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The Frequency of Diabetes Mellitus Among The Patients Reporting With Fascial Space Infection

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[1,2,4,5]Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work, manuscript writing.

[3]Drafting the work or revising it critically for important intellectual content; [6]Final approval of the version to be published

Funding Source: None
Conflict of Interest: None

Received: April 20, 2022
Accepted: Sept 05, 2022

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ABSTRACT

Objective: To determine the frequency of diabetic patients having Odontogenic Maxillofacial space infections in local population.

Methodology: This cross sectional study was carried out from 1-3-2020 to August 2020 in the Department of Oral and Maxillofacial Surgery, Pakistan Institute of Medical Sciences, Islamabad, to assess the frequency and association of diabetics with fascial space infection. A total of 70 patients of both genders with Odontogenic maxillofacial infection were included in the study. Patients were stratified into three age groups; Age group 1 was from 18-30, Age group 2 from 31-45 years and Age group 3 from 46-60 years. This form includes demographic data (age, gender, contact information, address), medical history (diabetic or non-diabetic) along with sign and symptoms were noted in the Performa. The SPSS version 20.0 was used to analyze the data. Mean and standard deviation was calculated for age. Frequency and percentages were used for the gender and diabetes mellitus.

Results: A total of 70 patients having Odontogenic maxillofacial space infection. Of these 70 study cases, 42 (60%) were females and 28 (40%) were males with mean age of 40.97±10.32 years. Out of 70 patients, 55 (78.57%) were diabetic and 15 (21.43%) patients were non-diabetic patients.

Conclusion: Diabetic patients are more prone to Odontogenic maxillofacial space infections and due to poor diabetic control multispace infection along with severe complications may occur.

Keywords: Odontogenic infections, Diabetes mellitus, Immunity, Susceptibility.

Cite this article as: Shar MK, Ali S, Farooq MU, Sadiq H, Junaid M, Rana ZA. The Frequency of Diabetes Mellitus Among The Patients Reporting With Fascial Space Infection. Ann Pak Inst Med Sci. 2022; 18(3):148-152. doi. 10.48036/apims.v18i3.640

Introduction

Maxillofacial space infection (MSI) is one of frequent infections in head and neck region.[1] Infection with odontogenic etiology contributes to Maxillofacial space infection from 50% to 80%.[2] These infections are the most rigorous problems to the maxillofacial surgeon, causing serious life threatening medical complications because of the complex anatomy of head and neck region despite of skillful management.[3] The oral fascial spaces are of two groups, one is primary and the other is secondary on the basis of direct or indirect involvement of infection from the source of infection.[4] There are two pathways of these infection with odontogenic origin in the oral and maxillofacial area: one through the root apex of teeth and other is from the deep periodontal pocket of teeth.[5] Diabetes mellitus (DM) is a metabolic syndrome which is characterized by absolute or relative insulin deficiency.[6,7] In DM all major cell types that are involved in the immune defense are affected.[8]

There is decrease secretion of interleukins with respect to infection, decreases the chemo taxis and phagocytic activity, immobilization of polymorph nuclear leukocytes and dysfunction in neutrophil's bactericidal function along with abnormal complement activation.[9] Patients with DM have a high risk of infection.[10] According to the research, DM patients are 1.409 times more likely to develop MSI than non-DM patients.[11] Hiroshi Hidaka et

al. reported that patients with DM suffer from MSI approximately twice as compared to non-DM patients.[12] According to Jun Hasegawa, presence of DM in patients with MSI is associated with aggravating the spread of the infection.[13] GC Mathew in his study reported that among 137 patients of MSI, 24% were diabetic and presented with more complications.[2] According to national diabetic survey of Pakistan the prevalence of diabetes is 26.3% in Pakistan.[14]

Maxillofacial space infections are the most difficult problems for the maxillofacial surgeon, causing serious life-threatening medical complications because of the complex anatomy of head and neck region despite of skillful management. It can spread upwards to the brain which may result in brain abscess, cavernous sinus thrombosis and meningitis or downwards to cause Ludwig's angina, mediastinitis or necrotizing fasciitis which can lead to death of the patient, especially in immune-compromised patients.[6]

