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Problems Associated with Insulin Administration Among Patients with Type 2 Diabetes Mellitus

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Abstract: ***Prevalence of diabetes is on the rise globally. Disparity in the availability and affordability of diabetes care, as well as low awareness of the disease and a lack of good glycemic control increases the burden of the disease. Insulin therapy is the corner stone of treatment of type 2 diabetes and goes a long way in achieving glycemic control. However, several issues have been identified with insulin administration. This study aims to identify the problems of patients on insulin injection. A cross sectional survey was done on 300 type 2 diabetes mellitus patients on problems associated with insulin administration in a tertiary care hospital in Kerala, South India. Objectives were to identify the problems of patients on insulin administration and to correlate the duration of insulin administration with the problems. Among the physical problems reported, 31% of subjects had tenderness, 22.3% of subjects had colour change at the insulin injection site, 19% of subjects had fatigue and 7.3% of subjects had itching at the insulin injection site. Majority of subjects (95.7%) had mild physical problems related to insulin injection and 4.3% had moderate physical problems (mean 16.5± SD 5.3) Among psychosocial problems, it was noted that 62% of them avoided carrying insulin during travel, where as 40.7% of subjects never used to skip long trips due to difficulty in taking insulin injections while travelling. Family members were supportive about insulin administration in 85.3% of subjects. Majority (45.3%) of subjects did not feel that they were a financial burden for the family. Majority (61.6%) were not worried about repeated insulin injections and possible complications if insulin injection is skipped. Only 43% were worried about low blood sugar levels while they are on insulin. Majority (62%) of patients had moderate level of psychosocial and financial problems associated with insulin administration, where as 34.3% had mild problems and 3.7% had severe problems (mean 16.5± SD 5.3). The study revealed that there is a significant correlation between duration of insulin administration and problems associated with insulin administration (p< 0.01)***

Keywords: Insulin administration, Type 2 Diabetes Mellitus, Physical problems, Psychological problems.

1. Introduction

The prevalence of diabetes is rising all over the world due to population growth, aging, urbanisation and an increase of obesity and physical inactivity. The International Diabetes Federation (IDF) estimates the total number of people in India with diabetes to be around 50.8 million in 2010, rising to 87.0 million by 2030. Disparity in the availability and affordability of diabetes care, as well as low awareness of the disease, lower age at onset and a lack of good glycemic control are likely to increase the occurrence of vascular complications causing a heavy economic burden for diabetic patients themselves, their families and society. The goals of management in people with diabetes are to provide relief of symptoms, improvement in quality of life, and prevention of complications. The non pharmacological management of diabetes includes dietary management, physical activity and stress management. Pharmacological management includes oral hypoglycemic agents and insulin therapy

Insulin therapy is the corner stone of treatment of type 2 diabetes. Despite evidence documenting benefits of insulin therapy in achieving glycemic control and reducing risk of long term diabetes complications,[1] insulin therapy remains underutilized[2] with only 29% of adults with diabetes in United States using insulin.[3] Several issues has been identified with injection administration technique .All these issues can affect pain and bruising, insulin absorption and blood glucose levels.[4] This study aims to identify the problems of patients on insulin injection.

2. Statement of the Problem

A cross sectional survey on problems associated with Insulin administration among patients with type 2 diabetes mellitus in a tertiary care hospital in Trivandrum district, Kerala, South India.

Objectives

1)To identify the problems of patients on insulin injection.
2)To correlate the duration of insulin administration with problems associated with insulin administration.

Operational definitions

1)Patients with Type 2 diabetes mellitus-Refers to males and females who are diagnosed as Type 2 diabetes mellitus by a physician, with the disease duration for more than a year and receiving insulin injection.
2)Problems associated with insulin injection- It refers to physical problems and psychosocial problems assessed using questionnaire and interview.

Hypothesis

There is a significant correlation between duration of insulin administration and problems associated with insulin administration.

3. Materials and Methods

The investigator adopted Quantitative approach for this study. The design selected was descriptive cross sectional design .The research variables are physical problems and psychosocial problems associated with insulin administration and duration of insulin administration. A tertiary care hospital was the setting. Subjects were selected randomly from the diabetes registry and their problems related to insulin administration were studied. Population of this study is all adults with type 2 diabetes mellitus who are on insulin. Males and females with type 2 diabetes mellitus for more than a year after first diagnosis and receiving insulin injection were included in the study. Those with cognitive impairment were excluded.

