4. RESULTS

In the present study a total number of 557 subjects were included in which 318 were below 50 and remaining were above age group and the respective percentage was 57 and 42.9 (Fig.-1). Out of the total subjects 272 (48.83%) and 285 (51.17%) were females and males respectively (Fig.-2).

In the category of males a total of 159 were below 50 and the remaining 126 were of the above 50 age group. Likewise in the category of females a total of 159 and 113 were of below 50 and above 50 age groups respectively (Fig.-3).

All the subjects were put into different groups taking into account of their health status and details are given in the Fig.-4. Group wise distribution of subjects were 185 (33.2%), 16 (2.87), 108 (19.40%), 125 (22.44%) and 123 (22.08%) of normal, juvenile diabetics, maturity onset diabetics, subjects with cardiovascular disorders and subjects with diabetes and cardiovascular disorders respectively.

In the healthy controls there were 64 each of males and females in below 50 age group and 30 and 27 of males and females respectively in above 50 age group. In the juvenile diabetes group there were 7 and 9 males and females respectively. In maturity onset diabetics group 24 males and 25 females in the below 50 age group and 30 males and females in above 50 age group. In the group of subjects with cardiovascular disorders there were 33 and 31 males and females respectively in below 50 age group and 32 males and 29 females in above 50 age group. Finally in the group of subjects suffering from diabetes and cardiovascular disorders there were 31 males and 30 females and 34 males and 28 females in the below and above 50 age groups respectively (Fig.-5).

Classification of subjects on the basis of dietary habits was also taken up and given in Fig.-6. Out of the 557 subjects, a total of 327 (58.7%) and 230 (41.29%) were on vegetarian and non vegetarian diet respectively. The percentage of non vegetarian population is higher taking into the account of dietary habits of Indian population especially Gujarati population who are basically vegetarian. The high number of vegetarian population may be due to cosmopolitan nature of Surat city.

Distribution of subjects belong to various groups based on the dietary habits is given in Fig.-7. The percentage smokers and non smokers was 27.29 and 72.71.
respectively (Fig.-8). Fig.-9 gives the distribution of various groups of subjects based on the smoking habit.

The number of alcoholics and non alcoholics were 83 and 474 respectively and the figures and percentages are given in Fig.-10 and distribution of these subjects based on various groups is given in the Fig.-11.

The height and weight of each subject was measured and using this data Body mass index was calculated using standard formula and the values of Body mass index are given in the Table-1. BMI in normal, juvenile diabetes, maturity onset diabetes mellitus, subjects with cardiovascular disorders and subjects with both diabetes mellitus and cardiovascular disorders is 23.57±4.68 kg/m$^2$, 19.07±3.54 kg/m$^2$, 25.34±4.66 kg/m$^2$, 25.61±4.41 kg/m$^2$, and 26.85 ±4.39 kg/m$^2$ respectively. When Body mass index of healthy controls is compared with other groups, a significant difference was observed between Healthy controls versus juvenile diabetics, Healthy controls versus maturity onset diabetics, healthy controls versus subjects with cardiovascular disorders. When the Body mass index of juvenile diabetics is compared with maturity onset diabetics, subjects with cardiovascular disorders and subjects with both diabetes and cardiovascular disorders, a significant difference was found. The Body mass index of healthy controls was higher than that of juvenile diabetics and lower than that of other groups.

In the perspective of the contribution from rural and urban areas only a small number of 58 (10.4%) subjects belonging to rural areas of Surat district where as major chunk of subjects i.e. 499 (89.59%) were from the urban areas of Surat i.e. Surat municipal corporation (Fig.-12).

When all the subjects were placed into different categories based on the source of drinking water there were 106 (19.03%) and 451 (80.97%) on filtered and non filtered drinking water source respectively (Fig.-13). Among the rural subjects only 9 subjects (15.52%) were on filtered water source and remaining 49 (84.48%) were on non filtered drinking water source. In the urban category 97 subjects (19.44%) were on filtered water source and remaining 402 subjects (80.56%) were on non filtered water source. Percentage wise there is not much variation between rural and urban population regarding usage of filtered water (Fig.-14).
Various groups of subjects were distributed on the basis of drinking water source and the number and percentage of respective groups are given in Fig.-15.

Among the vegetarians 67 were on filtered water source and remaining 260 were on non filtered source whereas 39 and 191 of non vegetarians were on filtered and non filtered water source respectively (Fig.-16).

Among the subjects who were on filtered water only 12 were having alcoholic habit whereas 71 subjects on the non-filtered water category had alcoholic habit. The respective figures in the non alcoholic category are 94 and 380 and corresponding percentage is of 19.83 and 80.16 respectively (Table-2).

Drinking water samples collected from tube wells with or without filter from the five different rural areas of the Surat district and analyzed for total hardness, calcium and magnesium and the results are given in the Table-3. Total hardness of water without filter ranged from a minimum of 200 mg/L to a maximum of 500 mg/L whereas with filter it ranged from 20 to 310 mg/L. Mean and SD of water without filter was 330 ±121mg/L, much higher than with filter (154±13 mg/L). Similar trend was observed in calcium and magnesium levels. Out of five places at two places the calcium was only 20 mg/L and correspondingly magnesium was zero. It emphasizes the fact that loss of minerals during the filtration process.

Likewise drinking water samples with or without filter from the different urban areas of the Surat municipal areas were collected and analyzed for the total hardness, calcium and magnesium. Total hardness of municipal water without filter ranged from 200 mg/L to 250 mg/L with a mean and SD of 226.67 ± 16.14 mg/L. From the same area the range of total hardness in the filtered water samples was from 30 to 180 mg/L with a mean and SD of 65.00 ±39.19 mg/L. The levels of total hardness were significantly lower in the drinking water with filter than without filter. Similar trend was observed in other parameters. Minimum and maximum levels of calcium in the water without filter were 100 mg/L and 160 mg/L respectively whereas in the water with filter these levels were 20 mg/L and 150 mg/L respectively. Without filter magnesium ranged from 60 to 120 mg/L and with filter this range was from 10 to 30 mg/L. In case of calcium mean and SD of without and with filter were 133.33 ±19.22 mg/L and 50.00± 34.99 mg/L respectively. In case of magnesium these values were 90.83 ± 17.81mg/L and 15.00 ±6.74 mg/L respectively (Table -4).
Mineral water of 10 popular brands used in Surat city were analyzed for total hardness, calcium and magnesium and the total hardness ranged from between 30 to 50 mg/L, calcium 10 to 40 mg/L and magnesium from 0-20 mg/L. Mean and SD of the above parameters was 40 ±8 mg/L, 27 ±9 mg/L and 20 ±13 mg/L respectively (Table -5).

Total hardness, calcium and magnesium were compared between rural and urban population who were on drinking water source obtained with or without filter and mineral water of ten commercial brands used in the city of Surat. Total hardness of rural and urban water without and with filter was 330 ± 121mg/L, 154 ±131mg/L & 226.67 ± 16.14 mg/L, 65 ± 39.19 mg/L respectively. In both rural and urban areas there was a large difference in the total hardness between non filtered and filtered water. Total hardness of mineral water of various brands of commercial brands was much below than the value of water collected from rural and urban areas. Similar pattern was observed in case of calcium and magnesium (Table-6).

