OBSERVATIONS

Higher Red Blood Cell Distribution Width Is Associated With the Metabolic Syndrome

Results of the Ibermutuamur CArdiovascular RIsk Assessment study

A high level of erythrocyte distribution width (RDW) is a novel prognostic marker that may reflect an underlying inflammatory state (1–3). Metabolic syndrome (MetS) is a chronic inflammatory disorder (4). We investigated the potential association between high levels of RDW and MetS.

This cross-sectional study is part of the Ibermutuamur CArdiovascular RIsk Assessment (ICARIA) plan. A detailed description has been published elsewhere (5). A total of 217,567 workers (73.1% male, mean age 35.8 years) who underwent a routine medical checkup were included in the study. The Adult Treatment Panel III (ATPIII, 2001) definition for MetS was used.

The mean RDW in the whole sample was 13.4% (SD 0.82%; range 10.1–33.4%; 75th percentile 14.0%). The prevalence of MetS was 8.2, 9.7, 10.8, and 12.4% in RDW first through fourth quartiles, respectively ($P < 0.0001$). In multivariate analyses (logistic regression), MetS was associated with the highest quartile of RDW (>14%) after adjusting for age, sex, smoking, alcohol consumption, BMI, white blood cell count, hemoglobin level, erythrocyte mean corpuscular volume, previous diagnosis of diabetes, and previous diagnosis of cardiovascular disease (odds ratio 1.14 [95% CI 1.07–1.21]; $P < 0.0001$). Receiver operating characteristic curve of RDW for the diagnosis of MetS approximated the diagonal (data not shown), indicating no diagnostic utility. For a RDW cutoff of 13.5%, the sensitivity for detecting MetS was 53% and the specificity was 54%.

A possible explanation for the observed association between RDW and MetS is that high RDW reflects an underlying inflammatory state that leads to impaired erythrocyte maturation and anisocytosis, as suggested previously (1–3). In fact, MetS exacerbates oxidative and inflammatory stress in obese adults, which is a potential mechanism for the increased cardiovascular risk in this condition (4). The association between high RDW and MetS is weaker than the observed association between RDW and cardiovascular events in high-risk populations (1,2). Likewise, the accuracy of RDW for classifying individuals as having MetS is lower than the accuracy of RDW for classifying individuals with cardiovascular disease (1,2). It can be speculated that the inflammatory state induced by MetS is not as strong as that induced by established cardiovascular disease. In the present study, there was also an association between a previous diagnosis of cardiovascular disease and RDW >14% (OR 1.24 [95% CI 1.04–1.50]; $P = 0.019$).

It should be noted that the study population is mostly composed of young healthy individuals in an active work situation who are not representative of the general population. An additional limitation is that serum levels of factors that can influence RDW (iron, vitamin B12, folic acid) were not determined in the present study. However, the association between high RDW and MetS was still present after adjusting for surrogate markers of deficit for these factors (hemoglobin level and erythrocyte mean corpuscular volume).

In conclusion, high RDW is associated with MetS. However, RDW is not useful as a diagnostic marker for this condition. Further studies are needed to elucidate the mechanisms responsible for the increased RDW among individuals with MetS.

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