Abstract

Women spend one third of their life in menopause with increase in longevity, the overall health and well-being of mid life women has become a major public health concern in the world. Symptoms experienced and begin with the menopausal transition from early stage of perimenopause usually continue making a compensatory decrease in overall health of women in post menopause and later years of life. The immediate symptoms of menopause are the effects of hormonal changes on many organ system, most extensively the cardiovascular and musculoskeletal system affecting their quality of life. In India, majority of population belong to lower socio-economic strata, women may not afford to opt the expensive HRT to overcome the scenario. Also the side effects associated with its use cannot be neglected. Thus the situation demands for other cost effective and healthy alternatives to improve the quality of middle age women.

This study addressed the menopausal symptoms of women aged between 30-60 years to understand the prevalence and itsseverity at different reproductive transition. The study also intends to identify and quantify the presence of phytoestrogen in normally consumed foods and effect of its consumption at MRS and hormone level in perimenopausal women.

The study was conducted in Vadodara district of Gujarat, 1000 women were screened for the prevalence of menopause related symptoms in the community. Their knowledge and perception level was also assessed on different terms related to menopause and effect of menopause on bone health and thyroid. In the study population, 58.7% women reported normal cycle pattern, while 14.6% were perimenopause and 26.7% were post menopausal women. The mean age for perimenopause women was 41.7(±4.2) and post menopause was 46.4(±5.3). The women attained the perimenopause at lower age of life; this may adversely affect the health of women.

The younger population was more concerned and had higher education profile ($p<0.001$) in comparison to women with increasing age. Though 80% women were working and helped to improve the socio-economic status of a family. Knowledge and perception about menopause, its onset, symptoms, HRT, interrelation of thyroid and bone health were found to be very poor. The education did not show any effect on knowledge and perception level of women at any phases of life. Almost none of the women knew about or heard the terms HRT (99.1%) and phytoestrogen (99.8%). Almost none of the women were aware of interrelation of menopause, thyroid and bone health.

The symptoms like pain in hands and legs (73.6%), anxiety (67.4%), physical and mental exhaustion (66.8%) and vaginal dryness (48.5%) were most prevalent in the population. During transition from perimenopause to postmenopause, we observed the severity of symptoms was increased for hot flashes, mood swings, anxiety, physical and mental exhaustion, pain in hands and legs, swelling, weight fluctuations, constipation and visual problems. The mean MRS was found to be stepping up during transition from premenopause(4.60 ± 3.07) to perimenopause (6.53 ± 3.93) and showed down during transition from perimenopause to post menopause (5.78 ± 3.03). A similar pattern was observed for all three subscales – psychological, somato-vegetative and urogenitalof MRS. There was a significant difference between premenopausal and perimenopausal for reporting psychological ($p<0.001$), somato-vegetative ($p<0.001$) and urogenital ($p<0.01$) symptoms. Also a significant difference was observed between premenopausal and postmenopausal women for psychological, somato-vegetative and urogenital symptoms ($p<0.001$). And there was no significant difference in reporting these symptoms between perimenopausal and postmenopausal women. This reflects women may face the menopausal symptoms at lower age which will remain till later years of life. This study confirms the women face physiological, psychological and urogenital problems since early stages of their mid life and is continue in later life, may persist till end of life. These lead to affect and disrupt or worsen the health related quality of mid-life's women. To ameliorate the menopausal problems and as an alternative to HRT, we attempted the use of phytoestrogen. Identification, quantification and use of phytoestrogens are not much explored in India; though it may be a cost effective and safe approach to address the menopausal problems. Therefore HPLC analysis was employed to identify and quantify the phytoestrogens present in locally consumed food. The HPLC limit of detection was different for each analyte - for isoflavones (daidzein and genistein) 1µg/g and for lignans (secoisolariciresinol, matairesinol) and coumestrol it was 2.5µg/g. There was an improvement in quantification of phytoestrogens following alkaline hydrolysis. Amongst all food samples fenugreek seeds ranked highest for total phytoestrogen content (2.22 mg/g), followed by elephant foot yam (1.38 mg/g), flaxseeds (1.1 mg/g) and the least was reported for pomegranate seeds (0.62 mg/g).

