MOLAR MORPHOLOGY: AN EVOLUTIONARY CHANGE OR A DEVELOPMENTAL VARIATION IN NORTH INDIANS

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The morphology of Lower first molar has shown considerable amount of variations, which may be attributed to evolutionary change or can be just a developmental anomaly. The changing Lower first molar morphology if established has definite clinical implications. Material and Methods: **150 boys and 150 girls were chosen as sample, impression recorded and models were prepared. The mandibular 1st molar morphology was analyzed using a magnifying lens and the sample was divided into 3 groups based on the cusp number on both sides of the arch.** Results: **In our sample population 67.73% had 5 cusped mandibular 1st molars, 25.53% had 4 cusped mandibular 1st molars and 6.73% had bilateral asymmetry.** Conclusion: **more then 25% of the subjects had only 2 cusps and a single developmental groove on its buccal aspect suggesting that it may be an evolutionary change & it has definite clinical implication in the field of orthodontics.**

Key Words: mandibular 1st molar morphology, Developmental Grooves, Cusps.

The permanent mandibular 1st molar cuspal pattern variation has always been assumed to be correlated with developmental groove patterns. Hellman1 in 1928 classified the lower 1st molar occlusal surfaces based on the number of cusps and the groove patterns established between them. The basic pattern is the Y5 type known as "dryopithecoid", the "5" referring to the main cusps .The 5 cusped lower 1st molar has double grooved pattern on its buccal aspect (Figure 1). The four-cusped pattern i.e. the single grooved pattern includes all these cusps except the hypoconulid(distal cusp) on the distal aspect, which is the most variable one on the occlusal surfaces. The number 4 or 5 is combined with the letter Y or a plus sign (+) which indicates the arrangement of the grooves between these cusps. The +4 pattern is considered to be the most evolutionarily or the advanced type and the Y5 as the ancestral variety.

If established that this is a common occurrence, shall have many clinical implications in orthodontics. The preformed bands are manufactured with the assumption that all lower first permanent molars have five cusps; a preformed band even of a smaller size will also not be expected to fit a 4 cusped molar with a single developmental groove on its buccal aspect. If the evolutionary trend is shifting towards a 4 cusped molar then the use of terms like "middle buccal cusp" in the definition of the first key to occlusion by Andrews2 may also need to be modified.

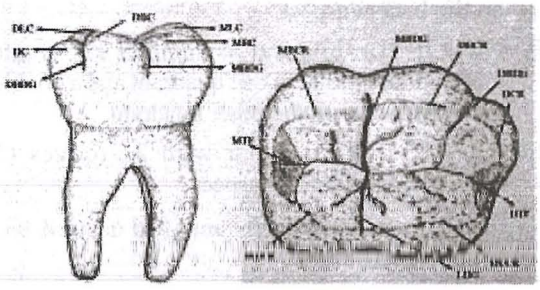


Fig 1. Morphology of the lower first permanent molar.

Due to these facts a study was conducted to evaluate the incidence of first permanent mandibular molar having 2 cusps & a single developmental groove on their buccal aspect in comparison to the molars having 3 cusps & 2 grooves on their buccal aspect. The incidence of these 2 different variants of 1st molar was also verified for any sexual varia-

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tion. The samples were also analyzed for the presence of bilateral asymmetries. Thereafter, prefabricated bands were adapted on the 2 different types of lower 1st molars on the models and the adaptability of the bands was also scrutinized.

Materials and Methods

The totals of 300 subjects (150 males & 150 females) were selected and their study models were prepared. Inclusion criteria were: Subjects only of north Indian origin, age group 18 to 21 yrs, Permanent mandibular molars completely erupted, No severe attrition, or caries. All the mandibular models were visualized using a magnifying lens with a magnification of 5X. Thereafter, the total sample was divided into 3 groups:

I. GROUP A– First molar with 1 groove (4 cusped) on the buccal aspect.

II. GROUP B – bilateral asymmetry i.e. single grooved first molar in one quadrant and a double grooved molar on the other quadrant.

III. GROUP C–First molar with 2 grooves (5 cusped) on the buccal aspect.

Results were statistically analysed using Z test for proportions.

