Chapter 5

Summary and Conclusion

The present cross sectional study intended to explore the relationship of psychosocial factors with the compliance among type 2 diabetic patients. This research was conducted on patients attending Out Patients Department (OPD) in Rajiv Gandhi Centre for Diabetes and Endocrinology, Jawaharlal Nehru Medical College, Aligarh. The Aligarh city is situated in the northern region of Uttar Pradesh, India. Diabetes type 2 patients aged 30—60 years with no comorbidity, with minimum of six month duration history of diabetes and willing to be a part of study were selected through purposive sampling technique. The pre-designed and pre-tested questionnaire cum interview schedule was used to gather information from a subset of 200 type 2 diabetic patients. The study was structured with following aims: To find the relationship between diabetic compliance (diet, exercise, blood glucose testing and medication) and glycemic control measured by glycosylated hemoglobin (HbA1c). To determine the relationship between diabetic compliance and demographic variables (i.e. gender, age, socio-economic status, dietary habits, domicile and duration of disease) among type 2 diabetic patients. To explore if psychosocial factors (i. health locus of control, ii. social support, iii. health consciousness) are better predictors of compliance among type 2 diabetes patients.

Continuous variables were presented as means and standard deviation (SD) while categorical variables as frequency and percentages. Pearson’s product moment correlation coefficient was performed to examine the relationship between criterion (compliance) and predictor variables (psychosocial factors and demographic variables).

Comparison between two or more categories of a variable was performed using one way analysis of variance (ANOVA) followed by Scheffe Post Hoc test. A statistical package for social sciences (SPSS) version 20 was used for the purpose of analysis.

The sample comprises of 200 patients, out of which 50.5% patients were males and 49.5% were females. The results regarding age groups revealed that about 22% patients were in early (30-40 years), 36% in middle (40-50 years) and 42% in late (50-60 years) age group.
Likewise with regard to socioeconomic status of the sample the data obtained showed that most of the subjects were from upper middle class (50.5%), 24.5% were from lower middle, only 10.5% were from upper class and rest (3%) belongs to lower SES, according to Kuppuswamy SES classification (2014).

On analysis of groups based on domicile of the patients it was found that majority of the patients were living in urban area (86%) and only 14% were rural people.

Results regarding marital status of patients revealed that 88% patients were married and 9.5% patients were widowed and only 3 patients were divorcee/ separated. Analysis regarding dietary habits revealed that 65% patients were non-vegetarian and only 35% sample reported vegetarian dietary habit.

According to World Health Organization (2006) criteria of BMI range, 37.5% patients fell in normal BMI category (less than 25 kg/m$^2$), 33.5% were overweight (25-30 kg/m$^2$), 7% were underweight (less than 18.5 kg/m$^2$) and only 5% patients were severely overweight (BMI more than 35 kg/m$^2$).

The results on duration of disease showed mean of 5.81 ± 6.11 years. Out of total sample, 64% patients fell in the category of 6 months to 5 years duration history, 21% patients had diabetes for the past 5 to 10 years, and 15% patients had diabetes since more than 10 years.

Results regarding HbA1c of the sample population showed mean HbA1c value of 8.09 % ± 1.73. The mean HbA1c level at the time of diagnosis was 9.81% ± 1.96 with a range of 5.4% to 14%. Regarding glycemic control of the sample, according to International Diabetes Federation (2015) criteria of target HbA1c range, it was found that 17% patients had excellent (HbA1c <6.6%), 18.5% patients had good (HbA1c 6.7-7.1%) and 29.5% had acceptable (HbA1c 7.2-8%) range of glycemic control. Poor glycemic control (HbA1c more than 8%) was found in majority (35%) of sample population.

**Diabetic compliance and HbA1c:** The first objective yielded the following result: dietary, exercise and medication compliance were negatively significantly correlated with HbA1c level. It was proved from the data obtained that patients who always followed the recommended diet (43.5%), exercise (29%) and medication (86%) had mean HbA1c level of 7.3%, 7.3% and 7%, respectively which is an acceptable range.
of glycemic control according to American Diabetes Association (2015) and International Diabetes Federation (2015). Those patients who sometimes complied with the regimen had poor glycemic control showed by their higher levels of HbA1c. This result concurs with and was supported by the earlier findings by National Diabetes fact sheet (2011), Afnan A. and Robert T. (2013) and Hiroko and Mariko et al. (2017).