Various biochemical parameters in the serum of healthy controls using filtered or non filtered drinking water were analyzed and the results are given in the Table-7. Fasting and random plasma blood glucose in both the groups was within the normal range though slightly higher levels in the non filtered group than filtered group. Likewise, no differences between the both the groups regarding the parameters like serum urea, total cholesterol, triglycerides, HDL cholesterol, LDL-cholesterol and ratios like TC/HDL and LDL/HDL were observed. The levels of aspartate transaminase, alkaline phosphatase were also within the normal range. Normal levels of serum proteins, albumin and globulin, calcium, phosphorous and uric acid was found in both of the groups. There was no significant difference in the values of systolic and diastolic blood pressure and body mass index between the two groups and the values were within the normal range. Alanine transaminase was significantly high in the non filtered group when compared to filtered groups but in both the groups the activity of this enzyme was within the normal range. Creatinine phosphokinase level was significantly low in the non filtered group when compared to filtered groups but in both the groups it was within the normal range.

Magnesium levels also within the normal range in both of the groups. But in filtered drinking water category the serum level of magnesium was 1.77 ± 0.36 mg/dl
and was on the lower side of the normal range, where as the level in the non filtered drinking water category was $2.01 \pm 0.48$ mg/dl which was on the higher side of the normal range. Serum magnesium levels of filtered group was significantly lower than the non filtered group (<0.01).

When magnesium status was assessed no significant difference between non-vegetarian and vegetarian population was observed (Table-8).

Magnesium status was assessed in the subjects who were on filtered and non filtered drinking water source. A total of 106 (19.03%) subjects were filtered water had magnesium level of 1.64±0.48 mg/dl and 451 (80.97%) subjects on non filtered water source had serum magnesium levels of 1.83±0.52 mg/dl. There was a significant difference (<0.001) in the serum levels of magnesium between filtered and non filtered water category (Table-9).

Serum magnesium in the healthy controls belonged to rural and urban population who were on filtered and non filtered drinking water source was analyzed. In both the rural and urban category persons who were on non-filtered drinking water source had higher magnesium levels (2.14 ±0.42 mg/dl & 1.98 ±0.49 mg/dl) than those on filtered drinking water source (1.66± 0.28mg/dl & 1.79 ±0.37mg/dl). The difference between urban filter and urban non filter group was not significant statistically, however, there was significant difference between rural filter and rural non filter drinking water source (<0.05) (Table-10).

Serum magnesium in juvenile diabetic subjects belonged to both rural and urban population who were on filtered and non filtered drinking water source was analyzed and the levels of both rural and urban subjects were much below than normal levels. There was no significant difference in filtered and non filtered drinking water source belonged to both rural and urban category except in the rural non filter (Table-11).

In the subjects with maturity onset diabetes mellitus, the levels of serum magnesium of rural and urban population were $1.96\pm0.47$mg/dl and $1.75\pm0.53$ mg/dl respectively in non filter category and the levels of urban category in filtered water category were much lower ($1.49 \pm 0.33$mg/dl) than on non-filter category of urban
population and much lower than rural category of both filtered and non filtered (Table -12)

In subjects with cardiovascular disorders serum magnesium levels of urban filtered water category were lower (1.37±0.62 mg/dl) than urban non-filtered category (1.69±0.46 mg/dl) and this value was lower than rural non-filter drinking water category (2.23 ± 0.38 mg/dl) (Table -13). When comparison was made statistically between various category of subjects a significant difference was found between urban filtered to rural non filtered drinking water source (<0.001), urban non filter to rural non filter drinking water source (<0.001).

Results of serum magnesium status in subjects of diabetes mellitus with cardiovascular disorders are given in Table-14. In the non filtered category of both rural and urban population these levels were 1.60±0.33 mg/dl and 1.83±0.55 mg/dl respectively. In the filtered category of urban population the levels were 1.44±0.34 mg/dl which was much lower than the levels of non filtered category of both rural and urban population.

All the 557 subjects were categorized based on their drinking water source. Serum magnesium levels were analyzed and found that 56.60 and 72.07 percent subjects were normomagnesaeemics in the filtered and non filtered drinking water source of water respectively. Slightly lower percentage of filtered water category was hypomagnesaeemics and significantly lower percentage of non filtered water category was hypomagnesaeemics(Fig.-17).

Serum magnesium levels were assessed in all the groups. Subjects having 1.6 mg/dl or above are classified as normomagnesaeemics and below 1.6 mg/dl are classified as hypomagnesaeemics and above 2.4 mg/dl are as hypermagnesaeemics.

In the group of healthy controls 73.33 and 26.67 percent of subjects in filtered water category the were normo and hypomagnesaeemics respectively. In the non filtered water category the respective percentages were 86.40 and 13.60 (Table-15).

In Juvenile diabetics group of subjects, who were on non filtered category the percentage of hypomagnesaeemics was very high though the number of subjects in this category was small and much below the fulfillment of statistical analysis (Table-16).
In the maturity onset diabetes mellitus subjects out of 12 subjects of filtered water category equal number of subjects were normo and hypomagnesaemics where as in non filter water category the percent of normo and hypomagnesaemics was 67.71 and 32.29 respectively. The percentage of hypomagnesaemics in the filter water category was higher than non filtered water category (Table-17).

In the subjects with cardiovascular disorders there was a significant difference in the percentage of normo and hypomagnesaemics between filtered and non filtered drinking water category. In case the source is filtered water 72.22 % of subjects were hypomagnesaemics and reversal of pattern was observed in non filtered water category in which the percent of normomagnesaemics was 72.90% (Table-18). Likewise pattern was observed in case of subjects with diabetes and cardiovascular disorders (Table -19).

When healthy controls of both rural and urban areas were examined regarding magnesium status 87.88 and 80.92 % subjects were normomagnesaemic. The percentage of hypomagnesaemics was 12.12 in rural and 19.08 in urban population (Table -20). Only two subjects with Juvenile diabetes belong to rural area were studied and both were hypomagnesaemic and out of 14 urban subjects 3 were normomagnesaemic and remaining were hypomagnesaemic (Table -21). In the subjects with maturity onset diabetes mellitus the percentage of hypomagnesaemics was higher (35.29 %) in urban population compared to the subjects of rural area (16.67%) (Table-22). Similar trend was observed in the subjects with cardiovascular disorders whereas opposite trend was observed in the subjects with diabetes and cardiovascular disorders. This may be due to very few number of subjects belong to rural areas and insufficient for statistical analysis (Table 23 &24).

