# KNOWLEDGE, HEALTH BELIEFS, FAMILY SUPPORT, PATIENT PROVIDER INTERACTION: A COMPARATIVE STUDY OF TYPE 2 DIABETES PATIENTS HIGHER IN ADHERENCE AND LOWER IN ADHERENCE TO THE DIABETES REGIMEN.

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## ABSTRACT

The study examined self-care recommendations for non-insulin dependent diabetes mellitus patients, assessed their adherence, identified and compared higher and lower adherent patients on their knowledge of the disease, perception of family support, perception of provider-patient interactions and health beliefs. The sample consisted of 60 (40 to 60 years old) type 2 diabetes patients visiting private clinics in Mumbai. The Interview and Questionnaire methods were used to assess the various factors. Descriptive and comparative statistical methods were employed. Almost all patients received recommendations for medication, diet, exercise and glucose testing while less received them for foot-care (66.1%) and eye-care (66.7%). There was a significant difference (p=0.001) between the scores of the higher (M=38.93) and lower adherent patients (M=29.77)). The scores for knowledge were average, while those for perceptions of family support and of patient- provider interaction were high. Patients believed that they were vulnerable to diabetic complications to an average extent, that they had high chances of developing serious medical problems and that their treatment was highly cost effective. They perceived the disease to be under personal control to a high extent, medical control to an average extent and situational control to a low extent. Lower adherent patients had significantly higher situational control than higher adherent patients. No differentiation between higher adherent and lower adherent patients, in terms of the factors studied emerged. Since the study focused on a relatively small sample of patients, no generalizations can be made.

**KEY WORDS:** Adherence; Compliance; Self-care recommendations; Family support; Patient-provider interaction; Belief system; Locus of control; Type 2 diabetes.

## INTRODUCTION

India is home to around 35-40 million diabetics, the largest number of diabetics in any one country (1). A review of literature suggests that diabetics are largely non-adherent. Non-adherence with medication regimens (2), dietary recommendations (3, 4), exercise (5, 6), insulin administration (5) and testing recommendations have been documented. Low adherence is a growing concern, seriously undercutting the benefits of current medical care. It is thus imperative to understand factors affecting adherence in order to eventually design interventions that facilitate adherence. A few foreign researchers have focused on these factors. Socio- demographic factors, personality variables, patients' beliefs and attitudes and other psychosocial factors have been shown to affect adherence to the diabetic treatment regimen (7-12). A need to address factors affecting adherence in the Indian context was felt and thus the relevance of the current study.

## MATERIAL AND METHODS:

### Aims

1. To examine the self-care recommendations for type 2 diabetes patients regarding their diabetes treatment regimen.
2. To assess their level of adherence and satisfaction with the same.
3. To identify type 2 diabetes patients with higher and lower degrees of adherence to the diabetes

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treatment regimen and to compare them on the following factors:

a. Knowledge of diabetes and the diabetes regimen.
b. Perception of family support.
c. Perception of provider-patient interaction.
d. Health beliefs and attitudes.

The sample consisted of 60 type 2 diabetes patients, between the ages of 40 and 60 years, attending three private clinics in Mumbai. There were 21 males and 39 females. Most were married (91.7 %), had completed the SSC (26.7%) or graduation (28.3%) and had a monthly income ranging between Rs.10,000 and Rs.20,000. The study was conducted in two stages. In the first stage, information regarding self-care recommendations for the patients was obtained and their level of adherence was assessed (n=60). In the second stage, based on the adherence scores, 15 higher adherent [HA] and 15 lower adherent [LA] patients were identified and compared on the four factors mentioned above.

Self-care recommendations were ascertained using an interview schedule that consisted of questions relating to eight areas of the diabetes treatment regimen: diet, exercise, medication, testing, foot care, eye care, habits and follow-up.