**Demographic variables and Diabetic Compliance:** The findings regarding the second objective were as follows:

**Gender** negatively correlated with diet and medication compliance. Females scored higher on diet and medication compliance as compared to males. Findings revealed that 47% females and males 39.6% males always complied with diet and had mean HbA1c of 7.5% and 7.1% respectively, and 90.9% females and 81.2% males always complied with medication regimen.

**Age** was significantly positively correlated with dietary compliance only. Results revealed that 48.8% of patients from late age group, 40.9% from middle and 38.9% from early age group always followed dietary regimen. Significant difference was found between late and middle age group on diet dimension. On comparing mean scores it was found that late age group patients followed more dietary regimen (Mean=39.71) than middle age group patients (Mean=38.38).

**Socio-economic status** was significantly positively correlated with diet, exercise and glucose testing compliance. Regarding differences among different SES groups, significant difference were found between the groups on diet, exercise and glucose testing compliance. Upper lower, upper middle and upper class significantly differed for diet and exercise compliance, and upper middle and upper lower for glucose testing compliance at P value < .05. Result revealed that upper class followed more diet and exercise regimen than upper middle and lower middle. And upper middle class adhered more to glucose monitoring regimen than upper lower class.

**Dietary habits** were significantly negatively correlated with dietary compliance only. It was observed that 51.4% vegetarian and only 39.2% non-vegetarian patients always followed recommended diet. The analysis showed significant difference between vegetarian and non-vegetarian patients on diet dimension at p value equal to .024.
Comparing mean scores showed that vegetarians were more compliant to dietary regimen (Mean= 39.64) than non-vegetarian (Mean= 38.64) patients.

**Domicile** was significantly negatively correlated with diet and positively correlated with glucose testing compliance. Results revealed that 53.6% rural and 41.9% of urban always complied with diet and only 7.1% rural and 25% urban patients tested their blood glucose as recommended by the doctor. On comparison of both groups significant differences were found at p value less than .05 and .01 for diet and glucose testing compliance. Comparing mean scores showed that urban patients scored lesser on diet (Mean= 37.19) as compare to rural patients (Mean= 39.86) and scored higher on glucose testing (Mean=3.32) than rural (Mean=2.57) patients.

**Duration of disease** was significantly positively correlated with glucose testing regimen compliance only. Analysis regarding duration of diseases revealed that out of total 200 sample, 30% patients from later years of diagnosis (above 10 years), 21.4% for more than 5 to 10 years and 21.1% for 6months to 5 years duration of diabetes history always tested their blood glucose on the recommended time. No significant differences were found between these groups on any dimension of compliance.

**Psychosocial Factors and Diabetic Compliance:** The analysis of the third objective of the study yielded the following results:

**Health Locus of Control** significantly predicted compliance and accounted for 4.6% of variance in dietary compliance, 7.3% in exercise and 11.8% in medication compliance which was significant at .001.

**Internal HLC** was found to be significantly positively predicted dietary and exercise compliance. Patients having high internal HLC were found to have comparatively low HbA1c level.

**Chance HLC** significantly negatively predicted dietary and exercise compliance. Patients having high chance HLC also had comparatively high HbA1c level.

**Doctors HLC** was found to be significantly positively predicted dietary and medication compliance. Patients having high doctors HLC had comparatively lower HbA1c level.

**Others HLC** was not significantly correlated with any dimension of compliance.
Male and female, and different age group patients did not differ significantly on health locus of control. Different socioeconomic status patients exhibited different locus of control. Lower class had low internal HLC whereas upper class had high internal HLC. In contrast upper class had low chance locus of control (mean=20.48) than upper lower (mean=27.83) and lower class (mean=32.00). And also lower SES patients had high others locus of control (mean=17.50) than lower middle (mean=12.16) and upper (mean=11.86) SES patients.

Significant differences were found between rural and urban on chance (p<.05) and others (p<.01) HLC. Urban people had low chance locus of control (Mean= 24.88) than rural people (Mean= 27.68). And also rural people had higher others locus of control (Mean= 14.68) than urban people (Mean= 12.58).

**Social Support** significantly predicted compliance and accounted for 3.2% of variance in dietary compliance (p<.01) and 2.1% of variance in glucose testing compliance (p<.05).

Social support was significantly positively correlated with diet (p < .01), blood glucose testing (p < .05) and medication (p < .05) regimen compliance. Patients with high perceived social support had comparatively lesser HbA1c level than those with lesser support. Negative support and family conflicts had worse effect on the glycemic control showed by higher level of HbA1c (9.3%).