Effect of phytoestrogen consumption was assessed between two experimental groups (EG1, n=48 and EG2, n=49) and control group (CG, n=48). Based on the findings of food analysis (quantity equivalent to 50mg phytoestrogen), the elephant foot yam was supplemented to EG1 and women in EG2 were supplemented with pomegranate seeds for 45 days of an intervention period.All three groups were given nutrition and

physical health education. The distribution of women did not differ across the three groups in terms of age, education, profession, monthly income and parity numbers. Anthropometric measurements (weight, height, waist circumference, hip circumference) and biochemical estimations (Hb, serum thyroid hormones-T3, T4, TSH, serum gonadotropins-FSH, LH and serum estradiol) were carried out before and after an intervention to assess the impact of phytoestrogen supplementation. Mean±SD for weight in EG1, EG2 and CG were 62±7.4, 61.3±7.5, and 63.2±7.4 respectively before intervention; which were reduced significantly to 60.6±6.9 ($p<0.001$) in EG1, 60.2±7.4 ($p<0.001$) in EG2 and non-significantly to 63.1±7.5 ($p=0.6$) in CG. The nutritional status of women based on their BMI revealed: in EG1 39.6% women were normal, 52.1% were overweight and 8.3% were obese, similarly in EG2 38.8% were normal, 59.2% were overweight and 2% were obese; and in control group 37.5% were normal, 56.2% were overweight and 6.2% were obese at baseline. For BMI, EG1 showed a significant reduction from 25.9±3.4 to 25.3±3.2 ($p<0.001$) and EG2 from25.5±2.8 to 24.8±3.2 ($p<0.01$). No change was observed for BMI in control group. Waist circumference was significantly reduced in all three groups; in EG1 – from 89.67±4.7 to 88.65±5 ($p<0.01$), in EG2 – from 90.80±4.5 to 90.12±4.4 ($p<0.001$) and in CG – from 90.5±4.5 to 90.06±4.8 ($p<0.001$). HC was reduced from 103.8±7.3 to 103.3±7.2 ($p<0.001$) and WHR from 0.88±0.04 to 0.87±0.05 ($p<0.05$) in women supplemented with pomegranate seeds. Theseresults support the suppression of fat accumulation by phytoestrogens.

The intervention showed the significant reduction in menopause related symptoms in all study groups ($p<0.001$). There was no significant difference in mean MRS at baseline amongst all three groups, while after supplementation there was a significant difference in mean MRS ($p<0.001$). Between the groups analysis revealed a significant difference in mean MRS between EG1 - CG ($p<0.001$) and EG2 – CG ($p<0.001$) while no significant difference between EG1-EG2 ($p=0.508$). The pomegranate supplementation showed significant improvement in Hb, serum FSH, LH and Estradiol level ($p<0.001$). The yam supplementation showed significant improvement in Hb ($p<0.05$) and serum FSH, LH and Estradiol level ($p<0.001$). The control also showed significant improvement in serum FSH ($p<0.01$) and LH ($p<0.001$). The post hoc analysis revealed there was a significant difference in improvement for Hb ($p<0.05$) and serum estradiol ($p<0.01$) between EG1 and CG. For serum estradiol a significant difference was also observed between EG2 and CG ($p<0.001$). The present study confirms and demonstrates that food-derived phytoestrogen modulate the balance between gonadotropin hormones and estradiol

level, which results into the overall relief in menopausal symptoms among perimenopausal women.

Knowledge and perception level of women regarding menopause, symptoms, HRT etc. were improved in all study groups after an intervention. Education and intervention programs on menopausal symptoms are thought to be essential in middle-aged women.Food frequency revealed after an intervention, percent responses were improved for consumption of fenugreek, seasame seeds, wheat flour and puffed rice. While consumption of food items like almonds, raisins, dates were not improved much, this could be due to the lower socio-economic profile of the population. The food items like jowar and soybean were not much acceptable by the study population. Milk and milk products were the chief source for iodine and consumed daily by half of the population. There was a marked increase in consumption frequency of spinach in control group in comparison to experimental groups. There was no much diffrence observed for consumption of other foods items.

As the supplementation proved beneficial in terms of relief in menopausal symptoms and hormone levels, a booklet "Menopause-and Its Management" was developed in local language (Gujarati). The points like basic information on menopause and its transitions, the frequency and severity of menopausal symptoms, long-term effects of estrogen loss and side effects of HRT, use of available therapies and role of laughing and stretching exercise, yoga to enhance health were included along with findings of supplementation phase. This booklet was distributed to women enrolled in control group.

To conclude, the study supports the acceptability and effectiveness of elephant foot yam and pomegranate for alleviating menopausal symptoms and to improve the serum FSH, LH and estradiol level to a lesser extent. This would be an enabling, cost effective and more acceptable alternative to unsafe and costly HRT for the relief from menopause related problems. Menopause awareness, including discussion of physiological changes, assessment of menopause-related symptoms and treatment options, and discussion of disease risk-reduction strategies, importance of phytoestrogen and exercise facilitates knowledgeable decision making among midlife and older women to face the menopausal transition with ease. Physical, mental, psychological and social aspects need to be taken into consideration in developing appropriate programs.