Retrospective analysis of the Prevalence of Oral Potentially Malignant Disorders and Oral Cancer in a hospital-based Setting during the COVID-19 Pandemic

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Abstract

Background and objectives: The Coronavirus pandemic have wreaked havoc on health systems worldwide. Due to lockdowns imposed all across the globe, patients have been unable to show up to dental institutions for regular dental check-ups. Consequently, asymptomatic oral lesions were left undetected in patients having risk habits. This study highlights the effect of the pandemic on the early detection of Oral Potentially Malignant Disorders (OPMDs) and Oral Cancer at our Dental School. **Methods:** A retrospective analysis of patient records for the duration between 1st January 2018 to 28th February 2021, was evaluated from our outpatient registry. Records were manually searched for provisional diagnoses of Oral Potentially Malignant Disorders (OPMDs) and Oral Cancer. Statistical analyses were performed by one way ANOVA and post hoc analysis, to determine the significant mean difference between these groups at $P<0.05$. **Results:** Of total population (n=34,120); the prevalence of OPMDs, Tobacco-induced mucosal lesions, and Oral cancer detected during the pandemic (2020) were 2.6%, 0.72%, and 0.22% respectively; however, there was no Statistically Significant difference for former two lesions. The prevalence of Oral Cancer showed a statistically significant difference ($P=<0.001$) for the years.Interpretation and conclusions: Post-lockdown, there was a surge in the number of OPMDs and Oral Cancer cases reported at our institution. This implies that asymptomatic oral lesions were left undiagnosed as patients couldn't get screened during the pandemic. Regular and timely dental check-ups are necessary to detect these lesions in their early stages, to prevent the further progression and burden of oral cancer. **Key words:** COVID-19, Oral cancer, pandemic, precancerous lesions, screening.

Introduction

The emergence of the novel Coronavirus disease (COVID-19) has caused an exceptional global health crisis, and has created international concern1. This pandemic has had a negative impact on the world economy [1], and has increased the burden on health systems. As a preventive measure, social distancing, lockdowns and quarantine of suspected cases were adopted across the globe as a strategic plan to reduce COVID-19 community spread. Owing to aerosol and droplet transmission of COVID-19, dental treatments were deferred and many hospitals restricted to emergency dental care only. During this pandemic, major health issues have been neglected by the public, and serious conditions such as Oral Cancer and early precancerous oral lesions remained undetected1. Globally, Oral Cancer ranks among the top sixth of all cancers, and India stands second for having the highest number of Oral Cancer cases [2]. Oral cancers are usually preceded by Oral Potentially Malignant Disorders (OPMDs), which are recognized as precursor lesions [2]. Leukoplakia, Erythroplakia, Tobacco Pouch Keratosis, Oral Lichen Planus and Oral Submucous Fibrosis are the most common OPMDs that precede Oral Cancer. Of these, the most commonly encountered OPMDs are Leukoplakia and Oral Submucous Fibrosis, which are usually asymptomatic, and patients do not seek medical care [3]. Use of tobacco in the form of cigarettes, smokeless tobacco, betel nut chewing and alcohol, are the most common risk factors for Oral Cancer [4]. The overall malignant transformation rate of OPMDs is 1.4 to 34%, in accordance with the systematic review carried out by Warnakulasuriya and Ariyawardana [5]. Early detection can improve the overall survival rate. The 5-year survival rate is 85% if diagnosed early, and is reduced to 40-67% in later stages [5].

Early detection of these asymptomatic oral lesions would improve the overall prognosis of the patient, and ensure that the economic burden on patients in terms of treatment is reduced. These lesions can be detected early in dental institutions, when patients come for routine dental care. Therefore, it is vital that regular oral health screenings are conducted at dental institutions. However, due to the COVID-19 pandemic, fewer patients have been visiting dental hospitals and clinics for regular dental check-ups. As a result, asymptomatic oral lesions have been left undiagnosed during the lockdown period. In addition, it has become increasingly difficult to monitor the progression of these oral lesions, as well as to educate patients regarding the consequences of habits, such as using smoking and smokeless forms of tobacco. This study intends to evaluate the effect of the Coronavirus pandemic on the early detection of OPMDs and oral cancer at our institution.