No significant differences were found between male and female, and different age group patients on social support. Different SES patients significantly differed on perceived social support (p=.001). Mean values showed that lower class had less social support (mean=49.67) as compared to upper lower (mean=60.17), lower middle (mean=63.31), upper middle (mean=62.64) and upper (mean=59.71) classes.

Significant differences were also found in rural and urban patients on social support (P<.05). Rural patients had lesser social support (Mean= 59.00) than urban patients (Mean= 62.28).

**Health Consciousness** significantly predicted compliance and accounted for 14% of variance in dietary compliance (p<.001) and 18.6% in exercise (p<.001) and only 3% of variance in medication compliance (p<.01).
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Health consciousness was significantly positively correlated with diet (p < .01), exercise (p < .01), blood glucose testing (p < .05) and medication (p < .01) compliance. Highly health consciousness patients had mean HbA1c of 7.5% and moderately health consciousness had 8.3% as their mean HbA1c.

No significant differences were found between male and female, different age groups and rural urban patients on health consciousness.

Significant differences were found between different SES groups on health consciousness at p value less than .05. Result revealed that lower class were less health consciousness (mean=41.00) as compared to upper class (mean=49.62) patients.
At a Glance results were as follows:

- 50.5% patients were males and 49.5% were females.
- 42% patients were in late (50-60), 36% in middle (40-50), and 22% were in early (30-40) age group.
- 50.5% patients were from upper middle class, 24.5% from lower middle, 10.5% were from upper class, 11.5% from upper lower, only 3% patients were from lower SES.
- 86% patients belong to urban community and only 14% were rural patients.
- 35% patients had vegetarian dietary habit and 65% were non-vegetarian.
- 64% patients fell in the category of early (6months- 5years), 21% in middle (>5 – 10 years), and 15% in late (above 10 years) duration of disease period.
- Dietary, exercise and medication compliance were significantly negatively correlated with HbA1c level. Compliance with treatment regimen had better effect on glycemic control. And those patients who sometimes followed the regimen had poor glycemic control showed by their higher levels of HbA1c.
- Females were better compliers as compared to males on diet and medication regimen.
- Elder patients adhered more to dietary regimen than middle and early age group patients.
- Upper SES patients followed more diet, exercise and glucose testing regimen as compared to other SES patients.
- Patients having vegetarian dietary habit compliance better to dietary regimen than non-vegetarians.
- Urban patients complied more with glucose testing regimen while rural patients adhered more with dietary regimen.
- Compliance with glucose testing regimen increases with the progression of the duration of disease.
- Health locus of control emerged as a predictor of compliance. It significantly predicted dietary, exercise and medication compliance.
- Internal HLC positively correlated with diet and exercise regimen that is why patients having high Internal HLC and low Chance HLC were comparatively had lesser HbA1c level.
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- Chance HLC negatively correlated with diet and exercise compliance, consequently patients having high Chance HLC comparatively had high HbA1c level.
- Patients with high Doctors HLC complied better with diet and medication regimen.
- Others HLC was not found significant.
- Male and female, and different age group patients did not differ on any dimension of HLC.
- Lower SES patients had high Chance HLC and low Internal HLC, while higher SES patients had low Chance HLC and high internal HLC.
- Lower SES patients had high Others HLC than other SES patients.
- Urban patients had low chance HLC and others HLC than rural patients.
- Social support also emerged as a predictor of dietary and glucose testing compliance.
- Social support positively correlated with diet, glucose testing and medication compliance. Patients with high perceived social support had comparatively lesser HbA1c than those with low support.
- Negative support and family conflicts had bad effect on the glycemic control showed by higher level of HbA1c (9.3%).
- No significant difference found between male and female, and different age group patients on social support.
- Upper SES patients had high perceived social support than other SES group patients.
- Likewise, lower SES patients had low perceived social support than upper classes.
- Rural patients had low support as compare to urban patients.
- Health consciousness also emerged as a strong positive predictor of dietary, exercise and glucose testing compliance.
- Health conscious patients had better compliance with diabetic treatment regimen.
- Highly health conscious patients had mean HbA1c level of 7.5% and moderately health conscious patients had 8.3% as their mean HbA1c.
- No significant differences were found between male and female, different age groups and, rural and urban patients on health consciousness.
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- Lower SES patients were less health consciousness as compared to upper class patients.