Sample size was calculated based on data from National Health Interview Survey (2007-2009). According to National Health Interview Survey, about 26% of people are on insulin injection in India. Based on this calculated sample size were 284. Taking into consideration an attrition rate of 10%, sample size was fixed as 300.

Tool was prepared by reviewing literature and in discussion with experts. Tool was translated to local language with the help of a language expert and was retranslated to English. Test re test reliability was done. Correlation coefficient was found to be 0.7. Demographic data, disease related data, physical problems related to insulin administration and psychosocial problems related to insulin administration were assessed using questionnaire.

Data was collected from among patients attending diabetic clinic OPD. Those fulfilling selection criteria were randomly selected using random number table method. A written informed consent was obtained. Confidentiality was assured.

4. Results

4.1 Demographic Data

Majority (49%) of subjects receiving insulin were of the age 51-70 years. 34.3 % of subjects were in the age group 35-50 years and 16.7% were above 71 years. Of the total subjects studied, 50% were males and 50% females. Majority (72.33%) of subjects was Hindus and 23% of subjects were Muslims. Majority (54.7%) of them had primary education and 36.7% of them had secondary education. Majority (64.7%) of subjects were currently unemployed, 17.7% of subjects were employed and 56.3% of subjects had a monthly income less than rupees 5000.

Clinical Data

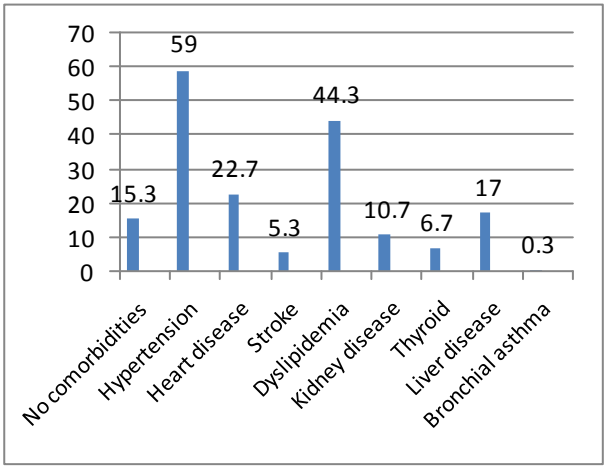

Figure 1: Associated Comorbidities

Majority (59%) of subjects had hypertension and 44.3% had dyslipidemia as co morbidity.

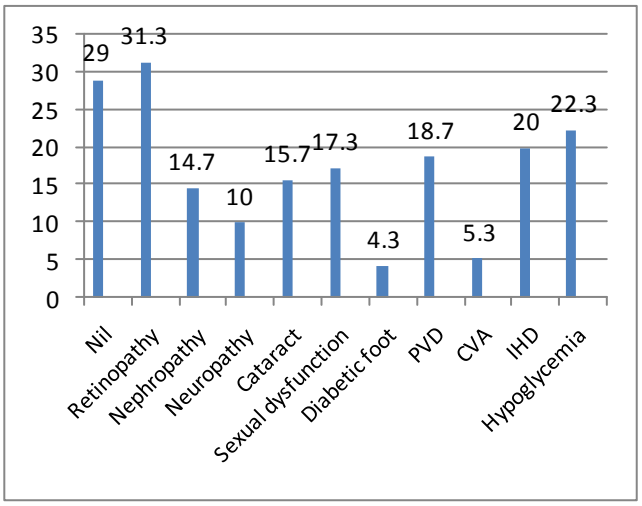

Figure 2: Diabetes related complications

Retinopathy (31.3%) and hypoglycemia (22.3%) were the most common complications reported among patients on insulin injection. However 29% reported that they did not have any complications of diabetes mellitus

Table1: Family history and exercise pattern

Characteristics	Frequency (f)	Percentage (p)
Family history		
Father is diabetic	64	22.3
Mother is diabetic	37	12.3
Both parents are diabetic	38	12.7
Siblings are diabetic	64	21.3
No family history of diabetes	114	38
Exercise		
Never	96	32
Occasionally	35	11.5
Regularly	77	25.7
Household works only	92	30

Majority (38%) of subjects had no family history of diabetes mellitus. Only 25.7% of subjects had habit of doing exercise regularly.

