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To Correlate Chewing side Preference with Handedness and Dental caries and oral hygiene status

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Abstract

Background: A person exhibits chewing side preference when consistent mastication occurs on one side. Early identification of a preferred chewing side [PCS] may be associated with the individual's handedness, significantly influencing the occurrence of dental caries and the maintenance of oral hygiene status.

Methods : A sample of 216 participants were selected for this study and all the participants checked Chewing side Preference, Handedness, Dental caries and oral hygiene status.

Result and Observations: The result is statistically analyzed using SPSS software. The study involved 216 subjects aged 8.0 (6.0-10.0) years, with median deft/DMFT score 1.0 (0.0-3.0) and OHI-s score 0.6 (0.0-1.0). Among 216 children, 120 had decayed/extracted/filled primary teeth, and 10 had decayed/missing/filled permanent teeth. Chewing side

preference was observed in 96.8% either its right or left side with 61.1% preferring the right side. Significant association was found between chewing side preference and caries occurrence and there is no significant association found between chewing side preference and oral hygiene status. No significant association was observed between chewing side preference and handedness ($p > 0.05$).

Conclusion: To understand and addressing chewing side preference in pediatric dentistry is crucial for comprehensive oral health care. Identifying asymmetry early can contribute to proper development, occlusal stability, and long-term well-being in young patients.

Keywords: Chewing side preference, Dental caries, Handedness , Oral hygiene

Introduction

Understanding the development of the stomatognathic system is significantly influenced by delving into the physiology and biophysics of natural human mastication.[1,9] Human mastication can manifest as either bilateral or unilateral, with many activities in daily life exhibiting a 'lateral preference' – a tendency to favor one side of the body over the other.

The act of chewing, or mastication, occurs simultaneously on both sides, known as bilateral chewing. If the number of chewing cycles on one side exceeds that on the opposite side by approximately 30%, it is referred to as a unilateral chewing pattern. This pattern can be further categorized into consistent unilateral chewing (all cycles on the same side) and predominant unilateral chewing (more than 70% of cycles on the same side).Chewing Side Preference (CSP) is identified when mastication consistently or predominantly occurs on one side. CSP assessment can be conducted through a direct method, such as visual observation.[2]

A person's lateral dominance can be established based on their sidedness, whether they are right-handed or left-handed. As per Nissan et al., hemispheric laterality is associated with the central hemisphere of the brain, influencing the lateral functioning of peripheral organs. Additionally, a person's handedness may be connected to their chewing side preference.[3].Lateral preference is important because hemispheric laterality is usually diagnosed by this sidedness.[10]

The timely identification of the preferred chewing side (PCS) is crucial in influencing the occurrence of dental caries, craniofacial development, occlusal harmony, and has the potential to prevent the development of a unilateral chewing pattern.[4]Chewing entails a combination of voluntary and involuntary actions, with control progressively transitioning towards involuntary mechanisms as it develops.[8]

To determine chewing side preference, one can employ either direct observation techniques, like visual assessment, or indirect methods such as electronic programs like cinematography, kinetography, and computerized electromyography. The direct method involves visually observing the side where the food bolus is positioned, which is a straightforward, practical, and quick test with minimal room for misinterpretation. This method is considered more accurate than the indirect methods for assessing chewing side preference.[6]

The commonest type of dental diseases includes dental caries and gum diseases. Dental caries is presently the commonest chronic disease among children and oral hygiene is one of the important practice of keeping one’s oral cavity clean and free from diseases.

Unilateral masticatory habit usually leads to accumulation of plaque and calculus on the contralateral

side leading to dental caries and gingival & periodontal diseases.

However, there is lack of research to link chewing side preference with handedness, dental caries and oral hygiene status. Thus this study aims to assess the impact of chewing side preference on handedness, dental caries and oral hygiene status.

Aims and Objectives

1. To check the Chewing side Preference, Handedness, dental caries and oral hygiene status in 6 to 12 years of children.
2. To correlate Chewing side Preference with Handedness and Dental caries and oral hygiene status.

Material & Methods

This study was done in Rishiraj college of Dental sciences and research centre , Bhopal.The study was carried out in children of age between 6 to 12 years of age.A sample of 216 participants were selected for this study following inclusion of children with good general health. All the participants was checked Chewing side Preference, Handedness, Dental caries and oral hygiene status

The assessment of chewing side preference, as per the method outlined by Mc Donnell et al., and involved participants being provided with a single piece of sugar-free chewing gum or nuts. They were instructed to chew, and after a 15-second interval, they asked to halt chewing and smile, allowing observation of the side where the chewing gum is positioned. This process repeated seven times for each participant, with a 5-second interval between each chewing cycle.

