages, despite decades of research and public health interventions and multiple health services offerings. A pervasive chronic disease that is incurable and hard to treat or reverse effectively, its attendant social and human costs are incalculable. A progressively disabling condition of one or more freely moving joints such as the knee joint, cases suffering from osteoarthritis commonly experience intractable bouts of pain, stiffness, a loss of mobility, and often, a steady decline in the ability to function physically and with adequate levels of physical endurance. However, despite efforts to categorize the disease in terms of its general features and possible determinants, the condition known as osteoarthritis is not only defined in various ways in the literature and practice, but appears non uniform in its manifestations, its target populations, responses to therapy, degree of joint involvement and distribution, and locality.[1–3] Often attributed to age and/or injury,[4] it now appears that factors other than biology alone, including those that can affect biology vicariously, may have a strong and clinically relevant bearing on the epidemiology and extent of the disease, and especially include one or more social factors among others, although not directly discussed by Hsu, Siwiec[5] Gaspar et al.,[6] or Pandey et al.,[7] and many others.

Consequently, while its eradication continues to be sought, the problems obstructing function in osteoarthritis that are largely attributed to impaired joint biomechanics and related secondary problems appear challenging to mitigate or fully comprehend in isolation. Unsurprisingly, most standard treatments applied accordingly appear to be sub-optimally effective at best[7] even when resorting to surgery or narcotics. Moreover, even when surgery is indicated, and performed, results vary, and may well be influenced by social determinants that prevail among other factors, such as a lower than desirable and unmet needs based socio economic status, a return of a patient to an area of deprivation, and others.[8, 9]

In reviewing some of our own experiences over time, it appears that without an understanding of whether or not one or more social determinants may be implicated in the osteoarthritis disease cycle among others, a universally favorable role for emergent genetic editing and articular cartilage repair approaches, along with dietary weight loss and exercise recommendations to offset osteoarthritis,[10, 11] pervasive problems of adherence to standard physiotherapy directives and others[12] and heightened disability will remain. Indeed, it appears without efforts to consider social factors and their interaction with health status in general, it is clear osteoarthritis will continue to increase in prevalence and be observed to occur at an earlier age than is presently acknowledged, and most recommended guidelines for interventions that discount social deprivation will be unsuccessful in attaining uniform and desired results across the globe.[13]

In the face of rising health care costs in all spheres of endeavor, and a high number of aging adults worldwide who may already be in less than optimal health and suffering from osteoarthritis, including those in low income countries, a strong need to uncover as well as address all remediable factors in the disability cycle persists.[6,10, 14, 15] But with no definitive or universally strategic plan or set of directives or direction that might be uniformly affordable or practical and especially if viewed in isolation,[9] and at least two decades of calls to reduce racial and ethnic group health disparities in the United States, trends are likely to continue that fail to alleviate suffering in later life.

Key research questions

I. Is there any agreed upon linkage between social disadvantage in any form that could be identified and minimized to enable more effective osteoarthritis disability prevention efforts among the older adult? In particular, are social policy prevention programs, and strides in advancing equity and economic support promising for averting the costs of osteoarthritis is some respect? If so, what specific approaches are indicated? Finally, is the association between disadvantage and osteoarthritis where observed, uni- or bidirectional in selected cases?

II. Will careful early evaluation of adults who live in socially deprived neighborhoods be helpful for reducing osteoarthritis disability and its magnitude? Since osteoarthritis can magnify or induce a life time of suffering, plus account for significant proportion of total public health costs, should more emphasis on social health determinants such as socioeconomic status as suggested 10 years ago by Cleveland et al.,[16] and Knight et al.,[17] be more carefully examined? That is, is there current evidence that a strong case should yet be made for more public health investments towards well designed and resourced efforts to mitigate the possible cycle of excess osteoarthritis progression, plus persistent health costs and distress that are due to social deprivation?