In the study group there were hypertensive subjects in the cardiac, diabetic cardiovascular disorders groups. There were 70 subjects having high systolic and diastolic blood pressure belonged to both rural and urban areas. In these groups magnesium status was assessed and found that among the hypertensive subjects belong to rural areas 85.71 and 14.29 percent were normo and hypermagnesaemics respectively whereas 66.67 and 33.33 percent of urban subjects were belong to the respective category (Table -25).
The percentages of normo and hypomagnesaemics of diabetic subjects belong to rural and urban areas are represented in the table 26. There were a total of 247 diabetic subjects belong to both juvenile and maturity onset diabetes. Out of these 15 subjects belong to rural and 232 belong to urban. Among the rural population the percent of normo and hypomagnesaemics was 53.33 and 46.67 respectively. Among the urbanites 61.20 and 38.80 percent was normo and hypomagnesaemics respectively (Table -26).

In case of hypertensive subjects 40 and 60 percent of subjects were normo and hypomagnesaemics respectively on filtered water category and 73.33 and 26.66 percent of the subjects were normo and hypomagnesaemics respectively on non-filtered water category. The percent of hypomagnesaemics is much higher in filtered water category than non filtered water category. If the number of subjects were taken into account 4 and 44 subjects of filtered and non filtered category were normomagnesaemics and 6 and 16 subjects of filtered and non filtered category were hypomagnesaemics (Fig.-18).

In the diabetic subjects 39.29 percent of filtered water category was normomagnesaemic and higher percent (60.71) were hypomagnesaemics. In non filtered water category higher percent (63.48) of subjects were normomagnesaemics and much lower percent (36.52) of subjects were hypomagnesaemics (Fig.-19).

When all the subjects were examined for magnesium status among the healthy controls the percentage of normo and hypomagnesaemic subjects was 83.51 & 17.83 respectively. In juvenile diabetic subjects this percentage was 18.75 and 81.25 respectively. In case of maturity onset diabetic subjects 65.74 percent of subjects were normomagnesaemic and 34.25 percent of subjects were hypomagnesaemic. Similar pattern was observed in case of subjects with cardiovascular disorders and diabetes with cardiovascular disorders (Fig.-20).

All the subjects were divided into normal weight, overweight and obese based on their Body mass index (Table-27). There were 282 subjects belonging to normal weight (BMI-18-25 kg/m²), 191 subjects to overweight (BMI-25-30 kg/m²) and 84 to obese category (BMI >30 kg/m²). It is interesting to note that almost 50% subjects could be placed in the combined category of overweight and obese category. When
serum magnesium was assessed in all these subjects there was no significant difference among them (ANOVA-p=0.217).

In all the normomagnesaemic as well as hypomagnesaemic subjects BMI was calculated based on their height and weight and the results are given in Tables (28) and (29). In normomagnesaemics, BMI of juvenile diabetes was much lower 18.90±5.11 kg/m$^2$ than healthy controls 23.73±4.69 kg/m$^2$. In the subjects with hypomagnesaemia, Body mass index of healthy controls was significantly lower than that of subjects with cardiovascular disorders and of diabetes with cardiovascular disorders (<0.01). BMI of juvenile diabetic subjects was lower than that of maturity onset diabetes, cardiovascular disorders and diabetes with cardiovascular disorders (<0.001). According to the values of BMI of cardiovascular disorders and diabetes with cardiovascular disorders these subjects can be put into the category of overweight.

Out of 279 ambulatory (non-ICCU) patients 63.7% were normomagnesaemic and 36.2% were hypomagnesaemic. In this group of ambulatory patients, both fasting as well as random plasma glucose were significantly higher in hypomagnesaemics (<0.001). Serum calcium level in hypomagnesaemics was lower 8.64 ± 0.75 mg/dl than that of normomagnesaemics 9.09 ± 0.97 mg/dl (<0.001). (Table 30).

Out of all the subjects there were 93 subjects who were admitted in intensive care unit with different disorders and given in Table-31. In these subjects serum magnesium was analyzed and these values were found to be lower (1.68 ±0.55 mg/dl) than non critical care subjects (1.73 ±0.53mg/dl).

All the subjects were divided into ICCU and Non-ICCU and various serum parameters were compared (Table 32). Levels of urea and creatinine were significantly higher in ICCU patients (<0.001). HDL cholesterol level was lower 33.82±10.87 mg/dl in ICCU patients than non-ICCU patients 38.37 ± 10.18 mg/dl (<0.001). Enzymes specific for cardiac tissue, aspartate transaminase and creatine phosphokinase levels were much higher in ICCU subjects (<0.001).

Patients admitted in ICCU, out of 93 subjects, 54 of them were normomagnesaemics and 39 of them were hypomagnesaemics. Serum magnesium levels in normomagnesaemic and hypomagnesaemics were 2.05±0.31 mg/dl and
1.16±0.37 mg/dl. Levels in hypomagnesaemics were significantly low (<0.01). The levels of aspartate transaminase were significantly higher in case of hypomagnesaemics (108.10 ±85.00 IU/L). Compared to normomagnesaemics (60.89 ±61.60 IU/L) which was significant (<0.004). In case of alanine transaminase the levels of hypomagnesaemics was much lower than normomagnesaemics though it was not significant. There was also no significant difference in systolic and diastolic blood pressure and BMI between the two groups. Table-33.

Fasting and random plasma glucose levels in the healthy controls with normomagnesaemia were 89.29±17.17 mg/dl & 92.77 ±17.99 mg/dl respectively and corresponding levels in the subjects with hypomagnesaemia were 90.45 ± 24.23 mg/dl & 96.85 ±29.56 mg/dl respectively. In both of these groups glucose levels were within the normal range and no significant difference was observed between these groups of healthy controls (Table -34)

Serum lipid parameters in healthy controls were analyzed in normo and hypomagnesaemic subjects and given in the Table -35. The levels of serum cholesterol, triglycerides, HDL cholesterol, LDL cholesterol and the ratios of TC/HDL and LDL/HDL were within normal range and no significant difference between both the groups was found.

Serum urea and creatinine were analyzed and values are given in Table- 36. Both in normomagnesaemic and hypomagnesaemic subjects the levels of both of these parameters which determine the functional status of kidney were within the normal range and no significant differences between these groups were found.

Liver function tests including serum total protein, albumin, globulin, A/G ratio, total and direct bilirubin and enzymes alanine transaminase and alkaline phosphatase were analyzed in the normo and hypomagnesaemic male and female subjects belong to the group of healthy controls and found that all the parameters were within the normal range and there was no significant difference between these two groups were observed (Table -37).

Similarly serum aspartate transaminase and creatine phosphokinase were also analyzed and no difference was found between normomagnesaemic and hypomagnesaemic subjects and these values are given in Table 38.
The serum levels of calcium, magnesium, phosphorous and uric acid of male and female category normo and hypomagnesaemic subjects belong to the group of healthy controls are given in Table-39. These were 9.57 ±1.10 mg/dl & 8.90 ± 1.17 mg/dl; 2.06 ± 0.39 mg/dl & 1.33 ± 0.21 mg/dl; 4.04 ± 0.80 mg/dl & 4.14 ±0.71 mg/dl & 5.08 ± 1.60 mg/dl & 5.23 ±1.69 mg/dl of calcium, magnesium, phosphorous and uric acid of normo and hypomagnesaemic subjects respectively. Calcium levels of hypomagnesaemics were lower than normomagnesaemic (<0.02) and magnesium levels of hypomagnesaemics were much lower than normomagnesaemic subjects (<0.05).

