

Does seasonal variation affects odontogenic space infection in diabetic patient? A retrospective study

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Abstract

Introduction: Odontogenic infection in diabetic patients has always been a challenge for the treating maxillofacial surgeons. Thus the aim of this study is to evaluate any seasonal variation which affects the spread of odontogenic infection in diabetic patients.

Material and methods: A retrospective epidemiological study was done by obtaining record from October 2014 to September 2021 were and analysed. 597 patients. Clinical features studied were demography (age, sex), spaces involved, systemic diseases, presentation upon hospital admission (symptoms and signs, temperature), duration of hospital stay, and complications.

Results: Odontogenic infection was more frequently observed in summers than other season and diabetic patients are more prone to get infection in summers (47.7%). Mandibular space infection were more frequently seen rather than maxillary infection. The length of hospital stay and complication observed in diabetic patient is more than nondiabetic group.

Conclusion: In summer season the diabetic patients are more prone to maxillofacial infection.

Keywords: Dental infection, Odontogenic infection, Antibiotic, Diabetic, Season, Summers

Introduction: The bacterial invasion from pulpal and periodontal tissue to the surrounding bone, periosteum and facial spaces is termed as odontogenic space infection.¹ The acceleration of odontogenic infection to deeper facial spaces is directly proportional to the virulence of bacteria, immunity of the host, comorbid state, inappropriate treatment, ignorance by the patient or by the general practitioner, and antibiotic therapeutic failure.² Life-threatening complications like respiratory distress, necrotizing fasciitis, cavernous sinus thrombosis, meningitis, cerebrospinal abscesses, mediastinitis, empyema, pericarditis, sepsis, and septic shock may add fuel to fire.³ Therefore early diagnosis and prompt treatment which includes extraction of the infected tooth with immediate incision and drainage under antibiotic coverage remains the mainstay for prevention of escalation of the infection into deeper spaces.³ Systemic comorbid patients are more susceptible to facial cellulitis and deep neck infections developed from odontogenic infections. Thus the aim of this study is to find out whether seasonal variation affects the pattern of odontogenic infection in diabetic patients.

Material and methods: This is a retrospective epidemiological study was done by obtaining the patient records at the Department of Oral and Maxillofacial Surgery, People Dental academy, People hospital, Bhopal. Patient record from October 2014 to September 2021 were obtained and analysed. 597 patients were studied. Variables reviewed included age, gender, seasonal variations, socioeconomic background, signs and symptoms, time of onset till presentation, medically compromised patients, tooth involved, fascial spaces involved, length of hospital stay, complications. The ethical clearance was given by the ethical committee of the institution.

In this study 597 patients were retrospectively evaluated with odontogenic space infection. The criteria for hospital admission was: Odontogenic infection causing swelling in one or more of the deep fascial spaces of head and neck obstructing the airway or vital structure, fever greater than 101° F, need for a general anesthesia or the need for in-patient control of concomitant systemic disease.

Clinical features studied were demography (age, sex), spaces involved, systemic diseases, presentation upon hospital admission (symptoms and signs, temperature), duration of hospital stay, and complications.

Statistical analysis: Statistical analysis was carried out using descriptive statistics in the Statistical Package for the Social Sciences (SPSS) software, version 25.0, (IBM SPSS, Inc. Chicago, Illinois). Results were statistically analyzed by Chi square test for categorical data. A 'p' value of 0.05 was considered for statistical significance.

Results: A total of 597 patients with odontogenic maxillofacial space infections were included in this study, with an age range of 9–63 years. The demographic data which includes the age, gender, socio economical status (Kuppuswamy Scale) and diabetic status is mentioned in table 1.

Distribution of patient according to the seasonal variations is shown in table 2. 261(43.7%) infected patients were observed in summer season. The result is statistically insignificant.

Out of 261 reported in summer season, 175 (47.7%) were known diabetic patient. The results were statistically significant.

Single space infection was observed in 244 (40.9%) cases and multiple (more than 2 spaces) were observed in 353 (59.1%). The multiple spaces involvement in diabetic patients was 219

cases as compared to nondiabetic patient which was 134 in number, but was not statistically significant.

Space infection due to mandibular tooth was seen more as compared to maxilla. In 360 patients, infection were secondary to mandibular tooth whereas in 237 patient had infection due to maxillary tooth. The result was however not significant.

Length of hospitalization stay: 119 patients were discharged within 3 days of admission of which 80 were diabetic, 339 patients remained admitted for 3-5 days of which 222 patients were diabetic and only 139 patients required hospitalization stay for more than 5 days of which 74 were diabetic. The result was significant which is suggestive of diabetic patients requiring more hospitalization.

Complication like airway obstruction, sepsis and pneumonia was seen in 31 patients out of which 19 were diabetic. Although the incidence was observed more in diabetic patients but results were insignificant.

