CHAPTER V

DISCUSSION

Background
Diabetes mellitus is a chronic condition but people with diabetes can lead a normal life provided they keep their diabetes under control. Life style modifications (LSM) are an essential component of any diabetes management plan. Life style modification can be a very effective way to keep diabetes in control. Improved blood glucose control can slow the progression of long term complications. Small changes can lead to improvements in diabetes control, including a decrease in need for medication. With this back ground a study was undertaken to assess the effectiveness of structured teaching programme (STP) on life style modification of diabetic patients in Kempegowda Institute of Medical sciences hospital and research center Bangalore.

This chapter presents the discussion of the study findings

The findings of the study have been discussed with reference to the objectives and hypothesis stated and in relation with findings of other studies under the following section.

Section A: Findings related to socio demographic variables
Section B: Findings related to diabetes knowledge and practice of diabetes life style educational programme.
Section C: findings related to monitoring blood glucose

Section D: Findings related to diabetes medication practice

Section E: Findings related to diabetes diet

Section F: Findings related to diabetes exercise

Section G: Findings related to diabetes foot care

Section H: Findings related to diabetes and its complication

Section I: Findings related to association between Pre-test and post-test with selected Socio-demographic variable

Section J: Findings related to correlation between knowledge and practice.

Section A: Findings related to socio demographic variables

Age: it is evident from the result that 46.4% of subjects were in the age group of 50-59 years compared to 36.0 % and 17.6 % respectively in the age group of 40-49 and 60-69 years.

Gender: Majority of the subjects (76%) were male compared to female (24%) since in patients admitted to hospital were more male diabetes patients.

Marital Status: Majority of the subjects (93.2%) were married. 6.8% were not married

Educational level: Majority of the subjects (37.8%) had education up to S.S.L.C., followed by up to 7th standard (28%), PUC (21%) and only 13.2% had completed degree.

Religion: Majority (73.6%) of subjects were found to be Hindus compared to Muslims (17.4%) and Christian (9.0%). Hindus were more represented in the study population since study area resided by more Hindus.

Type of family: Most of the subjects, 73.2% belong to nuclear family followed by 20.2% and 6.6% from joint family and extended family respectively. Since nuclear family exist more in study area.
**Residence:** Majority of the subjects were from urban background and remaining 18% were from rural area. Since the hospital is inside the city area.

**Family income:** The result indicated that 44.8% of the subjects had monthly income of Rs. 5000-9000, compared to income below Rs. 5000 (31.8%) and only 23.4% were above Rs. 9000.00. All subject belongs to middle income group, since the hospital catered to lower income group patients.

**Food habits:** Majority of the subjects 85.2% were non-vegetarian compared to 14.8% who reported to be vegetarian.

**Fasting for religious purpose:** Only 16.4% of subjects fasted for religious purposes.

**Smoking habits:** The result indicated that only 19.2% of subjects had smoking habit out of which, 21.1% of the subjects stopped smoking after diagnosis of diabetes.

**Duration of diabetes:** The duration of diabetes ranged 1-5 years 66.4% followed by 6-9 years 21.2% and above 10 years 12.4%.

**Type of medication prescribed:** Data indicate 84.0% of subjects were advised oral hypoglycemic agents compared to 16.0% of subjects advised with insulin injection.

**Undergone eye test after diagnosis of diabetes:** Only 11.8% of subjects had undergone eye test after diagnosis.

**Co morbid condition:** The result shows that hypertension was the common co morbid condition 35.6% as compared to the other diseases like eye disorders 30.8%, renal disorders 16.6%, neuritis 16.4% and cardiac conditions 15.4%.
Section B: Findings related to diabetes knowledge and practice of diabetes

life style educational programme

A study to implement an educational programme in 10 Latin American countries and to evaluate its effect on the clinical, biomedical and therapeutic aspect as well as the economic cost of diabetes was conducted. Educators from each participating country were previously trained to implement the educational programme, reinforce the value of patient education as an essential part of diabetes care.40

All parameters measured in the study had improved significantly (p< 0.0001) by 1 year, suggesting that an educational approach for promoting healthy life style habits and patient education were an essential part of diabetes care to decrease the development of complication.