In the juvenile diabetic subjects plasma glucose of normo and hypomagnesaemic subjects was 238.333 ±189.60 mg/dl & 289.77 ±108.07 mg/dl. In both the groups the levels of glucose were much higher than normal levels and the levels in hypomagnesaemics were higher than normomagnesaemics. Random plasma levels of glucose of respective groups were 255.00 ± 21.47 mg/dl & 337.54 ±123.04 mg/dl which are slightly higher than the fasting levels of the corresponding group (Table-40).

Various serum lipid parameters of normo & hypomagnesaemic subjects with juvenile diabetes were analyzed the results are given in Table -41. In hypomagnesaemic the levels of serum cholesterol were lower than normomagnesaemic subjects though not statistically significant. There was significant difference in the levels of LDL cholesterol between normo and hypomagnesaemic subjects as there were lower levels observed in the later group (<0.05).

The results of serum urea and creatinine normo and hypomagnesaemic subjects with juvenile diabetes mellitus (type-1) are given in Table -42. The levels of both of these two groups were within the normal range and there was no statistical significance between these two groups regarding the above mentioned two parameters.

Various serum parameters pertaining to determine the functional aspects of liver were assessed and the results of serum total proteins, albumin, globulins, A/G ratio, total and direct bilirubin and enzymes like alanine transaminase and alkaline phosphatase of both normo and hypomagnesaemic with juvenile diabetes are given in Table -43. Levels of all the parameters were within the normal range. There was
difference of approximately 1 gm/dl in the levels of serum proteins between normo (7.67 ±0.76 gm/dl) and hypomagnesaemic (6.76 ±1.12 gm/dl) subjects though they were not statistically significant.

In the juvenile onset diabetic subjects the serum aspartate transaminase levels of normo & hypomagnesaemic subjects were 16.33 ±2.08 IU/L & 48.59 ±42.15 IU/L and creatine phosphokinase levels were 95.67 ±28.92 IU/L & 392.56 ±210.25 IU/L respectively. Higher levels of both the enzymes were observed in hypomagnesaemic subjects than normomagnesaemic subjects though they were not statistically significant due to wider individual variations (Table -44).

Results of serum calcium, magnesium, phosphorous and uric acid of normo hypomagnesaemic subjects with juvenile diabetes are given in Table-45. There was no difference in the levels of serum calcium, and uric acid between both the groups. Serum magnesium levels were 1.93 ± 0.06 mg/dl & 1.21 ± 0.16 mg/dl in the normo and hypomagnesaemic subjects respectively and the difference was statistically significant (<0.001). The levels of serum phosphorous in normo and hypomagnesaemic subjects were 4.60 ± 1.21 mg/dl & 3.47 ±0.09 mg/dl respectively.

The levels of plasma glucose in normo and hypomagnesaemic subjects of maturity onset diabetes mellitus were 164.48 ±93.26 mg/dl and 179.38 ±91.14 mg/dl respectively. There was no significant difference between these groups. Similar trends were observed in case of random glucose also (Table -46).

Normo & Hypomagnesaemic subjects afflicted with maturity onset diabetes mellitus have normal serum levels of cholesterol, HDL Cholesterol, LDL-cholesterol and triglycerides and triglycerides and TC/HDL and LDL/HDL ratios and so significant difference was found between these two groups. Results are given in Table -47.

Results of serum urea, creatinine and various hepatic parameters of the subjects with maturity onset diabetic subjects are given in Table 48 & 49. All the values were within the normal range. Except serum albumin, there was no difference in the values between normo & hypomagnesaemia subject. In the case of serum albumin, hypomagnesaemias had lower values than normomagnesaemics.
Aspartate transaminase and creatine phosphokinase, enzymes specific for cardiac tissues were analyzed in the maturity onset diabetic subjects and the results are given in Table 50. No significant difference between these two groups was observed.

Concentration of serum calcium, magnesium, phosphorous and uric acid of hypomagnesaemic subjects with maturity onset diabetic subjects were lower than normomagnesaemic subjects (Table- 51). Except magnesium, these differences were not significant. In case of serum magnesium the levels in hypomagnesaemic subjects were 1.21 ± 0.24 mg/dl compared to 2.03 ±0.43 mg/dl of normomagnesaemic subjects which was highly significant (<0.001).

Results of various biochemical parameters in normomagnesaemic and hypomagnesaemic juvenile diabetics and maturity onset diabetics are given in Table - 52. There was no significant difference between various parameters between normomagnesaemic and hypomagnesaemics of juvenile diabetics except magnesium, TC/HDL and LDL/HDL ratios. TC/HDL ratio (<0.04) and LDL/HDL ratio (<0.002) were higher in hypomagnesaemics than normomagnesaemics. Levels of serum magnesium was lower in hypomagnesaemics (1.12 ±0.37 mg/dl) than normomagnesaemics (1.98 ±0.30 mg/dl) which was highly significant (<0.001). In case of maturity onset diabetics there was no difference between normo and hypomagnesaemic subjects in all the parameters except magnesium, calcium, urea and uric acid. But urea, uric acid and calcium were within normal range in both of the groups. In case of serum magnesium normomagnesaemic subjects have higher values (2.03 ±0.43 mg/dl) than hypomagnesaemic subjects (1.21 ± 0.24 mg/dl) which was highly significant (<0.001).

Results of Fasting and random plasma glucose of normo and hypomagnesaemic subjects with various cardiovascular disorders are given in Table-53. There were no significant difference in these values between these two groups and the levels were within the normal range.

Table-54 illustrates the level of various lipid parameters in the normo and hypomagnesaemic subjects with various cardiovascular disorders. Except HDL cholesterol there was no significant difference in the values of Total cholesterol,
triglycerides, LDL-Cholesterol, TC/HDL & LDL/HDL. HDL cholesterol levels were higher in Normomagnesaemics (37.29 ± 10.34 mg/dl) than hypomagnesaemic subjects (34.03 ±9.44 mg/dl), but the difference was statistically not significant.

No significant difference in serum urea & creatine and hepatic parameters such as serum total proteins, albumin, globulins, A/G ratio, total and direct bilirubin, alanine transaminase and alkaline phosphatase between normo and hypomagnesaemic subjects with various cardiovascular disorders was observed (Table - 55 & 56).

In both the normo and hypomagnesaemic subjects with various cardiovascular disorders the levels of serum aspartate transaminase and creatine phosphokinase were higher than normal levels but there was no significant difference between these two groups (Table -57).

Except serum magnesium, the levels of serum calcium, phosphorous and uric acid in normo and hypomagnesaemic subjects with various cardiovascular disorders were within the normal range (Table -58). Serum magnesium levels in normo & hypomagnesaemic subjects were 1.98 ±0.30 mg/dl & 1.12 ± 0.37 mg/dl respectively. Levels in hypomagnesaemic subjects were significantly lower than normomagnesaemics (<0.001).