Chewing side preferences (CSP) categorized based on the following criteria:

Consistent Preferred Chewing Side (CPCS):	5 out of 7 strokes on the same side.
Predominant Preferred Chewing Side (PPCS):	5 out of 7 or 6 out of 7 strokes on the same side
Observed Preferred Chewing Side (OPCS):	5 out of 7, 6 out of 7, or 7 out of 7 strokes on the same side.

Handedness of the person can also be related to his/her Chewing side Preference

Handedness was checked by asking subject to perform tasks like throwing a ball. All the subjects performed each task twice and the hand used predominantly choose as dominant hand.

Dental caries status was checked by conducting dental examinations to assess the presence and severity of dental caries using established diagnostic criteria. It was recorded using DMFT/deft index and Oral hygiene status was checked. Evaluated the child's oral hygiene by assessing factors such as plaque accumulation, gingival health, and dental cleanliness using appropriate indices (e.g., Simplified Oral Hygiene Index).

Inclusion Criteria

- Children of age group between 6 to 12 years Healthy Childrens

Exclusion Criteria

- Medically compromised children, Temporomandibular joint disorders, Orofacial pain, Restricted mouth opening, Major occlusal abnormalities, Tenderness on percussion of any teeth, Participants reported no past history of active orthodontic treatment

Statistical analysis

Data were analyzed using SPSS (Statistical Package for Social Sciences) 25.0 version. Data were analyzed for probability distribution using the Shapiro-Wilk test and data was not found to have normal distribution. Thus, non-parametric tests of significance were applied.

Results

The study included 216 subjects with a median (inter-quartile range) age of 8.0 (6.0-10.0) years. The median (inter-quartile range) deft/DMFT score and OHI-s score of the study subjects was 1.0 (0.0-3.0) and 0.6 (0.0-1.0) respectively.

We found that 96.8% of children had a chewing side preference and the majority preferred chewing from the right side (61.1%).

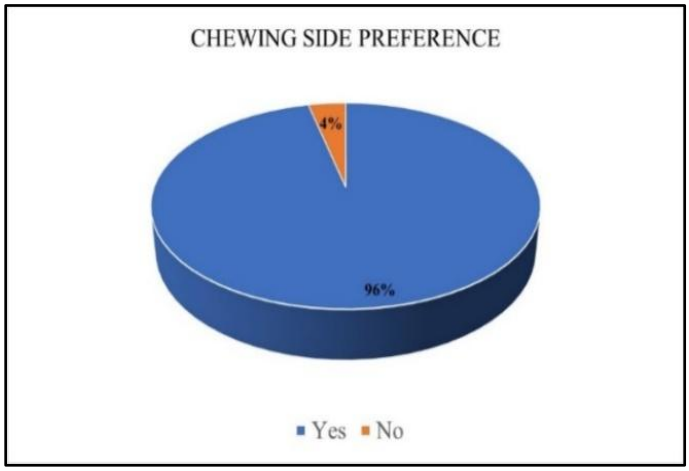

Figure 1: Distribution of study subjects based on chewing side preference.

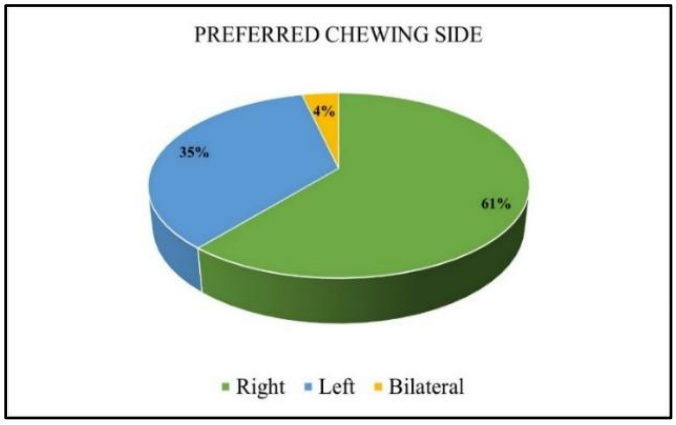

Figure 2: Distribution of study subjects based on preferred chewing side.

Results showed a significant association between the occurrence of chewing side preference and the occurrence of caries.[Table 1]

Table 1: Description of caries status of the study subjects.

		Caries		Total	Chi-square value	Df	p-value
		Yes	No				
Chewing side preference	Yes	128 (98.5%)	80 (93.0%)	208 (96.3%)	4.292	1	.038*
	No	2 (1.5%)	6 (7.0%)	8 (3.7%)			
Total		130 100.0%)	86(100.0%)	216(100.0%)			

Chi-square test. *p-value <.05 was considered statistically significant.

