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DIETARY DEFICIENCIES OF IRON AND NIACIN IN THE AETIOLOGY OF SYMPTOMATIC GALLSTONES – DATA FROM A UK PROSPECTIVE COHORT STUDY (EPIC-NORFOLK) USING 7-DAY FOOD DIARIES

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Introduction Low iron intake reduces nitric oxide synthase (NOS) activity, which impairs gallbladder motility and bile flow. Low iron intake decreases activity of cholesterol 7-α-hydroxlase, an enzyme which converts cholesterol to bile acids. Niacin increases plasma high density lipoprotein and lowers triglycerides, both of which are associated with lower rates of gallstone disease. This study investigated dietary iron and niacin intake and the risk of developing symptomatic gallstones, for the first time using seven-day food diaries (7-DFDs), the most accurate feasible method of estimating food intake in large studies.

Methods 25,639 participants (56% women), aged 40–74 years were recruited into the European Prospective Investigation into Cancer-Norfolk (EPIC-Norfolk) with 23,658 completing 7-DFDs at enrolment. The cohort was monitored for 14 years for new symptomatic gallstones, with diagnoses confirmed by review of the clinical notes. The 7-DFDs recorded one week's diet including food types, frequency of consumption, quantities and cooking methods. A representative sample of 3970 and those with gallstone disease had their 7-DFDs coded by nutritionists using a computer program containing nutrient information on 11,000 food and 55,000 portion sizes. A cohort analysis used Cox regression to estimate sex specific hazard ratios (HR) for developing gallstones for fifths of dietary iron and niacin acid intake, adjusted for age, body mass index, energy, alcohol and physical activity in men, and also parity and hormone replacement therapy use in women.

Results 177 women (mean age of diagnosis 66.5 years SD = 9.5 years) and 90 men (64.2 years SD = 9.2 years) developed symptomatic gallstones. In women, increased dietary iron intake was associated with a decreased risk of symptomatic gallstones (highest vs lowest fifth HR = 0.36 95% CI = 0.20 to 0.66; per fifth increase HR = 0.82 95% CI = 0.72 to 0.94 p = 0.003), although no effects were seen in men (per fifth increase, HR = 0.97 95% CI = 0.81 to 1.17). Increased dietary niacin intake was also associated with a decreased risk of disease in women (highest vs lowest fifth, HR = 0.50 95% CI = 0.30 to 0.83; per fifth increase HR = 0.86 95% CI = 0.76 to 0.97 p = 0.011), but no effects were found in men (per fifth increase HR = 0.96 95% CI = 0.81 to 1.14).

Conclusion In women, gallstone disease may be prevented by increasing dietary iron and niacin intake, for which there are plausible biological mechanisms. No effects were found in men, although this could be due to a lack of power as only half the number of cases diagnosed and also that men are less

likely to be iron deficient. These nutrients should be measured in future studies to confirm the association.

Competing interests None.
Keywords aetiology, diet, gallstones, iron, niacin.