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The association of the combination of handgrip strength and cardiorespiratory fitness with incident chronic kidney disease: A UK biobank observational study

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Objectives : It is unclear whether the combined relations of muscle strength and cardiorespiratory fitness (CRF) affect the risk of incident chronic kidney disease (CKD). This study aimed to investigate the risk of incident CKD based on the balance between hand grip strength (HGS) and CRF.
Methods : Participants without a prior history of CKD and with available data on HGS and CRF were included from the UK Biobank database. HGS was assessed by a dynamometer. CRF was calculated with a regression formula, including maximum workload during fitness test and body mass. HGS and CRF were divided into tertiles, each resulting in nine categories. The primary outcome was incident CKD.
Results : A total of 67,471 participants (median [IQR] age, 58 [50.0-63.0] years, 36,706 women [54.4%]) were included in the primary analysis. During a median follow-up of 11.5 years, 1623 (2.4%) incident CKD occurred. In a multivariable Cox proportional hazard model, participants with both HGS and CRF in the lowest tertile were associated with the risk of incident CKD compared to participants with both HGS and CRF in the highest tertile (adjusted hazard ratio [aHR] 2.69; 95% confidence interval [CI], 2.05-3.55). In the lowest tertile of CRF, an increase in HGS was found to be associated with a linear decrease in the risk of CKD. Similarly, an increase in CRF was associated with a gradually decreasing risk of CKD in the lowest HGS tertile. However, there was no additional benefit observed in improving CRF or HGS for patients in the middle tertile of both CRF and HGS.
Conclusions : This prospective cohort study found that the combination of HGS and CRF was associated with the risk of incident CKD. This result suggests that CRF and muscle strength have complementary roles in the development of CKD risk.