III. Moreover, if preventive strategies do appear to exist are they grounded in a strong evidence base or are they too general, or of high merit-but not followed, contemplated or actively avoided by providers because they are seen as 'stigmatizing.[18]

Rationale

Osteoarthritis currently poses an enormous challenge to many aging individuals, worldwide, as well as tremendous challenges to health providers, plus immense hospital and societal costs. At the same time, the disease may impact life quality, as well as the ability to live independently in the community. But what produces the variations seen in osteoarthritis when age, gender, and joints are similar? For example, can limited health care access initiate a cycle of osteoarthritis damage that is not as easy to ameliorate when compared to the availability of high-level standard care? Since outcomes for osteoarthritis sufferers', for example those in some disadvantaged American populations are significantly worse off than those who are disease free, and both standard treatments and surgery to replace a diseased painful joint is not always as effective in those with a poor health background due to preventable inequities, it appears a better understanding of what specific variables might be amenable to intervention in at risk individuals in the context of primary, as well as secondary and tertiary osteoarthritis preventive efforts. To address these questions it appears necessary to go beyond biology and genetics, and explore various other possible mediating aspects of osteoarthritis including the interaction between the environment and the person, including the socioeconomic and policy plus living environments.

Hypotheses

In accord with Jenkins et al.,[19] who reported on the role of social deprivation in the development of osteoarthritis, it is hypothesized there is a consistent cyclical linkage between the onset and progression of disabling osteoarthritis in the older population that can be mediated by perpetual social disadvantage and in multiple respects that may be remediable. Mechanisms of influence underlying social disadvantage and osteoarthritis disability may be multiple and multi layered including social and biological implications.

Methods

The desired data believed to address the key questions posed in this mini review were sought largely on the **PUBMED** electronic data base when applying the key terms: "*inequities and osteoarthritis", "osteoarthritis and disability", "osteoarthritis and social disadvantage", "socioeconomic status and osteoarthritis", "osteoarthritis and social deprivation"*. As well, the **PubMed Central,** and **Google Scholar** resource sites were reviewed for additional data. Articles published in the English language as full reports and pertinent to the current theme were sought. Excluded were articles that did not discuss osteoarthritis per se and some related social issue or health cost, outcome, and prevalence, for example those that discussed obesity and osteoarthritis, articles on the perception of possible therapies, or laboratory studies were excluded. Available data representing the time periods over which most osteoarthritis research has emerged and extending to March 1, 2024 were carefully reviewed even if their embedded data sources were not current. Those articles of potential relevance deemed pertinent in the present topic were downloaded and scrutinized further. The review material was then carefully organized and summarized in narrative form, given the lack of any uniform focus or diagnostic descriptions in most studies. All forms of clinical study as well as review articles as well as all forms of possible osteoarthritis as well as deprivation were deemed acceptable including intangible and tangible socially manifest inequalities, inequitable or absence of adequate disease management and prevention resources or the potential role of educational deprivation factors, alongside neighborhood and provider access deficits in the context of osteoarthritis development and/or outcomes, rather than the role of other more mainstream factors of salience in the disease cycle. Each article review focused on what was observed or not observed and what might be concluded as a result as well as possible implications for research and practice. **PUBMED** was selected as the key electronic data source of information given its widespread data repository and effective method of accessing relevant data.

Key results

Even though this was a restricted review, it was clear that osteoarthritis remains a topic of immense interest and is one that has been studied in multiple reports published since 2000 and before then. Of these, of the more than 2000 current **PUBMED** articles on the topic of osteoarthritis as of March 20, 2024, including highlighted osteoarthritis associations, only two currently speak to a role of inequities in this regard, even though all persistent inequities are conceivably of high clinical as well as research importance to examine, address, and rectify as indicated. This recommendation is indeed recounted by almost all current authors whether they studied similar or dissimilar aspects of the issue. In terms of social deprivation - broadly defined by Smith et al.,[20] as encompassing the restriction of access faced by an individual in multiple spheres, including educations, occupational, or cultural interactions as well as neighborhood deficiencies,[3, 21] all can have a bearing on the ability of practitioners to develop tailored interventions and to secure adherence to these in the long term. Unsurprisingly, and possibly due to poverty, discrimination or other disadvantages, social deprivation remains pervasive and is increasingly and widely acknowledged as a salient outcome determinant in various musculoskeletal conditions according to Smith et al.[20]

