Prevalence and Determinants of Dental Caries Among Two WHO Index Age Groups in Jaipur: A Cross-Sectional Study.

ABSTRACT

Background

Dental caries remains one of the most prevalent chronic oral diseases worldwide and affects individuals across all age groups. Monitoring dental caries prevalence among WHO index age groups provides valuable epidemiological information for planning preventive oral health programs and healthcare policies.

Aim

To assess the prevalence of dental caries among two WHO index age groups, 12 years and 65–74 years, and evaluate associated demographic and behavioral determinants in Jaipur city.

Materials and Methods

A descriptive cross-sectional study was conducted among 400 participants comprising 200 school children aged 12 years and 200 elderly individuals aged 65–74 years. Dental caries assessment was carried out using the WHO Oral Health Assessment Form (2013) and DMFT index. Data regarding oral hygiene practices, fluoride use, dietary habits, tobacco use, alcohol consumption, and dental visitation patterns were collected. Statistical analysis was performed using SPSS version 25. Descriptive statistics, ANOVA, Student's t-test, and Pearson's correlation analysis were applied with significance level set at $p<0.05$.

Results

The overall prevalence of dental caries was 62.5%. Caries prevalence among 12-year-old participants was 51%, whereas elderly participants demonstrated significantly higher prevalence of 74% ($p=0.000$). Female participants in the elderly age group showed significantly higher DMFT scores compared to males ($p=0.0158$). Rural elderly participants exhibited higher caries prevalence than urban participants. Poor oral hygiene practices, irregular dental visits, and adverse dietary habits were associated with increased caries experience.

Conclusion

Dental caries prevalence was considerably higher among elderly individuals compared to adolescents. Age, gender, residential location, and oral hygiene practices significantly influenced caries prevalence. Comprehensive preventive oral healthcare programs targeting both adolescents and elderly populations are necessary to reduce disease burden.

Keywords

Dental caries, DMFT, WHO index age groups, oral hygiene, elderly population, prevalence

INTRODUCTION

Dental caries is a multifactorial, biofilm-mediated, diet-modulated chronic disease characterized by demineralization and destruction of dental hard tissues caused by bacterial fermentation of dietary carbohydrates.[1] It remains one of the most prevalent oral diseases affecting populations globally and continues to pose a major public health challenge despite substantial advances in preventive dentistry and oral healthcare awareness.[2]

The caries process involves a dynamic interaction between host susceptibility, oral microorganisms, dietary sugars, saliva, and environmental factors. When pathological factors outweigh protective mechanisms such as remineralization and fluoride exposure, irreversible cavitation occurs.[3] Dental caries may lead to pain, infection, tooth loss, compromised mastication, poor nutritional status, speech difficulties, and reduced quality of life.[4]

According to the Global Burden of Disease Study, untreated dental caries in permanent dentition is the most prevalent health condition worldwide, affecting nearly 2.4 billion individuals, while approximately 486 million children suffer from caries in primary dentition.[5] Developing nations are experiencing increasing prevalence due to urbanization, westernized dietary patterns, increased sugar consumption, and inadequate oral healthcare infrastructure.[6]

The World Health Organization recommends monitoring specific index age groups to facilitate global comparisons and oral disease surveillance.[7] Among these, 12 years is considered the global monitoring age for dental caries because almost all permanent teeth, except third molars, have erupted by this age. It also represents the final stage at which school-based sampling can be conveniently performed.[8] Conversely, the 65–74-year age group reflects cumulative lifetime exposure to oral diseases and provides valuable information regarding the effectiveness of oral healthcare systems and treatment services available to elderly populations.[9]

India continues to face substantial oral health disparities despite improvements in healthcare delivery systems. Studies have reported varying prevalence of dental caries across different geographic regions and socioeconomic groups within the country.[10] Janakiram et al. reported that dental caries prevalence among Indian populations ranged from 49% in children to approximately 85% among elderly individuals aged 65–74 years.[11] Similarly, Pandey et al., in their systematic review and meta-analysis, reported pooled dental caries prevalence of 54.16% in Indian populations.[12]

The elderly population represents a particularly vulnerable group due to increased root surface exposure, gingival recession, systemic diseases, medication-induced xerostomia, poor manual dexterity, and reduced accessibility to oral healthcare services.[13] Simultaneously, adolescents remain highly susceptible to dental caries due to frequent sugar consumption, poor oral hygiene practices, and inadequate preventive awareness.[14]

Several international studies have investigated dental caries prevalence among adolescents and elderly populations independently. Mamani et al. reported caries prevalence of 61.1% among secondary school students in Rwanda, while Orfali et al. demonstrated high prevalence among Saudi Arabian school children.[15,16] However, limited Indian literature exists comparing caries prevalence among adolescents and elderly populations simultaneously within the same geographic setting.

