**Search strategies in PubMed**

1. estrogen OR oestrogen OR androgen OR testosterone OR (dehydroepiandrosterone sulfate) OR (dehydroepiandrosterone sulphate) OR (follicle stimulating hormone) OR (luteinizing hormone) OR (luteinising hormone) OR prolactin OR progesterone OR estradiol OR androstenedione OR FSH OR LH OR (sex hormone binding globulin) OR SHBG OR (sex hormone\*) OR (steroid hormone\*)

2. esophagus OR oesophagus OR esophageal OR oesophageal OR (upper digestive) OR (upper gastrointestinal) OR (upper aerogidestive)

3. cancer OR carcinoma OR adenocarcinoma OR tumor OR tumour OR malignan\* OR neoplas\*

4. 1 AND 2 AND 3

All terms were searched in TITLE/ABSTRACT.

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| **Supplementary Table 1.** Distributions of circulating sex hormone levels by case-control status | | | | | | | | | |
| Hormone | Group | Mean | Standard deviation | Median | Lower quartile | Upper quartile | Minimum | Maximum | Missing |
| Sex hormone-binding globulin, nmol/L | Controls | 42.00 | 16.87 | 41.00 | 28.00 | 53.00 | 7.00 | 103.00 | 4 |
|  | Cases | 40.90 | 15.52 | 38.50 | 29.00 | 51.00 | 12.00 | 89.00 | 4 |
| Dehydroepiandrosterone sulfate, µmol/L | Controls | 6.70 | 3.18 | 6.20 | 4.5.00 | 8.25 | 0.80 | 25.50 | 4 |
|  | Cases | 7.11 | 3.43 | 6.90 | 4.60 | 8.80 | 0.28 | 21.20 | 4 |
| Follicle-stimulating hormone, IU/L | Controls | 4.61 | 4.34 | 3.80 | 2.70 | 5.20 | 1.20 | 56.50 | 4 |
|  | Cases | 4.72 | 3.47 | 3.90 | 2.70 | 5.20 | 0.71 | 32.20 | 4 |
| Luteinizing hormone, IU/L | Controls | 5.06 | 2.67 | 4.70 | 3.25 | 6.30 | 1.60 | 24.80 | 4 |
|  | Cases | 4.98 | 2.49 | 4.70 | 3.30 | 6.10 | 1.50 | 25.60 | 4 |
| Prolactin, mIU/L | Controls | 188.66 | 143.50 | 158.00 | 110.00 | 228.50 | 19.00 | 1243.00 | 4 |
|  | Cases | 169.35 | 189.56 | 141.00 | 96.00 | 198.00 | 24.00 | 2690.00 | 4 |
| Testosterone, nmol/L | Controls | 17.00 | 7.09 | 16.30 | 12.20 | 20.50 | 1.20 | 53.30 | 5 |
|  | Cases | 16.57 | 6.79 | 15.50 | 11.80 | 20.15 | 1.70 | 47.70 | 4 |
| 17-OH-progesterone, nmol/L | Controls | 2.08 | 1.05 | 1.80 | 1.30 | 2.60 | 0.14 | 5.90 | 5 |
|  | Cases | 2.13 | 1.15 | 1.90 | 1.30 | 2.60 | 0.14 | 8.90 | 4 |
| Progesterone, nmol/L | Controls | 1.31 | 0.44 | 1.06 | 1.06 | 1.50 | 1.06 | 3.40 | 4 |
|  | Cases | 1.36 | 0.47 | 1.06 | 1.06 | 1.60 | 1.06 | 3.60 | 4 |
| Estradiol, nmol/L | Controls | 0.07 | 0.03 | 0.07 | 0.04 | 0.09 | 0.04 | 0.16 | 4 |
|  | Cases | 0.08 | 0.03 | 0.08 | 0.06 | 0.09 | 0.04 | 0.16 | 4 |
| Androstenedione, nmol/L | Controls | 5.05 | 6.02 | 2.80 | 1.91 | 4.40 | 1.91 | 33.00 | 5 |
|  | Cases | 5.39 | 5.77 | 3.20 | 1.91 | 5.15 | 1.91 | 33.70 | 4 |
| Testosterone:estradiol ratio | Controls | 247.25 | 100.89 | 228.33 | 180.00 | 306.41 | 28.28 | 688.25 | 5 |
|  | Cases | 228.30 | 95.58 | 218.66 | 165.28 | 273.53 | 24.29 | 669.39 | 4 |
| Free testosterone index | Controls | 4.37 | 2.29 | 4.07 | 3.33 | 5.10 | 0.52 | 31.35 | 5 |
|  | Cases | 4.26 | 1.44 | 4.16 | 3.33 | 5.17 | 0.35 | 8.94 | 4 |

