

# Prevalence of Dental Caries, Periodontal Diseases, and Periapical Pathoses among Patients attending a Tertiary Dental Care Center in Central Gujarat: A Hospital-based Cross-sectional Study

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## ABSTRACT

**Introduction:** Dental caries and periodontal disease are the two globally leading oral infections. There is considerable variation in the prevalence of these diseases. Also, these may lead to various periapical pathoses like periapical abscess, cysts, and so on. These may be attributed to differences in age, gender, sample size, geographical distribution, and protocol followed for diagnosis.

**Objectives:** To estimate the prevalence of dental caries, gingivitis/periodontitis, and periapical pathoses in patients of all ages in a dental institute in central Gujarat.

**Materials and methods:** After obtaining approval from the Institutional Ethics Committee, a hospital-based cross-sectional study was carried out in a dental institute of central Gujarat. A total of 4,642 patients were screened, out of which 2,849 subjects were included in the present study. Intraoral examination was done under all aseptic conditions by using a diagnostic set of instruments by trained professionals and the status of the pathology recorded according to the standard procedure. Data were stored in an Excel spreadsheet for analysis.

**Results:** It was observed that dental caries/pulp pathoses were more prevalent in the younger age group with mean age 23.1 years. All the other pathoses were observed among the middle age group (above 35 years). Overall prevalence of dental caries/pulp pathoses, gingivitis/periodontitis, and periapical pathoses was observed in 54.8% of males as compared to 45.2% females.

**Conclusion:** The current study collected significant data for the prevalence of three different odontogenic oral lesions in the central Gujarat geographical location at a tertiary level. There is male preponderance in the prevalence of these diseases in general. There is a need to generate awareness about oral health and the prevention of dental caries and gingivitis/periodontitis and to institute measures for the provision of dental care services at the primary level.

**Keywords:** Periapical pathoses, Periodontitis, Pulp pathoses.

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## INTRODUCTION

Dental caries is an infectious microbiologic disease of the calcified tissues of the teeth, characterized by the demineralization of inorganic portions and destruction of the organic substances of the teeth.<sup>1</sup> Periodontal disease is an inflammatory disease that affects the soft and hard structures that support the teeth. Periapical pathoses are the result of dental caries in the apical region of the root and gradually to the underlying bone. Dental diseases are a significant public health burden in India, with dental caries affecting 60 to 65% and periodontal diseases affecting an estimated 50 to 90% of the general population.<sup>2</sup> Oral diseases over the years have been fluctuating with changing lifestyle. Many of the oral diseases or conditions are associated with unhealthy lifestyle.<sup>3</sup> Dental caries and periodontal disease show striking geographic variation, socioeconomic patterns, and severity of distribution all over the world.<sup>4</sup> Differences in prevalence studies conducted earlier may be attributed to certain factors like age, sex, sample size, geographical distribution, and healthy or unhealthy behaviors, such as sugar in the diet and smoking. Few prevalence studies have used only clinical criteria to reach the diagnosis, whereas others used both radiographic and clinical criteria.<sup>5</sup> This can be effectively prevented and controlled through a combination of community, professional, and individual actions.<sup>6</sup> With the above background, a cross-sectional study was designed to estimate the overall prevalence of dental caries, periodontal diseases, and periapical pathoses and its age and gender-wise distribution in a general population attending a tertiary dental care center in central Gujarat. A comparison between different prevalence studies was also done.

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**MATERIALS AND METHODS**

After obtaining approval from the Institutional Ethics Committee, a hospital-based cross-sectional study was carried out in routine dental check-up in a dental institute of central Gujarat. An informed consent was obtained from all participants, and the study was carried out according to the World Medical Declaration of Helsinki. Intraoral examination of the subjects was done under all aseptic conditions by using a diagnostic set of instruments by trained professionals and the status of the pathology recorded according to the standard procedures. A total of 4,642 patients attending dental OPD were screened, out of which 2,849 study subjects having caries/pulp pathoses, gingivitis/periodontitis, and periapical pathoses were included for further analysis. Remaining patients, with no above-mentioned criteria, were excluded from the study. Statistical analysis was done using an Excel spreadsheet and Graph Pad Prism Software, California USA.

**RESULTS**

The results of the study have been categorized into three parts for the purpose of further discussion, namely, the prevalence of dental caries, the prevalence of periapical pathoses, and the prevalence of periodontal diseases. Table 1 shows gender-wise distribution of all the three diseases with male preponderance (54.8% in males and 45.2% in females). Table 2 shows age-wise distribution of all three diseases with higher occurrence in younger population in the age group 21 to 40 (44.3%).