Therefore, the present study was undertaken to assess the prevalence and determinants of dental caries among two WHO index age groups, 12 years and 65–74 years, in Jaipur city and evaluate associated demographic and behavioral factors.

MATERIALS AND METHODS

Study Design

A descriptive cross-sectional observational study was conducted from January 2025 to June 2025 in Jaipur city, Rajasthan.

Study Population

The study population comprised 400 participants divided equally into:

- 200 school children aged 12 years
- 200 elderly individuals aged 65–74 years

Sampling Method

Jaipur city was divided into four zones. School children were selected randomly from various schools, while elderly participants were recruited from the Department of Public Health Dentistry, Rajasthan Dental College and Hospital.

Inclusion Criteria

- Participants belonging to selected WHO index age groups
- Individuals willing to participate and provide informed consent

Exclusion Criteria

- Individuals with systemic diseases requiring specialized dental care
- Participants unwilling to participate

Examiner Calibration

Examiner training and calibration were performed before commencement of the study. Duplicate examinations were conducted on 30 participants not included in the final sample. Intra-examiner reliability was assessed using Cohen's Kappa coefficient and Intraclass Correlation Coefficient (ICC). Calibration values demonstrated satisfactory agreement (Kappa=0.85; ICC=0.91).

Data Collection

Clinical examination was performed using:

- Mouth mirror
- CPI probe
- WHO Oral Health Assessment Form (2013)

The following variables were recorded:

- Demographic details
- Oral hygiene practices
- Fluoride toothpaste use
- Sugary drink consumption
- Tobacco and alcohol habits
- Dental visitation patterns

Dental caries was assessed using the DMFT index.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 25. Descriptive statistics, ANOVA, Student's t-test, and Pearson's correlation coefficient were applied. Statistical significance was considered at $p<0.05$.

RESULTS

The present study included 400 participants equally distributed between 12-year-old children and elderly individuals aged 65–74 years.

The overall prevalence of dental caries was 62.5%. Caries prevalence among 12-year-old participants was 51%, whereas prevalence among elderly participants was significantly higher at 74% (p=0.000).

Table -1: Distribution of the study population according to the gender (12 & 65-74 years)

Gender	**Frequency(N)**	**Percentage(%)**
Male	288	72
Female	112	28
Total	**400**	**100**

Male participants constituted 72% of the study population, while females accounted for 28%.(table -1)

Table 2: Association of gender and DMFT in 12 year population

Gender	DMFT
Male	0.38 ± 0.73
Female	0.25 ± 0.54
p-value	0.19

Significance level set at <0.05; Test applied: ANOVA test.

Table 3: Association between DMFT & gender (age 65-74 years) in the study populations

Gender	DMFT
Male	1.87 ± 2.6
Female	2.80 ± 1.6
p-value	0.0158

Significance level set a t<0.05; Tests applied: ANOVA test.

Table 4: Association between DMFT and location (age 12 years)in the study population

Location	DMFT
Urban	.34±.62
Semi urban	.34 ±.74
Rural	.36 ±.74
p-value	.993
Total	**400**

Significance level set at <0.05; Test applied: ANOVA test.

Table 4 depicted that the location of a 12-year-old has no significant association of location on dental caries prevalence with a significance level at 0.993.

Table 5: Association between DMFT and location (age 65-74 years) in the study population

Location	**DMFT**
Urban	0.34 ±0.62
Semiurban	0.34 ±0.74
Rural	0.38 ± 0.74
p-value	.005
Total	**400**

Table 5 showed that age group of the 65-74 years have significant significance with p value as 0.05 showing the people living in rural area showed high score of DMFT.

Among elderly participants, females demonstrated significantly higher DMFT scores compared to males (p=0.0158). Rural elderly participants exhibited higher caries prevalence compared to urban participants.(Table-2)

The majority of adolescents brushed once daily and demonstrated high sugary beverage consumption. Awareness regarding fluoridated toothpaste was inadequate among both age groups.

DISCUSSION

Dental caries remains one of the most significant oral health challenges globally due to its multifactorial etiology, chronic progression, and substantial impact on quality of life. The present study evaluated dental caries prevalence among two WHO index age groups and identified significant demographic and behavioral determinants associated with disease occurrence.

