

Impact of covid-19 pandemic on diabetic foot care - experience at a tertiary care centre in India.

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Abstract

Introduction: The coronavirus disease 2019 (COVID-19) reached India in January 2020 and since then it has made a significant impact on economy and health care system. DFU is one of the major reasons for hospitalization in people suffering from diabetes. Approximately 10- 15% diabetic patients develop diabetic foot ulcers (DFU). The aim of this study is to evaluate the impact that COVID-19 pandemic has made on the patients suffering from DFUs in terms of severity, outcomes and demographic profile.

Methods: Diabetic patients with foot ulcers admitted in our hospital from March to October in the year 2020 were included in the study and classified under Period A. This cohort was compared with a population of patients admitted in the same time frame in the year 2019 and classified under Period B. Non-diabetic Patients with foot ulcers and patients with ulcers above the ankle were not included in the study.

Results: Our study included 84 patients out of which 31 patients were admitted in Period A and 53 patients were

admitted in Period B. Mean duration of foot ulcer (in months) in period A (4.8, range 2-8) was more than that in period B (3.9, range 2-9). Diabetic ulcer severity score (DUSS) was higher in period A (2 ± 0.91) than in period B (1.71 ± 0.78). High number of major amputation procedures was performed in 2020 (9, 29.03%).

Conclusion: Through our study we observed that COVID-19 had a notable drastic effect on DFU care leading to higher risk of amputation. This confirms the need for appropriate and timely management of patients of DFU either through in-hospital care or via telemedicine.

Keywords: DFU, Covid – 19, WHO.

Introduction

The coronavirus disease 2019 (COVID-19) reached India in January 2020 and since then it has made a significant impact on economy and health care system. The health care services and protocols to manage chronic diseases like diabetes were not formulated keeping in mind the situations like COVID-19 pandemic and thus prone to fail. DFU is one of the major reasons for hospitalization

in people suffering from diabetes [1]. Approximately 10-15% diabetic patients develop diabetic foot ulcers (DFU)[1]. About 20 million people are estimated to be currently suffering from an active DFU worldwide [2]. About 20% of patients with moderate or severe DFUs undergo amputation procedure [3]. Patients with DFUs have 2.5 times greater 5-year risk of death than the patients without DFUs [4]. Moreover, delay in management of DFU increases the risk of amputation and death of the patient [5-7]. The COVID-19 and the strict lockdown led to disruption of medical services and care to patients suffering from DFUs leading to adverse outcomes.

The aim of this study is to evaluate the impact that COVID-19 pandemic has made on the patients suffering from DFUs in terms of severity, outcomes and demographic profile. Patient data from the month of March, 2020 to October, 2020 (Period A) was taken and compared with the data of same time period in 2019 (Period B). The findings from this study will be useful for formulating management protocols for the present and future scenario.

Methods: Diabetic patients with foot ulcers admitted in our hospital from March to October in the year 2020 were included in the study and classified under Period A. This cohort was compared with a population of patients admitted in the same time frame in the year 2019 and classified under Period B. Demographic data, biochemical parameters, clinical parameters and outcomes were noted from the hospital records and Microsoft Excel sheet was prepared.

Inclusion criteria: All subjects suffering from Diabetes mellitus as per WHO criteria with foot ulcers.

a) Symptoms of Diabetes plus random blood sugar > 200 mg/dl

Or

b) Fasting blood sugars > 126 mg/dl

Or

c) Two-hour plasma glucose levels > 200 mg/dl

Exclusion criteria: Nondiabetic Patients with foot ulcers and patients with ulcers above the ankle were not included in the study.

Statistical analysis: Continuous variables were compared with t test and Fischer exact test was used for categorical variables. The data was analyzed using SPSS 27.0 for MAC (SPSS Inc. Chicago, IL, United States).

Results

Our study included 84 patients out of which 31 patients were admitted in Period A and 53 patients were admitted in Period B (Fig. 1). Major findings are mentioned in Table 1. Males were majority in both the periods with 19 in Period A and 30 in Period B. Mean HbA1c % in period A was higher (8.13 ± 1.21) than that in period B (7.8 ± 1.01). Mean C - reactive protein (CRP) values were also higher in period A (44 ± 13.4) as compared to period B (39.84 ± 10.58). Mean duration of foot ulcer (in months) in period A (4.8, range 2-8) was more than that in period B (3.9, range 2-9). Higher percentage of patients reported with gangrene in period A (11, 45.8%) in comparison to period B (12, 22.6%). Diabetic ulcer severity score (DUSS) was used for scoring with 4 being the maximum score and having the least potential of healing. DUSS was higher in period A (2 ± 0.91) than in period B (1.71 ± 0.78). High number of major amputation procedures were performed in 2020 (9, 29.03%) along with surgeries other than the amputation (7, 22.5%). These other surgeries include surgical debridement and abscess drainage.