To what degree this idea can be supported in the realm of osteoarthritis care and prevention remains challenging however, because it is recounted that many available controlled studies do not examine or document socially influential attributes to any degree,

particularly as regards osteoarthritis. However, when assessed by discrete measures of social deprivation, those reporting one or more social deprivation indicators have not only been quite limited, but inconsistently measured even though possibly implicated in the disease progression and its severity.[22]

Pollard et al.,[23] found different significant paths for gender and social deprivation: on impairment that was significant for men and those less deprived but not women and regardless of age. This group suggested both that osteoarthritis per se does not adequately explain the health outcomes observed when considering levels of deprivation. Thus, differential treatments and interventions to counter osteoarthritis may need to be implemented among social deprivation groups even in countries where efforts to reduce inequalities that limit equal access to knee and hip replacement surgery have been put forth,[24] Those in the most deprived category moreover appear to present with worse clinical signs and are offered more oral opioids than those who are more affluent as outlined by Jenkins et al.,[19] and Zeng et al.[25] In addition, if the patient undergoing joint replacement surgery comes from a deprived neighborhood, they appear to need more costly after care than those returning to a viable home. Moreover, simply discharging such patients into the same deprived community, must inevitably have demonstrable effects, even if follow up shows no excess 90 day re admittance burden, the impact of long term deprivation may remain even if discounted by Mehta et al.,[26] and Bennett et al.,27 and with this persistent states of multi morbidity and less than optimal physical functioning ability.[28] Indeed even if more deprived patients can achieve similar improvements in osteoarthritis surgery outcomes to those who are less deprived, it is still possible that the rates of deprivation or social gap levels induce or foster osteoarthritis disability to a more profound degree at all joints[29, 30] especially the knee where a high deprived percentage are found to be obese.[29, 31]

Kouraki et al.,[32] who used path models to statistically test how social deprivation, education and anxiety, that may manifest before an osteoarthritis diagnosis, as well as after a diagnosis showed high degrees of social deprivation before diagnosis tended to predict greater limitations in activities of daily living after diagnosis. Although higher educational attainment before diagnosis can possibly protect against limitations in activities of daily living after diagnosis, by improving those cognitive abilities and anxieties compounded by social deprivation, improving the social environment to counter osteoarthritis development in some, was not mentioned. However, inequalities in socioeconomics alone appear to be increasing even in highly developed countries along with osteoarthritis and pain states.[33] On the other hand, even if they suffer more intently as a group, Michel et al.,[34] and Hartnett et al.,[35] report those who are more highly affluent appear to receive joint replacement surgery at higher rates than those categorized as being in the lower income strata.

In this regard, one of several recent papers, such as that by Rahman et al.,[36] show that even if surgery is forthcoming, a past experience of greater deprivation than not tends to be significantly associated with an increased post operative length of stay, non-home discharge sites, emergency department visits, and readmissions This was a finding that was more stark than that of Edwards et al.,[37] and Pollard et al.,[23] but one supported by the observations of Jordan et al.[38] According to Pisarty-Alatorre et al.,[39] current socioeconomic status does impact functional status, quality of life and disability amongst cases with osteoarthritis and more research to elucidate the relationships between childhood socioeconomic status indicators and osteoarthritis outcomes as assessed over the life course may prove useful in identifying patients at risk for worse outcomes, a notion supported by Kemp et al.,[40] who investigated whether adults with multiple possible social disadvantage experiences would tend to have poorer outcomes following attendance in an osteoarthritis management program, and if so, what might determine this result, and Sheth et al.,[41] More equitable resource access and targeted early intervention is also indicated[31, 42–44] to avert a perpetual cycle of deprivation that limits opportunities, literacy, education, and service options, and/or forces or reinforces an adult to undertake stressful work or repetitive work.[45] On the other hand, a state of perpetual deprivation may further impact joint vulnerability and osteoarthritis risk and outcomes due to its immeasurable impact on expectations, self-perceptions, pain and self beliefs[46, 47] and possible mechanical loading and excess joint stress of occupational or obesity origin or both.[48]

In short, even if a role for deprivation is often uncharted in osteoarthritis clinical trials and other reports, it is a possible significant disease risk factor, mediator, or moderator, even if surgery, is forthcoming and warrants attention.[41, 49–51]