The level of adherence was examined using an interview schedule that consisted of items pertaining to seven areas of the treatment regimen: diet, exercise, medication, testing, foot care, habits (smoking/drinking), and follow-up. For each area, the patients were asked to recollect the previous week and report the number of days in that week that they had adhered to the self-care regimen. In addition, the patients reported, on a four-point scale, their personal satisfaction with their adherence for each aspect of treatment. Higher scores were indicative of a higher level of adherence and greater satisfaction with respect to the particular area (Cronbach alpha coefficient = 0.6479).

Knowledge of diabetes and diabetes treatment regimens was assessed via the face to face questionnaire method and included Part A (multiple choice items, tapping information and facts about diabetes and the treatment) [Cronbach alpha coefficient = 0.7140] and Part B (items describing health situations that diabetics generally encounter, tapping comprehension) [Cronbach alpha coefficient = 0.5434]. Higher scores were indicative of better knowledge (diabetes- related information and comprehension).

Perceptions of family support and patient- provider interaction were assessed via the face-to-face questionnaire method. Higher scores indicated a more favorable perception of family support and patient provider interaction [Cronbach alpha coefficient = 0.8163 and 0.7527 respectively].

Health beliefs and attitudes were assessed in terms of cost effectiveness of treatment (treatment benefits and barriers), vulnerability to and severity of medical problems and health locus of control. Cost effectiveness was assessed with a five-point rating scale. Higher scores were indicative of greater cost effectiveness of treatment. [Cronbach alpha coefficient = 0.7079 and 0.6316 for benefits and barriers respectively]. Beliefs of severity and of vulnerability were also assessed using a five-point scale. In the former, patients had to rate their likelihood of developing diabetic complications while in the latter, they had to rate how severe they would anticipate the problem to be, if they were to develop it. Some of the medical problems included were kidney disease, high blood pressure, gangrene etc [Cronbach alpha coefficient = 0.6069, 0.8422, 0.8127 for beliefs of severity, beliefs of vulnerability to self and others respectively]. Perceived health locus of control was measured using the interview method. This tool tapped three dimensions of control, viz. personal, situational and medical. Higher scores were indicative of greater control in that dimension [Cronbach alpha coefficient = 0.8496, 0.7356, 0.7320 respectively].

The researchers developed all the assessment measures after thoroughly reviewing the existing relevant measures (13, 14) and incorporating some of the items.

## RESULTS

### Self-Care Recommendations

Self-care recommendations regarding the kinds of food to eat/avoid [the need to consume salads and vegetables (71.7%) and reduce oily and fatty food items (78.3%)] were received by 91.7% of the patients. All patients were informed about the amount of food

that should be consumed and a majority received instructions about the number of meals per day (98.3%) and their spacing (91.7%). However, only about two-thirds (65%) received information about food exchanges and still fewer (40%) were told to reduce carbohydrate-rich foods. Although exercise recommendations were given to all of the patients, with walking mentioned as a form of exercise (86.7%), only a few were informed about the amount of exercise to be taken (25.0%) and the required precautions while exercising (38.3%). Medication (tablets/insulin) recommendations were given to 96.7% patients and included, dosage, the number of doses in a day and the timing of the medicine intake. While just about a half of the sample were provided with foot care recommendations, the general focus being on suitability of foot wear (53.3%), only a few were given instructions about foot hygiene (36.7%). Blood glucose testing recommendations were given to all the patients and instructions regarding the need for a regular follow up were provided to a majority (93.3%). Eye care recommendations were given to only a third of the sample (33.3%) and included going for an eye checkup. Finally, just 10% of the patients were advised to avoid smoking and to reduce drinking.