RESULTS

Amongst the total sample of 300 subjects (150 males and 150 females) observed using a magnifying lens; 8 models in the male and 10 models in the female sample were rejected due to incomprehensible morphology of the molars(table 1). 25.53% of the total subjects had 4 cusped (single grooved) lower 1st molar and 6.73% had bilateral asymmetry while 71.2% male samples and 64.32% female samples displayed double grooved(5 cusped) lower 1st molar . Whereas 21.8% of the males and 29.28% of the females (Table II and III) had molars with single groove. In the group B 7% of the males and 6.4% of the females displayed bilateral asymmetries in which only one quadrant of the mandible showed single grooved lower 1st molar. . No statistically significant difference was found between the male and female samples.

TABLE I (TOTAL SAMPLE)

Groups	No. of subjects	Percentage
GROUP A	72	25.53
GROUP B	19	6.73
GROUP C	191	67.73

18 models were not considered

TABLE II (MALES)

Groups	No. ofsubjects	Percentage
GROUP A	41	29.28
GROUP B	9	6.4
GROUP C	90	64.29

8 models were rejected

TABLE III (FEMALES)

Groups	No. ofsubjects	Percentage
GROUP A	31	21.8
GROUP B	10	7
GROUP C	101	71.2

10 models were rejected

DISCUSSION

The trend in modern hominid dentitions has been toward a reduction in size and form of the teeth and jaw bones. It has been implied that reduced cusp number was accompanied by reduction of the size of the teeth3. Garn et al4 have reported an incidence of 18% in a sample of 256 Caucasians possessing 2 buccal cusps & a single developmental groove. In the present study the incidence was found to be as high as 25% (Table I) in the North Indian population.

The variation in size of the molars may compromise proper intercuspation, whereas in cases of bilateral asymmetries the treatment planning of midline problems may be a cause of concern. If nearly 25% of the population possesses only 2 cusps and a single developmental groove on its buccal as-

pect in lower first permanent molar then the first key of occlusion by Andrews2 may also require modification in its verbatim.

All the manufacturers are providing preformed bands of various sizes that snugly fit on the 5 cusped mandibular first molar. Owing to this significant variation (4 cusped) in the morphology of the lower

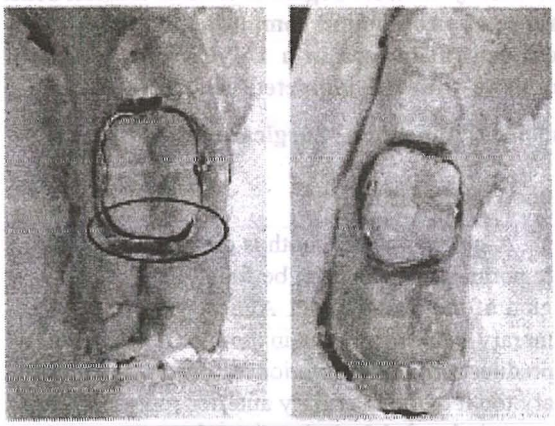


Fig 2. Note the difference in the fit of a prefabricated Band on the 4 & 5 cusped molars.

first permanent molar, it is not possible to adequately fit a preformed band on a single grooved molar (Fig. 2). In the present study the incidence of the 4 cusped lower first permanent molar was seen in alarming 25.53% of population; thus indicating a need for either fabricating a customized band or introduction of a new additional design of preformed bands that can snugly fit onto the single grooved lower first molars .

Conclusion

1. Four cusped mandibular first permanent molar with single developmental groove on the buccal aspect was present in 25.53% of the population sample.
2. The morphological variation in size of the molars should also be considered in treatment planning in cases with compromised intercuspation, bilateral asymmetries or midline problems.
3. There arises a need of a new design of the preformed bands for the single grooved (4cusped) mandibular first molar.
4. A modification in the definition of molar relation may be considered.
5. The molar morphology is independent of the gender.

Further studies need to be carried out on other larger sample of different ethnic groups in India to check for the incidence of mandibular first permanent molar with a single developmental groove on their buccal aspect to establish whether this is an evolutionary change or just a developmental anomaly in particular area.

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