**Prevalence of Dental Caries/Pulpitis**

Dental caries/pulpitis was observed to have higher prevalence in females (46.9%; Table 3) as compared to males (43.4%; Table 4). This shows that females suffer from caries/pulpitis more than males. On the contrary, caries/pulpitis and periapical pathoses together were observed to be highly prevalent in males (56.5%; Table 4) than females (43.5%; Table 3). When dental caries and

**Table 1:** Gender-wise distribution of study population

Gender	Frequency	Percentage
Female	1,289	45.2
Male	1,560	54.8
Total	2,849	100

**Table 2:** Age-wise distribution of study population

Age groups	Frequency	Percentage
1–20	599	21
21–40	1,262	44.3
41–60	783	27.5
61–80	194	6.8
Above 80	11	0.4
Total	2,849	100

**Table 3:** Prevalence of various pathologies in female population

Overall pathologies	Females	Percentage
Caries/pulpitis	247	46.9
Gingivitis/periodontitis	411	43
Periapical pathoses	50	40.7
Caries/pulpitis and gingivitis/periodontitis	387	44.8
Caries/pulpitis and periapical pathoses	30	43.5
Gingivitis/periodontitis and periapical pathoses	79	52.3
Caries/pulpitis and gingivitis/periodontitis and periapical pathoses	85	53.1
Total	1,289	45.2

**Table 4:** Prevalence of various pathologies in male population

Overall pathologies	Males	Percentage
Caries/pulpitis	280	43.1
Gingivitis/periodontitis	545	57
Periapical pathoses	73	59.3
Caries/pulpitis and gingivitis/periodontitis	476	55.2
Caries/pulpitis and periapical pathoses	39	56.5
Gingivitis/periodontitis and periapical pathoses	72	47.7
Caries/pulpitis and gingivitis/periodontitis and periapical pathoses	75	46.9
Total	1,560	54.8

**Table 5:** Average age range of study population as compared to various pathoses

Pathology outcome	Number	Mean age	Standard deviation
Caries/pulpitis	527	23.1	16.717
Gingivitis/periodontitis	956	38.72	16.295
Periapical pathoses	123	35.37	17.280
Caries/pulpitis and gingivitis/periodontitis	863	35.42	14.705
Caries/pulpitis and periapical pathoses	69	33.77	16.810
Gingivitis/periodontitis and periapical pathoses	151	39.56	15.595
Caries/pulpitis and gingivitis/periodontitis and periapical pathoses	160	39.45	14.321
Total	2,849	34.65	16.821

gingivitis/periodontitis were compared, males had higher percentage (55.2%; Table 4) than females (44.8%, almost 10% less than males; Table 3). The average mean age for dental caries/pulpitis was 23.1 years (Table 5).

**Prevalence of Gingivitis/Periodontitis**

The prevalence of gingivitis/periodontitis based on gender-wise distribution of the study population was observed to be higher in males (57%; Table 4) than in females (43%; Table 3). The mean age for gingivitis/periodontitis was 38.72 years (Table 5), while for dental caries and gingivitis/periodontitis, the mean age was 35.42 years. For gingivitis/periodontitis and periapical pathoses, the mean age was 33.77 years (Table 5).

## Prevalence of Periapical Pathoses

The prevalence of periapical pathoses based on gender-wise distribution of the study population was found to be high in males (59.3%; Table 4) as compared to females (only 40.7%; Table 3). Among all three diseases, periapical pathoses were the highest in males. Periapical pathoses in combination with gingivitis/periodontitis were the highest in females (52.3%; Table 3) while in males it was 47.7% (Table 4). The average mean age for periapical pathoses was 35.37 years (Table 5), while the mean age for dental caries/pulpitis and periapical pathoses was 33.77 years.

## DISCUSSION

### Prevalence of Dental Caries

In this study, the prevalence of dental caries was found to be the highest in the male study population, at 54.8% (1,560 study subjects out of 2,849 subjects), while in another study conducted by E Shubha Poorani and CS Chandana, it was found that females had 49.1% of dental caries, which was more than the occurrence in males (41.8%).<sup>7</sup> Oral health was shown to be better in females in a large number of studies. Females are generally more health conscious. It may be an important factor responsible for this observation. In this study, the prevalence of dental caries/pulp pathoses, gingivitis/periodontitis, and periapical pathoses was found to be the highest in the age group 21 to 40. The lowest prevalence was found in the geriatric population above the age of 80.<sup>8</sup> Dental caries is a significant health problem among the people of all ages, but the magnitude of the problem is the greatest among young children.<sup>9</sup>