Table2: Duration of diabetes mellitus and insulin therapy

Characteristics	Frequency (f)	Percentage (p)
Duration of diabetes mellitus		
1-5 yrs	44	14.7
5-10 yrs	91	30.3
10-15 yrs	57	19
>15 yrs	108	36
Duration of insulin therapy		
1-3 yrs	150	50
4-6 yrs	86	28.7
>6 yrs	64	21.3

Majority (36%) of subjects had duration of diabetes mellitus for more than 15 yrs and 50 % of them started insulin therapy only in the past 1- 3yrs.

Table 3: Type and method of insulin injection

Characteristics	Frequency(f)	Percentage(p)
Types of insulin		
Rapid acting	23	7.7
Short acting	1	0.3
Intermediate acting	265	88.3
Long acting	11	3.7
Method of insulin injection		
Insulin syringe	254	84.7
Insulin pen	43	14.3
Both	3	1

Intermediate acting insulin was mostly used (88.3%) and insulin syringe was the most preferred method of injection (84.7%)

Physical Problems

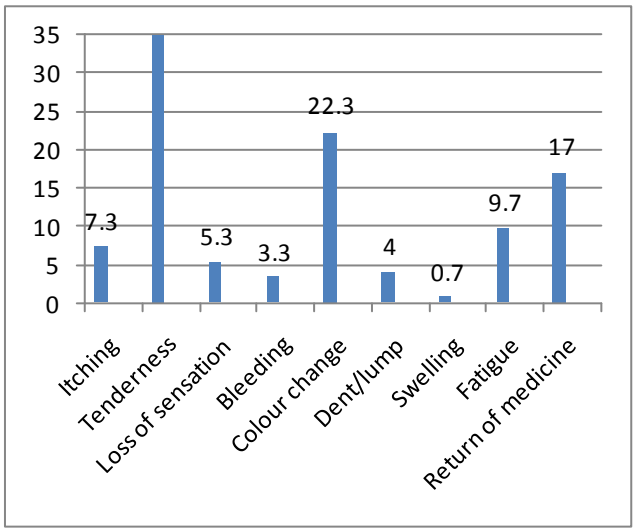

Figure 3: Physical problems

Tenderness (31%) and colour change at the insulin injection site (22.3%) are the most frequently experienced problems. 19% of subjects had fatigue and 7.3% of subjects had itching at the insulin injection site.

Psychological Problems

Majority (40.7%) of subjects never used to skip long trips due to difficulty in injecting insulin. About 62% of them avoided carrying insulin while travelling. 42% of subjects used to attend unavoidable family functions and 32.7% of subjects never used to skip parties due to difficulty in taking insulin injections. Majority (53.3%) of subjects used to take insulin injection by self and 44.7% of subject's family members were aware of the importance of the insulin injection. In 85.3% of subjects family members were supportive. Majority (45.3%) of subjects felt that they were not a financial burden for the family.

Table 4: Distribution of subjects according to their perception about recurrent injections and possible blood sugar fluctuations

Characteristics	Frequency(f)	Percentage(p)
Perception about repeated injections and possible complications if skipped		
Not worried	185	61.6
Worried	115	38.4
Perception about low blood sugar levels		
Not worried	171	57
Worried	129	43

Majority (61.6%) were not worried about repeated insulin injections and possible complications if insulin injection is skipped. Only 43% were worried about low blood sugar levels while they are on insulin.

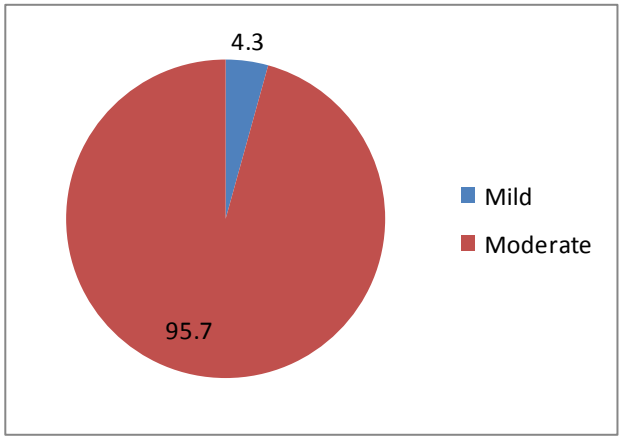

Figure 4: Distribution of subjects according to severity of physical problems associated with insulin injection