Materials and Methods

This is an observational, cross-sectional study design. The patient records were retrospectively analyzed for the time period from 1st January 2018 to 28th February 2021, from the Outpatient Department Register of the Department of Oral Medicine and Radiology, at KLE Society's Institute of Dental Sciences, Bangalore, Karnataka. The Institutional Review board approved the study (REF/IRB/CoDE-KLE/JAN 2021/15). The total population (n= 34,120) was evaluated from the registry. The patient records were manually searched for provisionally diagnosed cases of OPMDs, tobacco-induced oral mucosal lesions and oral cancer, which constituted three groups. The OPMDs taken into account were Homogenous Leukoplakia, Non-homogenous Leukoplakia, Tobacco Pouch Keratosis, Oral Lichen Planus, and Oral Submucous Fibrosis, while the Tobacco-induced oral mucosal lesions considered were Smoker's Palate, Smoker's Melanosis, Paan Chewer's Mucosa, and Tobacco- induced lichenoid reactions. The search results were tabulated and statistically analyzed for the prevalence of OPMDs, Tobacco-induced mucosal lesions and Oral Cancer for the years 2018 to 2021. Group 1 consisted of OPMDs, group 2 comprised of Tobacco-induced mucosal lesions, and Oral Cancer was included in group 3. Statistical analyses were performed by one way ANOVA and post hoc analysis, to determine the significant mean difference between these groups at $P<0.05$. The statistical package Medcalc software and Microsoft excel were used for the statistical and graphical evaluations.

Results

A total population of (n=34,120) was evaluated from the registry for the years 2018 to 2021, identified (n=1013) OPMDs, Tobacco-induced mucosal lesions (n=141), and Oral Cancer (n=100). The prevalence of OPMDs, Tobacco-induced mucosal lesions and Oral Cancer are depicted in Table I. The prevalence of OPMDs, Tobacco-induced mucosal lesions were 2.6% & 0.72% respectively, which had reduced during the pandemic year (2020). Figures 1(a) and 2(a) shows the distribution of OPMDs and Tobacco- induced mucosal lesions for the years 2018 to 2021. However, there was no Statistically Significant difference in prevalence of these lesions for the years 2018 to 2021 [Figures 1(b) , 2b) & (Table II)].

Table 1: *Shows the year wise distribution of OPMDs, Tobacco induced mucosal lesions, and oral cancer and their prevalence during the years 2018 to 2021.*

| Year	Total number of Participants	OPMDs		Tobacco Induced mucosal lesions		Oral Cancer	
		Cases	Prevalence	Cases	Prevalence	Cases	Prevalence
2018	12479	350	2.8%	38	0.3%	30	0.24%
2019	10882	360	3.3%	37	0.34%	40	0.36%
2020	8559	230	2.6%	62	0.72%	19	0.22%
2021	2200	73	3.3%	4	0.18%	11	0.5%
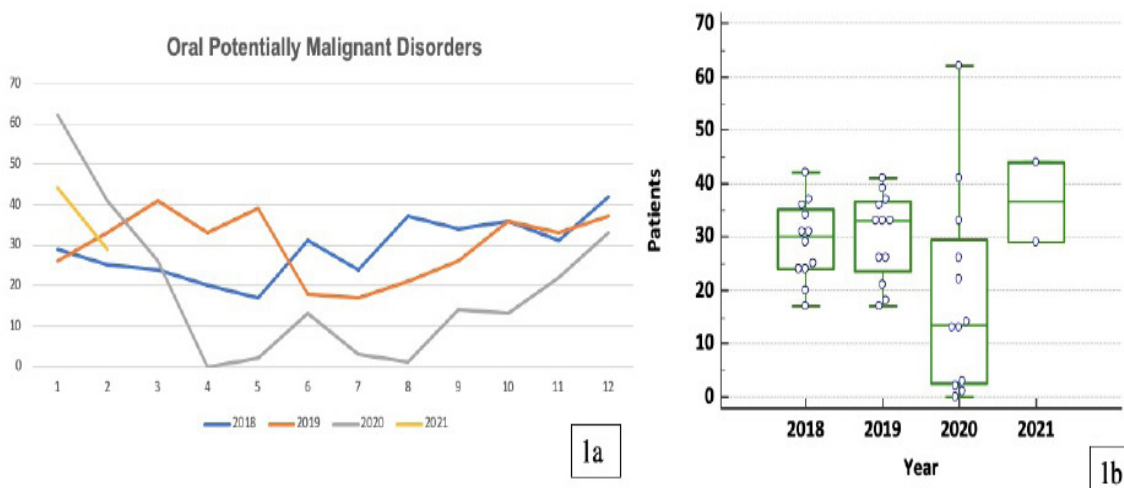
Figure 1(a): *Line graph shows year-wise distribution of patients with Oral Potentially Malignant Disorders (OPMDs); 1(b) – Box-whisker plot shows no statistically significant difference in prevalence of OPMDs .*