Discussion

India has one of the world's largest populations of diabetic patients and they are at a higher risk of getting infected with COVID-19 due to impaired immune responses because of an altered cytokine profile and activation of T cell and macrophage [8,9]. Diabetic patients develop various microvascular and macrovascular complications during their lifetime, of which DFU plays a major role in negatively affecting quality of life [8]. Patients with DFU usually suffer from peripheral arterial disease (PAD) as a macrovascular complication [10]. Neuroischemic DFUs occurrence is increasing due to this and timely revascularization procedure can have a positive impact on ulcer profile [11].

In our study the mean age of patients was 57.7 ± 11.47 years in period A and 59.64 ± 8.71 years in period B. There were no significant differences between two periods in terms of age, gender and duration of diabetes. Diabetic ulcer severity score (DUSS) was used for scoring the DFUs (Table 2). It comprises of four variables i.e presence or absence of palpable pedal pulses, probing to bone, whether the ulcer site is foot or toes and lastly, whether the ulcer is single or multiple in number. Score 0 and 1 was assigned according to the variable and DUSS was calculated by adding these separate scored variables to a theoretical maximum of 4. An increase in the DUSS by one score point reduced the chance for healing by 35% [12]. The mean DUSS was higher in period A than in period B. This along with other factors like higher mean HbA1c and CRP in 2020 highlights the major problem of DFUs being ignored by diabetic patients.). Higher number of major amputation procedures was performed in 2020 in comparison to 2019 ($p < 0.01$).

DFU represents the most common cause of non-traumatic lower limb amputation worldwide and leads to prolonged hospitalization and huge health care costs due to critical limb ischemia, and gangrene [13,14]. Patients were diagnosed with gangrene more frequently in period A which is a well-known risk factor for amputation [13,14]. COVID-19 related lockdown had a detrimental effect on the amputation risk because of halt in DFU care which leads to delayed diagnosis and appropriate care. Rogers et al advised prioritizing patients with serious foot problems to receive appropriate hospital care in time meanwhile managing stable patients through telemedicine [15]. Our study has few notable limitations. First, it's a study done in a single tertiary care centre, so it may not represent the nationwide trend. Second, it being a retrospective study done via collecting data from hospital records, hence may be associated with sampling error.

Conclusion

Through our study we observed that COVID-19 had a notable drastic effect on DFU care leading to higher risk of amputation. This confirms the need for appropriate and timely management of patients of DFU either through in-hospital care or via telemedicine. The trends and results observed in our study will be helpful to health authorities in planning strategies to tackle a similar situation in future. We recommend more studies on impact caused by COVID-19 pandemic on diabetic foot care to see whether similar trends were present across the country.

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Figures and tables

Fig 1: Line diagram showing month wise comparison of patient admission in period A and period B

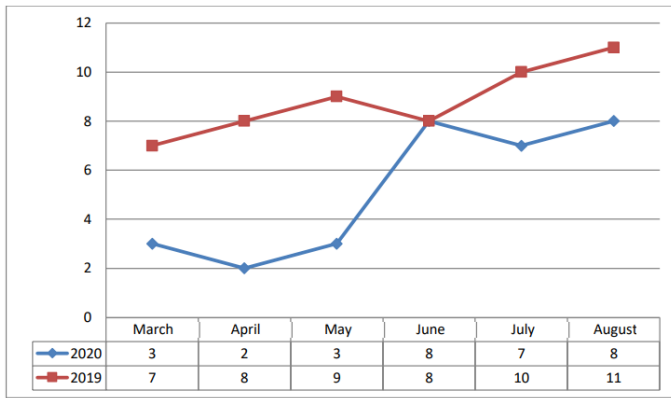


Table 1: Clinical parameters, demographic features and clinical interventions among the patients considered in the study.

Parameters	Period A (2020)	Period B (2019)
1. Age(years)	57.7 ± 11.47	59.64 ± 8.71
2. Male/Female	19/12	30/23
3. HbA1c %	8.13 ± 1.21	7.8 ± 1.01
4. CRP (mg/ml)	44 ± 13.4	39.84 ± 10.58
5. Diabetes Duration (years)	13.16 ± 5.3	14.09 ± 4.59
6. Ulcer Duration (months)	4.8(2-8)	3.96(2-9)
7. Gangrene	11 (35.48%)	12 (22.6%)
8. DUSS	2 ± 0.91	1.71 ± 0.78
9. Major Amputation	9 (29.03%)	6 (11.3%)
10. *Other surgeries than amputation	7 (22.5%)	6 (11.3%)

Data are reported as mean ± SD or median (interquartile range) unless specified otherwise. *Other surgeries include surgical debridement and abscess drainage.

Table 2: DUSS scoring system

Variables	Score 0	Score 1
Palpable pedal pulses	Present	Absent
Probing to bone	NO	Yes
Ulcer site	Toes	Foot
Ulcer number	Single	Multiple