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Prevalence of Low Bone Mineral Density and Assessment of Screening Tools in a Rural Area of Delhi: Reg No: 93

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ABSTRACT

Introduction: Osteoporosis poses a disproportionate burden on postmenopausal women, yet access to DXA-based bone mineral density (BMD) measurement remains severely limited in rural India, with only 700–800 scanners serving over 140 million postmenopausal women. This study aimed to determine the prevalence of osteoporosis and osteopenia in a rural Delhi cohort, examine associations with lifestyle and menopausal symptom burden, and compare the diagnostic performance of five validated screening tools—OSTA, SCORE, ABONE, ORAI, and OSIRIS—against DXA-measured BMD. **Methodology:** This community-based cross-sectional study enrolled 94 women aged 40 years and above at the Rural Health Training Centre, Najafgarh, under the SNSP Abhiyan. BMD was assessed via portable peripheral DEXA at the right calcaneus and classified per WHO T-score criteria. Participants completed a sociodemographic and lifestyle questionnaire and the validated 11-item Menopause Rating Scale (MRS). Diagnostic performance of five risk scores was evaluated using sensitivity, specificity, PPV, NPV, and ROC curve analysis. **Results:** Mean age was 52.5 ± 8.8 years and mean age of menopause was 44.8 ± 9.9 years. BMD was abnormal in 93.7% of participants—51.1% osteopenic and 42.6% osteoporotic. Lower educational status was significantly associated with abnormal BMD ($p = 0.028$). Multivariate regression identified age ($p = 0.038$) and somatic menopausal symptom severity ($p = 0.026$) as independent predictors of reduced BMD. OSTA demonstrated the highest sensitivity (85.7%) and NPV (98.1%) with an AUC of 0.73. SCORE had the highest PPV (85%) but poor sensitivity (42.5%) and an AUC of 0.50. ABONE, ORAI, and OSIRIS showed moderate performance with AUCs of 0.53–0.57.: **Conclusion:** This study reveals a high burden of low BMD among rural women in Delhi. OSTA emerged as the most effective primary screening tool, supporting targeted DXA referrals in resource-constrained settings. Age and somatic menopausal symptom severity were significant predictors of reduced BMD, highlighting the skeletal consequences of estrogen deficiency. Integration of OSTA into rural primary care protocols, alongside development of population-specific screening questionnaires, is strongly recommended.

KEYWORDS

Osteopenia, Osteoporosis, Bone Mineral Density, Menopause