

Phytoestrogens - Natural SERMs

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Phytoestrogens are plant derived substances that are structurally and functionally similar to estrogens and are found in many foods. Mainly there are three classes of phytoestrogen- isoflavonoids, coumestans and lignans (1). They exhibit estrogenic activity in body by acting on estrogen receptors. They have both weak estrogen and anti- estrogenic activity therefore; they are termed as natural SERMs. Their SERMs like action makes them very useful in various indications (2).

Hot flushes

Phytoestrogen supplementation can decrease the intensity and frequency of hot flushes. Genistein have been shown to possess positive effects on hot flushes without a negative impact on endometrial thickness, suggesting a future role of phytoestrogen as a strategically therapeutic alternative in the management of postmenopausal symptoms. In comparison with placebo, genistein can reduce daily flushes significantly by a mean of 22%, 29% and 24% after 3, 6 and 12 months of treatment respectively. Flush score decreases by a mean of 53%, 56% and 54% after 3, 6 and 12 months of genistein therapy respectively as compared with placebo (3).

Vaginal dryness

Mixed reports are available in this regard, few suggesting improvement in vaginal dryness and other suggesting deterioration of vaginal dryness with the use of phytoestrogens, however soya flour in dose of 45 gm daily has been suggested useful in improving vaginal dryness (1).

Cancers

Phytoestrogens may be protective against various types of cancers especially breast, endometrium and hence they have attracted considerable attention.

Breast carcinoma

Phytoestrogens may modulate hormone levels and estrogen receptor (ER) expression. Three fold greater risk of ER-negative tumors relative to ER-positive tumors

is associated with low intake of the isoflavones genistein (4). Other isoflavones like daidzein and biochanin also have been shown to influence T-47D human breast cancer cells proliferation and cell cycle progression suggesting their protective role against breast cancers.(5)

Although, isoflavones are hypothesized to protect against breast cancer, but still it is not clear whether they act as oestrogens or anti-oestrogens in breast tissue. However, recently in contrast to studies showing that conventional hormone replacement therapies increase mammographic breast density, the isoflavone supplement did not increase mammographic breast density. Furthermore, there are no effects on oestradiol, gonadotrophins, lymphocyte tyrosine kinase activity, or menopausal symptoms, suggesting anticancer activity of isoflavones to be mediated by its antiestrogenic activity (6). Isoflavones in addition to above mechanism, might reduce breast cancer risk by multiple other ways like by reducing estrogen levels, enhancing estrogen metabolism or by down regulation of estrogen receptors. Even epidemiological study conducted on Asian and Americans suggest that increase consumption of soya can decrease breast cancer risk (1).

Endometrial carcinoma

The development of endometrial cancer is largely related to prolonged exposure to unopposed estrogens. Phytoestrogens may have antiestrogenic effects. Obese postmenopausal women consuming relatively low amounts of phytoestrogens have the highest risk of endometrial cancer compared with non-obese postmenopausal women consuming relatively high amounts of isoflavones and dietary intake of phytoestrogens (isoflavones, coumestans, and lignans) including soya foods are associated with reduced risk of endometrial cancer (7, 8).

Osteoporosis

It has been recognized that human diet containing, phytoestrogens, can be useful for prevention of osteoporosis (9). Soybean isoflavones have structures similar to that of estrogen and have received attention as

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alternatives to hormone replacement therapy for the prevention of postmenopausal osteoporosis. Daidzein, a major isoflavone found in soybean, is metabolized to equol by gut microflora, and the metabolite exhibits a stronger estrogenic activity than daidzein which may inhibit bone loss apparently without estrogenic activity in the reproductive organs. Thus, phytoestrogens in the form of soy-derived isoflavones and genistein may be protective against osteoporosis due to their ability to exert oestrogenic actions on bone cells in postmenopausal women and thus suppressing osteoclastic bone resorption and promoting bone formation (10,11).

CVS health

Genistein in vitro relaxes arteries by a nitric oxide dependent mechanism and enhances the dilator response to acetylcholine of atherosclerotic arteries. Genistein supplementation improves endothelial dysfunction and reduces infarct size in an experimental model of myocardial ischaemia-reperfusion injury. Furthermore, genistein in postmenopausal women increases plasma nitric oxide breakdown products, reduces endothelin-1 levels and improves endothelial dependent vasodilation in post-menopausal women. All these findings, taken together, suggest that this phytoestrogen might represent an attractive alternative for cardiovascular protection (12). It may have an additional favorable effect on other cardiovascular markers like fasting glucose, fasting insulin and fibrinogen levels (13).

Intake of the plant lignans secoisolariciresinol, matairesinol, lariciresinol, and pinoresinol also can reduce the risk of cardiovascular diseases (14). Similarly, phytoestrogen alpha-zearalanol is effective against atherosclerotic development (15). However, few contrary reports are also available which suggests that, phytoestrogens do not have a protective effect on cardiovascular disease (16, 17).

Conclusion

Phytoestrogens may be protective against various types of cancer, menstrual irregularities, osteoporosis and cardiovascular diseases. Although more data and studies are needed to prove their efficacy and potency equal to the synthetic SERMs, but the time has now come to recognize their potential role and use them rationally in ameliorating various problems in postmenopausal women.

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