

A Review on Osteoarthritis and Osteoporosis: Ongoing Challenges for Musculoskeletal Care

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ABSTRACT

Osteoarthritis and osteoporosis are two different musculoskeletal conditions which requires everyone attention. Physically inactive and increasingly obese requires a change from treating musculoskeletal conditions to a preventive approach towards promoting lifelong musculoskeletal health among older people. Accumulating data suggest that both osteoarthritis and osteoporosis are associated with an increased risk of pain, social disturbance and reduced quality of life. This review explores the management of these musculoskeletal conditions and its challenges in providing care for people living with osteoarthritis or osteoporosis. Prevention strategies and promotion of lifelong good musculoskeletal health are challenging within the society.

KEYWORDS: Care, Challenges, Musculoskeletal, Osteoarthritis, Osteoporosis

INTRODUCTION

Musculoskeletal health requires muscles, bones and joints comfortably work together to accomplish activities of daily living. Any interruption to this relationship contributes to musculoskeletal disorders. Global increase in obesity, physical inactivity, and ageing population are contributing factors to the interruption of good musculoskeletal health (1). Millions of people in the world suffering of pain and disability due to musculoskeletal disorders such as arthritis, musculoskeletal pain, fragility fractures, which damaging not only the physical aspect, but also their emotional and well-being. It has been reported that musculoskeletal disorders contribute 10% of world years lived with disability (YLDs) and 2.2% of YLDs is knee osteoarthritis (2). An ageing population, alongside rising levels of physical inactivity, and obesity may affect in the advancement of osteoarthritis and osteoporosis (3). The incidence of osteoarthritis and osteoporosis is continuing to escalate with the increasingly older people population (4,5). The global life expectancy is increasing steadily, and the number of older people is rising in every geographic region. Pain can be a major issue to deal with, among people living with musculoskeletal disorders, jeopardizing their active life. For people with osteoarthritis and osteoporosis, they may have the fear of leaving their own house, due to possibility of further consequences. It may have impact on their working life, their ability to perform duties, leading to loss of income if untreated. Many prevention strategies reported to prevent the

occurrence of these factors, and maintaining active lifestyles among older population. Seven electronic databases that are accessible and relevant to osteoarthritis and osteoporosis were searched through the British Nursing Index, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane Central Register of Controlled Trials (CENTRAL), Ovid EMBASE (Excerpta Medica dataBASE), MEDLINE (Medical Literature Analysis and Retrieval System Online, or MEDLARS Online), the SPORTDiscus, and PsychINFO. Other resources were also identified through the reference lists of the identified studies. The search strategy used terms such as 'osteoarthritis', 'knee osteoarthritis', 'osteoporosis', 'fragility fracture', and linked to 'challenges', 'musculoskeletal care', in order to identify the relevant articles on osteoarthritis and osteoporosis. A search tool was used to list all possible terms related to the main concepts in the search question. The results of each category were combined using the Boolean terms 'AND' and 'OR' to narrow down the search findings. This review serves the current situation of these two musculoskeletal conditions and provide points of challenges for everyone to deal with this burden of painful conditions, also falls disproportionately on those who are more disadvantaged in society.

Osteoarthritis among older adults

Osteoarthritis (OA) is degenerative painful joint disease, often involves the neck, hips, knees, lower back, or the hands. OA usually develops in joints that are repeated overuse in a particular job from carrying around excess body weight especially the knee. Eventually this injury impact thins or wears away the cartilage that cushions the bones in the joint. Then, the bones rub together yielding grating sensation. Reduction of joint flexibility, development of bony spurs, and the swelling of joint. The condition will result in pain, increased levels of disability, reduced functional performance, and affects patients' quality of life (6,7). As the knee is the commonest among all, it will be elaborated further in this review. Knee OA is mainly affecting older people which lead to difficulties in undertaking activities

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of daily living, impacting on individuals, families, and society. Individual with OA may have early loss of income, increased mortality rates, (8) and also affects their psychological well-being, which may lead to low self-worth, distress, and loneliness (9). Osteoarthritis of the knee will increase gradually due to the increase of older population and obesity globally (10,11), while female gender is double that males worldwide (12,13).

