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Original article:

Study of prevalence of infections in type 2 Diabetes Mellitus

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Abstract

Introduction: Diabetes mellitus has become a significant medical concern due to its cumulative prevalence globally.It is cate gorized into non-communicable diseases.[1]Infections play an important role in morbidity & mortality of patient with type 2 DM

Methodology: 100 patients with Type 2 Diabetes Mellitus with infections were included in the study. Following their voluntary informed consent, patients were included in the study.

Results : It was observed that 24 (24%) cases had Urinary Tract infections, 16 (16%) cases had skin infections, 14 (14%) cases had wound infections, 16 (16%) cases had Pneumonia Including COVID-19, 6 (6%) cases had Oral Candidiasis, 3 (3%) cases had periodontitis, 11 (11%) cases had gastrointestinal infections, 4 (4.0%) cases had Sepsis, 3 (3%) cases had tuberculosis and 3 (3%) cases had ear infection. It was observed that 56 (56%) cases had bacterial infections, 12 (12%) cases had fungal infections, 14 (14%) cases had viral infections and 18 (18%) cases had mix infections.

Conclusion: Based on our findings, we conclude that urinary tract infections followed by skin infections and respiratory infections are common infections observed in cases with Type 2 diabetes mellitus. The bacterial infection was observed in maximum number of cases (56%).

Keywords: Diabetes mellitus , bacterial infection , COVID-19

Introduction:

Diabetes mellitus has become a significant medical concern due to its cumulative prevalence globally.It is categ orized into non-communicable diseases.[1]Infections play an important role in morbidity & mortality of patient with type 2 DM.[2] Strong proof suggests to a key role of microbes in DM, being an infectious agent related with the diabetic status and as likely causal factor of DM. DM-related infections include bacteria, viruses, fungi, parasites and prions.[3]Studies have shown that lymphocyte, monocyte and neutrophil function defects are the cause of increased infections in diabetics.[4] Decreased levels of leukotriene, thromboxane B2 and prostaglandin E are other causes.[5] Studies revealed diminished phagocytosis by monocyte and reduced lymphocyte function in diabetics.[6] Infections may lead to metabolic imbalances and contrariwise, the metabolic imbalances of diabetes may lead to infection..[7,8]

Material and methods:

The present study was conducted in the Dept. of General Medicine, Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune. The total period of study was spread over 2 year 2 months from August 2018 to September 2020. After collection of data, the data entry forms were checked for their completeness and missing, and incomprehensible data was rechecked from the respective participant profile. Data entry was done in MS Excel data sheet. The data cleaning and the retrieval of the missing data were done. The collected data was analysed, and the report writing was completed.

100 patients with Type 2 Diabetes Mellitus with infections were included in the study. Following their voluntary informed consent, patients were included in the study.

Inclusion criteria

- Patients of type 2 Diabetes Mellitus irrespective of age.

Exclusion criteria

- Type 1 Diabetes mellitus
- Prolonged Steroid therapy
- Diabetes mellitus on anti-cancer therapy
- HIV

Study Tools

Based on the review of literature, a predesigned semi-structured questionnaire was prepared on infections in type 2 diabetes mellitus.

Results:

It was seen that 29 (29%) cases were between 41 to 50 years, 41 (41%) cases were between 51 to 60 years, 22 (22%) cases were between 61 to 70 years of age and 8 (8%) cases were above 70 years of age.

Mean age of the patients was 52.4 year (standard deviation 10.6 years). Age of the patients ranged from minimum 42 year to maximum 77 year.

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Mean age of the patients was 52.4 year (standard deviation 10.6 years). Age of the patients ranged from minimum 42 year to maximum 77 year.

It was observed that mean weight of cases was 72.5 ± 14.6 kg, mean height of cases was 156.7 ± 17.4 cm, mean BMI of cases was 28.1 ± 6.4 and mean WHR of cases was 1.08 ± 0.22.

Table 1: Distribution of study subjects according to BMI categories

BMI Categories	Frequency	Percent
Normal BMI (18.50-24.9)	12	12.0
Overweight (25.0 – 29.9)	48	48.0
Obese (More than 30)	40	40.0
Total	100	100.0

The above table shows distribution of cases according to BMI categories. It was observed that 12 (12%) cases were Normal BMI (18.50-24.9), 48 (48%) cases were Overweight (25.0-29.9) and 40 (40%) cases were Obese (More than 30.0).