Table 2: *ANOVA analysis for Group 1 and Group 2 for the years 2018 to 2021.*

Year	n	Group 1				Group 2			
		Mean	Std deviation	ANOVAF ratio	P value	Mean	Std deviation	ANOVAF ratio	P value
2018	12	29.1667	7.4203			3.1667	3.2706		
2019	12	30	8.202	2.272	0.098	3.0833	2.7122	0.427	0.73
2020	12	19.1667	18.8623			5.1667	8.7888		
2021	2	36.5	10.6066			2	1.4142		

*Group 1- OPMDs; Group 2- Tobacco induced mucosal lesions.*
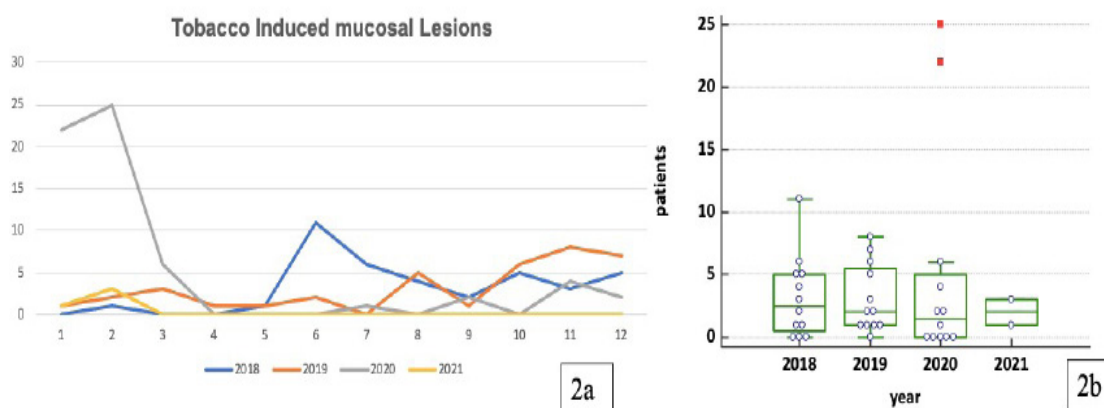
Figure 2: *Line graph shows year-wise distribution of patients with Tobacco induced mucosal lesions; 2(b) – Box-whisker plot shows no statistically significant difference in prevalence of the same; Indicates outliers.*

The prevalence of Oral Cancer was 0.22% during the pandemic and post-lockdown; in just the initial two months of the year 2021, there was an increased prevalence of 0.5%. Graph 3(a) shows year-wise distribution of patients with Oral Cancer. The prevalence of Oral cancer showed a Statistically Significant difference ($P =< 0.001$) between the pandemic year (2020), in comparison with the years 2019 and 2021. Post-lockdown, there were increased number of Oral Cancer cases detected with a prevalence rate of 0.5%, in comparison with the years 2018 and 2020 (Figure 3(b), Table III).

