Chapter 7

Summary and conclusion

The present hospital based case-control study conducted at Regional Cancer Centre, Trivandrum was assessed the risk estimates for lifestyle risk factors such as reproductive factors, anthropometric factors and levels of household and occupational physical activities for the development of breast cancer after adjusted for potential confounders, as well as after assessment of interaction between risk factors. Attributable risk according to the significant risk factors was also estimated.

Among pre-menopausal women, later age at last pregnancy, increased hip size and higher body size were observed as significant risk factors. A protective association was observed for increased parity, longer lifetime duration of breast-feeding and increased time spent for physically strenuous household activities. Among postmenopausal women, late age at menopause, overweight, increased hip size and higher body size at early years of life were observed as significant risk factors. An inverse association was observed for increased parity, increased time spent for physically strenuous household activities.

Several models based on the potential confounding factors were constructed as the association between the risk factors and the disease may be confounded by other factors. In the stratified analysis among pre-menopausal women, the overall confounding effect was less than 10% for variables such as lifetime breastfed duration, time spent in household activities such as cleaning the house, cooking, and walking. In the final model for risk estimation corresponding to these variables, the potential confounders were not included as the confounding variables only ‘overfit’ the data and not affected the estimates. In the analysis among post-menopausal women, degree of confounding was more than 10% for all variables except for the time spent in walking ≥ 60 minutes/day. Hence potential confounding variables were included for risk estimation in all models except the variable ‘walking’. Strong positive confounding effect (actual effect was
overestimated without adjustment for confounders) was observed for variables such as age at first pregnancy (325%) and age at first childbirth (262%) among pre-menopausal women and age at first pregnancy (159%) among post-menopausal women. For variables such as age at marriage (25%) and body size at 20 years (32%), negative confounding effect (actual effect was underestimated without adjustment for confounders) was observed among post-menopausal women.

Assessment of degree of confounding provided the information for inclusion or exclusion of potential confounders. Adequate control for confounding provided unbiased risk estimates and exclusion of less important confounders avoided the ‘overfit’ of the data. The analysis of interaction between risk factors also helped to avoid the ‘overfit’ of data.

Breast cancer risk attributed to overweight was 7.3%, waist size > 85cm was 5.4% and hip size >100cm was 5.1%, age at last pregnancy >30 years was 19.4% and increased physical activity (> 6 hours/day) was 13% among the pre-menopausal women. The corresponding risk attributed to increased hip size (> 100cm) was 11.15%, higher body size at early years was 11.68%, late age at menopause (> 50 years) was 12.06% and physical activity ≥ 360 minutes was 12% among post-menopausal women. Thus a total of 50% of expected breast cancer cases among pre-menopausal women can be prevented if women have normal body mass index, early age at pregnancy, and increased physical activity. Similarly a total of 47% of expected breast cancer cases among post-menopausal women can be prevented if women have normal waist and hip sizes, normal body size at early years and increased physical activity.

In conclusion, the detailed analysis helped to obtain unbiased breast cancer risk estimates by menopausal status and there by estimating the attributable risk for development of the disease.