Table 2: Duration of diabetes mellitus

Duration	Frequency	Percent
0-4 years	11	11.0
5-9 years	52	52.0
10-14 years	27	27.0
15 years and above	10	10.0
Total	100	100.0

The table above displays distribution of cases according to duration of diabetes mellitus. It was observed that 11 (11%) cases were 0-4 years, 52 (52%) cases were 5-9 years, 27 (27%) cases were 10-14 years and 10 (10%) cases were 15 years and above.

Table 3: Distribution of study subjects according to Waist Hip Ratio Risk Category

Waist Hip Ratio Risk Category	Frequency	Percent
Normal Cardiac Risk (<0.9 for M and <0.85 for F)	23	23.0
Increased Cardiac Risk (≥0.9 for M and ≥0.85 for F)	77	77.0
Total	100	100.0

The above table shows distribution of cases according to Waist Hip Ratio Risk Category. It was observed that 23 (23%) cases were having normal cardiac risk (<0.9 for M and <0.85 for F) and 77 (77%) cases were having increased cardiac risk (≥0.9 for M and ≥0.85 for F).

Table 4: Distribution of cases according to laboratory profile

Variable	N	Minimum	Maximum	Mean	SD
Fasting Blood Sugar	100	134	193	156.4	17.64
Post Prandial	100	212	286	234.2	22.38
HbA1c	100	6.5	13.0	9.21	3.81
HDL	100	37	49	43.42	7.91
LDL	100	133	221	174.21	23.54
Triglyceride	100	151	242	189.57	24.73
Cholesterol	100	177	278	204.51	26.72

The above table shows distribution of cases according to laboratory parameters. It was observed that mean fasting blood sugar of cases was 156.4 ± 17.64 g/dl, mean post prandial BSL of cases was 234.2 ± 22.38 g/dl, mean HbA1c of cases was 9.21 ± 3.81 %, mean HDL of cases was 43.42 ± 7.91 mg/dl, mean LDL of cases was 174.21 ± 23.54 mg/dl, mean Triglyceride of cases was 189.57 ± 24.73 mg/dl and mean cholesterol of cases was 204.51 ± 26.72 mg/dl.

Table 5: Distribution of cases according to microvascular complications

Microvascular Complications	Frequency	Percent
Present	41	41.0
Absent	59	59.0
Total	100	100.0

The above table shows distribution of cases according to microvascular complications. It was observed that 41 (41%) cases had microvascular complications while 59 (59%) cases did not have microvascular complications.

Table 6: Distribution of cases according to type of Microvascular Complications

Microvascular Complications	Frequency	Percent
CKD	4	9.8
Microalbuminuria	16	39.0
Retinopathy	8	19.5
Peripheral neuropathy	7	17.1
Autonomic neuropathy	3	7.3
Erectile dysfunction	3	7.3
Total	41	100.0

The above table shows distribution of cases according to type of Microvascular Complications. It was observed that 4 (9.8%) cases had Chronic Kidney disease, 16 (39.0%) cases had Microalbuminuria, 8 (19.5%) cases had Retinopathy, 7 (17.1%) cases had Peripheral neuropathy, 3 (7.3%) cases had Autonomic neuropathy and 3 (7.3%) cases had erectile dysfunction.

Table 7: Distribution of cases according to type of infections

Infections	**Frequency**	**Percent**
Urinary Tract infections	24	24.0
Skin infections	16	16.0
Wound infection	14	14.0
Pneumonia Including COVID-19	16	16.0
Oral Candidiasis	6	6.0
Periodontitis	3	3.0
Gastrointestinal infections	11	11.0
Sepsis	4	4.0
Tuberculosis	3	3.0
Ear infection	3	3.0
Total	100	100.0

The above table shows distribution of cases according to type of infections. It was observed that 24 (24%) cases had Urinary Tract infections, 16 (16%) cases had skin infections, 14 (14%) cases had wound infections, 16 (16%) cases had Pneumonia Including COVID-19, 6 (6%) cases had Oral Candidiasis, 3 (3%) cases had periodontitis, 11 (11%) cases had gastrointestinal infections, 4 (4.0%) cases had Sepsis, 3 (3%) cases had tuberculosis and 3 (3%) cases had ear infection.

Table 8: Distribution of cases according to group of infection

Infections	Frequency	Percent
Bacterial infection	56	56.0
Fungal infection	12	12.0
Viral Infection	14	14.0
Mix infection	18	18.0
Total	100	100.0

The above table shows distribution of cases according to group of infections. It was observed that 56 (56%) cases had bacterial infections, 12 (12%) cases had fungal infections, 14 (14%) cases had viral infections and 18 (18%) cases had mix infections.