Researchers conducted a study to determine the efficacy of education provided by a nurse and a dietitian in a primary care clinic for 6 months duration. Glycemic control, lipid level, knowledge about diabetes medication and symptoms were monitored during the six months follow up. At 12 months, the intervention group had significant reduction in mean fasting blood sugar, total cholesterol values and their knowledge of diabetes had improved. The education/ behavior modification programme was clinically worth while.41

In this present study results show that diabetes knowledge mean score of post-test 70.2% were better than the Pre-test 34.6% and enhancement found to be 35.6% and post-test reported practice 71.3% were better than the Pre-test (39.2%) and enhancement was
found to be 32.1%, revealing the effectiveness of structured teaching programme on diabetes lifestyle modification.

A study which followed prospectively 46 type2 diabetes patients for 55 weeks in order to evaluate the efficiency of an educational programme based on behavior modification was undertaken. At the end of follow up, the patients obtained an average weight loss, fasting serum glucose descended, systolic blood pressure decreased, triglyceride levels were lowered, and also serum glucose level.\(^{38}\)

**Section C: Findings related to monitoring of blood glucose level.**

A study reported that continuous glucose monitoring is a technique which appears to be highly useful in diabetes patients. To study unstable diabetes, to detect asymptomatic and nocturnal hypoglycemia, to adopt and or to adjust insulin treatment, several clinical studies/tests were to be conducted in various conditions, for continuous glucose monitoring.\(^{95}\)

The present study result shows that monitoring of blood glucose knowledge mean score of post-test (68.1%) were better than the Pre-test (24.6%) and enhancement found to be 43.5%, and post-test practice (66.9%) were better than the Pre-test (37.8%) and enhancement found to be 29.1%, revealing the effectiveness of structured teaching programme on diabetes lifestyle modification.

Management of diabetes patient should include regular assessment, careful monitoring for glycemic control with presence of hypoglycemia, a continuous glucose monitoring system that can provide important insight into 24 hours glycemic control.
Overall careful management and education had positive treatment outcomes in diabetes patients.96

A study described that many people with diabetes are falling short of attaining or maintaining goals. Monitoring of blood glucose is among the many strategies proposed to address the problem. Monitoring blood glucose complements by providing specific information regarding the effect of diet, exercise and medication.97

**Section D: Findings related to diabetes and medication practice**

A study reported that diabetes mellitus patient (type 2) adherence to prescribed medication is essential to effectively monitor such patients in the home, a thorough knowledge of the medication used to control hyperglycemia is needed. Primary failure with therapy has been studied, the home health care provider must be aware of the mechanism of action of the different classes of hypoglycemic agents to monitor treatment.88

In the present study result shows that the knowledge mean scores of post-test (72.1%) were better than the Pre-test (28.6%) on diabetes medication, however the enhancement knowledge on diabetes and medication (40.6%) and post-test practice mean score (68.9%) were found to be comparatively higher than the Pre-test scores (33.6%), where the enhancement was found to be higher (35.4%).

A similar study on effect of diabetes drug counseling was undertaken. In a randomized controlled trial a total of 360 volunteers with type 2 diabetes were recruited; one group received diabetes drug counseling, the other received diabetes education along
with drug counseling. The most favorable glycemic outcomes were in the group that received drug counseling and diabetes education.\textsuperscript{88}

**Section E: Findings related to diabetes and diet**

A study stated that lifestyle changes that promote weight loss are the primary treatment for people with type 2 diabetes who are overweight. Improving caloric balance (consuming fewer calories than are used by body), should be considered the primary goal of lifestyle modification. The timing of food intake should be consistent. People using anti hypoglycemic agents may find it easier to control their blood sugar levels when they eat approximately the same amount of carbohydrates at the same time each day.\textsuperscript{21}

In the present study, results show that the knowledge mean scores of post-test were better than the Pre-test (28.6\%) on diabetes diet. However the enhancement knowledge on diabetes diet was found to be 42.0\%. It is interesting to note that the post-test practice mean score (75.4\%) was found to be comparatively higher than the Pre-test scores (47.2\%). In the Pre-test, the enhancement was found to be higher (28.1\%).

Dietary advice for treatment of type 2 diabetes mellitus in adults, includes initial dietary management immediately after formal diagnosis as an accepted cornerstone of treatment was researched. 1467 participants were included to assess the effect of the type and frequency of different types of dietary advice. The study measured weight and glycemic control and blood pressure. The results suggest that adoption of dietary advice is found to be a good way to promote better glycemic control.\textsuperscript{98}
A study to evaluate the effectiveness of lifestyle intervention programme on glucose tolerance was undertaken. The subjects in the intervention group received regular dietary advice. The control group received only brief information about beneficial effects of healthy diet and increased physical activity. A lifestyle intervention programme is effective and induced beneficial changes.  