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| **Supplementary Table 2.** Pair-wise Spearman's correlation coefficients between circulating sex hormone levels | | | | | | | | |  |  |  |  |
| Hormone | SHBG | DHEAS | FSH | LH | Prolactin | Testosterone | 17-OHP | Progesterone | Estradiol | AE | T:E2 ratio | FTI |
| SHBG | 1 | -0.02 | 0.09 | 0.27\*\* | 0.13\*\* | 0.62\*\* | 0.23\*\* | 0.02 | 0.19\*\* | 0.08 | 0.47\*\* | -0.42\*\* |
| DHEAS | -0.02 | 1 | -0.05 | 0.01 | 0.06 | 0.08 | -0.04 | 0.45\*\* | 0.03 | 0.15\*\* | 0.04 | 0.12\*\* |
| FSH | 0.09 | -0.05 | 1 | 0.48\*\* | 0.08 | 0.07 | -0.04 | -0.02 | 0.06 | 0.02 | 0.04 | -0.01 |
| LH | 0.27\*\* | 0.01 | 0.48\*\* | 1 | 0.12\*\* | 0.28\*\* | 0.19\* | 0.07 | 0.26\*\* | 0.13\*\* | 0.06 | 0.01 |
| Prolactin | 0.13\*\* | 0.06 | 0.08 | 0.12\*\* | 1 | 0.06 | -0.03 | -0.08 | 0 | 0.02 | 0.02 | -0.11\* |
| Testosterone | 0.62\*\* | 0.08 | 0.07 | 0.28\*\* | 0.06 | 1 | 0.53\*\* | 0.09 | 0.43\*\* | 0.25\*\* | 0.61\*\* | 0.39\*\* |
| 17-OHP | 0.23\*\* | -0.04 | -0.04 | 0.19\*\* | -0.03 | 0.53\*\* | 1 | 0.14\*\* | 0.25\*\* | 0.32\*\* | 0.30\*\* | 0.38\*\* |
| Progesterone | 0.02 | 0.45\*\* | -0.02 | 0.07 | -0.08 | 0.09 | 0.14\*\* | 1 | 0.10\* | 0.16\*\* | 0.02 | 0.07 |
| Estradiol | 0.19\*\* | 0.03 | 0.06 | 0.26\*\* | 0 | 0.43\*\* | 0.25\*\* | 0.10\* | 1 | 0.17\*\* | -0.39\*\* | 0.28\*\* |
| AE | 0.08 | 0.15\*\* | 0.02 | 0.13\*\* | 0.02 | 0.25\*\* | 0.32\*\* | 0.16\*\* | 0.17\*\* | 1 | 0.12\* | 0.19\*\* |
| T:E2 ratio | 0.47\*\* | 0.04 | 0.04 | 0.06 | 0.02 | 0.61\*\* | 0.30\*\* | 0.02 | -0.39\*\* | 0.12\* | 1 | 0.14\*\* |
| \* P<0.05; \*\* P<0.01  AE: androstenedione; DHEAS: dehydroepiandrosterone sulfate; FSH: follicle stimulating hormone; FTI: free testosterone index; LH: luteinizing hormone; 17-OHP: 17-OH-progesterone; SHBG: sex hormone-binding globulin; T:E2 ratio: testosterone:estradiol ratio | | | | | | | | | | | | |

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| **Supplementary Table 3.** Quality assessment scale of studies included in the meta-analysis | | | | | | | | | |
| Study | Selection | | | | Comparability | Exposure | | | Total |
| Case definition | Representativeness of cases | Selection of controls | Control definition | Exposure ascertainment | Ascertainment method | Non-response rate |
| Petrick et al. 2019 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 8 |
| The present study | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 8 |