The overall prevalence of dental caries in the present study was 62.5%, indicating a considerable burden of untreated oral disease within the study population. Similar prevalence rates have been reported in several Indian and international epidemiological studies. Pandey et al., in a

systematic review and meta-analysis evaluating dental caries prevalence in Indian populations, reported pooled prevalence of 54.16%.[12] Likewise, Kale et al. observed prevalence rates ranging from 61% to 66% among children in Eastern Mediterranean countries.[17]

The present study demonstrated significantly higher caries prevalence among elderly participants (74%) compared to adolescents aged 12 years (51%). This finding is consistent with the observations of Janakiram et al., who reported prevalence rates approaching 84–85% among elderly Indian populations.[11] Increased caries prevalence among elderly individuals may be attributed to cumulative lifetime exposure to cariogenic challenges, gingival recession, root surface exposure, poor oral hygiene maintenance, systemic illnesses, medication-induced xerostomia, and reduced dental healthcare utilization.[13]

Carvalho and Schiffner evaluated trends in European adults and elderly populations and reported significantly elevated DMFT scores among older adults due to increased missing teeth components and prolonged disease exposure.[18] Similar findings were observed in the present study, where elderly participants demonstrated substantially greater caries experience than adolescents.

Female participants in the elderly age group showed significantly higher DMFT scores compared to males. Comparable findings were reported by Orfali et al. in Saudi Arabia, where females demonstrated higher caries prevalence in permanent dentition.[16] Hormonal fluctuations, postmenopausal salivary changes, dietary patterns, and greater retention of natural teeth among females may contribute to increased susceptibility. Furthermore, elderly women often experience nutritional deficiencies and osteoporosis-related changes affecting oral health status.

The present study also revealed that rural elderly participants had significantly higher caries prevalence than urban participants. Similar findings were reported by Nimmy et al., who observed increased disease burden among rural populations in Tamil Nadu.[19] Rural populations frequently encounter barriers such as inadequate accessibility to oral healthcare facilities, lower socioeconomic status, financial constraints, and limited preventive awareness. Reduced exposure to fluoridated oral healthcare products and delayed treatment-seeking behavior further aggravate disease progression.

Among adolescents, dental caries prevalence was 51%, which is comparable to findings reported in Indian and African studies. Mamani et al. reported caries prevalence of 61.1% among Rwandan secondary school students, whereas Alraqiq et al. observed prevalence of 48.2% among Libyan school children.[15,20] These findings collectively suggest that dental caries remains a major oral health concern among school-aged populations globally.

Oral hygiene practices demonstrated significant associations with dental caries prevalence in the present study. A majority of adolescents brushed only once daily and showed inadequate awareness regarding fluoridated toothpaste. Similar findings were reported by Liu et al., who observed increased caries risk among Chinese adolescents with delayed tooth brushing initiation and inadequate fluoride exposure.[21] Fluoride has proven anti-cariogenic effects through remineralization and inhibition of bacterial metabolism; therefore, inadequate fluoride exposure substantially increases susceptibility to dental caries.

Sugary beverage consumption was considerably higher among adolescents in the present study. Frequent intake of fermentable carbohydrates and carbonated beverages promotes acidogenic

bacterial activity and enamel demineralization. Reyes-Lara et al. demonstrated strong associations between excessive sugar intake and increased caries prevalence among socially vulnerable children and adolescents.[22] Increased urbanization and widespread availability of processed foods have significantly altered dietary patterns among children and adolescents in developing countries.

The present study further revealed inadequate utilization of preventive dental services among elderly individuals, with most participants seeking dental care only during painful conditions or emergencies. Similar observations were reported in previous Indian geriatric studies.[23] Fear of dental procedures, financial limitations, low awareness levels, dependency on caregivers, and restricted accessibility to dental facilities contribute to poor healthcare utilization among older adults.

The findings of the present study highlight the urgent need for comprehensive community-based preventive oral healthcare programs targeting both adolescents and elderly populations. School dental health education programs emphasizing proper oral hygiene practices, fluoride use, and dietary counseling may significantly reduce disease burden among children. Simultaneously, geriatric oral healthcare initiatives focusing on regular screening, tobacco cessation counseling, preventive treatment, and improved accessibility to dental services are essential for elderly populations.

Although the study provides valuable epidemiological data, certain limitations should be considered. The cross-sectional design restricts establishment of causal relationships, and self-reported behavioral data may be affected by recall bias. Nevertheless, the study offers important baseline information regarding dental caries prevalence among WHO index age groups in Jaipur.

CONCLUSION

The prevalence of dental caries was significantly higher among elderly individuals compared to 12-year-old adolescents. Age, gender, residential location, oral hygiene practices, and dietary behaviors were important determinants influencing caries prevalence.

