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Prevalence and Trends of Cardiovascular-Kidney-Metabolic (CKM) Syndrome Among Korean Adults, 2013-2022

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Objectives : Cardiovascular-Kidney-Metabolic (CKM) syndrome, proposed by the American Heart Association, highlights the interconnectedness of cardiovascular, kidney, and metabolic diseases. This study investigates long-term trends in CKM syndrome prevalence among South Korean adults.
Methods : We used data from the Korea National Health and Nutrition Examination Survey from 2007 to 2022, which includes a representative longitudinal cohort. Data were extracted using two-stage stratified cluster sampling, and complex sampling analysis was performed with adjustments for age, sex, residential area, education, income, smoking, drinking, and physical activity. CKM syndrome stages were defined as follows: stage 0 (no risk factors), stage 1 (excess adiposity or prediabetes), stage 2 (metabolic risk factors or chronic kidney disease), and stages 3+ (high risk of chronic kidney disease, cardiovascular disease, or diagnosed cardiovascular disease with or without kidney failure). Prevalence estimates were age-standardized, and multinomial logistic regression was used to compare relative risks across CKM stages.
Results : A total of 79,391 adults (weighted frequency: 34,263,405) were analyzed. Prevalence was found to be 18.97% for stage 0, 28.19% for stage 1, 44.66% for stage 2, and 8.19% for stages 3 and 4. Stage 0 prevalence demonstrated stability, whilst the other stages exhibited an upward trend ($P < 0.05$). Stage 2 demonstrated a significant increase over time compared to the other stages ($P < 0.05$). A higher prevalence of advanced stages (Stage 3 and above) was observed among adults over the age of 65. Higher-income population demonstrated a greater prevalence of stage 0–2. A higher prevalence of advanced stages was observed in males compared to the females ($P < 0.05$). Smokers were more likely to have advanced stages, while regular exercisers had lower-stage prevalence.
Conclusions : This study is the first large-scale investigation into CKM syndrome's longitudinal prevalence in South Korea. Further research is needed to understand trends and inform healthcare policies.

Figure1.jpg

Fig 1. Trend in prevalence of Cardiovascular-Kidney-Metabolic Syndrome Among Korean Adults, 2013-2022