Table 1 – Demographic distribution of study subjects based on space infection

DEMOGRAPHIC CHARACTERISTICS		N (%)
Gender	Male	352 (59.0%)
	Female	245 (41.0%)
Age	0-15 years	18 (3.01%)
	15-30 years	122 (20.43%)
	30-45 years	180 (30.15%)
	>45 years	277 (46.39%)
Socioeconomic class (Kuppuswamy Scale)	Upper class	27 (4.52%)
	Upper middle	98 (16.41%)
	Lower middle	120 (20.10%)
	Upper Lower	135 ((22.61%)
Diabetes	Yes	367 (61.5.0%)
	No	230 (38.5.%)
Total		597(100%)

N= number of subjects

Table 2- Distribution of study subjects according to season

SEASONS	MONTH	MALE N (%)	FEMALE N (%)	TOTAL N (%)	P- VALUE
SPRING	FEBRUARY- MARCH	36 (10.2%)	34 (13.9%)	70(11.7%)	0.187
SUMMER	APRIL- JUNE	152(43.2%)	109(44.5%)	261(43.7%)	
MONSOON	JULY- MID SEPTEMBER	83(23.6%)	50(20.4%)	133(22.3%)	
AUTUMN	SEPTEMBER- NOVEMBER	54(15.3%)	26(10.6%)	80(13.4%)	
WINTER	DECEMBER- JANUARY	27(7.7%)	26(10.6%)	53(8.9%)	
TOTAL		352(100%)	245(100%)	597(100%)	

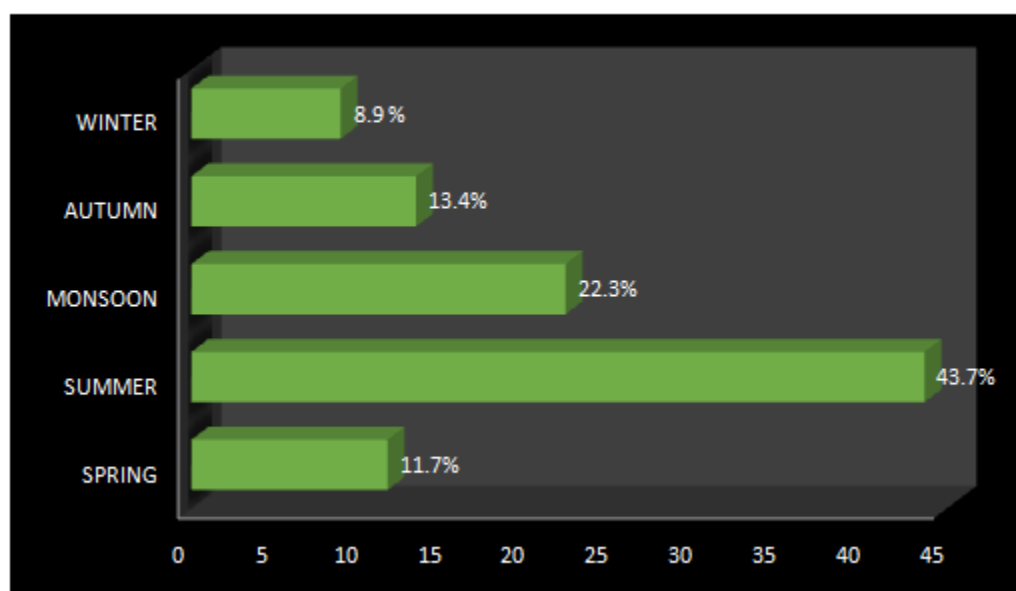
Graph 1- Distribution of study subjects according to season

Table 3 - Distribution of study subjects according to seasons and diabetes

SEASONS	MONTH	DIABETIC N (%)	NON- DIABETIC N (%)	TOTAL N (%)	P- VALUE
SPRING	FEBRUARY- MARCH	37 (10.1%)	33(14.3%)	70 (11.7%)	0.01*
SUMMER	APRIL- JUNE	175 (47.7%)	86(37.4%)	261 (43.7%)	
MONSOON	JULY- MID SEPTEMBER	80 (21.8%)	53(23.0%)	133 (22.3%)	
AUTUMN	SEPTEMBER- NOVEMBER	51 (13.9%)	29((12.6%)	80(13.4%)	
WINTER	DECEMBER- JANUARY	24(6.5%)	29(12.6%)	53(8.9%)	
TOTAL		367(100%)	230 (100%)	597 (100%)	

*statistically significant, N= number of subjects

Table 4- Distribution of study subjects according to type, jaw involvement, length of hospitalization, complication according to diabetes

SPACE INFECTION		DIABETIC N (%)	NON- DIABETIC N (%)	TOTAL N (%)	P-VALUE
TYPE	SINGLE	148 (40.3%)	96(41.7%)	244 (40.9%)	0.73
	MULTIPLE	219 (59.7%)	134(58.3%)	353 (59.1%)	
	Total	367 (100%)	230 (100%)	597 (100%)	
JAW INVOLVEMENT	MAXILLA	154 (42.0%)	83 (36.1%)	237 (39.7%)	0.15
	MANDIBLE	21358.0%)	147(63.9%)	360 (60.3%)	
	Total	367(100%)	230 (100%)	597(100%)	
LENGTH OF HOSPITALIZATION	1-3 Days	80 (21.8%)	39(17.0%)	119(19.9%)	0.00*
	3-5 Days	222(60.5%)	117((50.9%)	339(56.8%)	
	>5 Days	74(32.3%)	65 (17.7%)	139(23.3%)	
	Total	367 (100%)	230 (100%)	597(100%)	
COMPLICATION	No	348(94.8%)	218 (94.8%)	566(58.3%)	1.00
	Yes	19 (5.2%)	12(5.2%)	31(5.2%)	
	Total	367 (100%	230(100%)	597(100%)	

*statistically significant, N= number of subjects

Discussion: The improvement in socio economic standards, awareness among general public and invention of antibiotic has drastically reduced the progression of odontogenic infection.

