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A COMPARISON STUDY OF INFECTIONS AMONG CONTROLLED AND UNCONTROLLED GLYCEMIA AMONG TYPE II DIABETES PATIENTS

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ABSTRACT

The risk of infection among diabetic patients appears to be independent of age, sex and comorbidity. There are data suggesting patients with diabetes are at increased risk for infections. During the last few years, there has been increasing incidence of infections in diabetic individuals with diabetic complications due to opportunistic infections. The study was carried out to evaluate the rate of infections and the bacterial profile in uncontrolled and controlled glycemia associated with type2DM. Hospitalized patient samples were collected. These samples obtained from patients were subjected to culture and sensitivity. A data entry form was prepared to collect data pertaining to the demographics and clinical laboratory investigations of the patients and statistical analysis were done using Chisquare test and Microsoft excel programme. The results obtained showed an increased rate of infection among men with uncontrolled glycemia. Skin and urinary tract infection were the most common infections among type2DM patients. Gram negative organisms were mostly present in the culture. Most patients with infections were on irregular medication. The study concluded that uncontrolled glycemia were associated with increased rate of infections.

Key words: Hospitalized patient, Opportunistic infections, Diabetes mellitus.

INTRODUCTION

Diabetes mellitus (DM) is the most common, debilitating, chronic, attenuating endocrine disease that results in increased public health and clinical problems. The risk of infection among diabetic patients appears to be independent of age, sex and comorbidity. There are data suggesting patients with diabetes are at increased risk for infections. During the last few years, there has been increasing incidence of infections in diabetic individuals with diabetic complications due to opportunistic infections [1-5]. The infection leads to the early development of complication even after a trivial trauma, the disease progresses and becomes refractory to antibacterial therapy [6]. The alarming fact is that India has more people with diabetes than any other country and the incidence of foot problems and amputations remains very high, accounting for up to 20% of diabetes-related hospital admissions [7-8]. There are evidences of bacteremia arising in diabetics, although in some areas the evidence is still scanty. Infections in diabetic population can be intense and deadly masque by chronic complications leading to late perception and medical addressability. Most individuals with T2D can manage their illness with perfect lifestyle, food practices etc. They are called as controlled diabetics while other subjects are diagnosed with uncontrolled state of the disease with obesogenic environment, probability of socioeconomic status, depression, race and hypertension [9,10]. Uncontrolled diabetics have been proved to be the source of major complications affecting heart and blood vessels. High sugar concentration damages capillaries causing neuronal defect. This affects different organs such

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as heart, kidney, eye, teeth, digestive system etc., [11,12]. Uncontrolled diabetes is more painful and needs an expensive treatment [13]. Under these circumstances the present study was conducted to evaluate the rate of infections and bacterial profile among uncontrolled and controlled glycemia associated with type 2 DM.

METHODOLOGY

An observational study was conducted at Karuna medical college Vilayodi, Chittur for a period of 6 months (November 2016- April 2017). The study was designed to evaluate the microbial spectra in the skin infections of hospitalized diabetic infections. Hospitalized patients pus samples were collected. These samples obtained from patients were subjected to culture and sensitivity. A data entry form was prepared to collect data pertaining to the demographics and clinical laboratory investigations of the patients. Patients who met the study protocol were included and the required data were collected from inpatient medical records and the obtained data were evaluated. All patients with type 2 DM presenting with skin infections admitted in the hospital were enrolled in the study. Those patients who did not have type 2 DM and were unwilling to participate were excluded. Immune compromised patients and undergoing chemotherapy and on immunosuppressants were excluded from the study (Controlled Type-2 Diabetes -FBS $\leq$ 120, PPBS $\leq$ 160, HbA1c<7; Uncontrolled Type-2 diabetes -FBS $\geq$ 120, PPBS $\geq$ 160, HbA1c>7). Statistical analysis were done using Chi square test and Microsoft Excel programme.

RESULTS AND DISCUSSION

A total of 150 patients were enrolled in the study after meeting the inclusion and exclusion criteria. In the total study population majority of the patients were from the age group of 50-60 years. It was followed by age group of 60-70years. The age group below 50 years and above 70 showed less number of patients. The rate of infection declined in above 80 years of age. The duration of Diabetes ranged from 1-20 yrs. More number of patients was found with duration of diabetes since 1-5 years (25%).

Out of the total 150 patients 97 were classified as uncontrolled and 53 as controlled glycemics (Table 1). The uncontrolled glycemics had more infections compared to the glycemics. Hyperglycemia proved to be one of the high risk factor for infections to occur. In the uncontrolled group 68 were males and 16 were females and 29 males and 37 females in controlled group(figure 1) (P<0.001). Altogether we had found males with T2DM had more infections compared to females with T2DM. this can be due to the fact that males have more addictions than females. Alcohol and smoking are causes for delayed wound healing, poor blood flow and infections.

Skin and soft tissue infections(48%) and urinary tract infections(28%) were the most common among T2DM patients. Skin infections were present more in uncontrolled glycemia whereas UTI in controlled glycemics(figure 2). Males were mostly affected with soft tissue infections which can be due to factors like smoking and alcoholism which inturn causes poor blood flow resulting in an increased infection rate and delayed healing. Females were mostly affected with UTI and were mostly asymptomatic. Uncontrolled glycemia in females often resulted in complicated UTIs and required hospital admission. Respiratory and gastrointestinal infections were less compared to the others.