Fasting plasma glucose was 146.03 ±75.63 mg/dl and 168.59 ±96.77 mg/dl respectively in normo and hypomagnesaemic subjects of diabetes mellitus with cardiovascular disorders. These values were not within the normal range. Similar pattern of results were obtained in case of random plasma glucose (Table -59).

No significant difference in the levels of serum cholesterol. Triglycerides, HDL- cholesterol, LDL-cholesterol, TC/HDL and LDL/HDL were observed between normo & hypomagnesaemic subjects of diabetes with cardiovascular disorders. These results are given in Table -60.

Serum urea and creatinine levels of norm & hypomagnesaemic subjects afflicted with diabetes and cardiovascular disorders, the levels of various hepatic function tests were within the normal range and no significant differences were observed between normo and hypomagnesaemic subjects (Table -61).
Normo and hypomagnesaemic subjects afflicted with diabetes and cardiovascular disorders the levels of various hepatic function tests were within the normal levels and no significant difference was observed between norm and hypomagnesaemic subjects (Table - 62).

Results of serum aspartate transaminase and creatine phosphokinase in normo & hypomagnesaemic subjects of diabetes with cardiovascular disorders are given in Table-63. No significant differences were observed.

In the diabetic subjects with various cardiovascular disorders there was a significant difference in the level of serum magnesium in hypomagnesaemics (1.28 ± 0.28 mg/dl) than normomagnesaemic subjects (2.08 ± 0.42 mg/dl). Serum calcium levels were also lower in hypomagnesaemics but these and the levels of phosphorous and uric acids were within the normal range in both of the groups (Table -64).

Table-65 illustrates the age and gender wise distribution of subjects with normomagnesaemics of various study groups. Number of subjects in the category of normal, juvenile diabetics, maturity onset diabetics, cardiovascular disorders and diabetes with cardiovascular disorders belong to males of below and above 50 age group were 50 & 26, 1 & nil, 18 &21, 20 & 23 and 22 & 23 respectively. In the female category the number of subjects in the respective category of below and above age groups was 50 &21, 2 & nil, 16 &16, 22 & 18, and 15 & 16. All the age groups of males and females combined the total study group of normomagnesaemics comprised of 152, 3, 71, 83 and 76 of normal, juvenile diabetics, maturity onset diabetics, cardiovascular disorders and diabetic with cardiovascular disorders subjects respectively.

Concentration of serum magnesium was analyzed in all the subjects irrespective of their disease status both male and female belong to all age groups of healthy controls, juvenile diabetic subjects, maturity onset diabetic subjects, subjects with cardiovascular disorders and subjects with maturity onset diabetes with various cardiovascular disorders were divided into normo and hypomagnesaemic on the basis of their magnesium status. Those who had serum magnesium levels between 1.7-2.4 mg/dl were placed in the category of normagnesaemia, below the level of 1.7 mg/dl hypomagnesaemia and above 2.4 mg/dl hypermagnesaemia.
In all these normomagnesaemic and hypomagnesaemic subjects serum fasting glucose, random glucose, lipid profile including total cholesterol, triglycerides, HDL cholesterol, LDL, cholesterol and ratios of TC/HDL and LDL/HDL, various kidney function tests including serum urea and creatinine, various liver function tests including total protein, albumin, globulins, A/G ratio, total and direct bilirubin, enzymes like alanine transaminase and alkaline phosphatase, and enzyme specific for cardiac tissue, aspartate transaminase and creatine phosphokinase and various other parameters like calcium, phosphorous and uric acid were analyzed.

Fasting plasma glucose of Juvenile diabetic, adult onset diabetic subjects and diabetes with cardiovascular disorders was 238.33 ± 186.69 mg/dl, 164.48 ± 93.26 mg/dl, 146.03 ± 75.63 mg/dl respectively higher than the subjects with cardiovascular disorders (88.42 ± 25.44 mg/dl) and healthy controls (89.29 ± 17.17 mg/dl). The pattern of random plasma sugar was similar to the fasting plasma glucose (Table -66).

All the serum lipid parameters of healthy controls, subjects with juvenile diabetes, maturity onset diabetes, cardiovascular disorders and diabetes mellitus with cardiovascular disorders were within the normal range. Serum levels of triglycerides in healthy controls were lower than all the other groups. These values were significantly higher in case of subjects of diabetes with cardiovascular disorders (<0.05). Serum cholesterol was higher than healthy controls in Juvenile diabetes (197.0 ± 52.04 mg/dl) and maturity onset diabetes mellitus (184.15 ± 34.88 mg/dl). HDL cholesterol was significantly lower than healthy controls in the subjects with various cardiovascular disorders (<0.001) and diabetes with cardiovascular disorders (<0.001). TC/HDL ratio of healthy controls was lower than all the other groups. This ratio was highest in case of maturity onset diabetes mellitus and followed by subjects of diabetes with cardiovascular disorders. Similar pattern was observed in case of LDL/HDL ratio (Table -67).

Serum urea in different normomagnesaemic subjects was within the normal range. Higher values than healthy controls were observed in all the other groups (Table -68). This was significantly higher in case of subjects of diabetes with cardiovascular disorders (<0.001). Serum creatinine was also with the normal range. Significantly higher value than healthy controls was in case of diabetes with cardiovascular disorders (<0.001).
Various liver function tests were carried out in normomagnesaemic subjects belong to various groups. Levels of all the parameters were within the normal range. Serum protein of the subjects with cardiovascular disorders were significantly lower than that of healthy controls (<0.001). Serum albumin levels of maturity onset diabetes mellitus (<0.001), cardiovascular disorders (<0.001) and diabetes with cardiovascular disorders (<0.00) were lower than healthy controls. A/G ratio of maturity onset diabetic subjects (<0.001) and cardiac subjects (<0.001) was lower than healthy controls. Serum bilirubin and alanine transaminase levels were within the normal range in all the groups. Serum alkaline phosphatase in juvenile diabetic subjects was very high (229.33 ±104.21 IU/L) than all the other groups (Table -69).

Results of Serum aspartate transaminase and creatine phosphokinase of normomagnesaemic subjects belong to various groups are given in Table–70. Levels of aspartate transaminase of all the groups were within the normal range and no significant difference was found in all the groups. Creatine phosphokinase of the subjects with cardiovascular disorders (397.75 ± 221.04 IU/L) was higher than that of healthy controls (101.07 ± 46.67 IU/L).

Serum magnesium, calcium, phosphorus and uric acid levels of normomagnesaemic subjects belong to different groups are given in Table -71. Serum calcium levels maturity onset diabetes mellitus (<0.001), cardiovascular disorders (<0.001) were significantly lower than healthy controls. The levels of all the other parameters were within the normal range and there was no significant difference between healthy controls and other groups.