A study explored compliance and adherence to dietary advice remain poor among diabetics. This study was to assess the dietary knowledge, practice and control of type 2 diabetes mellitus; all 33 subjects had trunkal obesity and needed to lose weight. About 52.5% who received dietary advice had a significant higher mean knowledge score and seemed to be associated with better dietary practice and better glycemic control.  

A study observed that prospective cohort studies and randomized clinical trials have demonstrated that type 2 diabetes complications can be prevented largely through moderate diet and lifestyle modification. There is increasing evidence that the quality of fat and carbohydrate plays a more important role than does the quantity.  

A sensible and sustainable diet, which may include reducing the number of calories eaten each day, allows for gradual weight loss over time. Weight loss can improve blood glucose control by decreasing insulin resistance and partially restoring the normal insulin producing function of the pancreas. Weight loss can also lower blood pressure.  

**Section F: Findings related to Diabetes and exercise.**

Exercise is beneficial for all individuals with or without diabetes. Even persons with long standing diabetes or diabetes complications can benefit from exercise. For
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diabetics, exercise promotes cardiovascular fitness and weight loss, lowers the high blood pressure, lipid and blood glucose level, and leads to an overall sense of well being.

In the present study, results show that the knowledge mean scores of post-test (74.0 %) was better than Pre-test (27.8%) on diabetes and exercise. However the enhancement knowledge on diabetes and exercise was found to be 46. 2% and it is interesting to note that the post-test reported practice mean score (71.0%) was found to be comparatively higher than the Pre-test scores (37.8%), where the enhancement was found to be higher (33.2%).

A study to assess the effect of exercise in type 2 diabetes trials were identified through the central register of controlled trials was done. Fourteen randomized trials comparing exercise against no exercise in type 2 diabetes were identified involving 377 participants. Trials ranged from eight weeks to twelve months duration. Compared with the control, the exercise intervention significantly improved glycemic control as indicated by glycated hemoglobin levels of 0.6 percent. This result is both statistically and clinically significant. The analysis shows that exercise significantly improves glycemic control. 66

A study to assess the effects of exercise training on patients with type 2 diabetes was conducted. Subjects were randomized into control group in which they received conventional treatment only, and exercise group in which they received conventional treatment together with exercise training and supervised muscle training twice a week for 12 months. The study concluded that exercise training improves glucose control in type 2 diabetes. 69
A study reported that during the last 50 years several studies have underlined the central role of physical exercise in the management of patients with both type 1 and type 2 diabetes mellitus. The numerous benefits described in normal individuals who practice regular exercise have also been demonstrated. Appropriate education may allow a proper and correct approach to physical exercise.\textsuperscript{73}

A study was conducted to evaluate a weight loss and exercise programme designed to improve diabetes management in older African group aged between 55-70 years with type 2 diabetes mellitus were randomized to either an intervention or usual care. After the adjustment for changes in weight and activity, the intervention programme was effective in improving glycemic and blood pressure control.\textsuperscript{71}

**Section G: Findings related to diabetes and foot care practice.**

A study reported that diabetic foot ulcers are likely to occur in up to 25% of people with diabetes mellitus at some time in their lives. Without adequate management, there is a high risk of infection, gangrene, amputation and death. Over 50% of major amputations in UK happen to people with diabetes, and within three years of amputations 50% patients will die. Diabetes foot ulcer needs specific management, and accurate and prompt assessment, diagnosis and treatment.\textsuperscript{75}

In the present study, results show that the knowledge mean scores of post-test (75.5%) was better than the Pre-test (30.4%) on diabetes foot care. However the enhancement was found to be 45.1%. It is interesting to note that the post-test practice
mean score (69.5%) was found to be comparatively higher than the Pre-test scores (32.6%). In Pre-test, the enhancement was found to be higher by about 36.9%.

A research study reported that similar cross sectional study on knowledge and practice of foot care in Iranian people with type 2 diabetes was conducted. Current practice and knowledge was determined. Least knowledge was identified. 52% of subjects were not aware of applying mild cream while feet are too dry, 60% failed to inspect their feet and 42% did not know to trim their toe nails and had a risky practice of walking barefoot. The result of this study highlighted that the patients had inadequate knowledge of self care about their foot and lacked optimal foot care services.

