OPEN ACCESS Freely available online

Journal of Osteoporosis and Physical Activity

Short Communication

The Role of Parathyroid Hormone and Parathyroid Hormone Receptor Type 1 in Osteoporotic Postmenopausal Arab Women

Yousef Bennett*

Department of Orthopedic Surgery, Fakeeh College for Medical Sciences, Jeddah, Saudi Arabia

DESCRIPTION

Osteoporosis is one of the most prevalent chronic diseases affecting the aged population and a serious public health concern. More than 50% of women over the age of 50 experience Postmenopausal Osteoporosis (PMO) due to age and hormonal changes. Osteoporosis is more common in women than men in Saudi Arabia, where it affects 44.5% of females and 33.2% of males. Parathyroid Hormone (PTH) is crucial in order to keep the body's calcium (Ca^{2+}) and phosphate (Pi) homeostasis. Active PTH directly induces the differentiation of bone-forming osteoblasts into bone-resorbing osteoclasts in response to low circulating Ca^{2+} levels, resulting in bone resorption and Ca^{2+}. PTH and PTH-related proteins trigger the activation of the Parathyroid Hormone Receptor Type 1 (PTHR1) (PTHrP). In contrast, PTH activates the Parathyroid Hormone Receptor Type 2 (PTHR2).

The PTHR1 gene, which is mostly expressed in osteocytes and osteoblasts, is found in exon 14 of chromosome 3. PTHR1 controls the amount of Ca^{2+} in the blood, and abnormal expression of this gene is linked to a number of metabolic disorders and significant bone dimorphisms. Numerous intracellular signalling pathways that may be G-protein-dependent or independent are started when PTH ligates the PTHR [1-3]. Improved therapeutic possibilities for diseases caused by defective PTHR1 signalling pathways may result from research on the alterations of PTHR ligands. The most prevalent disorders allowed to benefit from PTHR1-based therapy include receptor-associated diseases such as osteoporosis and hypoparathyroidism.

Multiple genetic analyses must be used to explain outcomes due to the complicated polygenic nature of osteoporosis. To identify the hormonally associated form of the disease, a genetic assessment method using osteoporosis molecular markers is extremely desirable. This is the first study, as far as we are aware, that looks at the function of polymorphisms in PTH and PTHRs as important genetic markers for controlling bone turnover in postmenopausal Saudi Arabian women. They concluded that the link between the PTHR1 gene polymorphism and BMD was caused by its function in attaining peak bone mass rather than by its impact on bone loss with age. Similar findings have been found in several other earlier investigations linking the PTHR1 gene to BMD of the hip and spine. In addition, it was shown that in young adult Japanese women, a tetranucleotide repeat (AAAG)n polymorphism in the promoter of the PTHR1 gene was associated with larger height but not with hip or spine BMD. The BMD and individual PTHR1 SNPs were not significantly associated in research by Feskanich et al., however, the hip peak BMD and haplotype 13 (AATG) were [4]. Overall, these investigations show that PTHR1 gene variations affect bone density and, consequently, there is risk of osteoporosis.

To further determine whether rs1138518 in PTHR1 affected the levels of specific bone turnover indicators in the blood, we performed an association analysis. While it was discovered that the C/T genotype was connected to a large decrease in 25(OH)D levels in PMO patients, the T/T genotype was connected to a considerable increase in 25(OH)D levels. This finding implies that specific PTHR1 rs1138518 genotypes may influence the control of circulating 25(OH)D levels. The two most important regulators of mineral metabolism are 25(OH)D and PTH, both of which are crucial for maintaining bone health. In this closely regulated cycle between these two hormones, 25(OH)D synthesis is encouraged by PTH while 25(OH)D exerts negative feedback on PTH secretion [5]. The conformational changes caused by receptor activation and G-protein are stabilized by the two-step PTH-PTHR binding process. Systemic Ca^{2+} levels and bone homeostasis are mediated by PTHR. The key mechanism of the ligation is PTHR activation to endocrine PTH, which initiates internalization and can promote long-lasting endosomal signalling. The paracrine ligand PTHrP can also activate PTHR to control metabolic activities in bone and other tissues.

CONCLUSION

This study is the first to show that PMO is significantly linked with PTHR1 rs1138518 in Saudi Arabian postmenopausal women. The PTH-25(OH)D feedback was found to be considerably impacted by the C/T heterozygote genotype. In PMO patients, the T/T genotype contributes to the

Correspondence to: Yousef Bennett, Department of Orthopedic Surgery, Fakeeh College for Medical Sciences, Jeddah, Saudi Arabia, E-mail: yousef@ksam-hs.edu.sa

Received: 06-Aug-2022, Manuscript No. JOPA-22-19138; **Editor assigned:** 10-Aug-2022, PreQC No. JOPA-22-19138 (PQ); **Reviewed:** 24-Aug-2022, QC No. JOPA-22-19138; **Revised:** 31-Aug-2022, Manuscript No. JOPA-22-19138 (R); **Published:** 09-Sep-2022, DOI: 10.35841/2329-9509.22.10.321

Citation: Bennett Y (2022) The Role of Parathyroid Hormone and Parathyroid Hormone Receptor Type 1 in Osteoporotic Postmenopausal Arab Women. J Osteopor Phys Act. 10: 321.

maintenance of elevated 25(OH)D levels. As a result, PTHR1 rs1138518 may serve as a biomarker that integrates 25(OH)D and PTH levels in PMO Arab patients.

REFERENCES

1. Raisz LG. Pathogenesis of osteoporosis: Concepts, conflicts, and prospects. J Clin Invest. 2005;115: 3318–3325.
2. Drake MT, Clarke BL, Lewiecki EM. The pathophysiology and treatment of osteoporosis. Clin Ther. 2015;37: 1837–1850.
3. Demontiero O, Vidal C, Duque G. Aging and bone loss: New insights for the clinician. Ther Adv Musculoskelet Dis. 2012;4: 61-76.
4. Feskanich D, Willett W, Colditz G. Walking and leisure-time activity and risk of hip fracture in postmenopausal women. JAMA. 2002;288: 2300–2306.
5. Li M, Nichol P, Lee L, Levin RM. Estrogen modulates permeability and prostaglandin levels in the rabbit urinary bladder. Prostaglandins Leukot Essent Fatty Acids. 2009;80: 125-129.