In all the normomagnesaemic subjects belong to the five groups, blood pressure was measured and the results are given in Table-72. There was significant difference of both systolic and diastolic blood pressure between healthy controls and the subjects with cardiovascular disorders (<0.001). Also in maturity onset diabetes, it was much lower than the subjects with cardiovascular disorders (<0.001). Both the systolic and diastolic blood pressure of subjects with diabetes and cardiovascular disorders was also significantly lower than the subjects with cardiovascular disorders (<0.001).

Age and gender wise distribution of subjects with hypomagnesaemia of various study groups was given in the Table-73. Number of males of below and above 50 age groups of normal, juvenile diabetics, maturity onset diabetics,
cardiovascular disorders and diabetes with cardiovascular disorders categories was 9 & 4, 6 & nil, 6 & 9, 13 & 19, and 9 & 11 respectively. The number of female subjects in the respective category was 14 & 6, 7 & nil, 9 & 13, 9 & 11 & 15 & 12. A total of 33, 13, 37, 42, 47 of both males and females of various categories were taken up for this study.

Results of fasting and random plasma glucose of hypomagnesaemic subjects belong to normal, juvenile diabetic, maturity onset diabetic, cardiac diseases and diabetes with cardiovascular disorders are given in Table -74. The levels of fasting plasma glucose were within the normal range in healthy controls and subjects with various cardiovascular disorders. But these levels were high in maturity onset diabetes mellitus and diabetes mellitus with cardiovascular disorders and very high in juvenile diabetes mellitus. Similar pattern was also observed in case of random plasma glucose.

Results of various lipid parameters of healthy controls, juvenile diabetics, maturity onset diabetics, cardiovascular disorders and diabetes with cardiovascular disorders are given in Table - 75. Levels of triglycerides were higher side of the normal range in maturity onset diabetes mellitus (149.65 ±59.82 mg/dl) and diabetes with cardiovascular disorders (164.04 ±76.78 mg/dl) though they were not statistically significant. The levels of serum cholesterol were on the lower (137.54 ±54.50 mg/dl) than all the other groups. The levels of HDL cholesterol were lower than normal in maturity onset diabetes mellitus, cardiovascular disorders and diabetes with cardiovascular disorders than the other two groups. The level of HDL cholesterol was on the lower side of normal range in Juvenile diabetes (67.06 ±44.32 mg/dl) than all the other groups. The ratio of TC/HDL and LDL/HDL were followed the similar pattern.

The results of serum urea and creatinine of hypomagnesaemic subjects of normal, juvenile diabetes, maturity onset diabetes, cardiovascular disorders and diabetes with cardiovascular disorders are given in Table -76. Urea and creatinine levels were within the normal range and no significant differences were found among these groups.
Various serum hepatic pertaining to determination of liver function were analyzed in the hypomagnesaeemic subjects of normal, juvenile diabetes, maturity onset diabetes, cardiovascular disorders and diabetes with cardiovascular disorders are given in Table - 77. The levels of all the parameters were within the normal range and no significant differences in the any of the parameters among the various groups except alkaline phosphatase was observed. In Juvenile diabetic subjects alkaline phosphatase levels were higher than any other group (152.69 ± 147.21 IU/L).

Serum aspartate transaminase and creatine phosphokinase pertaining to determine the cardiac functions were analyzed and the results are given in Table-78. The levels of aspartate transaminase in maturity onset diabetes (42.40 ± 38.20 IU/L) cardiovascular disorders (58.02 ± 51.46 IU/L) diabetes with cardiovascular disorders (84.54 ± 42.61 IU/L) were higher than that of Juvenile diabetes (28.96 ± 23.68 IU/L) and healthy controls (27.73 ± 9.63 IU/L). The levels of creatine phosphokinase were within the normal range in healthy controls (104.97 ± 44.84 IU/L), maturity onset diabetes mellitus (102.37 ± 81.55 IU/L) and diabetes mellitus with cardiovascular disorders (28.53 ± 23.09 IU/L). Very high levels were observed in juvenile diabetes (392.51 ± 210.15 IU/L) and cardiovascular disorders (337.67 ± 312.10 IU/L).

The results of serum magnesium, calcium, phosphorous and uric acid in the hypomagnesaeemic subjects of normal, juvenile diabetes, maturity onset diabetes, cardiovascular disorders and diabetes with cardiovascular disorders are given in Table-79. Except serum magnesium the results of all the other parameters were within the normal range and no significant difference among the various groups was found. Whereas in case of serum magnesium in normal, juvenile diabetes, maturity onset diabetes, cardiovascular disorders and diabetes with cardiovascular disorders was 1.33 ± 0.21 mg/dl, 1.21 ± 0.16 mg/dl, 1.21 ± 0.24 mg/dl, 1.12 ± 0.37 mg/dl and 1.28 ± 0.18 mg/dl respectively. All these level much below than the normal serum magnesium levels.

Systolic and diastolic blood pressure was measured in hypomagnesaeemic subjects of normal, juvenile diabetes, maturity onset diabetes, cardiovascular disorders and diabetes with cardiovascular disorders and the results are given in Table – 80. Systolic blood pressure of normal, juvenile diabetes, maturity onset diabetes and diabetes with cardiovascular disorders was significantly lower than that of subjects
with various cardiovascular disorders (<0.001). Diastolic blood pressure of subjects with cardiovascular disorders was significantly higher than healthy controls (<0.001), maturity onset diabetics (<0.01) and diabetes with cardiovascular disorders (<0.001).

Results of various biochemical parameters of normomagnesaemic and hypomagnesaemics of cardiovascular disorders and diabetes with cardiovascular disorders were given in Table-81. Serum magnesium levels in normomagnesaemic and hypomagnesaemics of cardiovascular disorders was 1.98 ± 0.30 mg/dl & 1.12 ± 0.37 mg/dl. Whereas the respective values in diabetics with cardiovascular disorders was 2.08 ± 0.42 mg/dl and 1.28 ± 0.28 mg/dl respectively. In both the cases the difference was highly significant (<0.001). Serum albumin and A/G ratio of normomagnesaemics of both cardiovascular disorders and diabetes with cardiovascular disorders lower than the corresponding hypomagnesaemics (<0.05) though the values were within the normal range. In both normo and hypomagnesaemics of the subjects with cardiovascular disorders creatine phosphokinase levels were very high.

Various biochemical parameters of patient who had controlled and uncontrolled diabetes are given in Table-82. Among the all the diabetic subjects those subjects with random blood glucose levels below 140 mg/dl were considered uncontrolled diabetics. The levels of fasting plasma glucose in controlled and uncontrolled diabetic groups were 90.95 ± 20.51 mg/dl and 200.29 ± 95.36 mg/dl respectively which was statistically significant (<0.001). The levels of random plasma glucose in these groups were 99.79 ± 18.00 mg/dl and 222.86 ± 104.86 mg/dl respectively. In both of these groups serum magnesium was 1.80 ± 0.46 mg/dl & 1.71 ± 0.56 mg/dl respectively which were on the lower side of the normal range. Serum triglyceride levels were significantly higher (161.18 ± 72.23 mg/dl) in uncontrolled diabetic subjects compared to controlled diabetic subjects (131.63 ± 57.37 mg/dl), which was significantly higher in the former group. There was no difference in all other parameters. No significant difference between these two groups regarding the values both systolic and diastolic blood pressure and BMI.

