5. Summary

- The prevalence of Diabetes is increasing globally at an alarming rate with India being the Diabetes Capital of the world. Diabetes is now not a disease of the elderly as it was 30 years ago. More and more of children are getting Diabetes at a very young age. Approximately 90 per cent of young people with Diabetes suffer from Type1. The number of children and young adults affected by Type 2 Diabetes is also on rise. In India approximately 70,000 children under the age of 15 years get Type 1 Diabetes every year, that means around 200 children a day. The incidence of Type 1 Diabetes is increasing in many parts of Asia, where resources may not enable targets for glycemic control to be achieved.

- In view of this background this study has been conducted with an aim to assess the nutritional status, clinical and subjective health profile of the children with Diabetes Mellitus and to find the effect of an organized diabetes management education intervention programme on their nutritional intake, glycosylated haemoglobin value, fixing insulin dosage based on carbohydrate count and quality of life. The total sample consisted of n=132 subjects, including Type 1 Diabetes (n=129) and Type 2 Diabetes (n=3) from IGICH government hospital (n=82) and SH corporate hospital (n=50) from south Bangalore. The age group of the subjects ranged from 1-18 years including both the genders.

- The subjects from low socio-economic class were found only in IGICH, similarly the subjects from upper class were found only in SH. The number of subjects belonging to upper lower and lower middle class were higher in IGICH as against upper middle and upper class in SH. The rate of consanguinity was relatively high among IGICH subjects when compared with subjects from SH (40.2 vs 23.4%).
• The age of onset of Type 1 Diabetes was more than 10 years in 40.3% subjects and 5-10 years in 27.1 per cent of the subjects. The duration of the disease was between 1–3 years in 40 per cent of the subjects and more than 5 years in 17 per cent of the subjects.

• It was observed that a total of 77.5 per cent of the subjects were non-vegetarians with higher percentage of them in IGICH compared to SH (90.2 vs 55.3%). Among 17.8 per cent of the vegetarians majority were found in SH group. 3.1 per cent of the total subjects were presented with food allergies. On the whole 80.6 per cent of the subjects had undergone diet counseling.

• Higher per cent of macro-nutrient adequacy was observed in subjects from SH compared with the subjects from IGICH which may be due to the disparity in their socio-economic status.

• 69.8 per cent of the subjects were doing exercise daily from both the hospitals but 9.3 per cent and 11.6 per cent of the subjects were either seldom exercised or not exercising. 72 per cent of the male subjects were indulging in daily exercise as against only 69 per cent of the female subjects. On the whole the mean time of watching TV which is an absolute sedentary activity was 96.49 minutes and 14.2 per cent percent of the subjects were watching TV for more than 2 hrs per day. This practice was more in SH subjects compared to IGICH subjects. Mean time of TV watching was more among male subjects compared to female subjects (85.88 vs 68.02 minutes).

• It was observed that for lower income groups, expenditure on food was the major expenditure. Monthly expenditure on food items from IGICH subjects was much less compared to SH subjects. This disparity may be based on their income levels.

• The energy contribution of the macronutrient intake of the subjects showed that the CHO from their diet were contributing more calories than required and the contribution of calories from proteins was less than recommended.
• It was observed that on the whole 51.9 per cent of the subjects were having poor glycemic control. Poor glycemic control was observed in majority of the subjects in the age group of 16 to 18 years followed by the age group of 13–16 years. There was no correlation between age and HbA1c value and it shows that the age does not have any bearing on HbA1c levels.

• The height, weight and BMI of majority of the subjects fall in the normal range. It was observed that percentage of subjects who were below normal pertaining to height, weight and BMI was more in IGICH as against SH. In a similar way, the percentage of subjects who were over weight and obese was higher in SH.

• On the whole an average of 43 per cent of the subjects had maintained optimal levels of blood glucose in the morning hours. However, the optimal blood glucose levels before and after dinner were found only in 28 per cent of the subjects.

• It is evident from the data that majority of the subjects from IGICH were experiencing better quality of life pertaining to managing the disease, self care, usual activities, pain and discomfort compared to the subjects from SH (57-61 vs 40-55%). However, it is interesting to note that 60 per cent of the subjects from SH reported no anxiety as against 51 per cent of the subjects from IGICH. 13 to 16 years old were better in managing diabetes with 93 per cent of subjects able to manage it efficiently. It was observed that the quality of life improves with increase in age.

• It was found that 89.1 per cent of the subjects were using Regular insulin which is short acting in combination with intermediate acting insulin NPH. Only limited percentage of subjects were taking Actrapid insulin in combination with Human Mixtard and Novorapid with Lantus.

• It was observed that the subjects from IGICH were taking significantly more short acting insulin than required before breakfast and less than required before dinner. In case of the subjects from S.H, they were taking significantly
lower intake of short acting insulin before dinner than the required dose. This is because the short acting insulin need to be adjusted based on the CHO content of the meal. As far as long acting insulin dosage is concerned there was no significant difference between the dosage taken by the subjects and required dosage irrespective of the hospital.

- All the Type 2 Diabetes subjects (n=3) were from SH and belong to urban families of upper middle and upper socio-economic status. All the subjects were consuming more than the desired level of energy and carbohydrate and fat intake was also on the higher side of the requirement. The subjects had irregular food habits with regular junk food intake.