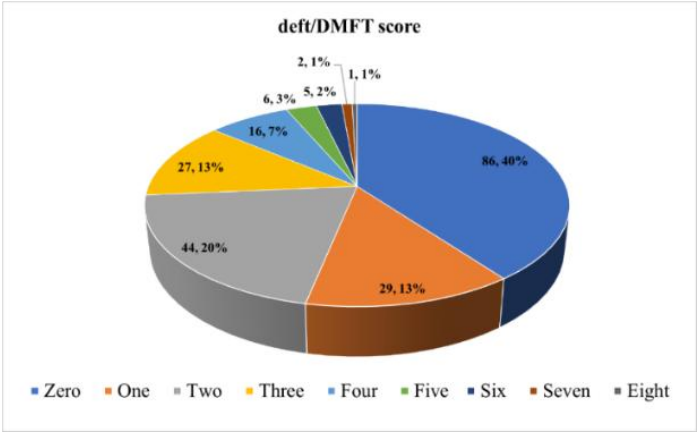

Figure 3: Distribution of study subjects based on deft/DMFT score.

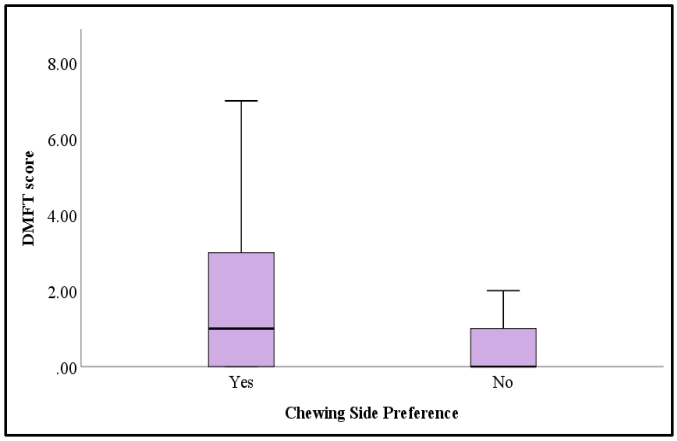

Figure 4: Comparison of caries among subjects with and without chewing side preference

However, the median (inter-quartile range) of the number of teeth affected by caries was not found to differ significantly between the groups. [Table 2]

Table 2: Comparison of number of teeth affected by caries (deft/DMFT) and OHI-S score among subjects with and without chewing side preference.

Parameter	Group		Z-value	P-value
	With CSP	Without CSP		
Deft/DMFT	1.0 (0.0-3.0)	0.0 (0.0-1.5)	-1.650	.099
OHI-s score	0.6 (0.0-1.0)	0.5 (0.075 1.005)	-.021	.983

Mann-Whitney U test.

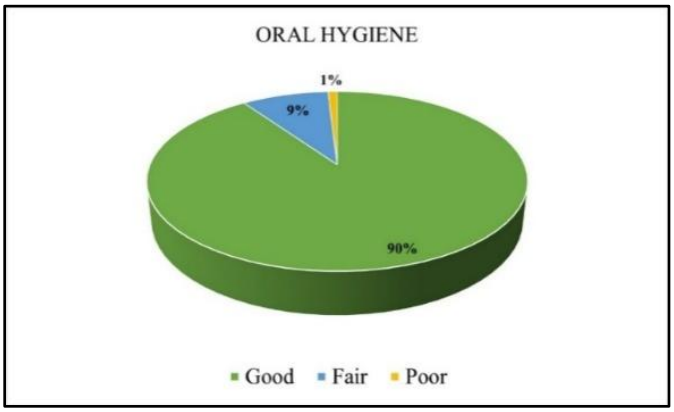

Figure 5: Distribution of study subjects based on oral hygiene.

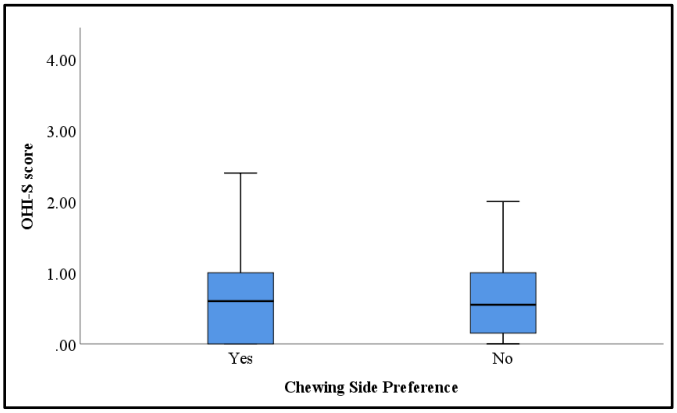

Figure 6: Comparison of OHI-S score among subjects with and without chewing side preference

Chewing side preference was not found to have a significant association with handedness (p-value >.05). [Table 3]

Table 3: Association between chewing side preference and handedness.