The Arthritis Foundation of Malaysia (AFM) estimates that around one in ten older people in the aged of 60 and above have OA, with the most common form being knee OA (14). The Community Orientated Program for Control of Rheumatic Diseases (COPCORD) study on musculoskeletal pain revealed that the knee was responsible for the majority of all reported complaints of the joints, and on further examination more than half of those had knee OA (15). Mismanaged pain may lead to serious physiological and psychological consequences for patients, including increased stress and anxiety, altered immune function, and decreased quality of life. Individuals with OA also have an increased risk of ischaemic heart disease including heart failure (16). A study by Zakaria et al. (2009) has shown that patients with knee OA attending primary care clinics in Malaysia have relatively poor physical health-related quality of life. Untreated pain may lead to longer hospital stays, higher readmission rates, increased healthcare costs for healthcare organisations, and decreased patient satisfaction (18). The increasing ageing population and growing prevalence of obesity in the global population require that all people prepare for this increased demand (13).

There are many recommendations and clinical guidelines published over the world for the management of knee OA. The Clinical Practice Guidelines by American Academy Of Orthopaedic Surgeons (AAOS) recommends modification of lifestyle for the patient with knee OA should include weight loss and exercise together with patient education (19). Meanwhile, the American College of Rheumatology (ACR), an organisation that advances treatment of musculoskeletal diseases and rheumatology, recommends that non-pharmacological treatment for people with knee OA should include exercise (aerobic, aquatic, tai-chi, and/or resistance), pain reduction modalities (thermal agents, patellar taping, manual therapy, walking aids), weight reduction session among overweight patients, psychosocial participation and self-management programmes (20).

While in Europe, The European League Against Rheumatism (EULAR) advises that non-pharmacological interventions of knee OA should comprise of initial assessment, patient education, and exercise regimes (21). Another organisation, Osteoarthritis Research Society International (OARSI), outlines four different recommendations of sub-phenotypes of OA, namely multi-joint OA without co-morbidities, multi-joint OA with co-morbidities, knee-only OA without co-morbidities and knee-only OA with co-morbidities (22). The European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases (ESCEO) has produced an algorithm for treatment of knee OA in Europe and worldwide by expanding on and adopting the proposed guidelines of the National Institute for Health and Care Excellence (NICE) (23). It includes information access and education, weight loss if overweight and exercise programmes.

In the United Kingdom (UK), NICE recommends

that patients with OA should be holistically assessed and managed by healthcare professionals, including support with self-management interventions (24). In the NICE guidelines, self-management strategies are emphasised to ensure positive behavioural changes among patients, such as weight loss, exercise, use of suitable footwear and pacing, and core treatments particularly exercise are individually targeted (24). In Australia, the management options in general practice include self-management, education, psychological intervention (mood), weight loss, exercise and daily activity impact (25).

The most recent recommendations for knee OA from a systematic literature review are consistent with the previous recommendations which focus on non-pharmacological treatment, where education (26) and exercise are prioritised with weight loss due to a lack of curative treatments (27). Individualised exercise programmes appear to produce better improvement in physical function and knee pain (11). Exercise therapy provides an effect in OA, particularly improved strength, proprioception and aerobic fitness (28). Thus it should be recommended regardless of patient age, pain severity or disability and comorbidity (24). Through a systematic review and meta-analysis by Tanaka et al., aerobic exercises and muscle strengthening exercises, with or without weights are effective for pain relief in people with knee OA (29). In addition, aerobic and strengthening exercise has been shown to increase knee cartilage glycosaminoglycan content among people with a high risk of knee OA (30). Thus, exercise is a reasonable approach to tackling the OA issue among the affected population. These evidences recommended that first-line non-pharmacological treatment should consist of education and exercise for patients with knee OA followed by weight loss and any intervention for alterations of structure and function. Emphasising these strategies could alleviate the symptoms and enhance health outcomes for better quality of life (27).