**Table 1: Mean Scores for Adherence to Different Aspects of the Regimen**

| Area of adherence | | Theoretical Range | Actual range | Mean | SD |
|---|---|---|---|---|---|
| **Diet** | | 0-7 | | | |
| High adherent | n=15 | | 4.7-6.9 | 6.25 | 0.54 |
| Low adherent | n=15 | | 4.1-7.0 | 5.54 | 0.9 |
| Total | n=60 | | 3.9-7.0 | 5.74 | 0.81 |
| **Exercise** | | 0-7 | | | |
| High adherent | n=15 | | 0-7.0 | 5.48 | 2.0 |
| Low adherent | n=15 | | 0-4.0 | 0.83 | 1.33 |
| Total | n=60 | | 0-7.0 | 3.24 | 2.67 |
| **Medication** | | 0-7 | | | |
| High adherent | n=15 | | 5.2-7.0 | 6.88 | 0.45 |
| Low adherent | n=15 | | 3.0-7.0 | 6.06 | 1.25 |
| Total | n=60 | | 3.0-7.0 | 6.65 | 0.8 |
| **Testing** | | 1-3 | | | |
| High adherent | n=15 | | 2.0-3.0 | 2.87 | 0.29 |
| Low adherent | n=15 | | 1.0-3.0 | 2.9 | 0.2 |
| Total | n=60 | | 1.0-3.0 | 2.83 | 0.37 |
| **Foot Care** | | 0-7 | | | |
| High adherent | n=15 | | 5.0-7.0 | 5.98 | 0.77 |
| Low adherent | n=15 | | 3.3-7.0 | 4.69 | 0.8 |
| Total | n=60 | | 2.4-7.0 | 5.29 | 1.17 |
| **Habits** | | 0-7 | | | |
| High adherent | n=15 | | 3.5-7.0 | 6.77 | 0.9 |
| Low adherent | n=15 | | 3.5-7.0 | 6.77 | 0.9 |
| Total | n=60 | | 3.5-7.0 | 6.78 | 0.79 |
| **Follow up** | | 0-4 | | | |
| High adherent | n=15 | | 3.0-4.0 | 3.78 | 0.43 |
| Low adherent | n=15 | | 2.0-4.0 | 3.26 | 0.88 |
| Total | n=60 | | 2.0-4.0 | 3.56 | 0.72 |

## Adherence

Overall, the adherence scores of the 60 patients (34.2±4.14) were good. There was a significant difference between the adherence scores of the HA (38.9±1.86) and the LA group (29.8±1.76) (t=13.864, p= 0.001). In general (Table 1), adherence to dietary aspects, medication recommendations, blood glucose testing and follow-up was high. Foot-care adherence was fairly high. Adherence to exercise recommendations was moderate, with LA patients (0.83) showing a lower level of adherence than their HA counterparts (5.48). Patients were highly satisfied with their adherence, being most satisfied with their adherence to follow up (3.72), followed by testing (3.50), medication (3.48) and diet adherence (3.22). Satisfaction with exercise adherence was the lowest (2.57).

The HA (n=15) and LA (n=15) patients were compared for the four factors mentioned below. For each of the factors, the findings of the entire group (n=30) precedes the findings of HA and the LA group.

## Knowledge (Information and Comprehension)

### *Information*

The entire group possessed an average amount of information (19.5±5.24). There was no significant difference between the HA (21±2.83) and the LA group (18.07±6.65) (t=1.572, non significant). Few patients had information regarding another term for type 2 diabetes (23.3%), cause of an insulin reaction (36.7%), foods rich in carbohydrates (16.7%), function of an oral hypoglycemic agent (40%), the meaning of the terms hypoglycemia (26.7%) and hyperglycemia (30%) and the symptoms of ketoacidosis (6.7%).

### *Comprehension*

The entire group demonstrated an average comprehension level (6.26±2.63). There was no significant difference between the HA (7.07) and the LA group (5.45) (t=2.483, non significant). While a majority of the patients (80%) reported that they would check with the doctor before buying an alternative drug, if the prescribed drug was out of stock, none indicated that they would avert such a situation by stocking up the medication in advance. A substantial number (HA 86.7%; LA 53.3%) did know that at a wedding, if they were unsure of the calorie content of food items, they could eat recommended food in appropriate quantities. Very few knew what to do if they consumed more than the usual dose of oral hypoglycemics (HA 6.7%; LA 0.0%) and one quarter of the sample (HA 26.7%; LA 6.7%) erroneously felt that they could consume chapattis/rice, if they felt hungry after a meal.