Studies show that the recurrence of foot infection was common among Indian diabetic patients (52%). A lesser prevalence of peripheral vascular disease (13%) among Indians was noted when compared with those in western countries (48%) Smoking increases the risk by reducing blood circulation in the legs and reducing sensation in the feet. Prompt and aggressive treatment of diabetes foot ulcers can often prevent exacerbation of the problem. Multidisciplinary management programmes that focus on prevention, education, regular foot examinations were recommended.

It was reported that a descriptive study of foot care practices involved a convenience sample of 61 adult men and women with type1 and type2 diabetes with 24 existing foot ulcers and 37 without foot ulcers, who resided in rural areas. These results reveal that those without foot ulcer have similar foot care practices to those with foot ulcers. Preventive practices must be stressed and reinforced so that those without foot ulcers do not develop foot ulcers.
It was observed that the screening technique is simple and can be used in clinic settings or at the bed side. Incorporating foot care education into the foot screening process increases or reinforces patient’s knowledge of self care. Such knowledge empowers patients to join with their health care teams to decrease the incidence of ulceration and amputation.\textsuperscript{86}

**Section H: Findings related to Diabetes and Recognizing Complication.**

Diabetes affects quality and life style of patients. Patients with diabetes can have 15 years or more reduction of life time and high mortality is due to cardiovascular complications. Effective strategies for reduction of the impact due to systemic complications are essential. In order to minimize the risk, behavior modification must be stimulated and pharmacological agent has to be used when indicated. Studies world wide have been confirming the effectiveness of life style strategies and even the use of pharmacological agents for prevention.\textsuperscript{99}

Present study data indicate, post-test practice mean scores were found to be comparatively higher than the Pre-test scores in the entire practice domain under study. However the enhancement was found to be higher with 22.3\% in the domain of diabetes life style practice knowledge compare to 37.6\% in management of complication.
Section I: Findings related to association between knowledge and selected

Demographical variables

Data depict association between age and knowledge level of subjects, indicating younger the age better is the knowledge. Association between duration of diabetes and knowledge level had above median practice indicating that higher the duration of diabetes mellitus, better is the knowledge level in both Pre-test and post-test found to be significant ($p < 0.01$). The association between gender and knowledge level was found to be non significant.

Gender and knowledge shows 52.2% females had above median knowledge compared to 49.2% of male. However the association between gender and knowledge level was found to be non significant indicating that gender has no impact on knowledge level. Education and knowledge level was found to be significant. Higher the education level, better is the knowledge. The association between income and knowledge level was found to be non significant, indicating no impact of income level on knowledge level. Type of family and knowledge level was found to be highly significant revealing impact of family. Extended family background was found with above median; residence and knowledge of subjects shows that the association between type of residence and knowledge was found to be non significant in both Pre-test and post-test. Smoking habit and knowledge level reveals significant association in Pre-test and non significant association in post-test.

Alcohol consumption and knowledge level of subjects, (70.9%) and (44.1 %), with alcohol and non alcoholic consumption had below median knowledge in Pre-test.
Further, 36.4% of alcoholic and 53.8% of non-alcoholic subjects had above median knowledge in post-test. However, the statistical test reveals non-alcoholic consumption subjects possess better knowledge.

In the association between age and practice, the test reveals significant association between age and practice. Older the age, better is the practice (p < 0.01). Duration and practice of subjects indicating higher the duration of diabetes mellitus better is the practice (p<0.01). Association between gender and practice showed male subjects (56.1%) had below median practice compared to female subjects, indicating gender has impact on practice level. Education and practice of subjects shown higher the education level better is the practice. Income and practice revealed higher the income better is the practice (p<0.01), association between residence and practice of subjects was found to be significant in Pre-test and non-significant in post-test. Association between type of family and practice level of subjects was found significant, revealing extended family has greater impact on practice. Association between smoking habit and practice data reveals non significant association. Association between alcohol consumption and practice level in Pre-test was non-significant and highly significant in post-test, revealing non-alcoholic consumption subjects had above median practice in post-test.

The correlation coefficient observed in the score between knowledge and practice of subjects is found to be significant. Hence, it can be concluded that there is a positive correlation.