Age and gender wise distribution of normo-magnesaemic subjects under critical care was, among the males below and above 50 category the number of subjects were 18 and 16 respectively and in females these numbers were 10 and 11 respectively (Table-83). Among the hypomagnesaemic subjects among the males
there were 11 and 13 subjects were below and above 50 category respectively and in female hypomagnesaemics these numbers of the respective age groups were 6 and 8 (Table-84).

Fasting and random blood sugar in the healthy controls of male and females of below and 50 years age group were analyzed and given in the Table 85 (a) & (b). Plasma glucose values in all the categories were within the normal range mostly between 88 to 100 mg/dl.

Fasting and random plasma glucose of males and females afflicted with juvenile onset diabetes mellitus are given in Table -86. The levels of plasma glucose were 306.29 ± 130.51 mg/dl & 259.78 ± 116.07 mg/dl in the males and females respectively. These values were much higher than the levels found in the healthy controls.

In the subjects with maturity onset diabetes mellitus fasting and random plasma glucose were analyzed and the values are given in Table- 87 (a) and comparative values of the same age group between males females are given in table 87 (b). Fasting plasma glucose in 50 years age group of males and females was 163.5 ±101.59 mg/dl & 176.60 ±97.57 mg/dl whereas in above 50 years age group these values were 168.36 ±77.39 mg/dl & 168.41 ±95.17 mg/dl respectively. Differences in the levels of plasma glucose of different age groups of males were not significant. Similarly no significant differences were observed between the same age group of males and females. Similar pattern in the values of random blood sugar was observed.

Fasting and random plasma glucose levels of different age groups of males and females of subjects with cardiovascular disorders are given in Table -88 (a) & (b). In below and above age group of males the plasma glucose values were 97.24 ± 53.38 mg/dl & 93.81 ±29.93 mg/dl and in the same age group of females these values 86.35 ± 20.13 mg/dl & 88.61 ± 21.47 mg/dl respectively. In both the groups random plasma glucose levels were slightly higher than plasma levels of the respective group. No significance was found between the various groups.

Fasting and random plasma glucose of male and female subjects with diabetes mellitus and cardiovascular disorders are given in Table- 89 (a) and (b). Fasting blood glucose levels in below 50 years age group of males and females were
150.71±93.48 mg/dl & 139.53 ± 74.20 mg/dl respectively and 169.10 ±79.61 mg/dl &161.88 ±92.48 mg/dl in males and females of above 50 years age group respectively. Similar pattern was observed in random plasma glucose levels. Both the levels of fasting and random plasma glucose were much higher than the level of healthy controls of respective age and gender groups.

Various liver function tests were carried out in the below 50 & above 50 years age group of both male and female healthy controls and results are given in Table-90 (a) and (b). No significant differences in the serum levels of total protein, albumin, globulin, total bilirubin, direct bilirubin, alanine transaminase and alkaline phosphatase were observed in the both the age groups of males as well as females. When the same age group of males and females for the above age groups for these parameters were examined the differences were also not significant.

In the study group of juvenile diabetes mellitus (type-1), no statistically significant difference in the levels of serum protein, albumin, globulin, total and direct bilirubin, alanine transaminase and alkaline phosphatase between males and females were found (Table -91).

Hepatic profile in serum were analyzed in the patients with maturity onset diabetes mellitus (type-2) and represented in the Table - 92 (a) and (b). The levels of serum protein, albumin, globulin, total and direct bilirubin, alanine transaminase and alkaline phosphatase were within the normal range and no statistical significance was observed between the males and females and between the different age groups of either males or females. The serum levels of above parameters in the subjects with various cardiovascular disorders and subjects with diabetes and cardiovascular disorders are given in the tables 93 (a) & (b) and 94 (a) & (b) respectively. The levels of above parameters significant difference between the different age groups of either males or females were not observed. Likewise also no differences were observed between the males and females of the same age group.

Renal function tests including serum urea and creatinine in the males and females of below and above 50 years age group of healthy controls, with maturity onset diabetes mellitus, cardiovascular disorders and diabetes with cardiovascular disorders and males and female subjects with juvenile diabetes (type-1) were carried out and given in the Table-95 (a) and (b), 96, 97(a) & (b), 98 (a) & (b), 99 (a) & (b). Serum urea
and creatinine levels in all these groups were within the normal range. No significant differences were observed between males and females of same age group. Within the same gender no significant differences were observed between different age groups.

Enzymes like serum aspartate transaminase and creatine phosphokinase specific for cardiac tissue were analyzed in the serum of both males and females of below and above 50 years age group of healthy controls. Both in males and females between the age groups there was no statistically significant difference was found. When the same age group of male and females were examined and here also the difference in the levels of the above mentioned enzymes were not statistically significant Table - 100 (a) and (b).

In the juvenile diabetes (type-1) no statistical significance was observed in the levels of serum aspartate transaminase between the male and females but the levels of serum creatine phosphokinase was very high (572.11±354.39 IU/L) in the females compared to males subjects (85.86 ±32.65 IU/L). But statistical significance was observed as there were wide individual variations in the values (Table -101).

In the Table-102 (a) and (b), the levels of aspartate transaminase and creatine phosphokinase of both males & females of different age groups of subjects afflicted with diabetes mellitus are given. No significant difference in the levels of aspartate transaminase between below & above 50 years age groups of males but there were higher values (52.78 ±45.49 IU/L) in the females of below 50 years age compared to male of the same age group (29.67±14.70 IU/L). Due to higher individual variations no statistical significance was observed. Levels of creatine phosphokinase were high (153.73 ± 39.53 IU/L) in the above 50 years age group of males compared to below 50 years age group (102.40 ± 48.85 IU/L). Again no statistical significance was observed due wide individual variations.

The levels of aspartate transaminase and creatine phosphokinase of males and females in below and above 50 years age group of subjects suffering from various cardiovascular disorders are given in Table - 103 (a) & (b). Levels of aspartate transaminase in above and below 50 years males were 97.06 ± 210.13 IU/L, 64.56 ±78.25 IU/L respectively and females these values were 49.65±96.82 IU/L & 46.07±37.13 IU/L respectively. The respective creatine phosphokinase values in
males were 199.1±120.28 IU/L & 177.84±117.01 IU/L. Similar trend in the levels of aspartate transaminase and creatine phosphokinase was observed in the females also.

In the subjects with maturity onset diabetes mellitus and cardiovascular disorders the levels of aspartate transaminase were 40.68 ± 53.61 IU/L & 27.12 ± 19.6 IU/L in the below 50 years age category of males and females respectively. The respective values of creatine phosphokinase were 91.34 ± 50.21 IU/L & 78.92 ± 53.27 IU/L. In the above age groups the values of aspartate transaminase were 37.50 ± 36.65 IU/L & 38.29 ± 37.26 IU/L & creatine phosphokinase were 151.51 ± 124.48 IU/L & 115.02 ± 104.82 IU/L. No significant difference in males and females was observed in the levels of both of the enzymes (Table 104 (a) and (b)).