Books, magazines and newspapers (53.3%) followed by diabetologists (40%) and friends and relatives (30%) were found to be the sources of diabetes- related information. A desire for information was expressed regarding management issues such as keeping to the diet during travel and at a function/party (23.3%) and differentiation between the symptoms of hypoglycemia and hyperglycemia (20%).

## Family Support

The entire group perceived fairly good family support (104.7±13.76). No significant difference was observed between the HA (108.7) and the LA group (100.7) (t=1.544, non-significant). Both groups reported a high level of satisfaction with the family support received and more of the patients (HA, 53.3%; LA, 20.0%) identified a change in the family's lifestyle to suit their needs, as the aspect of family support that helped them in the management of diabetes. Few patients desired that family members should help them with household chores (HA, 6.7%; LA, 13.3%) and be firm with them (HA, 13.3%; LA, 13.3%).

## Provider- Patient Interaction

The entire group perceived a very good patient-provider interaction (52.5±6.15) .No significant difference was observed between the HA (52.9±5.3), and the LA group (52.1±6.99) (t=0.353, non-significant). More HA (46.7%) and LA patients (33.3%) reported that the understanding and reassurance provided by the diabetologist helped them in the management of diabetes. Only a few (20%) expressed having expectations of the diabetologist that were not met, with having control over blood glucose level, being specifically mentioned as an unmet need (HA, 6.7%; LA, 13.3%).

## Beliefs and Attitudes

### *Beliefs about Vulnerability*

Patients perceived "self" (17.7±7.72) as significantly less vulnerable to diabetic complications

than "others" (20.3±6.51) (t=3.297, p= .003). The self-vulnerability was considered moderate. A non-significant difference, for both perceived vulnerability to "self" and "others", was observed between HA patients (15.8±7.08; 19.0±6.14) and LA patients (19.6±8.13; 21.5±6.85) (t =1.340, non significant and t=1.053, non significant respectively).

### *Beliefs about Severity*

Patients believed, to a high degree, that their disease could become severe due to the development of complications (29.6±4.22). The two groups (HA, 29.3±3.39; LA, 29.9±5.02) did not differ significantly (t = -0.376, non significant) in this respect.

### *Beliefs about Cost Effectiveness*

Patients perceived more treatment benefits than barriers (14.6±5.46). The difference between the two groups (HA, 14.3±4.79; LA, 14.9±6.21) was non-significant (t=0.250, non significant). Both HA (3.7) and LA patients (3.5) agreed with respect to the item "Sticking to my diet makes eating out difficult", However, LA patients agreed to a greater extent (3.3) than HA patients (2.7) with the item "With my home and work schedule, I find it difficult to find time for exercise".

### Health Locus of Control

With respect to the health locus of control (Table 2), patients believed to a great extent that health outcomes were within their control (42.1), to a moderate extent that they were under the control of the diabetologist (16.5) and to a small extent that they were under the control of outside circumstances (10.3). HA patients (7.3) demonstrated significantly lower situational control than LA patients (13.3) (t=2.730, p= 0.011) However, the two groups did not differ significantly from each other with respect to personal and medical control (t=1.985, non significant and t=0.726, non significant). Patients felt they had most control over keeping their weight at an acceptable level (HA, 3.5; LA, 3.3) and least over developing a shoe bite (HA, 1.06; LA, 0.8).

