Influence of Insolation on Osteoporosis Progression in Androgen Deprived Nonmetastatic Prostate Cancer Patients

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ABSTRACT

Prostate cancer is a major public health problem in all the developed countries. Increasing numbers of men with nonmetastatic prostate cancer are receiving long-term androgen deprivation therapy (ADT). ADT is associated with the loss of bone mineral density and a increased risk of bone fractures. The standard recommendations for male bone health include above all optimizing calcium and vitamin D intake, and exercise. Vitamin D₃ is an essential factor in the maintenance of bone health and calcium homeostasis. The main supply of vitamin D₃ is obtained through photosynthesis in the skin. The aim of this study was to investigate the influence of insolation on osteoporosis progression in androgen deprived nonmetastatic prostate cancer patients. We divided our androgen deprived prostate cancer patients in 2 groups. The first group (A) consists of 224 patients with insolation rate less then 3h per week. The second group (B) consists of 174 patients with insolation rate greater then 10h per week. With a questionnaire we determined, that patients from both groups were 70 to 80 years old, body mass index was 25–30 kg/m², androgen deprivation was 4–6 years and received no vitamin D supplements. In the group A 21.86% suffered pathologic fractures do to osteoporosis. In the group B 10.92% patients suffered from osteoporotic bone fractures. The risk for pathological bone fractures is significantly greater in the group A. In conclusion higher insolation in androgen deprived nonmetastatic prostate cancer patients significantly decreases the osteoporosis progression and the risk of pathologic bone fractures.

Key words: androgen deprivation, insolation, male osteoporosis, pathologic bone fractures, vitamin D

Introduction

Prostate cancer is a major public health problem facing man today in all the developed countries¹. Prostate cancer now outnumbers the lung cancer as the most common cancer in American men¹. The incidence of prostate cancer is rapidly increasing in the Primorsko-Goranska County of Croatia¹.

Increasing numbers of patients with nonmetastatic prostate cancer are receiving long-term androgen deprivation therapy (ADT)²,³. ADT is associated with the loss of bone mineral density and a significantly increased risk of bone fractures in patients with prostate cancer²,⁴,⁵.

Male osteoporosis is an increasing health problem in developed countries⁶. Almost one in four men older than 60 years of age will have an osteoporosis-related fracture⁵. Androgen deprivation therapy, most commonly with luteinizing hormone releasing hormone agonists or orchiectomy, increases the risk of male osteoporosis⁷.

Sex hormones, insulin-like growth factor 1, vitamin D and calcium are essential for maintenance of bone health⁸.

The standard recommendations for male bone health include optimizing calcium and vitamin D intake, and

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Exercise 9. Vitamin D deficiency and insufficiency, hypo-gonadism, glucocorticoids, and excess alcohol are the most common causes of secondary bone loss in men. Vitamin D3 in human is mainly obtained through photosynthesis in the skin, and food ingestion contributes to a small extent only. So, sunlight is a necessary part in the synthesis of cutaneous vitamin D12–17.

Materials and Methods

The study included 398 androgen deprived nonmetastatic prostate cancer patients. Bone metastases were excluded by clinical staging. We divided our patients in two groups. Group A consists of 224 patients with insolation rate less than 3 h per week. Group B consists of 174 patients with insolation rate greater than 10 h per week.

Patients from both groups were 70–80 years old, body mass index was 25–30 kg/m², androgen deprivation duration was 4–6 years and received no vitamin D supplements.

All above mentioned parameters were obtained from a baseline questionnaire competed by the subjects. Osteoporotic bone fractures were detected by X-ray examination. Anamnestically we excluded severe traumatic injuries.

Statistical analysis

Conventional software, Statistica 6.1 (StatSoft, Inc., Tulsa, OK, USA) was used for standard statistical analysis. p < 0.05 was considered statistically significant.

Results

In the group A (insolation rate <3 h/week) 49 (21.86%) patients suffered pathologic fractures do to osteoporosis. In the group B (insolation rate >10 h/week) 19 (10.92%) patients suffered bone fractures do to osteoporosis (p < 0.05, Figure 1).

The difference in osteoporotic bone fractures rate between two groups is statistically significant (p < 0.05). The risk for pathologic fractures is significantly greater in group A.

Discussion and Conclusion

Our results are clearly showing that the greater insolation rate significantly decreases the risk of pathologic bone fractures do to osteoporosis in androgen deprived nonmetastatic prostate cancer patients.

As seen in previous studies, the prevention and management of osteoporosis in men receiving androgen deprivation therapy, is an important issue of health care. Do to the constant increase of prostate cancer incidence and number of men receiving long-term androgen deprivation therapy, the number of severe osteoporosis cases is growing. Several new studies suggested that vitamin D supplements and exercise can prevent severe osteoporosis in men3,6,7. Others claimed that limiting alcohol consumption, smoking cessation, optimizing calcium and vitamin D intake, and exercise are crucial for male bone health4,5,9. It has also been proved that vitamin D deficiency and insufficiency contribute to secondary bone loss in men. It is well known that vitamin D3 is essential in the maintenance of healthy bone metabolism. The main supply of vitamin D3 is obtained through photosynthesis in the skin. Our results are consistent with above mentioned findings. In the group A (insolation rate <3h/week) 21.86% of patients suffered osteoporotic fractures, but in the group B (insolation rate >10h/week) only 10.92% suffered pathologic fractures. Also the risk for osteoporotic fractures is significantly greater in the group A of androgen deprived nonmetastatic prostate cancer patients. The decreased rate of osteoporotic fractures in group B is a consequence of greater insolation rate and vitamin D3 synthesis. Furthermore the greater insolation rate is probably combined with greater physical activity rate per week.

In conclusion greater exposure to the sun has multiple positive effects on androgen deprived prostate cancer patients and severe osteoporosis prevention.

References


UTJECAJ INSOLACIJE NA NAPREDOVANJE OSTEOPOROZE U BOLESNIKA S NEMETASTATSKIM KARCINOMOM PROSTATE POD ANDROGENOM DEPRIVACIJOM

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