Osteoporosis

Osteoporosis is classified by primary osteoporosis and secondary osteoporosis (31). Primary osteoporosis occurs due to disturbances of sexual hormones, ageing or both. While, secondary osteoporosis is mostly caused by chronic diseases and certain types of drugs, such as corticosteroids (31). Menopausal osteoporosis is one of the examples of primary osteoporosis, which occurs frequently, and becomes the most common health-related problem among women (32). Osteoporosis is the most common disorder amongst older people, resulting in a low bone mass and the microarchitecture deterioration of the bone tissue, leading to increased bone fragility and prominently increasing the risk of fracture (33). According to the World Health Organisation (34) the classification of osteoporosis in post-menopausal women is based on the Bone Mineral Density (BMD) T - score ≤ -2.5 of the young adult mean. Whereas, osteopenia or low bone density is defined as BMD T - score between -1.0 SD and -2.5 SD. Fragility fractures are fractures that occur from any mechanical forces in low energy of trauma (35). The most common locations are the vertebrae, hip, and wrist. Fragility fractures commonly occur in these two different conditions, namely osteopenia and osteoporosis. Any patient with a fragility fracture (regardless of T- score) is defined as having

osteoporosis.

In the United Kingdom, the population aged over 60 is projected to increase by 50% between 2000 and 2030 (5). By the year 2050, the global population of individuals aged ≥ 65 years is expected to reach to more than 1.5 billion. As increasing prevalence of osteoporosis the burden of fragility fractures also increase remarkably. Assuming a constant age specific risk of hip fracture, the projected number of osteoporotic hip fractures worldwide is estimated to increase from 1.66 million in 1990 to 6.26 million in 2050 (36). The report estimates that approximately one in two women and one in five men over the age of 50 will have an osteoporosis related fracture in their remaining lifetime (37). An analysis of the General Practice Research Database (GPRD, which includes 6% of the UK population) showed a similar figure in the UK (38). Population of older people is increasing faster in the developing countries of Asia. Surprisingly, epidemiological information is more widely available for hip than for other sites, although fragility fractures in other sites significantly contribute to the burden of osteoporosis. While the burden of hip fractures is increasing markedly throughout the world, the greatest impact is expected to be felt in Asia; specifically, the percentage of hip fractures in Asia is expected to rise from 26% in 1990 to 37% in 2025 (36). By the year 2050, half of all hip fractures in the world are projected to occur in Asia, particularly in China (39).

For instance, mainland China previously had one of the lowest incidence of hip fracture in the world in 1988, at 10 per 10 000. However, this has noticeably increased at about 10% per year from 2002-2006 (40). Similarly, in Hong Kong there is a 300% increase of hip fracture incidence from the 1960s to the 35 1990. However, the rates in Thailand and Malaysia increased 200% and 150% respectively (5). The Philippines similarly noted an increase in the number of hip fractures from 28 000 in 2003 and 34 000 in 2005, expecting the number to reach 175 000 in 2050 (5). Additionally, conservative estimates shows that the number of hip fractures occurring annually in India exceeds 140 000 (5).

Additionally, in Malaysia is projected to have three times the amount of individuals aged 60 years and above from 1.4 million in year 2000 to 3.3 million in year 2020 (42). Similarly to 10 other Asian countries, Malaysia has a high prevalence of osteoporosis of 24.1 % (43). The incidence of osteoporosis will almost certainly increase together with Asia's rapid growth in its ageing population. A cross-sectional study was conducted between December 2014 and December 2015, the incidence of osteoporosis was 10.6% in males and 8.0% in females and a concurrent increase in the incidence of osteoporosis and osteopenia were observed in females ($P < 0.05$) but not in males ($P > 0.05$) (44). There remains a serious lack of osteoporotic fracture data in Malaysia underscoring the need for large-scale epidemiological fracture studies to be funded and conducted.