## DISCUSSION

### Self- Care Recommendations

Recommendations for food exchanges were inadequate. Instructions regarding permissible food exchanges should be given to all patients, since this permits choice of items and avoidance of the monotony of having the same menu every day. Since hypoglycemia could result if the patient engages in vigorous exercises on an empty stomach, this information that was lacking, needs to be provided to the patients. Foot-care and eye-care recommendations were indeed poor. The vulnerability of diabetics to blistering and consequent susceptibility to infections makes foot-care recommendations imperative. Diabetic retinopathy is one of the leading causes of blindness and visual

**Table 2: Mean Scores for Health Locus of Control**

| Locus of control | | Theoretical Range | Actual Range | Mean | SD | t value | p value |
|---|---|---|---|---|---|---|---|
| **Situational control** | | | | | | | |
| Higher adherent | n=15 | 0-40 | 2-16 | 7.33 | 3.59 | | |
| Lower adherent | n=15 | 0-40 | 3-29 | 13.27 | 7.61 | | |
| Total | n=30 | 0-40 | 2-29 | 10.3 | 6.58 | -2.730 | 0.013 |
| **Personal control** | | | | | | | |
| Higher adherent | n=15 | 0-64 | 29-52 | 45.47 | 6.4 | | |
| Lower adherent | n=15 | 0-64 | 20-61 | 38.8 | 11.32 | | |
| Total | n=30 | 0-64 | 20-61 | 42.13 | 9.65 | | |
| **Medical control** | | | | | | | |
| Higher adherent | n=15 | 0-40 | 8-27 | 15.6 | 6.76 | | |
| Lower adherent | n=15 | 0-40 | 8-27 | 17.4 | 6.82 | | |
| Total | n=30 | 0-40 | 8-27 | 16.5 | 6.73 | | |

disability in adults in the economically developed countries (15), highlighting the relevance of providing eye-care recommendations. Also, it should be explained to the patients that even if they are not currently smoking or drinking, these habits may worsen the diabetic condition.

## Adherence

For all areas except that of exercise, the adherence was good. That diet adherence was good is not in keeping with the findings of Kravitz et al (5), who found that patients experienced great difficulty with the dietary aspects of the treatment regimen. A high adherence to medication intake was seen in this study. Studies have shown that insulin administration was associated with compliance rates greater than 90% (12,16,17). This regimen area is emphasized most by physicians. Also, the higher level can be explained by adherence bringing about symptomatic relief. Patients received few recommendations on foot care that explains the moderate adherence to foot- care. Adherence to exercise recommendations was the lowest, with lower adherent patients demonstrating a significantly lower level of adherence than their higher adhering counterparts. This finding is supported by previous research (18) where it was noted that only 53% of NIDDM patients adhered to exercise prescriptions and that too only 50% of the time. Exercise demands motivation and is time consuming. Diabetologists need to encourage patients, especially the lower adhering ones, to engage in exercise that is both rewarding and feasible.

## Knowledge

Patient hospitalizations for uncontrolled diabetes are often attributed to deficiencies in diabetes knowledge and inappropriate self - care behaviors (19). In the current study, however, no significant difference between the higher and lower adherent patients emerged. Only 15% of the patients received systematic education regarding diabetes that could account for the barely average information possessed by the patients. Lack of information about the type of diabetes they have, may lead to patients misinterpreting the information that they come across. The alarming ignorance about carbohydrate-rich foods can result in an inappropriate consumption of the same and further complications. Confusion between the symptoms of hypoglycemia and hyperglycemia may cause patients to take inappropriate action with serious adverse effects to their health.

Overall, patients were not very well equipped in terms of their ability to deal with diabetes-related emergency/problem situations. Inadequate information about food exchanges may have adversely affected the decision-making ability regarding the needed action, if they felt hungry after a meal. Poor information about the function of oral hypoglycemics and lack of exposure to an “overdose” situation may have prevented them from even imaginatively developing strategies for the same. No patients indicated that they would obtain from the doctor in advance, alternative medicines which they could consume, in case the usual medicine was not available; a possible situation in outstation travel.

A sizeable amount of higher adherent patients received information from very reliable sources (their diabetologists). However, information requirements still existed in the area of diet at parties/travel and differentiation between the symptoms of hypoglycemia and hyperglycemia. Tempting food and unknown caloric content of food items at parties and the inconvenience of following dietary recommendations during travel are problems to be addressed. Failure to recognize hypoglycemia or hyperglycemia may cause helplessness or inappropriate action.