		Handedness		Total	Chi-square value	Df	p-value
		Right	Left				
Chewing side preference	Yes	180 (97.3%)	28 (90.3%)	208 (96.3%)	3.621	1	.057
	No	5 (2.7%)	3 (9.7%)	8 (3.7%)			
Total		185 (100.0%)	31 (100.0%)	216(100.0%)			

Chi-square test.

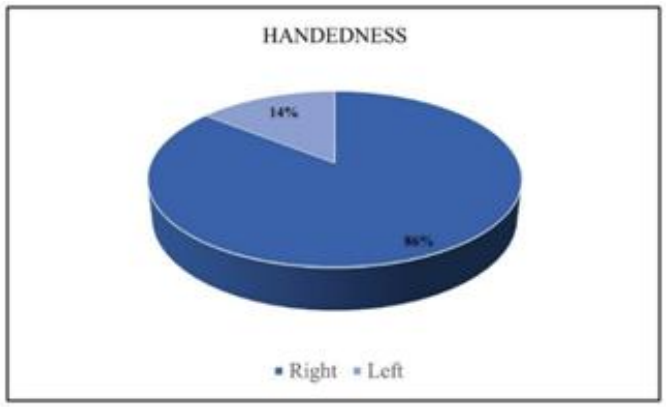

Figure 7: Distribution of study subjects based on handedness

Discussion

This observational study examined prevalence and self awareness of chewing side preference and correlation of chewing side preference with handedness, dental caries and oral hygiene status in sample population of 216 young children of age (6 to 12 years) for assessing preferred chewing side (PCS), the test food used was nuts or chewing gum (sugar free). This was because food influence the side preference.

We studied on 216 children , out of 216 subjects 209(96.8%) were observed to have a PCS. Out of them 132(61.1%) chewed on their right side and 76(35.2%) on left side and 8(3.7%) chewed bilaterally. Similarly Tiwari S et al conducted study on CSP in which total of 75 subjects out of 76(98.6%) were observed to have PCS.[1]

Handedness of the subjects was checked by asking them to perform tasks like throwing a ball. It was found that 185 subjects (85.6%) were right handed and 31(14.4%)

were left handed. Janvi M. Gandhi et al conducted a study on handedness found out that most of children included (45) in the study were right handed.[4]

The caries score of the subjects was recorded using deft/DMFT index. The median score of deft/DMFT was 1.0 (0.0-3.0). However, dental caries score given and recorded by ullal anand nayak et al. stated that dental caries score of primary dentition , mixed dentition, permanent dentition were (0.48 ± 0.779 on right side, 0.40 ± 0.789 on left side),(0.86 ± 1.003 on right side, 0.84 ± 0.961 on left side), (0.54 ± 0.826 on right side, 0.39 ± 0.720 on left side) respectively.[2]

Oral hygiene status is an indication of the cleanliness of the mout . Out of 216 subjects, 195 (90.3%) had good oral hygiene status and 19(8.8%) fair and 2(0.9%) Poor. Similarly, study given by Sharma S et al, states that the clinical level of oral hygiene was good in 81.7%, Fair in 17.5%, and 0.7% Poor.[5]

In this study, it was investigated weather there is any co-relation of chewing side preference with handedness, dental caries and oral hygiene status. The co-relation between chewing side preference and handedness was not found to be statistically significant, (p value >0.05), the similar study was conducted by Tiwari S et al , they found that correlation between observed preferred chewing side and handedness was found to be statistically significant (P value =0.02).[1]

Results showed significant association between occurrence of chewing side preference and occurrence of caries (p value < 0.05). Ullal Anand Nayak et al conducted a study on association between chewing side Preference and dental caries among deciduous , mixed and permanent dentition found that there was no statistically significant association between the presence of chewing side preference and dental caries among these groups (P >0.05)[2]. And this result showed that there is no significant association between chewing side preference and oral hygiene status (p value =0.983). Similary, The correlation between 'OPCS' and 'plaque' was found to be statistically significant (P < 0.05) in the study Tiwari S et al.[1]

Conclusion

Due to a lack of awareness regarding the effects of chewing side preference, it is essential to educate individuals about the potential consequences on dental and facial structures. The habit of chewing predominantly on one side can result in facial asymmetry, compromise oral hygiene, and contribute to dental problems. Identifying chewing side preference during dental examinations is vital for developing appropriate treatment plans.

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