It can be summarized that the knowledge level of subjects was found to be less than median in Pre-test; on diabetes lifestyle modification the knowledge score ranged between 32.6% to 47% as compared 66.9% to 80.5% in post-test among different
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The enhancement of mean knowledge score was found to be 41.9%. The statistical paired t-test indicating the enhancement of knowledge was found to be statistically significant (p<0.01) revealing the effectiveness of structured teaching programme on diabetes lifestyle modification. Thus younger the age, extended family, higher the education status, higher the income, diabetics with urban back ground, non smokers, non consumers of alcohol – all theses categories of people suffering from diabetes possessed better knowledge on diabetes lifestyle modification in post-test.

The practice level of subjects on diabetes lifestyle modification was found to be less than median. In Pre-test the practice score ranged between 32.6 % to 47.3% as compared to 66.9% to 80.5% in the post-test. Among different domains the enhancement of mean practice level was found to be statistically significant (p< 0.01) revealing the effectiveness of structured teaching programme on diabetes lifestyle modification. Thus, older the age, longer the duration, female subjects, those with higher education, higher income, extended family and non alcohol consumers possess better practice in post-test.

The management of type 2 diabetes has been revolutionized over the last 3-5 years as a result of dramatic changes in our health care system, new clinical trials data, novel pharmacological agents and better understanding of appropriate methods for patient education regarding life style issues. As a result, diabetes management has become heterogeneous, with dramatic differences in style and approach. Diabetes care has also become much more rewarding. The vast majority of patients can now achieve excellent glycemic control while leading full and unrestricted lives.

Number of research now shows type 2 diabetes can be controlled or diabetes complication can be delayed with life style changes, such as proper diet and regular
exercise, taking proper foot care, monitoring blood glucose level. Life style changes can be more effective than medication

**The Study Attempted to Examine the Following Research Hypothesis**

In order to evaluate effectiveness of structured teaching programme on knowledge and knowledge on practice score of diabetes patients on life style modification, before and after administration of structured teaching programme the following hypothesis was formulated

**H$_1$:** There will be significant difference in the level of knowledge, and knowledge on practice score of diabetes patients on life style modification, before and after administration of structured teaching programme.

Findings of the study reveals the mean pre and posttest knowledge and knowledge on practice regarding diabetes life style modification. The paired t test was carried out and it was found to be statistically significant at (p<0.01) level hence hypothesis H$_1$ is accepted.

**H$_2$:** there will be significant association between knowledge of life style modification of diabetes patients with their selected socio demographic variables

Findings of the study reveal the mean pre and post test knowledge of diabetes life style modification. Of diabetes patients with their selected socio demographic variables The $\chi^2$ test was carried out it was found to be statistically significant with age, ($\chi^2=0.01$), duration of diabetes ($\chi^2=0.05$), education ($\chi^2=0.01$), type of family ($\chi^2=0.01$), and area of residence ($\chi^2=0.05$), alcohol consumption ($\chi^2=0.05$) level, hence hypothesis H$_2$ is accepted.
However $\chi^2$ test also reveals there is non significant association with gender ($\chi^2=0.05$), income ($\chi^2=0.05$), and area of residence ($\chi^2=0.05$) smoking($\chi^2=0.05$) level. Hence hypothesis H2 is rejected.

**H3:** there will be significant association between knowledge on practice of life style modification of diabetes patients with their selected socio demographic variables

Findings of the study on knowledge on practice related to diabetes life style modification reveals mean different of demographic variables findings are patients reported practice not actual practice since $\chi^2$ test was carried out and it was found to be statistical significant at age ($\chi^2=0.05$), duration of diabetes ($\chi^2=0.05$), education ($\chi^2=0.05$), income ($\chi^2=0.01$), type of family($\chi^2=0.01$), alcohol ($\chi^2=0.01$), hence hypothesis H3 is accepted. However $\chi^2$ also reveal there is non significant association with gender ($\chi^2=0.05$), smoking ($\chi^2=0.05$) level. Hence H3 is rejected.

The need of the hour is direct public education and mass media campaigns, awareness about diabetes and its complications. There is a need to disseminate the message that diabetes complications are preventable and need for a behavioral change to adopt a healthy lifestyle. Early and effective treatment with a combination of knowledge and practice, should reduce the risk of diabetes related complications, and improve quality of life, as well as reduce health care costs related to diabetes.