The most reliable data are from analyses of hip fracture incidence for the years 1996 and 1997. Hip fracture incidence in 1996-1997 in those aged over 50 years was 90 per 100,000 individuals per year, and has likely increased due to the ageing population (45). The Chinese portion of the

population had the highest incidence of hip fractures compared to the Malays and Indians, accounting for 44.8% of hip fractures in women (45). With an ageing population, hip fracture numbers and costs are expected to escalate (46). In Malaysia, there were 57 women (28.4 percent) from 201 postmenopausal women who met the inclusion criteria had osteoporotic bones (47). Another study also found that, overall 42.1% and 11.1% postmenopausal and premenopausal were osteoporotic, a highly significant difference ($p < 0.0005$) (48). Therefore, early identification and preventive measure should be started earlier for the purpose maintaining bones mineral density among those vulnerable population.

According to Malaysian Osteoporosis Society, (2012) osteoporosis management in postmenopausal women should be considered for treatment, if they had a previous low trauma hip, vertebral or wrist (colles') fracture, or a T-score < -2.5 on DXA, after exclusion of secondary causes of osteoporosis (49). Overall management mainly focuses on pharmacologic therapy with administration of hormone replacement therapy (HRT) and anti-osteoporotic therapy. Common HRT drugs used are estrogen therapy with or without progestin, Tibolone and Selective Estrogen Receptor Modulators (SERMs), e.g. raloxifene. Besides, an example of anti-osteoporotic therapy includes potent inhibitors of bone resorption which is bisphosphonates such as Alendronate, Risedronate, Ibandronate and Zoledronic acid (49,50). However, the both therapy had been reported several side effects to the patients. HRT was found increase risk of cardiovascular disease and breast cancer (51). Another accepted anti-osteoporotic agent, bisphosphonates, are inconvenient to administer and are associated with several side-effects such as gastrointestinal irritation and osteomalacia (52). In fact, two adverse effects have been noted in bisphosphonate therapy; atypical femoral shaft fractures and osteonecrosis of the jaw (ONJ) (49). Consequences of those side effects, therefore increase awareness and concerns among the health care providers are findings alternative therapy for managing osteoporosis. Besides, osteoporosis preventive measures are one of the important aspects of osteoporosis management by used multicomponent of health programme which targeting to reduce the risk for fragility fracture.

Clinical Guidance on Management of Osteoporosis suggest the management of postmenopausal women with osteoporosis (53). The treatment options found in the algorithm for the management of postmenopausal osteoporosis reflects the order of preference according to current medical evidence. There are few comparative studies between therapeutic agents but the therapeutic aim is for clinical fracture reduction rather than an increase in BMD. Therefore, agents with clinical fracture reduction are ranked higher in the hierarchy of therapeutic choice than agents with only BMD data. Based on this algorithm, PMW who had history of fracture have to start anti osteoporotic agent. The worst even is the fracture, therefore the need of identifying PMW who have the risks for getting fracture is more crucial before they starts to experienced it. However, identifying who will benefit from preventative treatment is imprecise (54). A number of risk assessment methods are available to predict fracture incidence over a period of time, and these may be used to aid decision-making. Therefore it is important to allow the decision making through providing

substantial knowledge regarding the disease.

The goal treatments for osteoporosis is to adjust imbalance between bone formation by osteoblasts and bone resorption by osteoclasts (32,33). Prevention of osteoporosis mainly divided into primary, secondary and tertiary. Primary prevention is focused on adolescents, young women, and premenopausal women. Secondary prevention mainly involves lifestyle modification, a pharmacological therapy which targeting pre or postmenopausal osteoporosis women or women at high risk for secondary osteoporosis. Meanwhile, tertiary prevention strategies aiming for preventing future fractures in a woman with osteoporosis that has already sustained a fracture and covers pharmacological therapy, fall prevention strategies and also includes lifestyle modification (55).