## Family Support

Literature support for the view that family functioning is related significantly to regimen adherence or glycemic control is available (4). In the current study, no significant difference between higher adherent and lower adherent patients emerged. Patients perceived a fairly good and highly satisfactory family support. Changes in certain lifestyle patterns of the family members, such as reducing intake of oily and sweet foods and increasing intake of salads, made the adherence of the diabetic patient easier. A few patients wanted their family members to help with household chores and a few others wanted them to display firmness. Help with household chores not only reduces stress and fatigue but also provides more time to engage in recommended exercise. For those individuals who are dependent and have less adequate control from

within, perhaps having family members who are firm with them could be a facilitating factor.

### Patient- Provider Interaction

Patients perceived a very good patient- provider interaction. Diabetic patients need encouragement and understanding in order to help them continue to adhere to the complicated regimen. The reassurance and understanding provided by the diabetologists to the patients, could have helped them in the management of their diabetes .The few patients with unmet expectations from their diabetologists, about blood sugar control, need to be explained that blood glucose levels can fluctuate, due to various reasons such as stress, infection or unsuitable medication and that metabolic states are not always directly within the doctor's control.

### Beliefs and Attitudes

Patients believed that they were less vulnerable to diabetic complications than other patients, perhaps because they were adhering to the treatment regimens fairly well. Since diabetics have a higher risk of micro and macro vascular complications than the general population, patients should be educated about various diabetic complications, the risks of developing them, the consequences in terms of lowered quality of life and the need for vigilance regarding the same (15).

In diabetes, beliefs about disease seriousness have been predictive of dietary behavior and physical activity. Increasing research suggests that the patients' implicit illness beliefs are fundamental in guiding their behavior. Alogna's (6) study showed that compliant patients perceived their diabetes as more severe although they did not have more complications than the non-compliant patients. However, there was no significant difference between the two groups in the present study. The patient's beliefs about disease severity were fairly high in the present study, implying that they believed that diabetic complications were very serious and recognized that the severity of the disorders were heightened in a diabetic person.

It was rewarding to learn that patients believed that the treatment was fairly cost effective with the benefits outnumbering the barriers of treatment. Patients, however, mentioned difficulties sticking to the diet while eating out. In addition, lower adherent patients found it difficult to find time for exercise. Helping patients with self-control strategies would help them resist food temptations in social situations. Getting patients to manage time more effectively and to work around practical constraints, to devote some time to exercise, is a worthwhile objective.

Patients believed that most of the health outcomes were within their control. Believing that outcomes are within one's control encourages the person to change his/her behavior to achieve a more positive outcome. The lower adherent patients as compared with their higher adherent counterparts placed their locus of control on outside circumstances and situations. Helping such patients to redirect control to self is relevant.

### Conclusions

- With respect to self care recommendations, diabetologists need to be informed that in addition to the recommendations that they usually give, they need to give recommendations in the areas of foot-care, eye-care, food exchanges, foods rich in carbohydrates, and precautions to be taken while exercising.

- A rewarding finding of the study was the very favorable perception of family support and doctor-patient interaction and that health outcomes were perceived as being generally under one's control. A not so heartening finding is the average information and comprehension scores. Diabetologists need to organize patient education programmes that not only present theoretical input but also help patients in developing strategies for solving problems in real - life situations.

- The current study has not found any differences between higher and lower adherent patients in terms of the four factors studied. Since the study focused on patients visiting only three private clinics, included a relatively small sample size and consisted of two patient groups that were not sharply contrasted, no generalization can be made regarding the findings of the current study. Further investigation in this area is very relevant. Research efforts can also be directed towards assessing other factors that may influence adherence, such as personality variables (self efficacy, conscientiousness, coping styles and so forth).

## ACKNOWLEDGEMENT

We acknowledge the support provided and the co-operation extended by Dr. V. S. Ajgaonkar, Dr. D. G. Dalal and Dr.T. Shah in conducting this research. Without their help and the use of their patient data, this research would not have been possible.

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