Association between predicted Skeletal Muscle Index (pSMI) and Benign Prostatic Hyperplasia (BPH) among Chinese Middle-aged and Older Men: Evidence from the CHARLS Study

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Abstract

Objective

Predicted skeletal muscle index (pSMI) is a composite index derived from routinely available anthropometric and laboratory measures, but its relationship with newly reported benign prostatic hyperplasia (BPH) remains unclear. This study examined the association between pSMI and newly reported BPH in Chinese middle-aged and older men.

Methods

We analyzed 2,424 men aged ≥45 years from the China Health and Retirement Longitudinal Study (CHARLS). pSMI was calculated using a validated equation based on age, body weight, and routine laboratory measures including creatinine and cystatin C, and was evaluated as a continuous variable and by quartiles. Newly reported BPH was defined as a self-reported physician diagnosis first identified at follow-up among participants without reported BPH at baseline. Multivariable logistic regression was used to estimate odds ratios (ORs) and 95% confidence intervals (CIs) for newly reported BPH in relation to pSMI, adjusting for sociodemographic factors, lifestyle, body mass index, and major cardiometabolic comorbidities. Restricted cubic spline models assessed dose–response patterns, and subgroup analyses explored potential heterogeneity of the association.

Results

Overall, 190 of 2,424 men (7.8%) had newly reported BPH. The proportion of participants with newly reported BPH increased across pSMI quartiles. In the fully adjusted model, each 1-unit increase in pSMI was associated with higher odds of newly reported BPH (OR 1.29, 95% CI 1.01–1.65). Compared with Q1, adjusted ORs (95% CIs) were 2.04 (1.27–3.30) for Q2, 1.77 (1.02–3.09) for Q3, and 2.84 (1.46–5.54) for Q4 (P for trend = 0.0052). Spline analysis showed a significant overall association without evidence of non-linearity. The positive association was broadly consistent across clinical subgroups, with a significant interaction only for body mass index.

Interpretation of Results

Higher pSMI was associated with greater odds of newly reported BPH. Because pSMI is derived from age, body weight, hemoglobin, creatinine, and cystatin C, it may reflect a broader anthropometric and biomarker profile rather than skeletal muscle status alone. The observed association may therefore partly reflect metabolic, inflammatory, and aging-related characteristics relevant to BPH. The BMI interaction further suggests that the interpretation of pSMI may vary according to adiposity. These findings should be interpreted cautiously because the observational design does not establish causality, residual confounding remains possible, and BPH was based on self-reported physician diagnosis. Further prospective studies with standardized clinical phenotyping are needed to confirm the association and clarify its underlying mechanisms.

Conclusions

Higher pSMI was associated with greater odds of newly reported BPH in this population. As pSMI can be readily derived from routinely available anthropometric and laboratory measures, it may provide a simple composite index for population-based research. However, these findings should be interpreted as hypothesis-generating, and further prospective studies are needed to clarify the temporal relationship and epidemiological relevance of this association.