Discussion

The seemingly perpetual impact of osteoarthritis is widely noted in the literature, where multiple studies have focused predominantly on its biology and biomechanical attributes. To a much lesser extent, various social factors, collectively termed social health determinants, including social disadvantage are less well studied, if at all in many cases. However, even if osteoarthritis is inevitable, it appears that subgroups of young and older adults with low educational and economic resources may be more intensely impacted at a younger age than those who reside in affluence with high education. Even if this simplistic example is not without its flaws, this broad topic appears to be an important one to comprehend at least conceptually, if not practically in efforts to advance osteoarthritis prevention and intervention. However, even though some progress has emerged in the last two decades or so, and sufficient cumulative research points to a negative role for social deprivation and resource access limitations in explaining osteoarthritis disease cycles and presentation, how this information can be duly applied towards mitigating osteoarthritis rates and severity plus costs remains problematic in 2024. Moreover, even when state of the art interventions are made available, they may be less potent or unable to reach desired outcomes readily in the face of persistent hardships[44, 52] and a failure to optimize neighborhood environments[53, 54] along with a failure to assure access equity, which is rarely addressed in any context. In particular, social deprivation influences and the degree to which these prevail could be of high relevance not only in explaining osteoarthritis severity and distribution, but in the likelihood of acquiring the added risk of one or more comorbid health conditions,[55] Although measures of social deprivation have been advocated in this regard,[56] these are not commonly assessed or discussed or incorporated into standard care protocols. Indeed, the role of inequality and one or more injustices that may have profound impacts on osteoarthritis risk and severity are rarely broached even where global efforts are made to advance this line of inquiry. Moreover, even where neighborhood inequities that affect health prevail the degree of commitment to addressing this possible upstream osteoarthritis determinant are limited at best and many interventions focus on individual levels of tertiary treatment, regardless of individual capacity and basic safe living environments and access to needed resources, for example promoting self management and walking and joint protection in an unsafe stressful disadvantaged living and occupational environment, along with limited access to needed supplementary resources such as vitamin D.

The program must not only be carefully tailored, but must strive to also permit non discriminatory access to educational, nutritional, cognitive and mental health interventions, home safety modifications, as well as supportive therapeutic interventions. Rooted in economic, policy, and even though the social fabric of multiple countries may foster all these modifiable determinants, it appears improvements in all these spheres as well as novel policy approaches and early screening efforts are warranted to foster an even playing field for all, while reducing suffering and enormous health care costs.[32]

In the interim, it appears safe to say social deprivation and disadvantage as prevailing inequities in many spheres cannot be readily eradicated by the absence of their recognition or a failure to act on this when observed. Moreover, efforts that do not embrace those diverse social deprivation factors that may place citizens at risk regardless of age can impair both health in general, as well as osteoarthritis in particular.[32, 56] In addition, it appears those strategies that do not offer a well planned, adequately sustainable, and dedicated set of agreed upon steps wherever they are needed, along with efforts by health researchers to document any possible need and what should be done in this regard are likely to foster more rather than less suffering and exponential costs.

In sum, to alleviate the current and future osteoarthritis burden, the interaction of the aging adult's needs, situational, and environmental factors including income and insurance[58–60] that can potentiate excess distress and pain, plus health disparities, enormous physical, social, occupational, and mental distresses, must be considered in parallel and intervened upon thoughtfully, comprehensively, in a timely as well as empathetic manner as indicated. However, while this idea is not novel and is consistent with social cognitive theory precepts that are well accepted as explanatory, behavioral and health intervention outcome attributes, unfortunately, this approach is not a mainstream one in any respect. Moreover, it is not directly mentioned explicitly in the 2024-2028 osteoarthritis action plan reported in 2024 by a large organization.[61] In addition, it is also not distinctly embedded in proposals for forthcoming studies of osteoarthritis post injury osteoarthritis prevention approaches at the knee joint.[62] However, it appears crucial to examine the evidence base in this regard carefully as per Rijk et al.,63 and translate what we do know and can apply into current practices, using more subjective and objective assessments that are deemed relative to the impacts of social situations.