- All the subjects who were above 10 years of age (n=81) from total sample were selected for the diabetic education intervention study who attended the programme along with one parent either the mother or the father. However, only 40 subjects could complete the intervention programme. Diabetes education programme included the topics on dietary intake, lifestyle factors, personal hygiene, physical activity, calculation of CHO count and fixing the dose of bolus insulin based on CHO count and insulin sensitivity factor.

- The results pertaining to post-intervention were satisfactory regarding the dietary intake, blood glucose levels, lifestyle, quality of life and BMI. However it was evident from the results that the concept of fixing the bolus insulin dosage based on the CHO count and insulin sensitivity factor could not be achieved by the subjects or their care takers.

- At the conclusion of the intervention programme the information booklet in their own language containing information “Can we lead a normal life” about Type 1 Diabetes, complications, insulin intake, nutrition, food exchanges, glycemic index, CHO count, physical activity, foot care, practical tips, frequently asked questions and healthy recipes given to all the subjects. Practical information in hand is an effective and sustainable approach in improving their quality of life of Type 1 Diabetic subjects.
5.1: VALIDATING HYPOTHESIS

The following conclusions were drawn based on the findings and hypothesis formulated for the study:

- **H$_{01}$**: The nutrient adequacy of the dietary intake pertaining to energy and macro nutrients of the subjects will not be 100%.
  
  The above null hypothesis $H_{01}$ is accepted since the nutrient adequacy was either less than 100% or more than 100%.

- **H$_{02}$**: The somatic status of all the subjects will not be as per the normal standards.
  
  The above null hypothesis $H_{02}$ is accepted since the height, weight and BMI of some of the subjects were either less or more than the standards.

- **H$_{03}$**: The insulin intake will not be based on carbohydrate count.
  
  The null hypothesis $H_{03}$ is accepted since the insulin intake of the subjects was not based on the carbohydrate count.

- **H$_{04}$**: The insulin intake will not be based on body weight.
  
  The null hypothesis $H_{04}$ is accepted since almost all the subjects were taking either more than required or less than required insulin based on the body weight of the subjects.

- **H$_{05.1}$**: There will not be any difference between the subjects from government hospital and corporate hospital pertaining to nutritional intake.
  
  The above null hypothesis $H_{05.1}$ is rejected since corporate hospital (SH) subjects nutritional intake was higher when compared with government hospital (IGICH) subjects intake in all the age groups.

- **H$_{05.2}$**: There will not be any difference between the subjects from Government hospital and corporate hospital pertaining to BMI status.
  
  The above null hypothesis $H_{05.2}$ is rejected since more number of subjects belong to over weight and obese category in corporate (SH) hospital compared with government hospital (IGICH) subjects
• Ho5.3: There will not be any difference between the subjects from government hospital and corporate hospital pertaining to HbA1c value.

The above null hypothesis Ho5.3 is rejected since HbA1c values were more under control in SH subjects compared with IGICH subjects.

• Ho5.4: There will not be any difference between the subjects from government hospital and corporate hospital pertaining to Quality of life.

The above null hypothesis Ho5.4 is rejected since majority of the subjects from IGICH were experiencing better quality of life in managing disease, self care, usual activities, pain and discomfort, except that anxiety/depression was better managed by the subjects from SH.

• Ho6: The diabetes education intervention will not have significant effect on the following:

  Ho6.1: Nutrient intake
      Ho6.1.1: Energy
      Ho6.1.2: Carbohydrate
      Ho6.1.3: Protein
      Ho6.1.4: Fat

The null hypothesis Ho6.1.1 and Ho6.1.3 was rejected since there was a significant increase in mean energy and protein intake after intervention.

The null hypothesis Ho6.1.2 and Ho6.1.4 was accepted since there was no significant difference in carbohydrate and fat intake after intervention.

• Ho6.2: Somatic status

  Ho6.2.1: Height
  Ho6.2.2: Weight

The above null hypothesis Ho6.2.1 and Ho6.2.3 were rejected since there was a significant increase in mean height and weight after intervention even though the increase in height may be due to the growth spurt since the children belonged to the age group of above 10 years.
• H_06.3: Insulin intake
  H_06.3.1: Morning insulin intake
  H_06.3.2: Evening insulin intake
  The null hypothesis H_06.3.1 was rejected since there was a significant reduction 
in morning insulin intake after intervention.
  The null hypothesis H_06.3.2 was accepted since there was no significant 
difference in evening insulin intake after intervention.

• H_06.4: Glycemic control – Home Monitoring Blood Glucose(HMBG)
  H_06.4.1: Before breakfast
  H_06.4.2: After breakfast
  H_06.4.3: Before dinner
  H_06.4.4: After dinner
  The null hypothesis H_06.4.1, 6.4.2, 6.4.3 and 6.4.4 was accepted since there 
was no significant difference in mean HMBG values before and after breakfast 
as well as before and after dinner post intervention.

• H_06.5: HbA1c level
  The null hypothesis H_06.5 was rejected since there was a significant decrease in 
mean HbA1c level after intervention.

• H_06.6: Quality of life
  The null hypothesis H_06.3.1 was rejected since there was an improvement in all 
aspects of quality of life after intervention.