Lifestyle modification and preventing fracture among osteoporotic post-menopausal women through education. As a preventable disease, it is cost-effective to encourage osteoporosis preventive behaviour, for example, adequate calcium intake, optimal exposure to sunlight to induce vitamin D production in skin, regular weight-bearing exercise, smoking cessation and avoidance of excessive caffeine drinking (47). The challenge for osteoporosis prevention programmes is to identify young populations at risk and encourage the adoption of risk-reduction behaviours. In fact, secondary prevention of the disease should be a focus to maximizing peak bone mass through proper education on modifying lifestyle practices and identify fracture risk thus will help for preventing future fracture.

Meta-analysis in 17 trials involving 4305 participants were identified four categories of falls includes all injurious falls, falls resulting in medical care, severe injurious falls, and falls resulting in fractures. Exercise had a significant effect in all categories, with pooled estimates of the rate ratios of 0.63 (95% confidence interval 0.51 to 0.77, 10 trials) for all injurious falls, 0.70 (0.54 to 0.92, 8 trials) for falls resulting in medical care, 0.57 (0.36 to 0.90, 7 trials) for severe injurious falls, and 0.39 (0.22 to 0.66, 6 trials) for falls resulting in fractures, but significant heterogeneity was observed between studies of all injurious falls ($I^2=50%$, $P=0.04$). Exercise programmes designed to prevent falls in older adults also seem to prevent injuries caused by falls, including the most severe ones. Such programmes also reduce the rate of falls leading to medical care (56).

Systematic review of 12 studies of impact on select characteristics of structured osteoporosis prevention programmes on calcium intake in women were more likely to demonstrate participants had lower baseline calcium intake; and interventions were multi-dimensional and included factual information, skill training, and social contact delivered dynamically over time (57). Results indicate health behaviour change is more likely to occur when patient-centred interventions designed to increase knowledge and health beliefs, skills and abilities, and social facilitation are delivered over time. Therefore, the close and fewer contacts with a patient especially home-based care are useful in tackling lifestyle behaviour for preventive management in osteoporosis. However, there is a little study conducted on the preventive strategies on postmenopausal women especially in Malaysia setting.

Challenges

Osteoarthritis and osteoporosis are two very different musculoskeletal conditions with has little in common. The progression of disease develops differently and associated with different symptoms. These musculoskeletal conditions are diagnosed and treated differently, while people has the possibility to have both osteoarthritis and osteoporosis. Much is known about the potentially modifiable risk factors for these musculoskeletal conditions. Injury prevention, modifications of workplace, nutrition, are specific to these conditions (58). Like other conditions for long-term care, involvement of physical activity is one of the major actions for these musculoskeletal conditions. Awareness of lifestyle modifications as prevention strategy towards good musculoskeletal health should be imbued within the society. Appropriate physical activity can both prevent and reduce the impact of these musculoskeletal conditions reducing pain among the individuals and the opportunity to improve their own health. Identification of the needs of the local population and further to develop a proper preventive lifestyle modification programme to suit with Malaysian setting is challenging. The development of the health educational booklet tends to guide people with musculoskeletal conditions to be more informed and proactive to take part in their management of the disease. Cultural factors that are specific and appropriate for the context which are relevant to adherence and success of the programme is crucial (59). The education and personalised management delivered through the culturally adapted programme would assist people to self-manage their symptoms during their daily living activities.

CONCLUSION

Osteoarthritis and osteoporosis are globally common musculoskeletal conditions, contributing significantly to morbidity, mortality and healthcare costs. Ageing population and adoption of westernised lifestyles in transitioning populations is leading to an increasing burden of musculoskeletal health globally. Greater efforts are also required by everyone to contribute something towards the health of muscles, joints and bone for people at risk. Increasing physical activity and maintaining ideal body weight may reduce the risk of having musculoskeletal problem. For those who has developed musculoskeletal condition, lifestyle changes can substantially reduce the impact of the condition, at every stage of disease. Remaining active is one of the best things anyone can do for their musculoskeletal health, to help strengthen muscles, keep bones healthy, reduce pain and prolong the life of joints. Initiatives aimed at increasing physical activity should always explicitly refer to the musculoskeletal health benefits. Conducting any related activities for people living with a musculoskeletal condition need to ensure that making a difference is worth taking into considerations.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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