Patients with diabetes are more prone to developing fungal and bacterial infections in their mouths. The absence of antimicrobial effects and reduce salivary flow rate can cause these infections. In addition, poor metabolic control and an impaired defense mechanism may play a significant part in the development of such infections.[15] One of the most common opportunistic fungal infections is oral candidacies. The high prevalence rates of higher Candida colonization were reported in patients with diabetes type 1 when compared to type 2 (84% vs. 68%, respectively), while the percentage in non-diabetic patients was about 27%.[16]

Oral candidacies might be developed by various predisposing factors, such as decreased salivary flow and production (xerostomia). Salivary dysfunction in these patients can contribute to a higher carriage of fungi. Candida-related lesions include denture stomatitis, angular chelitis, and median rhomboid glossitis.[17] In diabetic patients, Candida infections are more prevalent in those who have poor glycemic control, use steroids, take broad spectrum antibiotics that disturb the normal oral flora and those who wear denture and smoke.[18]

Diabetic patients are more prone to infections than non-diabetic people. In our clinical setting (Pakistan Institute of Medical Sciences), there are many patients reported to us with fascial space infection, and the majority of them are diabetic. There is no local data available on incidence of diabetes among those with fascial space infection. We have conducted this study to find out the frequency of diabetes mellitus among the patients having MSI so that awareness can be given to such patients regarding prevention of these infections by strict diabetic control and maintaining good oral hygiene.

Methodology

This cross sectional study was carried out from 1-3-2020 to August 2020 in the Department of Oral and Maxillofacial Surgery, Pakistan Institute of Medical Sciences, Islamabad, to assess the frequency and association of diabetics with fascial space infection by using WHO sample size calculator with 95% confidence interval at the rate of 24% of population proportion of diabetic mellitus in infectious population with 10% absolute precision the sample size calculated was 70 by using consecutive non-probability sampling technique.[2] Either gender, having age range from 18 to 60 years with Odontogenic maxillofacial infection were included in the study. The localized dental abscesses without affecting fascial space and those participants with maxillofacial infections secondary to fractures of facial bones, infected cysts and tumors were set as exclusion criteria

The permission and supporting documents to carry out my study were signed by the head of the department and ethical committee of hospital. Patients reporting maxillofacial infection in the Oral and Maxillofacial surgery Department of Pakistan Institute of Medical Sciences Islamabad that fulfill study criteria were engaged. Every participant and his or her attendant provided informed consent.

Before the detailed clinical examination and necessary investigations (CBC, ESR) a brief history was taken from every participants. The final diagnosis of participants with fascial space involvement was taken through extra oral and intra oral clinical examination along with supporting radiographs like Orthopantomogram (OPG) to find out dental etiology. Presence of diabetes mellitus was verified by appropriate laboratory investigations (FBS and HbA1c).

A Predesigned Performa was used for demographic data and clinical findings. Every patient was examined by the investigator in a good light. Patients were stratified into three age groups; Age group 1 was from 18-30, Age group 2 from 31-45 years and Age group 3 from 46-60 years. This form includes demographic data (age, gender, contact information, address), medical history (diabetic or non-diabetic) along with sign and symptoms were noted in the Performa.

The SPSS version 20.0 was used to analyze the data. Mean and standard deviation was calculated for age. Frequency and percentages were used for gender and diabetes mellitus. Chi-square test was used for any significant association between fascial space infection and diabetes mellitus. The *P*-value of ≤ 0.05 was considered significant.

Results

The age range in this study was from 18-60 years, with the mean age of participants was 40.97 ±10.32 years, 42 (60%) were females and 28 (40%) were males. Out of 70 patients, 55 (78.57%) were diabetic and 15 (21.43%) were non-diabetic patients and majority (63%) of patients reported having submandibular space infection as presented in Table I. In the age group 18-30, out of 15 patients, 6 (40%) were diabetic. 26 (83.87%) patients among 31 patients in the age group 31-45 were diabetic, while in the age group 46-60, 95.83% of patients with MSI had diabetes, as shown in Table II. The correlation between diabetics and fascial space infection was not significant as *P*-0.096 which is presented in Table III.

Table I: Frequency and Percentage of the Variables used in the Study with Mean Age.

