# GEN *FTO RS 9939609*, CRP, RASIO PTH/25(OH)D DAN RASIO KALSIUM/ FOSFOR SEBAGAI FAKTOR RISIKO OSTEOPENI

## Studi pada perempuan usia produktif dengan obesitas sentral

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# HALAMAN PERSETUJUAN

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# HALAMAN PENGESAHAN

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# ABSTRAK

**Latar belakang** Gen *the fat mass and obesity* berperan pada obesitas, berkaitan dengan massa tulang. Lemak viseral berkaitan dengan *C reactive protein*. Vitamin D, hormon paratiroid, kalsium dan fosfor mempengaruhi massa tulang. Penelitian ini bertujuan membuktikan gen *FTO rs9939609*, CRP, 25(OH)D, PTH, rasio PTH/25(OH)D, Ca, P dan rasio Ca/P sebagai faktor risiko osteopeni pada perempuan obesitas sentral usia produktif.

**Metode** Penelitian *cross sectional* pada 130 perempuan usia 25–50 tahun dengan obesitas sentral di RS Nasional Diponegoro. Diagnosis osteopeni dari pemeriksaan *bone mineral density* dengan *dual-energy x-ray absorptiometry*. Deteksi polimorfisme gen *FTO rs 9939609* dengan *Taqman Assay*. Kadar CRP, PTH dan 25(OH)D dengan *enzyme linked fluorescent assay*, ion kalsium dengan *ion selective electrode* dan fosfor dengan fotometri. *Receiver operating characteristic* untuk menetapkan nilai *cut-off* terbaik untuk memprediksi risiko, dengan menghitung rasio prevalensi (RP). Model regresi logistik untuk mengendalikan faktor yang berpengaruh terhadap kejadian osteopeni.

**HASIL** Perhitungan *cut off values*, RP dan CI sebagai berikut: kadar PTH >23,25 pg/dL (RP=10,18; 95%CI:1,45-95,85; *p*=0,01), Ca >1,52 mmol/L (RP=6,0; 95% CI : 1,33–27,14; *p*=0,02); rasio PTH/25(OH)D >2,425 (RP=5,12; 95%CI: 1,13 – 23,19; *p*= 0,04) dan rasio Ca/P >1,185 (RP=4,89; 95%CI:1,33–17,97; *p*= 0,02). Kadar PTH >23,25 pg/dL disertai Ca >1,52 mmol/L : RP=18,71 (95% CI : 2,17 – 160,40, *p* = 0,008).

**SIMPULAN**
Kadar PTH >23,25 pg/dL, kadar Ca >1,52 mmol/L, rasio PTH/25(OH)D >2,425, rasio Ca/P >1,185 merupakan faktor risiko kejadian osteopenia. Kadar PTH >23,25 pg/dL disertai Ca >1,52 mmol/L merupakan faktor risiko terbaik untuk kejadian osteopeni.

**KATA KUNCI**
Gen *FTO rs 9939609,* CRP, PTH/25(OH)D, Ca/P, osteopeni, obesitas sentral

# ABSTRACT

## INTRODUCTION

*The fat mas and obesity gene play a role in obesity-related bone mass. Visceral fat is associated with C-reactive protein related to bone mass. Vitamin D, parathyroid hormone, calcium, and phosphorus also affect bone mass. This study aimed to analyze the role of FTO genes rs9939609 polymorphism, CRP, 25(OH)D, PTH, PTH/25(OH)D, Ca, P ratio, and Ca/P ratio as risk factors for osteopenia in women with central obesity.*

## MATERIAL AND METHODS

*A cross-sectional study was conducted on 130 women aged 25-50 with central obesity at Diponegoro National Hospital. The diagnosis of osteopenia was based on bone mineral density/ (dual-energy x-ray absorptiometry). Detection of FTO gene rs 9939609 polymorphism was done by Taqman Assay. CRP, PTH, and 25(OH)D levels were measured by enzyme-linked fluorescent assay, Ca ion was measured by the ion-selective electrode and P by a photometer. Receiver operating characteristic (ROC) analyses were conducted to assess the optimal cut-off values to predict the risk factors by calculating the prevalence ratios (PR)A logistic regression model was fit to measure the risk of each osteopenia risk factor according to various parameters.*

## RESULTS

*Calculation of cut off values, PR and CI as follows: PTH level >23.25 pg/dL (PR=10.18;95%CI:1.45-95.85; p=0.01), Ca >1.52 mmol/L (PR=6.0; 95%CI:1.33-27.14; p=0.02). The PTH/25(OH)D ratio >2.425 (PR =5.12; 95% CI : 1.13–23.19; p= 0.04) and Ca/P ratio >1.185 (PR =4.89;95%CI:1.33–17,97;p= 0.02). The risk of osteopenia for PTH levels >23.25 pg/dL together with Ca >1.52 mmol/L was 18.71 (95% CI : 2.17–160.40, p = 0.008)*

## CONCLUSION

*PTH levels >23.25 pg/dL, Ca levels >1.52 mmol/L, PTH/25(OH)D ratio >2.425 and Ca/P ratio >1.185 are risk factors of osteopenia in women of productive age with central obesity. PTH levels >23.25 pg/dL accompanied by Ca >1.52 mmol/L is the best risk factor for osteopenia.*

## KEYWORDS

*FTO rs 9939609, CRP, PTH/25(OH)D ratio, Ca/P ratio, osteopenia, central obesity*