Table 9: Comparison of type of infections with HbA1c level

Infections	**HbA1c level**			
	6.5 – 8.0	**8.0 – 10.0**	**Above 10**	**Total**
Urinary Tract infections	12	7	5	24
Skin infections	9	5	2	16
Wound infection	5	6	3	14
Pneumonia Including COVID-19	4	10	2	16
Oral Candidiasis	3	1	2	6
Periodontitis	1	2	0	3
Gastrointestinal infections	6	4	1	11
Sepsis	0	1	3	4
Tuberculosis	1	2	0	3
Ear infection	1	2	0	3
Total	42	40	18	100

Discussion:

In the present study, it was seen that 29 (29%) cases were between 41 to 50 years, 41 (41%) cases were between 51 to 60 years, 22 (22%) cases were between 61 to 70 years of age and 8 (8%) cases were between above 70 years of age. In the study conducted by Ali Abdulelah Alhabobi et al., [9] it was seen that 9 (3%) cases were less than 20 years, 32 (10.7%) cases were between 20 – 40 years, 156 (52%) cases were between 40 - 60 years of age and 103 (34.3%) cases were between above 60 years of age. In the present study, out of 100, 59 (59%) cases were male while remaining 41 (41%) cases were female. The ratio of male to female is 1.4:1. In the study conducted by Ali Abdulelah Alhabobi et al.,[9] 214 (71.3%) cases were male while remaining 86 (28.7%) cases were female. The ratio of male to female is 2.5:1.

In the present study, it was observed that 12 (12%) cases were Normal BMI (18.50-24.9), 48 (48%) cases were Overweight (25.0-29.9) and 40 (40%) cases were Obese (More than 30.0). In a study done by Wani FA et al., [10] 30 (30%) cases were Normal BMI (18.50-24.9), 50 (50%) cases were Overweight (25.0-29.9) and 20 (20%) cases were Obese (More than 30.0). In my study, there were more participants in overweight and obese group as compared to study conducted by Wani FA et al. [10]

In the present study, it was observed that mean fasting blood sugar of cases was 156.4 ± 17.64 g/dl, mean 2 hour blood sugar of cases was 234.2 ± 22.38 g/dl, mean HbA1c of cases was 9.21 ± 3.81 %, mean HDL of cases was 43.42 ± 7.91 mg/dl, mean LDL of cases was 174.21 ± 23.54 mg/dl, mean Triglyceride of cases was 189.57 ± 24.73 mg/dl and mean cholesterol of cases was 204.51 ± 26.72 mg/dl. In the study conducted by Ali

Abdulelah Alhabobi et al.,[9] 144 (75.8%) cases had HbA1c level more than 7 while 46 (24.2%) cases had HbA1c level less than 7. In the present study, it was observed that 41 (41%) cases had microvascular complications while 59 (59%) cases did not have microvascular complications. In the study conducted by Waseem Abu-Ashour et al.,[12] it was observed that 29 (1.6%) cases had microvascular complications.

In the present study, it was observed that 24 (24%) cases had Urinary Tract infections, 16 (16%) cases had skin infections, 14 (14%) cases had wound infections, 16 (16%) cases had Pneumonia Including COVID-19, 6 (6%) cases had Oral Candidiasis, 3 (3%) cases had periodontitis, 11 (11%) cases had gastrointestinal infections, 4 (4.0%) cases had Sepsis, 3 (3%) cases had tuberculosis and 3 (3%) cases had ear infection.. In the study conducted by Ali Abdulelah Alhabobi et al., [9] it was observed that 26.3% cases had Urinary Tract infections, 23.0% cases had skin infections, 12.7% cases had wound infections, 4.7% cases had Pneumonia, 7.3% cases had Oral Candidiasis, 2.0% cases had HBV infections, 0.7% cases had HCV infections, 0.3% cases had sepsis, 0.3% cases had tuberculosis and 0.3% cases had ear infection. In the present study, it was observed that 56 (56%) cases had bacterial infections, 12 (12%) cases had fungal infections, 14 (14%) cases had viral infections and 18 (18%) cases had mix infections. In the study conducted by Ali Abdulelah Alhabobi et al., [9] it was observed that 46.7% cases had bacterial infections, 12.0% cases had fungal infections, 4.7% cases had viral infections and 21% cases had serious infections.

Conclusion:

Based on our findings, we conclude that urinary tract infections followed by skin infections and respiratory infections are common infections observed in cases with Type 2 diabetes mellitus. The bacterial infection was observed in maximum number of cases (56%). This was followed by mix infections and viral infection. The infections were observed with higher level of HbA1c in blood. The most common age group was 51 – 60 years and male gender. All elderly diabetic patients should be screened for oral hygiene to prevent dental infections.

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