Socioeconomic factor plays a significant role in odontogenic infections. In our study we found significantly higher number of low economic patient being vulnerable which is consistent with study conducted by Wang et al. who stated that the maxillofacial infections are predominately seen in underserved patients lacking access to health care which concurred with our socioeconomic factor.⁴

261 (43.7%) infected patients were observed in summer season. The result is statistically insignificant. The result of the study are in consistent with the study conducted by Keswani ES et al. Although Bakir et al reported an apparent preponderance of patients presenting in the autumn season.⁴

Out of 261 cases reported in summer season, 175 (47.7%) were known diabetic patient. The results were statistically significant. The seasonal variation has not been studied in past. The results may be due to extreme heat affect blood sugar levels. In hot climate fluid loss is more which causes blood sugar to rise as the blood glucose becomes more concentrated and also the kidneys receive less blood flow and work less effectively which causes hyperglycemia.⁵ This hyperglycemic state may fastens the growth of bacterial infection into deeper tissues.

Single space infection was observed in 244 (40.9%) cases and multiple (more than 2 spaces) were observed in 353 (59.1%). The multiple spaces involvement in diabetic patients was 219 cases as compared to nondiabetic patient which was 134 in number, which was not statistically significant.

Space infection due to mandibular tooth was seen more as compared to maxilla. In 360 patients, infection were secondary to mandibular tooth whereas in 237 patient had infection due to maxillary tooth .The result was however nonsignificant. The results are in consistent with the study performed by keswani et al, Storeo et al. and Flynn et al.⁴

Length of hospitalization stay: 119 patients were discharged within 3 days of admission of which 80 were diabetic, 339 patients remained admitted for 3-5 days of which 222 patients were diabetic and only 139 patients required hospitalization stay for more than 5 days of which 74 were diabetic. The result was significant which is suggestive of diabetic patients requiring more hospitalization. As the diabetic patient are more susceptible to facial cellulitis and deep neck infections so they require more time to recover.

Complication like airway obstruction, sepsis and pneumonia was seen in 31 patients out of which 19 were diabetic. Although the incidence was observed more in diabetic patients but results were insignificant. The reason for more complication is diabetic patients may be due to a) decreased chemotaxis, adhesion, migration and phagocytosis of leukocytes. All of which may reduce the defensive activity of the body against bacterial colonoization. b) Decreased proliferation of fibroblasts, endothelial cells and collagen which hampers the process of tissue repair. c) In diabetic patients microangiopathy is observed which decreases blood flow and consequently decreases oxygen supply and nutrition to cells. d). Decreased proliferative capacity of keratinocytes which delays re-epithelialization of wounds.⁶

Conclusion: Summer season worsens the progress of odontogenic infection in diabetic patients. Although the sample size in the study was insufficient to draw a conclusion but a study on larger group need to validate the study further.

References:

1. A retrospective analysis of risk factors of oromaxillofacial infection in patients presenting to a hospital emergency ward. Jinyoung Park , Jae-Yeol Lee , Dae-Seok Hwang , Yong-Deok Kim , Sang-Hun Shin , Uk-Kyu Kim , Jae-Min Song. *MaxillofacPlastReconstr Surg.* 2019 Nov 22;41(1):49.

2. Keswani ES, Venkateshwar G. Odontogenic Maxillofacial Space Infections: A 5-Year Retrospective Review in Navi Mumbai. *J Maxillofac Oral Surg.* 2019 Sep;18(3):345-353.
3. EwaZawiślak and Rafał Nowak. Odontogenic Head and Neck Region Infections Requiring Hospitalization: An 18-Month Retrospective Analysis. *HindawiBioMed Research International* Volume 2021. <https://doi.org/10.1155/2021/7086763>
4. Keswani ES, Venkateshwar G. Odontogenic Maxillofacial Space Infections: A 5-Year Retrospective Review in Navi Mumbai. *J Maxillofac Oral Surg.* 2019 Sep;18(3):345-353
5. LabbanL . Do Seasonal Temperature Changes Affect Blood Glucose Levels?. *J Diabetes Treat*,2017: 124.
6. Ortiz R, Espinoza V (2021) Odontogenic Infection. Review of the Pathogenesis, Diagnosis, Complications and Treatment. *Res Rep Oral MaxillofacSurg* 5:055. doi.org/10.23937/2643-3907/1710055