SUPPLEMENTARY METHODS

Population characteristic

We followed the exclusion criteria to delete the participants who not met this study: (1) participants without the record of exposure assessment (drink status, diet intake, smoke status, physical activity, sleep duration) (n=2,873); (2) participants without the record of metabolic biomarkers (waist circumference, triglycerides, high-density lipoprotein cholesterol, systolic blood pressure, diastolic blood pressure, fasting plasma glucose) (n=5,360); (3) participants who had MetS at baseline (n=14,083); (4) participants whose energy intake were implausible at baseline (men <800 or ≥4,000 kcal/day; women:<500 or ≥3,500 kcal/day) (n=941).

Definition of healthy lifestyle factors

For drinking status, the participants were grouped based on questions about whether currently drink or past drink, or never drink. For alcohol consumption, the total amount of alcohol consumption was obtained from the information on the frequency of soju (Korean distilled alcoholic beverage), beer, makgeolli (Korean traditional rice liquor), spirits, wine, cheongju (Japanese rice wine), and fruit liquor per day multiplying the number of drinks each time. And then calculate the ethanol intake per day according to standard ethanol content (soju 21%, beer 4.5%, makgeolli 6%, spirits 40%, wine 13%, Cheongju 15%, and fruit liquor 14%) and ethanol density (0.789 g/mL) [1]. Participants were categorized into four groups: for men: 0; 0–20 g ethanol/day; 20–40 g ethanol/day; ≥40 g ethanol/day; for women: 0; 0–10 g ethanol/day; 10–20 g ethanol/day; ≥20 g ethanol/day. Physical activity was based on the multiplier of frequency and duration of exercise per week and was defined as physically active (≥150 min/week), physically inactive (0–150 min/week), and non-active. For smoking status, the participants were grouped based on questions with two criteria, before 2010, "Have you ever smoked more than 20 packs (400 cigarettes) of cigarettes?" after 2010, the cut-off of smoke was changed to 5 packs. For dietary assessment, dietary intake was assessed by the 106-item semi-quantitative food frequency questionnaire (FFQ) which was validated by a 12-day dietary record in the previous study [2]. In this study, the healthy diet quality was defined by the diet quality index for Koreans (total score 0–9). The validity was assessed by a previous study [3]. Participants were classified into four groups: 0–2 (best diet quality), 3–4, 5–6, and 7–9 (poorest diet quality). For sleep duration, data was obtained from self-reported answers to the following questions before 2009: "How much sleep have you had on average per day (including naps)?", and after 2009, data was obtained by summing up the time of sleep hours and minutes. Participants were divided into four groups: <6, 6–8, 8–10, and ≥10 hours.

We adopted five healthy lifestyle factors to construct an operationalized scoring scale, with one point scored for adherence to a healthy lifestyle and zero points otherwise (Supplementary Table 1). For limiting drink, a score of 1 was assigned to participants who had never or past drunk. For physically activity, a score of 1 was assigned to participants who exercise ≥150 minutes per week. For limiting smoke, a score of 1 was assigned to participants who had never or past smoke. Notably, due to the low sample size of current smokers in women, smoking was not considered in women. For diet quality, a score of 1 was assigned to participants whose Diet Quality Index for Koreans (DQI-K) was in the range of 0–3 [3]. For sleep duration, a score of 1 was assigned to participants who slept 6 to 8 hr/day.

SUPPLEMENTARY REFERENCES

1. Yoo JE, Han K, Shin DW, Kim D, Kim BS, Chun S, et al. Association between changes in alcohol consumption and cancer risk. JAMA Netw Open 2022;5:e2228544.
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