SUMMARY AND CONCLUSION

The present study was carried out to evaluate the effect of BPA on Indian population. In review of literature we outlined that how controversies exist among the researchers related to the exposure and the action of BPA despite huge scientific efforts. Many researches, based on animal models, described the BPA’s endocrine disrupting characteristics, mechanism and human risk assessment. The aim of this research was to collaborate observational and experimental approach to identify the role of BPA in hormonal changes among Indian female which leads to PCOS. Here it has been presented, the exposure to BPA among the Indian population through food and beverage containers and the side effects for the first time. The results obtained through laboratory and surveys have been discussed in the previous chapter and following conclusions have been drawn:

- Initially, 15 samples were chosen for determination of migration of BPA into the water includes baby feeding bottles, drinking water bottles, microwave safe polycarbonate bowl and cans of different brands. Detectable levels of BPA were observed in the present study in all the samples of plastic ware and can as well. The leaching BPA concentration is higher for old and used plastic wares as compared to the new ones. FB3 feeding bottle showed highest level of migration of BPA into sample (52.54 ppm).
- Among the drinking water bottles, all the four samples leached BPA at detectable levels with highest concentration of BPA migration in an old and used polycarbonate bottle of sample WB3 of 0.71 mg/l of BPA under normal room temperature kept for 24 hours followed by sample WB4 and WB2 with concentration of 0.28 mg/l and 0.083 mg/l of BPA while the least amount of BPA leaching was observed in sample WB1 at concentration of 0.06 mg/l at room temperature for 24 hours.
- A total of 200 females were being involved in the study aged between 13 to 45 years of reproductive age group. 150 PCOS patients and 50 healthy females were surveyed for the study to determine their dependency on BPA sources with respect to food and drinks. The survey was carried out through a planned questionnaire of 34 questions which included various factors regarding their food habits and health.
- According to the survey results it was concluded that urban population was more dependent upon the plastic wares and higher exposure to BPA rather than the rural population. It was
also observed that the food and beverages is the major route of exposure to BPA. Although the quality of plastic used by rural population was very poor as compared to the urban, however, urban population is more dependent upon the use of plastic ware for storage food and water and upon packed food as well.

- According to the survey result 21 to 30 year aged females fell under the most exposed category towards BPA sources and these includes approximately 30% of the total female population. It was also observed out that 61.33% population of urban area suffered from PCOS as in comparison to the rural population where the ratio declined to 38.66%. When we considered obesity factor in the participants it was found that 53% of the PCOS females were overweight or fall under the category of obese while 17% of the healthy females were overweight or obese.

- The hormone analysis of thyroid hormones- triidothyronine (T3), thyroxine (T4) and thyroid stimulating hormone (TSH), luteinizing hormone (LH), follicle stimulating hormone (FSH) and testosterone was done for all the subjects involved in the study with their informed consent. This was done to analyse the variation in their hormone levels from the normal range and the comparison was done t study the variation with the respect to the BPA levels found in the blood samples of the subjects.

- The results in the above table show that there is a slight variation in the hormone levels among the PCOS patients and healthy females. Elevated levels of LH were also observed in case of PCOS women which were rather less in case of healthy females. Moreover, the ratio of LH/FSH was also noticed to be increased in PCOS women with value of 1.44 while it was slightly less in case of healthy females as 1.13. There was also a significant difference in the hormone levels of testosterone with value of 30.9 ng/dl in case of PCOS women while the level was observed to be 28.45 ng/dl in healthy females.

- Statistical analysis was done using T-test to identify the significant difference between the various hormone levels among PCOS patients and healthy female by applying null hypothesis. The results of T- test possess that T3, T4, LH, FSH and ratio of LH and FSH have significant difference.

- Determination of BPA levels in blood samples of 20 PCOS patients and 20 healthy females was done using HPLC. The BPA concentrations were observed to be higher in PCOS women with minimum concentration of 1.46µg/L while the minimum concentration of BPA
in healthy females was found to be 0.97 µg/L. The highest level of BPA was found to be 6.38 µg/L in a PCOS female while the highest concentration in a healthy female reached about to 4.47 µg/L.

- The BPA level was found to be more in age group of 26-30 years of females with BPA concentration of 4.7 µg/L among PCOS while the BPA level was observed to more in case of age group 36-40 years in healthy females with BPA concentration of 3.09 µg/L. The lowest levels of BPA were noticed in age group of 15-20 years of females in both PCOS and healthy subjects as well with BPA concentration of 1.87 µg/L in PCOS subjects and 1.68 µg/L in healthy subjects.

- The BPA level was found to be more in obese PCOS subjects with BPA concentration of 3.57 µg/L as compared to non-obese PCOS subjects in which the BPA concentration was observed to be of 3.44 µg/L. But in case of healthy females, the higher BPA concentration was observed in case of non-obese subjects with BPA concentration of 2.59 µg/L while obese healthy subjects showed concentration of 2.24 µg/L of BPA in blood samples.

- BPA levels were also compared among females residing in the rural and urban areas of both PCOS and healthy group. The BPA level was found to be more in PCOS females residing in urban areas with BPA concentration of 3.69 µg/L as compared to PCOS females residing in rural areas in which the BPA concentration was observed to be of 3.02 µg/L. While in case of healthy females, the higher BPA concentration was observed in case of rural women with BPA concentration of 2.6 µg/L while urban residing healthy subjects showed concentration of 2.6 µg/L of BPA in blood samples.

- Different indications can be obtained from this study. Firstly, it was concluded that BPA comes in food system from plastic containers and canned products. Our findings also suggest that there might be a direct relation between the BPA level in blood and hormonal imbalance among the PCOS females. It was also observed that PCOS patients have higher BPA level in their blood which also supports the theory that BPA plays a critical role in development of PCOS among females by regulating the action of hormones at reproductive age. It was noticed that the hormonal variation among reproductive age group may be due to the high level of BPA in their blood. Our research strongly suggests that BPA might be involved in the development of PCOS in females. Further efforts need to clarify the BPA dose response effect on estrogen receptors and other hormones that lead to the ailment.