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An In-Vitro Evaluation of Occlusal Fissure Morphology in Primary Molars

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Abstract: Under a stereomicroscope, investigate the intricate architecture of the pit and fissure system of the primary first and second molars.

Material and Method: 60 mandibular and maxillary first and second primary molars were collected, cleaned with pumice, water slurry, and preserved in neutral 10% formalin. Using a carborundum disc, the teeth were longitudinally (buccolingually) segmented into thicknesses of 40 to 100 µm. The glass slide with the ground teeth pieces was fixed, and the stereomicroscope was used to magnify the image by 10 times to look at the fissure pattern. The findings were tabulated and examined.

Result: V-type fissure patterns were more common in maxillary mandibular molar teeth (Primary Maxillary 1st Molar: 53.3%; Primary Maxillary 2nd Molar: 60%); U-type fissure

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patterns were more common in mandibular primary teeth (Primary Mandibular 1st Molar: 60%; Primary Mandibular 2nd Molar: 66.6%).

Conclusion: Compared to other fissure patterns, the U and V types of fissure patterns were more common in the primary molars.

Keywords: Pit and Fissure, Primary Molars, Occlusal Surface

Introduction: The hard tissues of the tooth are affected by dental caries in children, which is brought on by a confluence of factors including tooth shape, bacteria, etc., as well as other aggravating factors including nutrition and genetic predisposition. The primary dentition's distinctive pit and fissure pattern makes it susceptible to dental caries. The most economical solution is thought to be sealing these tooth surfaces. Dental caries continue to be a significant oral health issue in developing nations because of underdeveloped human, capital, and financial resources as well as inadequate training.

According to Nango's categorization based on the morphology of pits and fissures, five basic categories of occlusal pits and fissures are described as U, V, I, IK, and Y.[2] Salman FD in 2011 conducted a study to comprehend the occurrence pattern of the various forms of occlusal fissure morphology. He discovered that V and IK have the highest percentages, whereas I-type fissure has a low percentage. In line with Nagano's findings, he came to the conclusion that shallow fissures (V and U forms) have less severe dental caries.[3]

Nagona also investigated the relationship between the form and depth of the fissure and the location of the initial carious lesion, and he discovered that caries begins at the bottom in the V type, halfway down in the U type, and at the top in the I type and IK type. By preventing the impaction or even diffusion of significant amounts of substrate, which seems to be less susceptible to carious attack than substrate that allows some room for plaque and debris to build, a deep, narrow fissure may resist carious advancement. The depth of the actual fissure seems to be of minor importance compared to the steepness of the walls and the room for retention above the entry to the fissure. Therefore, knowledge of the patterns of fissures and pits is essential for maintaining teeth.[2-4] The purpose of the current study was to examine under a stereomicroscope the intricate architecture of the pit and fissure system of the primary first and second molar teeth.

Material and Method: For present in-vitro study 60 (maxillary and mandibular) extracted/exfoliated primary molar teeth with intact crown structure with or without root surface

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were selected after thorough examination. The teeth were cleaned with a slurry of pumice, rubber polishing cups and then with water, preserved in neutral 10% formalin, until the time it was sectioned and examined under stereomicroscope. The tooth was first sectioned longitudinally in a buccolingual direction with the water cooled carborundum disc. Then the serial sections were grounded and polished resulting in a final thickness of 40µm to 100µm. The prepared sections were mounted to the glass slide and cover slips were placed. The examination of the specimen and photomicrograph was carried out using stereomicroscope with 10 X magnification. The different fissure patterns were noted, tallied, and statistically examined.

Result: Pit and fissure of 60 mandibular and maxillary first and second primary molars morphology were examined and recorded. **Table 1** showed V-type (Primary Maxillary 1st molar -53.3% and Primary Maxillary 2nd[st] molar – 60%) of fissure pattern was more prevalent in maxillary mandibular molar teeth followed by U-type (Primary Maxillary 1st molar - 46.6% and Primary Maxillary 2nd[st] molar – 40%). Similarly U-type (Primary mandibular 1st molar -60% and Primary mandibular 2nd[st] molar – 66.6%) of fissure pattern followed by V-type (Primary mandibular 1st molar -33.3% and Primary mandibular 2nd[st] molar – 26.6%).

Table 1 Occlusal Fissure Morphology of Deciduous Molars Teeth

Teeth (*n*)	**Type of Fissure**				
	U-Type	**V-Type**	**I-Type**	**K-Type**	**Y-Type**
Maxillary 1st molar *(n=15)*	7 (46.6%)	8 (53.3%)	-	-	-
Maxillary 2nd molar *(n=15)*	6 (40%)	9 (60%)	-	-	-
Mandibular 1st molar *(n=15)*	9 (60%)	5 (33.3%)	1 (6.66%)	-	-
Mandibular 2nd molar *(n=15)*	10 (66.6%)	4 (26.6%)	1 (6.66%)	-	-

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Discussion: Young children have pits and fissures susceptible to decay. The complicated morphology of such teeth is confirmed by Ripa et al. (1988)[5] finds that the enamel in pits and fissures cannot compensate for plaque buildup, leading to weaker protection against caries than on smooth surfaces. The proximity of the fissure depth to the dentino-enamel junction (DEJ) and the extremely carious dentin underneath are the main causes of the rapid emergence of dental decay in pits and fissures.[6-8]

The majority of the fissure morphology seen in the current study were U-shaped fissures and V-shaped fissures, with a small fraction of other fissure pattern types. Similar findings were made in Mortimer's 1970 research, which found that U and V-type fissures were more common in primary teeth.[9]

Altaf G and colleagues found that deep fissures are more prone to caries followed by intermediate fissures but shallow fissures have the least caries.[1] Similar results were found by Gillins and Bunoucore[10] in which they found that deep invaginations may sometimes even progress up to the DEJ but with unexposed dentin. The V/U-shaped fissures (shallow fissures) have been found to be self-cleansing and resistant to caries. Also, the complex branch pattern of I/K-type fissures has the deepest fissure morphology, making them the most susceptible caries.

The U and V shaped fissure pattern is predominate in primary molars, according to the current study. However, the focus of preventive actions should be on a precise evaluation of risk factors related to the tooth surface, such as the depth, width, and enamel structure of fissures in primary teeth. Therefore, additional research is advised to confirm the aforementioned factors and the danger that they pose for the development of dental caries.

Conclusion: The primary molar teeth had a greater U and V shaped fissure pattern. It is advised to do another research with a larger sample size to examine the relationship between fissure shape and other risk factors for the development and progression of caries.

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