Variable		N(%)	Mean age
Diabetes	Present	55(78.57)	40.96±10.32
	Absent	15(21.43)	
	Total	70(100)	
Gender	Male	28(40)	
	Female	42(60)	
	Total	70(100)	
Fascial space	Submandibular	44(62.9)	
	Buccal	19(27.1)	
	Infra-temporal	5(7.1)	
	Sub-mental	2(2.9)	
	Total	70(100.0)	

Table II: Age group wise distribution of patients with diabetes mellitus.

Age Category	Absent	Present	Total
18 to 30	9 (60%)	6 (40%)	15
31 to 45	5 (16.12%)	26 (83.87%)	31
46 to 60	1 (4.16%)	23 (95.83)	24
Total	15 (21.42%)	55 (78.57%)	70

Discussion

Odontogenic maxillofacial space infection pertains to infections of the craniofacial areas that are the potential spaces and facial planes that have a solely odontogenic etiology.[19] However, the prevalence of Odontogenic infections has significantly decline due to improved dental health care and efficacy of antibiotics, in spite of that these can be potentially life-threatening because of negligence by general practitioner of patient, antibiotic therapeutic failure, failure of immune system associated with medical conditions or unavailability of proper healthcare facilities in a developing country.[20] The incident of diabetic patients is increasing worldwide, with a higher predisposition to infections. The most frequent infections with severe systemic complications in diabetic patients are associated with sustained hyperglycemia.[21]

In our study, 70 patients were treated with Odontogenic maxillofacial space infection (MSI). The mean age of the patients were 40.97 years (SD±10.32) with an age range of 18-60 years. G.C Mathew and his colleagues[2] reported that the mean age of patients with MSI was 39.96 ±15.9 years. Lee et al[22], found that Odontogenic infections were in the age range of 1 to 89 years with mean age of 33.4 years. Sueharaet et al[23], studied fascial space infections and found that the mean age was 37.6 years. All these studies correlate well with our findings.

The odontogenic infection was more in the age group 31-45 followed by age group 46-60. In this study, the least reported patients were from age group 18-30. Adults have a higher prevalence of infection, which may be due to poor oral health and systemic diseases that impair a person's immune response. Rehmann et al[24] reported that these odontogenic infections occurred most frequently in age group 31-50. Seuhara et.al[23] also reported that many of his participants with fascial space infections belongs to the 3rd decade followed by 5thand 4thdecade. Such findings are also consistent with our study. Females formed the predominant gender group in our study with 60% (n=42) females' involvement, whereas males constituted 40% (n=28) of the total sample.

Muhammad Ishfaq et al conducted their study at Khyber

Table III: Correlation of diabetic with space infection by using Chi-Square test.

Variable		Fascial space					P-value
		Submandibular	Buccal	Infratemporal	Submental	Total	
Diabetic	Present	35	16	3	1	55	.096
	Absent	9	3	2	1	15	
	Total	44	19	5	2	70	

College of Dentistry in Peshawar, Pakistan and found that females were the most frequently repeated gender in their study, forming 65.1% of the study population[4] which is in agreement with our study. Rehman et al[24] reported that the gender distribution in their study was 63.1% males and 36.9% females with odontogenic infections. Zhang et al[25] reported the proportion of males to be 59.0%. Poeschl et al[26] had also reported that in their study, males were predominant, which is in disagreement with our study. Out of 70 patients, 55 patients (78.57%) were diabetic, clearly indicating a higher risk for infection among diabetics. The percentage of diabetics reported by Huang et al was (88.9%)[27] and according to Parhiscar[28] (50%) of the patients with MSI were diabetic which is in agreement with our study. The association of diabetic with fascial space infection of Huang et al is significant, which is in disagreement with our study.[28] In the present study, female predominance were found that might be due to their socioeconomic reasons, high pain threshold, and cultural restriction. In such circumstances, people have a reservation to take their females patients to the dentist in this part of the world.

Conclusion

This study concluded that participants with diabetes mellitus are more prone to maxillofacial space infections than non-diabetic patients. Ignorance of the prevailing systemic disease and non-compliance of its treatment leads to complications of MSI which then become difficult to manage.

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