Out of maximum score of 9, 95.7% of subjects acquired a score between 0 to 3 which revealed that majority of subjects had mild physical problems related to insulin injection and 4.3% of patients acquired a score between 4 to 6 which showed that they had moderate physical problems (mean 16.5± SD 5.3)

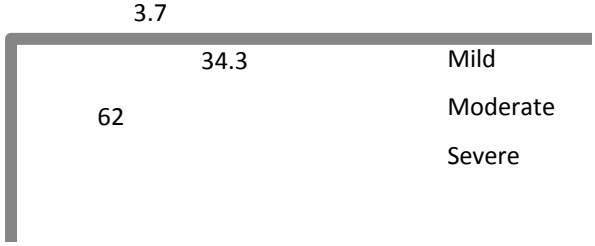

Figure5: Distribution of subjects according to severity of psychosocial and financial problems associated with insulin injection

Out of total score of 38, majority (62%) of patients acquired a score between 13 to 25 which revealed that they had moderate level of psychosocial problems associated with insulin administration. 34.3% of patients acquired a score between 0 to 12 showing that they had mild problems and remaining 3.7% of patients scored between 26 to 38 and revealed to have severe problems (mean 16.5 ± SD 5.3)

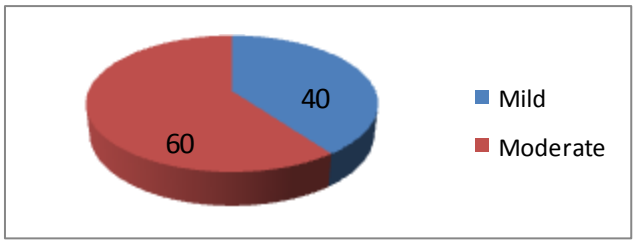

Figure 6: Distribution of subjects according to severity of overall problems

Out of total score of 47, majority (60%) of patients had scored between 16 to 31 which revealed that they had moderate problems and remaining 40% of patients acquired a score between 0 to 15 which showed that they had mild problems associated with insulin administration (mean 17.5 ± SD 5.8)

Table 5: Correlation of the duration of insulin administration and the problems associated with insulin administration

Problem	Correlation	P value
Physical problems and duration of insulin therapy	0.051	0.382
Psychological problems and duration of insulin therapy	0.252**	0.000
Overall problems and duration of insulin therapy	0.242**	0.000

Study revealed that psychological problems are more than physical problems. It was found that there is a significant correlation between duration of insulin administration and problems associated with insulin injection.

5. Discussion

Present study revealed that the physical problems associated with insulin injection were minimal with majority of them reporting tenderness at the site of injection as their major problem [5]. A study conducted on insulin injection practices showed that 65% of patients had injection site problems. It can be concluded that patients need skill development on insulin administration techniques and need to be given opportunity for hands on training to minimize the insulin injection site problems.

Majority of subjects avoided carrying insulin vial while travelling. It was also found that the disease never hindered them from undertaking long trips or parties. This shows that majority of them used to skip insulin doses during those days and was not worried about changes in blood sugar levels that it may bring about. This supports the results of a study in US which showed that patients intentionally omit insulin doses due to interference with daily activities, injection, pain and embarrassment [6]. Several studies shows that decreased insulin regimen compliance among patients with diabetes mellitus leads to inadequate glycemic control [7].Hence it is essential to emphasis compliance to insulin therapy for better glycemic control.

The present study revealed that there is a significant correlation between duration of insulin injection and problems associated with insulin injection. It shows that patients on insulin injection for a longer duration are at higher risk for developing problems related to insulin injection. This can be minimized by following correct insulin injection techniques, proper site rotation, single use of needles and regular self site checkups.

6. Recommendations

On the basis of the findings of the study, the following recommendations were made

- The study can be conducted on a large sample and in multiple settings so that findings can be generalized
- An observational study on insulin administration techniques can be done in home setting
- An experimental study can be conducted on the effect of training package on insulin administration techniques

7. Conclusion

The following conclusions were made based on the findings of the study.

- Majority of subjects had moderate level of problems associated with insulin injection
- There is a significant correlation between duration of insulin injection and problems associated with insulin injection.

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