Abstract:
Some studies have already proposed an inverse association between vitamin D levels and breast density. As breast density is already considered an established risk factor for breast cancer, such a connection could offer a new starting point for the prevention of breast cancer. To investigate this suggested connection, a total of 412 pre- and 572 post-menopausal women for whom mammography was indicated were recruited into this cross-sectional study. In addition to a questionnaire-based interview on the patient's general and gynecological medical history, her eating habits and lifestyle, serum levels of 25-hydroxyvitamin D [25(OH)D], calcium, phosphate and creatinine were determined. Breast density was determined by mammography and categorized as 1 to 4 according to the ACR classification. In addition to performing descriptive analysis to get a better overview of the data, a number of multivariate regression models were developed to determine the impact of confounders and the connection between vitamin D and mammographic density. More than half of all participants had low levels of 25(OH)D (< 20 ng/ml) and only a small minority of women (5.7 %) had what are currently considered to be optimal serum levels of 25(OH)D of at least 30 ng/ml. The significant majority of the cohort had a medium mammographic density (n = 463 had ACR 2; n = 343 had ACR 3). Logistic regression analysis showed that lower 25(OH)D
serum levels were associated significantly more often with high rather than medium breast density. This association remained, even after adjusting for other factors which influence breast density such as age, BMI and menopausal status (p = 0.032 for ACR 4 vs. ACR 2; p = 0.028 for ACR 4 vs. ACR 3). When the same analysis was done separately for pre-menopausal and post-menopausal women, BMI in both groups was found to be inversely correlated with breast density and this inverse correlation was highly significant. In post-menopausal women, age was found to be similarly correlated while 25(OH)D did not appear to be associated with ACR. In pre-menopausal women the opposite was the case: although there was no correlation between age and breast density, higher vitamin D levels tended to be associated with lower breast density (p = 0.06 for ACR 2 vs. ACR 4) in this smaller sample (n = 412). When vitamin D-rich food and food supplements were also taken into account, regular intake of vitamin D preparations was associated with lower breast density; this association achieved borderline statistical significance (p = 0.05 for ACR 3 vs. ACR 4). When the analysis also took menopausal status into account, the breast density of pre-menopausal women was lower following regular vitamin D intake and this lower breast density of pre-menopausal women was statistically highly significant (p< 0.001 for ACR 1 and ACR 2 vs. ACR 4, respectively). This effect was not found in post-menopausal women. Frequent intake of vitamin D-containing nutrition had no significant impact on ACR in either of the groups. These results reinforce the assumption previously proposed by several authors that higher levels of 25(OH)D pre-menopause and vitamin D substitution are associated with lower breast density and could reduce the risk of breast cancer. The findings did not confirm any post-menopausal association between vitamin D and mammographic breast density.