Diabetes mellitus type 2 is a progressive disease which requires a congruent approach on the part of the patient including compliance to treatment regimen: changes in diet composition, physical exercise, timely checking of blood glucose level, medication and behavioral modification. It is essential to maintain glycemic control and reduce diabetes related complications. Despite the importance of compliance to diet, exercise, glucose testing and medication regimen for health outcomes, patients often neglect the doctor’s recommendations which results in poor glycemic control. There are various demographic factors including age, socioeconomic status, lack of understanding of the long-term benefits of treatment compliance, cost of medication and certain health believes (health locus of control) and attitudes (health consciousness) along with lack of social support which were found to be related to poor compliance. It was observed that these factors emerged as predictors of compliance and plays a crucial role in attaining optimal glycemic control. A holistic approach is needed for addressing these factors on an individual basis for improving compliance among the patients for the management of diabetes and maintaining their health and quality of life.

Lastly, it was concluded that, females comparatively had better compliance to the diet and medication regimen than males. Lower SES patients were more prone to diabetes related complications because of the lower compliance to treatment regimen, due to high cost of medication, unawareness of the diabetes related complications and lack of health consciousness. Lower SES patients and rural patients were less health conscious and had less perceived social support as compare to other SES patient. And they also have high chance and low internal HLC while upper SES and urban patients had high perceived social support, low chance locus of control and high internal locus of control and were more health conscious. High level of family cohesion, low level of conflicts, high internal and doctors HLC, low chance HLC and high health consciousness improves patients adherence to treatment regimen and improves health outcomes.
Recommendations

After analyzing the results of the study it was found that despite the importance of following treatment regimen diabetic patients do not comply completely with all the regimen areas. There is lack of knowledge and awareness of better health outcomes of compliance to diabetic regimen. Urban patients sometimes due to lack of time and social support did not comply with all regimen areas while rural people did not adhere to all diabetic treatment regimen due to money constraint and lack of health care centers in the nearby regions. Due to this reason, the following recommendations were made:

1. More longitudinal as well as interventional studies should be undertaken to find the reason for non-compliance behavior and coping strategies for better health outcome.

2. There is an urgent need to mount programs for early detection of the disease (diabetes) and timely prevention of complications of uncontrolled diabetes. Programs should also be made to explore the problems faced by the patients while complying with the treatment regimen and search for the solution for that problem.

3. Holistic approach should be used to promote healthy eating habits, physical exercise and timely monitoring of blood glucose.

4. Patients should make understand the importance of taking medicine on the recommended time i.e. before or after the meal.

5. Strategies should be made including a reduction in the complexity of the treatment regimen, improved doctor–patient communication and reduced total costs.

6. Proper counseling of the patients should be done to enhance risk reduction behavior in them and developed more internal health locus of control as person having more internal locus of control seems to take charge of their health and cope better with the disease condition.

7. All the necessary efforts and strategies should be made to understand family members especially (spouses) their positive support and cooperation in self-care behavior of the patients.
8. Programs should be implemented to enable skills in modification of lifestyles without disturbing much of daily chores.

9. More studies concerning other psychosocial factors like stress, depression, anxiety etc. of the diabetic patients should need to be done.

10. More researches should need to be done on health consciousness behavior.

11. More intense and extensive research is required to study the factors responsible for dietary compliance.
Limitations and Constraints

Although every possible effort was made to get the correct information, the following limitations were noted:

1. In the present study only three psychosocial factors were studied because more often than not the patients were reluctant in filling the longer questionnaire.
2. The result was based on the responses given by the patients. Hence there is possibility of biased result.
3. Interventional research could not be undertaken.
4. No intensive follow up studies could be undertaken.
5. Patients with diabetes complications and co-morbid conditions could not be included in the study.
6. The other biochemical parameters except HbA1c could not be studied.
7. Factors like education, knowledge, stress could not be included in the study.
8. Sample was taken only from Rajiv Gandhi Center for Diabetes and Endocrinology, Jawaharlal Nehru Medical College, Aligarh Muslim University, Aligarh.
1. This cross sectional study paved the way for further investigation in longitudinal as well as interventional studies on diabetic patients in need to monitoring the level of compliance.

2. Further research may be conducted to explore the mediating effects of positive social support on the risk reduction behaviors of diabetic patients.

3. Further research may be undertaken for dietary and exercise intervention strategies and their impact on health outcomes of diabetic patients.

4. Replication of the study may be required which should include patients from diverse socio-cultural background like from metropolitan cities and from remote areas.

5. Comparative studies should be carrying out to see the effect of compliance and associated psychosocial factors on the diabetes complications and morbidity.

6. Further research may be undertaken for comparative study on compliance of diabetic patients attending governmental and non-governmental hospitals and clinics.