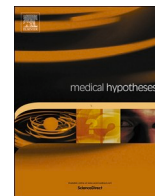




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## Letter to Editors

## Will the bone mineral density in postmenopausal women get worse during the COVID-19 pandemic?



## ARTICLE INFO

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Dear Editor,

Osteoporosis (OP) is one of the major public health problems, which is characterized by bone mineral density (BMD) loss and pathological changes of bone microstructure related to morbidity and mortality [1]. It affects a large proportion of the aging population, especially postmenopausal women. According to estimates by the National Health and Nutrition Examination Survey conducted by the Centers for Disease Control and Prevention's National Center for Health Statistics, more than 9.9 million Americans suffer from OP, and an additional 43.1 million have low bone mass [2–3]. Compared with men, women are disproportionately affected with OP at a rate of 4:1 [3]. Fig. 1.

Coronavirus disease 2019 (COVID-19) is rapidly spreading worldwide and not well controlled so far. Statistics from Hopkins University show that up to May 20th this year, about 3.4 million people died worldwide. However, the World Health Organization (WHO) believes that nearly 8 million people may have died from this deadly virus. Due to the rapid progression of the pandemic, residents were required to medical isolation and home quarantine to restrict movements within the population in some countries. We propose that the BMD of postmenopausal women may get worse during the COVID-19 pandemic.

First of all, for the postmenopausal women who do not know whether they suffer from OP [4], they are limited to visit hospital for having BMD testing due to the pandemic, result in unable to understand their BMD condition; On the other hand, it is more difficult to have access to anti-osteoporosis drugs to a certain extent for postmenopausal women with OP.

Secondly, it is not feasible to get sufficient calcium and vitamin D from the daily meals because of the long home quarantine. A research carried out by Reyes-Garcia R showed that daily intake of milk could induce significant improvement of vitamin D status, increased BMD at the femoral neck, and favorable effects on glucose and lipid profile in healthy postmenopausal women [5]. At the same time, effective outdoor activities or exercises are significantly restricted and cannot be performed as usual. As we know, bone tissue is a dynamic tissue that is constantly absorbed and rebuilt. Aerobic exercise exceeding four times a week has a protective effect on bone loss. Physical exercise benefits bone microstructure, improving BMD and bone strength [6]. Therefore, sufficient physical exercise is of paramount importance in OP prevention and

treatment.

Thirdly, a significant number of postmenopausal women gained weight during the COVID-19 pandemic since lack of physical exercise. Increased body mass index (BMI) is a risk factor for decreased BMD. Johansson et al. found that women with higher BMI had an increased risk of OP and fractures than the normal group [7]. Another study also reported a downward trend of female BMD with increased BMI. Bone marrow mesenchymal stem cells (BM-MSCs) and adipose stem cells have homology. The cell experiments showed that mature adipocytes had an inhibitory effect on osteoblasts when co-cultured. This phenomenon may be related to the release of cytokines and polyunsaturated fatty acids [8,9]. The distribution of fat cells is also related to bone formation. The fat cells between muscles and the bone marrow cavity are different from subcutaneous fat, which will injure the bones [10].

Last but not least, a study indicated that OP-related pain, muscle weakness, loss of flexibility, anatomical deformities, and mood changes could impair the quality of life (QOL) [11]. In addition, OP may cause sleep disturbances due to pain, physical discomfort, anxiety or depression [12]. Conversely, the Pittsburgh Sleep Quality Index (PSQI) and the Checklist of Individual Strength (CIS) total scores were significantly different in the postmenopausal osteoporosis and osteopenia groups compared to those with normal BMD. They concluded that QOL and sleep quality significantly impacted women with postmenopausal osteoporosis or osteopenia [13]. Therefore, OP, QOL, and sleep quality form a vicious circle during quarantine periods in the COVID-19 pandemic.

In conclusion, the COVID-19 pandemic may affect the BMD in postmenopausal women. We should pay more attention to this issue. It is not easy to arouse attention for OP because of no obvious clinical symptoms in the early stage. When the trabecular bone fracture happens in the late stage, the current treatment measures cannot repair it, significantly increasing the future risk of cortical bone fracture. Meanwhile, more studies on the relationship between COVID-19 and BMD in postmenopausal women are needed. BMD should be monitored to prevent OP as early as possible. Bone densitometry is of great significance for this purpose.

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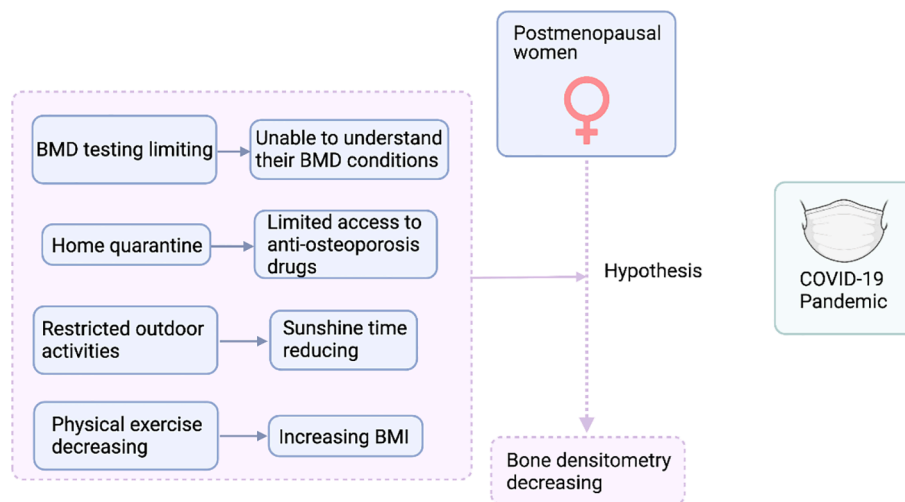


Fig. 1. Graphical format of the hypothesis.

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## Consent statement/Ethical approval:

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## Declaration of Competing Interest

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