Table 3: *ANOVA analysis for Group 3 for the years 2018 to 2021.*

Year	n	Group 3				
		Mean	Std deviation	F ratio	Years of comparison	P-value
2018	12	2.5	1.3817	6.859	2021	0.001*
2019	12	3.3333	1.3027		2020	0.001*
2020	12	1.5833	1.3114		2019, 2021	0.001*
2021	2	5.5	0.7071		2018, 2020	0.001*

Group 3- Oral Cancer; P value- 0.001* statistically significant difference in reporting of Oral Cancer for the years 2018 to 2021.
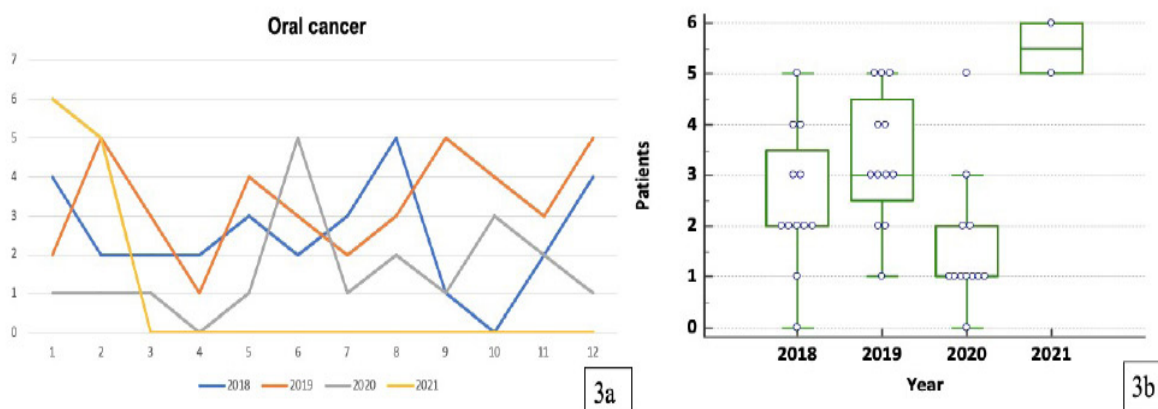
Figure 3: *Line graph shows year-wise distribution of patients with Oral cancer; 3(b) – Box-whisker plot shows statistically significant difference (P<0.001) in prevalence of Oral Cancer.*

Supplementary Table I (a) provides the detailed description of distribution of OPMDs, Tobacco-induced lesions and Oral Cancer month-wise for the years 2018 to 2021.

Discussion

Dentists play a vital role in the early detection of Oral Cancer through opportunistic screening, when patients visit for routine dental care1. During the time of lockdown, patient care and dental visits were disrupted, probably resulting in delayed diagnosis of OPMDs/ Oral Cancer or unavoidably missed diagnosis6. Another major issue of concern is the stress caused due to the outbreak, which probably would have increased risk habits such as smoking, smokeless tobacco, arecanut and alcohol, thereby elevating the risk of OPMDs/ Oral Cancer [1]. This pandemic situation has created disturbances in routine dental care, and screening for early detection of Oral Cancer and OPMDs across the globe. The Interdepartmental Research Center (CIR) Dental School of Turin, Italy, which is a referral center for Oral Cancer diagnosis, has identified 40 cases in 2019 (approximately 0.16 cases daily), of which only one identified case of Oral Cancer was referred by a general dentist during the pandemic [6]. Similar findings were reported from our hospital database. During the year 2019, our hospital database reported 40 cases of Oral Cancer (annual incidence of 3.33 cases every month), which was reduced during the pandemic in 2020 with 19 cases (annual incidence of 1.5 cases every month). However, post-lockdown in just the initial two months of the year 2021, 11 Oral Cancer cases were diagnosed, with an annual incidence of 5.5 cases. There could have been a delay in the reporting of these patients to the hospital due to the lockdown and quarantine, or delay in access to care may be due to the patients' fear to visit primary health care providers.