Lipid profile in serum of healthy controls was analyzed and given in table 105 (a) and (b). Triglyceride levels in the males above 50 years were slightly higher (159.2 ±81.09 mg/dl) than that of below 50 years group (130.06 ± 57.54 mg/dl). Similar trend was observed in females also. In the below and above 50 years age group of males were compared with females, these levels were 130.06±57.54 mg/dl & 104.43±61.94 mg/dl respectively in below age group and 159.27±81.09 mg/dl & 131.30 ± 66.35 mg/dl in above age group respectively. In both the age groups the levels were higher in males when compared to females. No significant difference among various groups in the levels of serum cholesterol was observed except in the above 50 age group of females in which it was 190.52 ± 33.04 mg/dl. Similar trend was observed in case of HDL and LDL cholesterol. Both the ratios of TC/HDL and LDL/HDL were higher in the above 50 age group of females. These values were 4.48 ± 1.37 & 2.81 ± 1.10 respectively.

Levels of various serum lipid parameters of juvenile onset diabetes mellitus subjects are given in Table-106. Mean and SD of serum triglycerides was 141.87 ±57.82 mg/dl and 119.14 ±57.10 mg/dl in the males and females respectively. Total cholesterol levels were in males and females 128.71 ± 41.24 mg/dl & 164.22 ± 65.68 mg/dl respectively. Similarly the levels of HDL cholesterol, LDL cholesterol and the ratios of TC/HDL and LDL/HDL were higher in females than males.

In the below and above age groups belonged to males and females afflicted with maturity onset diabetes mellitus patients, serum lipid parameters were analyzed and the corresponding data is represented in the Table-107 (a) and (b). In both the
age groups of males and females no significant differences in the levels of serum triglycerides, cholesterol, HDL and LDL cholesterol and the ratios of TC/HDL and LDL/HDL were observed. Likewise no significant difference between males and females belonging to either below or above 50 years age group of subjects was observed.

In the subjects with cardiovascular disorders also no significant difference in the various parameters of lipid profile and TC/HDL and LDL/HDL ratio were observed in the below and above 50 years age group category of both males and females (Table -108: a).

When the below 50 years age group of males were compared with same age group of females there were slightly higher levels total cholesterol, HDL cholesterol and LDL cholesterol in females than males were observed. The respective values in females and males were 180.13 ±39.32 mg/dl & 156.71 ±40.62 mg/dl; 42.09 ± 10.84 mg/dl & 33.57 ±8.29 mg/dl and 108.74 ± 36.16 mg/dl & 96.83 ± 38.13 mg/dl (Table -108: b)

Serum lipid parameters in the below and above 50 age group of males and females are given in Table-109 (a) and (b). In the 50 years age group of males with below 50 years age group, the respective levels of triglycerides were 170.71 ±70.20 mg/dl and 132.97 ±52. 63 mg/dl, total cholesterol 168.61 ±42.91mg/dl & 153.42 ±39.69 mg/dl, HDL cholesterol  33.15 ± 9.47 mg/dl & 32.57 ±9.76 mg/dl and LDL cholesterol 101.22±42.11 mg/dl & 95.08 ±36.21 mg/dl. No significant difference was observed in the above parameters between the two different age groups of males. Similar trend was observed in the various lipid parameters and TC/HDL and LDL/HDL cholesterol ratios below and above 50 years age group of females. In the same age group of males and females were compared no significant differences were formed.

Levels of serum magnesium, calcium, phosphorous and uric acid in healthy controls are given in Table- 110(a) and (b). Serum magnesium, calcium, phosphorous and uric acid below 50 years age group of healthy controls were 1.98 ± 0.45 mg/dl, 9.50 ±0.86 mg/dl, 3.97 ±0.88 mg/dl and 5.86 ±1.44 mg/dl respectively. The respective values in the same age group of females of the above parameters were 1.84 ±0.42 mg/dl, 9.16 ± 1.20 mg/dl, 4.19 ±1.20 mg/dl and 4.52 ±1.73 mg/dl. In the
above 50 years age group of males and females the similar pattern in the level of 
serum magnesium, calcium, phosphorous and uric acid were found. There was no
significant difference in the levels of these parameters within the same groups with
different age categories and within the age group of different genders.

In the male and female subjects with juvenile onset diabetes mellitus the
serum magnesium, calcium, phosphorous and uric acid in the males and females was
1.38 ±0.30 mg/dl & 1.31±0.35 mg/dl; 8.78 ±0.84 mg/dl & 9.05 ±1.07 mg/dl; 4.09 ±
1.17 mg/dl & 3.37 ±0.84 mg/dl and 4.70 ±2.86 mg/dl & 4.30 ±3.41 mg/dl respectively. There was no significant difference between males and females of all 
these parameters. Serum magnesium in both males and females was much lower when 
compared to the respective group of healthy controls and serum calcium levels were 
on the lower side (Table -111).

Male and female subjects of below and above 50 years age groups suffering
from maturity onset diabetic subjects were taken up to assess the levels of serum 
magnesium, calcium, phosphorous and uric acid. In the below 50 years age group of 
males the levels of serum magnesium, calcium, phosphorous and uric acid were 1.87 
±0.74 mg/dl , 8.93 ±0.69 mg/dl, 4.17 ±0.89 mg/dl & 4.89 ±1.77 mg/dl respectively. 
The corresponding levels in the above 50 years age group were 1.74 ±0.41 mg/dl, 
9.16 ± 0.96 mg/dl, 4.02 ±0.91 mg/dl and 5.12 ± 1.94 mg/dl respectively. Between 
these groups the values were not statistically significant. In the females also in both 
the age groups similar trend was observed (Table -112 (a) & (b)).

In the subjects with cardiovascular disorders the levels of serum magnesium, 
serum calcium, serum phosphorous and serum uric acid in the below 50 years 
category of males and females was 1.62 ±0.50 mg/dl & 1.80 ±0.54 mg/dl; 8.90 ± 1.03 
mg/dl & 8.88 ±0.77 mg/dl; 4.34 ±2.21 mg/dl & 5.2 ± 5.63 mg/dl and 5.37 ±1.80
mg/dl & 4.87 ± 2.64 mg/dl respectively. In the above 50 years age group of males and 
females the similar trend was observed. In both the age groups males were compared
to females no significant differences in all these parameters were found (Table -113
(a) & (b)).

In the subjects with diabetes disorders serum magnesium, calcium, 
phosphorous, and uric acid was assessed in the below and above 50 years age group 
of both the males and females. Higher values in the levels of serum magnesium in the
both the age groups of males compared to females were observed but these were within the normal range. The levels of serum calcium were higher though within the normal range were observed in the males of below 50 age group. Values of all these parameters are given in the Table- 114 (a) & (b).