

## Hypertension Related Bone Disorders: A Prospective Observational Approach

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### Abstract

Hypertension is the most common comorbidity in geriatric population. Increasing age is a risk factor for developing cardiovascular abnormalities and bone deformations. But hypertension can be predisposing factor for osteoarthritis/osteoporosis. Bone disorders are more prevalent in hypertensive patients since they share a common pathophysiological mechanism and duration of hypertension is related with the severity of bone disorders. Also the drug therapy given to hypertensive patients might influence the bone health. A combination therapy given to hypertensive patients can slow down the bone proliferation and bone loss.

**Keywords:** Hypertension; Osteoporosis; Osteoarthritis; Bone proliferation

### Literature Review

**Association of hypertension with knee pain severity among people with knee osteoarthritis** <https://www.sciencedirect.com/science/article/abs/pii/S1524904221001892>. Compared with the normal BP group, individuals with stage 2 hypertension reported significantly higher OA knee pain severity by KOOS in the past 7 days ( $\beta=-2.05$  [95% CI -4.09, -0.01],  $p=0.049$ ) and by NRS in the past 30 days ( $\beta=0.31$  [95% CI 0.01, 0.62],  $p=0.045$ ) after adjustments for demographic and medical factors. Hypertension was associated with higher OA knee pain severity in individuals with knee OA.

### Association between hypertension and osteoarthritis: A systematic review and meta-analysis of observational studies

A total of 26 studies with 97,960 participants were included. The overall odds of having OA significantly increased in the people with hypertension compared to the normotensive ones (OR = 1.60, 95%CI = 1.33, 1.94). The association of hypertension with OA was detected in knee (OR = 1.62, 95%CI = 1.32, 1.98), not in hand (OR = 1.19, 95%CI = 0.92, 1.53). Moreover, there existed a stronger association of hypertension with radiographic knee OA (OR = 1.89, 95%CI = 1.40, 2.54) than symptomatic knee OA (OR = 1.39, 95%CI = 1.17, 1.65). The association between hypertension and radiographic knee OA remained statistically significant for the studies that adjusted for body mass index (BMI) (OR = 1.42, 95%CI = 1.13, 1.78), and was particularly strong in women (OR = 2.27, 95%CI = 1.17, 4.39). <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9072802/>

### Association between hypertension and the prevalence of low back pain and osteoarthritis in Koreans: A cross-sectional study

Hypertension showed an inverse relationship with LBP and osteoarthritis prevalence, which may be ascribed to hypertension-associated hypalgesia, and antihypertensive medication intake and longer hypertension duration, attenuated this association. Bae Y-H, Shin J-S, Lee J, Kim M-r, Park KB, Cho J-H, et al. (2015) Association between Hypertension and the Prevalence of Low Back Pain and Osteoarthritis in Koreans: A Cross-Sectional Study. PLoS ONE. 2015 Sep 22; 10(9): e0138790.doi:10.1371/journal.pone.0138790.ecollection 2015 <https://pubmed.ncbi.nlm.nih.gov/26393797/>

### Introduction

Blood pressure that is higher than usual is referred to as high blood

pressure or hypertension. High blood pressure may be diagnosed if blood pressure readings are frequently above normal. Recently, it has been found that hypertension and bone disorders share a common pathophysiology and are inter-linked. Based [1-6] upon this assumption, we have conducted a research to analyze the relationship between hypertension (HTN) and osteoarthritis (OA), a condition that affects the elderly more frequently and causes severe joint pain concurrently, due to the deterioration and inflammation of the articular cartilage. OA is known to be the main cause of disability, with restriction of activity and pain, leading to a low quality of life and a higher rate of hospitalization. At the same time after the age of 35 years, both men and women are at a risk of developing osteoporosis and usually have a low bone mineral density. In this study we have tried to explore the relationship between hypertension, osteoporosis and osteoarthritis in middle aged individuals.

### Aims & Objectives

**Aim:** To study the association between bone disorders and hypertension.

### Objectives

- To study the prevalence and incidence of bone degeneration in hypertensive patients.
- To compare the efficacy of anti-hypertensives in preventing bone loss.
- To analyse the pattern of bone loss in hypertensive patients.

### Methodology

**Study site:** This study is being conducted in Star Hospitals, Hyderabad.

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**Study design and subjects:** A prospective study is conducted over a period of 6 months in orthopaedics department.

**Study duration:** 6 months

**Sample size:** 320

A cross-sectional study was conducted in a group of middle-aged patients. The data was taken from the inpatient area of orthopaedics department. A sample patient profile form was prepared and the necessary data was collected. Also a survey form was prepared for the assessment of joint pains in hypertensive patients. The survey was done in hypertensive patients admitted in various other departments as per the inclusion criteria. Around 120 active cases have been collected in the inpatient department through the patient profile form and survey was [5-8] done in 200 patients. The data has been recorded in an excel sheet for analysis.

### Source of Data

All essential data has been gathered from patient data collection forms of inpatient department, and survey questionnaire circulated to various departments in the hospital.

### Selection Criteria

#### ❖ Inclusion criteria

- Patients of both the genders.
- Patients of age
- Male: 35-65 years
- Female : 35-55 years
- Patients diagnosed with hypertension for more than 2 years.
- Patients having SBP >125mmHg and DBP >85mmHg
- Non-alcoholic
- Non-smoker
- Patient not having CAD, cancer, endocrine or immune disorders, severe liver, kidney or haematopoietic diseases.

#### ❖ Exclusion criteria

- Pregnant or lactating women.
- Patients taking medications for bone disorders.
- Post-menopausal women.
- Patients having diabetes, RA, other malignant disorders.

### Discussion

Hypertension was the most common comorbidity in individuals admitted in the hospital with complaints of OA/osteoporosis symptoms. These symptoms were more pronounced in female population than compared to males. We have examined middle aged men and women with hypertension and found that these individuals are at higher risk of developing OA/osteoporosis. The individuals who had hypertension for more than 3 years showed a severe bone disease. We have tried to explore the association of bone disease severity and antihypertensive drugs. And we found that the individuals who took beta blockers combination drugs and diuretics combination with other antihypertensives showed a positive effect rather than individual drugs when taken alone. OA

was much severe in patients taking ACE inhibitors/ARB/Beta blockers/thiazide diuretics alone. Through the survey we have found that those individuals who had hypertension for more than 2 years, have more frequent joint pains and therefore they had a high Womac score.

### Results

Most of the individuals having symptoms of OA and osteoporosis had hypertension as a comorbidity.

The patients using combination of beta-blockers and diuretics had a higher bone mineral density and slower disease progression than compared to the individuals taking other antihypertensive drugs.

### Conclusion

- Hypertension could be a risk factor for developing OA/osteoporosis.
- Anti-hypertensives in combination with beta blockers and Anti-hypertensives in combination with thiazide diuretics have a positive effect in maintaining bone loss.

### Informed Consent

Informed consent was obtained from all individual participants included in the study.

### Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the Institutional ethics committee of Star Hospitals, Hyderabad, and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

This article does not contain any studies with animals performed by any of the authors. Observational study was conducted on the human subjects.

### Conflict of Interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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