At the same time, more consistent documentation, and discussions on equity associated health linkages and ramifications in health education training programs as well as in legal, ethical, and public health spheres of endeavor are also strongly indicated. To this end, osteoarthritis interventionists can help by remaining mindful not to overburden their disadvantaged clients resources including possible environmental and occupational toxins as well as safety issues. As well, system level strategies, including personalized cultural understandings along with attempts to comprehend the lived experiences of disadvantaged groups is also of possible high salience, even if not well studied to date.[44] As per Booker et al.,[64] it is not only salient to do this as far as explaining osteoarthritis pain experiences and intervention needs, but may also highlight other clinically relevant issues that may otherwise limit the goal of achieving optimal intervention outcomes such as feelings of low empowerment as well as perceived or actual discrimination and care injustices.[50] Indeed, emerging data show resource deprivation alone and especially that which occurs early in life[40] is a significant observable contributor in its own right to perceived or actual osteoarthritis treatment inequities and outcomes.[65]

Implications

As per the state of knowledge in the current realm, it is clear that concerted multilevel strategies implemented across the lifespan by healthcare professionals, organizations or systems, policy makers and economists along with dedicated efforts to carefully examine and document social disadvantage attributes as this applies to osteoarthritis care and prevention is strongly indicated.[20] Doing all that is possible to improve the stressful experiences of cumulative social deprivation such as deficits in educational opportunities, health care access, racial discrimination, race-based implicit biases and others, do appear to contribute to a high degree in terms of unsatisfactory orthopedic-related outcomes observed for some minority groups and others, especially the socio economically disadvantaged groups and its members and warrant dedicated attention.[40, 67–69]

In this regard, three points offered by observations of Abuwa et al.,[70] appear highly relevant as follows:

I. Osteoarthritis guidelines presently fail to clearly highlight the relevance of as well as the support needed in the context of efforts to care for all who are at risk or have confirmed osteoarthritis.

II. Those clinicians caring for those with osteoarthritis who face disadvantages due to economic or other intersectional factors need to have access to high quality care.

III. Developers could strengthen osteoarthritis guidelines by incorporating steps that ensure factors related to equity and social disadvantage are embedded in future frameworks and tools, and by including diverse persons with osteoarthritis on guideline development panels.

Final concluding remarks

A concerted overview of some key contemporary literature leads us to conclude that there is an immense clinical and public health need to mitigate osteoarthritis in the older adult population. To this end and despite a limited evidence base and bearing in mind not all parts of the globe may demonstrate extremes in social advantage and how these are health related, it is specifically concluded that:

I. Social disadvantage in its multiple forms including resource deprivation is a potential predictor of osteoarthritis and its severity and outcomes.

II. Osteoarthritis in turn, can impact social wellbeing and income negatively and significantly.

III. Efforts to ensure equitable social resources and opportunities are put in place where indicated, across the lifespan, will lower the magnitude of human suffering and its immense costs.

IV. Allied efforts in education, occupational health and safety, housing and neighborhood safety are paramount factors to target as well.

V. A failure to address the role of social disadvantage in heightening osteoarthritis joint attrition, for example through repetitive work or unemployed situations, and its failure to be prominently examined and reported in clinical trials and others ensures we will not have data that is sufficiently precise to avert a high degree of downward spiraling among the aging adult.

VI. To advance the goal of averting osteoarthritis degradation and to maximize opportunities for high levels of mobility and life quality, concerted research and clinical efforts to examine if any social deficiency prevails individually or collectively or both and to intervene accordingly in this regard.

In sum, despite the presence or risk of osteoarthritis disability, sufficient data imply it should be feasible to routinely assess and estimate the impact of any possible disease associated social as well as physical needs of an aging adult so as to foster a higher chance of them experiencing a meaningful life with limited suffering and less possible reliance solely on pharmacologic and surgical options. Early intervention will predictably be significantly more effective than late life approaches and can be targeted with a high possible degree of promise to attenuate joint specific osteoarthritis lesions, due to occupations that are repetitive or unsafe, and most likely undertaken by necessity by many in the lower social economic class.

Funding

None.

Acknowledgments

None.

Conflicts of interest

The author declares no conflicts of interest.

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Citation: Marks R. Osteoarthritis and social disadvantage interactions: retrospective overview and emergent findings and health implications. *Int Phys Med Rehab J*. 2024;9(1):39–45. DOI: 10.15406/ipmrj.2024.09.00371