The prevalence of dental caries in the age group 21 to 40 years in the present study was found to be 44.3%, which is lower than that reported in the WHO Oral Health Country Profile (94%).<sup>10</sup> However, the results were found to be higher than that found in a study conducted by Doifode et al<sup>11</sup> in Nagpur (48.6%) in the same age group and by Chakraborty et al<sup>12</sup> in Siliguri (57.03%) in the age group 35 to 40 years. Over a 5-year period, among the present total study population, caries prevalence had increased from 29.9 to 46.7% and periodontal disease (existence of periodontal pockets) prevalence had dramatically increased from 5.3 to 24.4%.<sup>13</sup> In this study, caries/pulp pathoses were seen among the younger age group with a mean age of 23.1 years. In this study, all the other pathoses were seen occurring among the middle age group (above 35 years).

### PREVALENCE OF PERIODONTAL DISEASE

Traditionally, with age periodontal disease increases and almost everybody is more or less susceptible to it.

This belief has come from both epidemiologic studies and clinical observations. Increasing edentulousness with age usually reflects destructive periodontal disease and greater mean tooth loss and mean periodontal index scores in older age groups.<sup>14</sup> Among the various prevalences recorded in this study, results showed that gingivitis/periodontitis was the highest among the seven pathologies at 33.55% (956 out of 2,849 study subjects), among which males accounted for 57% (545 out of 956 study subjects) and females accounted for 43% (411 out of 956 study subjects). Recent evidence indicates that rural populations have a higher prevalence of periodontal diseases. Interestingly, oral disease patterns, health behaviors, and health care modalities are significantly different from those in urban areas.<sup>15</sup>

To accomplish an adequate level of periodontal health, the individual must be aware of disease symptoms, perceive a need to do something about the symptoms, be motivated to do something about them, know what to do about them, and finally adopt the appropriate behavior.<sup>16</sup>

It can be attributed to several factors, e.g., the huge population of India (approximately 1,000 million), out of which 72% live in rural areas. There is no oral health care system in rural areas with the dentist: Population ratio of about 1:2,00,000. There is no para-dental infrastructure at the village level and the primary health care center level. At the community health care center level, only 25% community health centers have dental surgeons, but have inadequate instruments, equipment, and dental materials. Good oral health care infrastructure and easy access to the services available at village/primary health center level have been shown to affect the prevalence of periodontal diseases.<sup>17</sup>

The KAP survey on oral health practices of 3,247 individuals, 6 to 60 years of age, in the Sidhaura block of Haryana revealed that the use of dattan was more prevalent (56% in adult community and 49% students) than tooth brush (35% adult community and 34% students). A total of 37% of the community had the knowledge of brush being the best oral hygiene measure, and 25% of the community using brush brushed only once per day. The knowledge of the community regarding the role of fluorides in the prevention of dental caries was completely lacking: 1.8% of the community was using fluoride dentifrice. A total of 35 to 45% of the community were consuming sweet foods/drinks etc. four times a day.<sup>18</sup>

### PREVALENCE OF PERIAPICAL PATHOSES

In this study, the prevalence of periapical pathoses was more in males (59.3%) than in females (40.7%). The average mean age for periapical pathoses was 35.37 years. This can be explained by the negligence of the individuals toward



dental caries, which further progresses toward periapical pathoses. Periapical pathoses are more prevalent in males as males have more pain threshold than females. Hence, males have more negligence toward dental caries, which further leads to periapical pathoses. According to a study, 12% of periapical lesions have non-endodontic origin, and the other 88% have odontogenic origin.<sup>19</sup> In another study, a total of 584 radiographs out of 1,000 were diagnosed with periapical pathology. No sex predilection was noted in the distribution of periapical pathology, and the majority of the patients (36.30%) belonged to the 25 to 36 years age group.<sup>20</sup>

## CONCLUSION

The oral cavity has the potential to harbor at least 600 different bacterial species, and in any given patient, more than 150 species may be present, surfaces of teeth can have as much as billion bacteria in its attached bacterial plaque and microorganisms in dental plaque interact with neutrophils/monocytes resulting in acute-phase inflammatory response by the systemic dissemination of locally produced mediators.<sup>21</sup>

This study was conducted to get meaningful data for different odontogenic oral diseases and plan preventive/curative measures. There is a need to generate awareness about oral health and the prevention of dental caries, gingivitis/periodontitis, and periapical pathoses so as to institute measures for the provision of dental care services at the primary level.

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