

Phytoestrogens and Health

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Phytoestrogens are secondary plant products; the most important groups are lignans and isoflavones. Soy beans are rich in isoflavones, whereas flaxseed and also berries and grains are rich in lignans. Due to their chemical structure, which is similar to endogenous 17-beta estradiol, phytoestrogens can bind to the estrogen receptor and have agonist, antagonist, or partial agonist/antagonist effects on the estrogen receptor. However, the estrogenic effect of phytoestrogens is much weaker (100 to 10,000 times) compared with the effect of 17-beta estradiol. Phytoestrogens affect the metabolism of sex steroid hormones, such as estrogens, and it has been hypothesized that the lower incidence of breast cancer in Asian compared with Western countries is partly due to the high intake of phytoestrogens, although not all epidemiological studies showed a clear association. Moreover, phytoestrogens have hormone-independent effects on cell differentiation and apoptosis. They are, thus, thought to be associated with other diseases such as diabetes mellitus, cardio-vascular diseases, and osteoporosis.

It was the aim of our study to examine the association of urinary concentration of phytoestrogens (isoflavone and lignans) with frailty, metabolic syndrome and the concentration of inflammatory markers. These associations have been examined using data of the National Health and Nutrition Examinations Survey (NHANES), which are regularly conducted to assess the health status of the general US population. We included approximately 1750 participants, for whom measurements of urinary phytoestrogen concentrations were available. In contrast to assessing dietary intake of phytoestrogens, measuring phytoestrogens in urine has the advantage of also assessing endogenous phytoestrogens, whose concentration depends on the metabolism of the gut microflora and who have stronger estrogenic effect than exogenous phytoestrogens.

In general, we observed no strong association between urinary phytoestrogens and the prevalence of frailty in women, who were 50 years of age and above. Only the concentration of o-Desmethylangolesin (O-DMA) was inversely associated with the odds of frailty, such that women with high urinary excretion of O-DMA had a lower odds of frailty than women with low concentrations. When looking at components of the metabolic syndrome (overweight/obesity, hypertension, hyperglycemia, and dislipidemia), we observed that higher levels of isoflavones and lignans were associated with a lower odds of hypertension, elevated concentrations of triglycerides, decreased HDL-cholesterol levels. In particular, we found participants with high excretion of enterolactone, a lignan, were less likely to have the metabolic syndrome than participants with lower enterolactone excretion. In the third analysis, we observed an inverse association between lignan excretion and chronic inflammation such that higher lignan excretion was related with lower circulating levels of C-reactive protein and the number of white blood cells.

In summary, in our studies we were able to show that in particular the intake of lignans may contribute to decreasing the risk of cardiovascular diseases because these components might suppress inflammation processes and have impact on lipid metabolism and blood pressure.