Recently, a British Dental Association (BDA) research in England suggested that during the lockdown, 14 million appointments were missed, which means thousands of undiagnosed cases. Patients did not have examinations for Oral Cancer as part of their routine check-ups, which resulted in an increase in new cases of Oral Cancer reported post-lockdown [7]. According to the Irish Cancer Society, around 550 people are affected with Head, Neck and Oral Cancer every year. As patient visits for dental check-ups are less likely owing to the COVID-19 infection, dentists have warned that a high number of Oral Cancers could be missed or diagnosed at later stages [8]. The clinical stage of Oral Cancer may be advanced, and the patient may progress from curative phase to palliative stage [9]. Similarly, a delay in diagnosis of Oral Cancer was noted due to the quarantine in Cordoba, Argentina [10].

Oral Cancers are often preceded by clinically visible oral lesions, known as Oral Potentially Malignant Disorders. Opportunistic screening or thorough self-examination by the patient himself, can aid in the early detection of these oral lesions [11]. These lesions are often clinically monitored regularly. As routine dental care has ceased because of the pandemic, and opportunities for screening of the oral cavity have become limited, it has affected the early detection and prevention of OPMDs. This may result in delay in the diagnosis of OPMDs as well as Oral Cancer, and lead to the progression of the disease.

In our hospital set-up, opportunistic screening has identified 360 OPMDs (annual incidence of 30 cases) in 2019, whereas 230 OPMDs (annual incidence of 19.1 cases) were detected during the pandemic (2020), and 73 OPMDs (annual incidence of 36.5 cases) in 2021, which showed a higher prevalence rate. Though statistically insignificant between the years 2018 to 2021, clinically significant reduction in the number of OPMDs was reported during the pandemic. Specialty clinics and private dental hospitals remained closed, which hindered the follow up of OPMDs. Asymptomatic oral lesions are often an incidental finding during routine dental check-ups. If patients miss screening, these lesions may progress further [9]. The COVID-19 outbreak has resulted in an increase in habits such as smoking, tobacco chewing and alcoholism. This enhances the occurrence of OPMDs.

Oral Cancer is preventable if detected early. Early detection of Oral Cancer results in a better prognosis and favorable course, whereas diagnostic delays have worse histological grading, larger size neck involvement and poor prognosis [9]. The pandemic has probably delayed the diagnosis due to non-reporting of individuals to hospitals, and increased risk habits resulting in a higher risk of developing OPMDs. In addition, anxiety amongst the population about becoming infected with COVID-19, has led to their isolation. A study showed that 60% of all Oral Cancers were in Tis, T1, or T2 stage before the pandemic. The pandemic has affected tumour staging at the first visit, and has led to postponing of the management of these oral lesions [10]. However, we do not have any data concerning TNM staging, or therapeutic delays.

Regular clinic visits should be encouraged to monitor the progression of lesions, and to review their condition. During this pandemic setting, local authorities across the globe have framed guidelines and distinguished dental emergencies and urgent situations. Operational guidelines stated by the Dental Council of India during the COVID-19 pandemic have categorized Biopsy of oral mucosal lesions as an urgent care. Urgent care situations are those that require priority care, but do not increase the patient's death risk [7]. Given the current situation, patients can be monitored through telemedicine portals, and if biopsy is required, they can be directed to specialty clinics and managed accordingly.

Conclusion

As an impact of the closure of dental practices due to the COVID-19 pandemic, there may have been limited opportunities for the early detection of Oral cancer and asymptomatic OPMDs. This analysis reports an increase in the prevalence of Oral Cancer and OPMDs post-lockdown at our institution. Routine dental checkups can reduce the burden of Oral Cancer through opportunistic screening, which was probably missing during the lockdown.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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