Implementation of preventive oral healthcare strategies, regular screening programs, fluoride-based interventions, and oral health awareness campaigns is essential for reducing disease burden and improving quality of life among vulnerable populations.

CLINICAL SIGNIFICANCE

The present study provides valuable epidemiological baseline data regarding dental caries prevalence among WHO index age groups in Jaipur and may assist policymakers and healthcare providers in planning targeted preventive oral healthcare programs.

REFERENCES (VANCOUVER STYLE)

1. Pitts NB, Zero DT, Marsh PD, Ekstrand K, Weintraub JA, Ramos-Gomez F, et al. Dental caries. Nat Rev Dis Primers. 2017;3:17030.
2. Selwitz RH, Ismail AI, Pitts NB. Dental caries. Lancet. 2007;369(9555):51-59.
3. Fejerskov O, Nyvad B, Kidd E. Dental Caries: The Disease and Its Clinical Management. 3rd ed. Oxford: Wiley Blackwell; 2015.
4. Petersen PE. The World Oral Health Report 2003: Continuous improvement of oral health in the 21st century. Community Dent Oral Epidemiol. 2003;31(Suppl 1):3-24.
5. GBD 2017 Oral Disorders Collaborators. Global burden of untreated caries. J Dent Res. 2020;99(4):362-373.
6. Moynihan P, Kelly S. Effect on caries of restricting sugars intake. J Dent Res. 2014;93(1):8-18.
7. World Health Organization. Oral Health Surveys: Basic Methods. 5th ed. Geneva: WHO; 2013.
8. Petersen PE, Baez RJ. Oral Health Surveys: Basic Methods. Geneva: WHO; 2013.
9. Petersen PE, Yamamoto T. Improving oral health of older people. Community Dent Oral Epidemiol. 2005;33(2):81-92.
10. Hiremath A, Murugaboopathy V, Ankola AV, Hebbal M, Mohandoss S. Prevalence of dental caries among Indian school children. J Clin Diagn Res. 2016;10(7):ZC47-ZC50.
11. Janakiram C, Antony B, Joseph J, Ramanarayanan V. Prevalence of dental caries among WHO index age groups in India. J Clin Diagn Res. 2018;12(8):ZE08-ZE13.
12. Pandey P, Nandkeoliar T, Tikku AP, Singh D, Singh MK. Prevalence of dental caries in Indian population: A systematic review and meta-analysis. J Int Soc Prev Community Dent. 2021;11(2):256-265.
13. Agrawal R, Gautam NR, Kumar M, Kadhiresan R, Saxena V, Jain S. Oral health status among elderly population. J Clin Diagn Res. 2015;9(3):ZC11-ZC15.
14. Sharma V, Gupta N, Arora V, Gupta P, Mehta N. Dental caries prevalence among school children. Indian J Dent Sci. 2015;7(2):34-38.
15. Mamani SJ, Mukamurigo J, Uwambaye P, Andegiorgish AK. Dental caries prevalence among secondary school students in Rwanda. BMC Oral Health. 2025;25:118.
16. Orfali SM, Al-Talhi NM, Al-Shammari M, Al-Muzaini A, Al-Otaibi M, et al. Caries prevalence among Saudi Arabian school children. Saudi Dent J. 2023;35(2):101-109.
17. Kale S, Kakodkar P, Shetiya S, Abdulkader R. Dental caries prevalence in Eastern Mediterranean countries. J Int Oral Health. 2020;12(3):192-198.

18. Carvalho JC, Schiffner U. Dental caries in European adults and senior citizens. Caries Res. 2019;53(3):242-252.

19. Nimmy P, Prabu D, Dhamodhar D, Sindhu R, Rajmohan M, Savitha S. Prevalence of dental caries among WHO age groups in Tamil Nadu. J Indian Assoc Public Health Dent. 2024;22(1):45-52.

20. Alraqiq H, Eddali A, Boufis R. Dental caries prevalence among Libyan school children. Libyan J Med. 2021;16(1):1872345.

21. Liu Y, Sun Y, Zhang Y, et al. Oral health status among adolescents in China. BMC Oral Health. 2024;24:511.

22. Reyes-Lara RE, Curto A, Ribas-Perez D, Barbero-Navarro I, Rodriguez-Menacho D, Flores-Fraile J, et al. Oral health inequalities among vulnerable children. Int J Environ Res Public Health. 2025;22(3):412.

23. Chahar P, Mohanty A, AY A. Oral health-related quality of life among elderly patients in Delhi. J Family Med Prim Care. 2019;8(5):1738-1744.