SUMMARY AND CONCLUSIONS

The present study has been conducted on family data for observing the possible role of selected genetical and environmental factors in the determination of obesity. For achieving the aims and objectives, 816 family members belonging to 200 obese and 209 family members belonging to 50 non-obese families of Khanna (District Ludhiana) and Mandi Gobindgarh (District Fatehgarh Sahib) have been screened for selected morphological parameters, genetical and environmental factors. All the families included in the present study had the youngest child aged 15 years or above. The Obese families selected and included in the present study had either one or both the parents obese, while the control sample comprised of families with both the parents non-obese as per their BMI. The selected family members have been categorized as obese and non-obese on the basis of calculation of their BMI from body measurements i.e. weight and height taken up following standard techniques as per recommendations of WHO, 1998 taken up after the collection of sample.

The type of obesity has also been taken up from WC as per NHLBI (Grundy et al., 2005) and also by calculating WHR (as per recommendation by WHO, 1999) from waist and hip circumferences indicating central obesity.

The role of genetics in the occurrence of obesity amongst the members of families included in the present study has also been observed through selected genetical markers including ABO / Rh blood grouping, Secretor Status and PTC Tasting Ability. The pedigrees have also been drawn extracting
information from the proband / proposita upto maximum generations for which the same could be obtained on the occurrence of obesity in the kindreds.

In the present study attempt has also been made to look into the role of selected environmental factors such as socioeconomic status, dietary habits and lifestyle on the occurrence of obesity. Socioeconomic Status of the selected families has been calculated following Kuppuswamy’s Socioeconomic Status Scale and its modifications suggested by Kumar et al., 2007 by calculating total score from the socioeconomic parameters i.e. education of the parents, occupation of head of the family and total family income from all the sources. The dietary habits on which information has been collected from each family member of selected families included frequency of non-vegetarian diet, number of meals taken in a day, frequency of junk food consumption, frequency of sweets consumption, frequency of sweetened beverages consumption, frequency of snacks consumption in a day, frequency of eating food outside home. A number of factors depicting the lifestyle of the family members have also been recorded which included type of physical activity performed, duration of physical activity performed, frequency of physical activity, time spent in sedentary activities, foods consumed during sedentary activities, office hours, conveyance used for going to office and sleeping hours.

The data collected has been put to analysis with the help of statistical Package for Social Sciences (SPSS 11.0 version). In order to compare the proportions of obese and non-obese respondents, Z-test i.e. test of proportions has been applied and for comparing the two mean values of a variable /
parameter, Student's t-test was applied. Chi-square test has been applied to observe the association between two way classification of obese and non-obese respondents. To find out the relationship between two parameters/variables, Karl Pearson’s Coefficient of Correlation (r-value) was worked out and heritability has been calculated from r-value to observe the role of genetics in obesity from BMI, WC and WHR. Regression Analysis was done to observe the combined effect of dietary habits as well as lifestyle parameters on the body mass index of all the family members.

The present study results indicate that obesity is present significantly more among children belonging to obese parents (31.73 per cent) than that of non-obese parents (11.01 per cent). Moreover it has been observed that more sons (36.70 per cent) are obese as compared to daughters (22.82 per cent). Pre-obese class of obesity has been found in majority of parents (43.50 per cent fathers and 43.50 per cent mothers) belonging to obese families followed by obese class-I, obese class-II and obese class-III. It has been observed that mothers (30.29) have greater mean BMI than fathers (28.11) whereas sons (23.76) had greater mean BMI as compared to daughters (22.39).

BMI is a better diagnostic test of general obesity among members of obese families while WC has been found to be a better indicator of central obesity among them (except in the case of fathers) whereas in the non-obese families WHR has been found to be a better indicator of central obesity amongst all family members (except daughters) as per the results of the present study.
Obesity increases among children with presence of obesity amongst their parents as revealed from the present study results. Non-obese parents had 11.01 per cent obese children however when single parent is obese, obesity increases to 22.58 per cent and it further increases to as high as 37.16 per cent among children when both the parents are obese, clearly depicting that obese parents tend to have obese children. Hence the present study results reveal that the risk of obesity among children of obese parents increases 3.37 times than the children of non-obese parents.

The present study data indicates that the heritability estimates for BMI ranged between 23.00 per cent (parent-child) to as high as 68.00 per cent (mother-son) among various family member combinations indicating that parents with higher BMI tend to have children with higher BMI. The results of the present study heritability estimates clearly indicate that maternal influence is stronger on the children as compared to the paternal influence. This maternal influence has been found to be strongest on sons (68.80 per cent) followed by daughters (65.80 per cent). Fathers are influencing more the BMI of daughters (58.80 per cent) as compared to their sons (32.40 per cent).

Heritability estimates between three out of four main parent child combinations clearly indicate a greater genetical influence on the determination of BMI as compared to environmental factors as the values range from 58.80 per cent to 68.80 per cent in the present study data.

Heritability estimates for WC revealed that mothers have a greater influence than fathers on the WC of sons (mothers: 71.40 per cent; fathers: 37.00 per cent) and daughters (mothers: 47.60 per cent; fathers: 35.80 per cent).
Heritability of WHR has been found to be highest from mothers to sons (68.00 per cent) followed by fathers to sons (63.60 per cent) and fathers to daughters (62.40 per cent).

The prevalence of ABO blood groups shows a pattern of B>O>A>AB among all the members of obese and non-obese families except daughters of non-obese families where blood group O predominates B, A and AB.

Predominant Rh positive factor ranges from 92.88 per cent to 96.50 per cent among various family members where as secretors are varying between 75.29 per cent to 76.51 per cent and tasters range from 75.00 per cent to 85.91 per cent.

The present study results also indicate that the polygenically controlled factor of obesity amongst parents is not showing any similarity with their children in context of ABO blood group distribution.

Although obesity being known as polygenically controlled, the present study results on the pedigree analysis indicate that obesity has been found in majority (85.50 per cent) to be familial.

It has been observed from the present study results that majority of obese (88.00 per cent) and non-obese families (68.00 per cent) belonged to middle socioeconomic strata implicating obesity to socio-economically better off sections of the society.

The present study results on the basis of Regression Analysis reveal that the dietary habits have a significant impact on BMI of mothers (82.80 per cent) followed by the daughters (50.00 per cent), fathers (43.00 per cent) and the
least influence of dietary habits has been observed on the BMI of sons (18.60 per cent).

The present study results indicate that there is insignificant impact of lifestyle factors on BMI of various family members as their effect ranges from 3.60 per cent to 18.70 per cent only as revealed by regression analysis.

On the basis of chi-square computation between obese and non-obese sample on dietary habits it can be concluded that dietary habits implicating larger caloric content increase the incidence of obesity. Selected lifestyle parameters including food consumed during sedentary activities, office/school/college hours, conveyance used for going to work place and sleeping hours are also adding to the prevalence of obesity as indicated by the present study results.

Thus, it is concluded from the findings of present study that obese parents tend to have obese children and the risk of obesity among children increases with the prevalence of obesity among their parents. The risk of becoming obese is 2 times among children when one of the parents is obese and it increases to 3.37 times when both the parents are obese. Mothers have a greater genetical influence on children than fathers that too is higher on sons as compared to daughters. It has also been observed that WC is a better indicator for determination of central obesity as compared to WHR. The role of genetics in the determination of obesity amongst children has been found to be greater than the environmental factors. Selected environmental factors are also contributing in the occurrence of obesity among family members.