Gram negatives (55.4%) were more more common among diabetic paients. Gram positive organisms were found to be more associated with uncontrolled glycemia and gram negatives were more associated with controlled glycemia (figure 3) (P= 0.011). Foot ulcer was the most common skin infection and lower urinary tract was most affected. S.aureus was the predominant gram positive organism and was present only in skin infection followed by Enterococcus which was present in both skin and urinary tract infections. E.coli was the predominant gram negative organism and was present in both skin and urinary tract infections; but was more in UTI. Other organisms isolated were P.mirabilis, P.aeroginosa, K.pneumonia, P.vulgaris and Shigella species.

Among the total patients 52% were on irregular medication (Table 2). Among them 68% had uncontrolled glycemia. Among the patients taking regular medication 61% had uncontrolled glycemia (P = 0.381). Most patients were found to be on monotherapy (Metformin tablet 500mg twice daily). Seventy five percent patients with infection having poor glycaemic control had initiation of insulin therapy. Patients reported with irregular treatment had stopped taking medication without physician's knowledge and had no regular glycemic monitoring.

Table 1. Population distribution among controlled and uncontrolled glycemics

Parameter	Uncontrolled glycemia	Controlled glycemia
Total patients (n=150)	97 (64.6%)	53 (35.3%)

Table 2. Medication adherence among uncontrolled and controlled glycemics

Parameter	Regular Medication (n= 78)	Irregular Medication (n= 72)
Uncontrolled Glycemia	53 (68%)	25 (32%)
Controlled Glycemia	44 (61%)	28 (39%)

Fig 1. Gender wise distribution among controlled and uncontrolled glycemics.

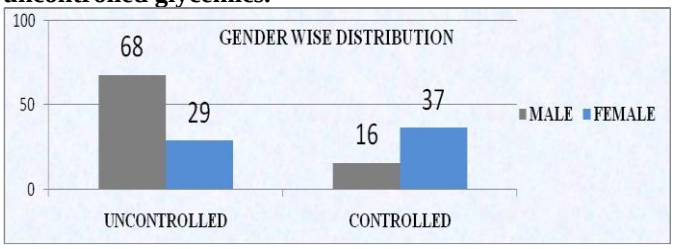


Fig 2. Infection wise distribution among controlled and uncontrolled glycemics

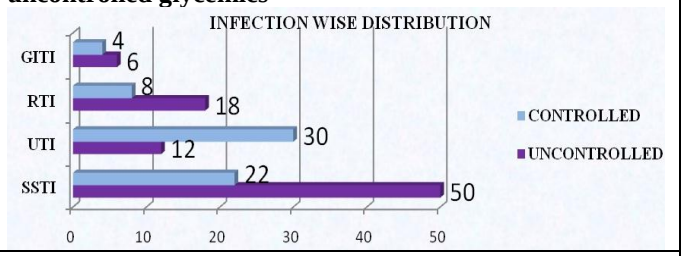
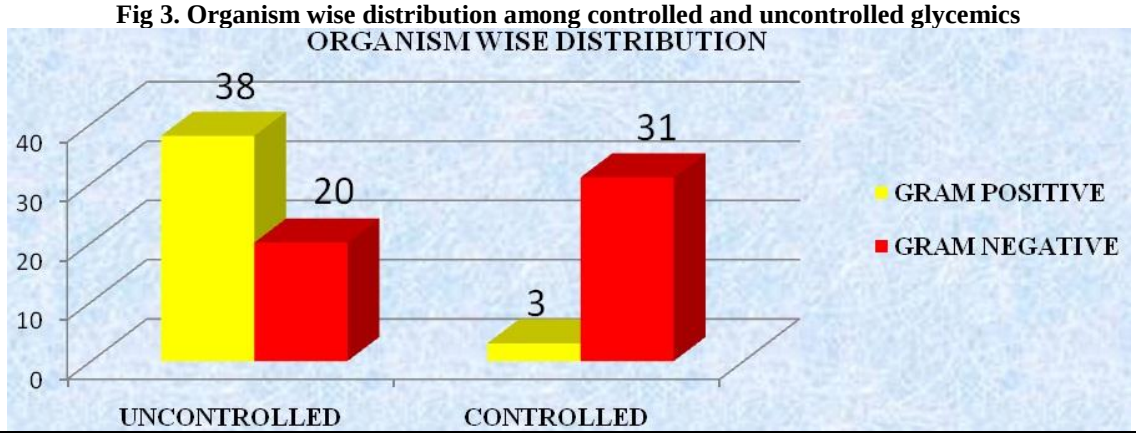


Fig 3. Organism wise distribution among controlled and uncontrolled glycemics



CONCLUSION

Skin and urinary tract infections are more common with diabetes patients. Uncontrolled glycemia associated with type2 diabetes is having a greater risk of acquiring infections. Many of these infections require quick diagnosis and immediate treatment of the severe complications or even fatal outcome is to be averted. If not properly treated they become the most common cause of morbidity in diabetic patients.

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Nil

CONFLICT OF INTEREST

No interest

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