

CORRELATIVE ANALYSIS OF NAIL FORM TO TOOTH FORM

Shanti Varghese¹, Vinaya Bhat², Suja Joseph¹, Arun Kumar¹

1) Department of Prosthodontics, Kerala University of Health Sciences, Kerala, India.

2) NITTE University, Karnataka, India.

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Corresponding author:

Shanti Varghese

e-mail: shantivrgs02@yahoo.com

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ABSTRACT:

Aim: This observational study investigated the correlation of nail form to tooth form.

Materials and Methods: Measurements of the length and width of left maxillary central incisor and the nail of the left hand's forefinger of 110 subjects were taken with the help of a calibrated manual vernier caliper. The information obtained was statistically analyzed using Pearson's correlation test.

Results: A positive correlation existed between incisor length and nail length ($P = 0.001$), and incisor width and nail width ($P = 0.001$). Consistent relationships were also observed between these measurements.

Conclusion: A definite correlation exists between nail form and anterior tooth form. It can be inferred that nail form can be considered amongst other parameters in determining the anterior tooth form.

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شانتى فارغيس

البريد الإلكتروني: shantivrgs02@yahoo.com

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الملخص العربي:

ربط تحليلي بين شكل الاظافر و شكل الأسنان

شانتى فارغيس¹، فينايا بهات²، سوja جوزيف¹، أرون كومار¹

(1) قسم التعويضات السنية، جامعة كيرالا للعلوم الصحية، كيرالا، الهند

(2) جامعة نيتي، كرناتاكا، الهند

الهدف: دراسة مظهرية للعلاقة بين شكل الاظافر و شكل الأسنان.

المواد و الطرق: تم أخذ قياسات الطول و العرض للقاطع العلوي الأيسر و ظفر الاصبع لليد اليسرى لعدد 110 شخص. القياسات اجريت بواسطة القدمة ذات الورنية. تم تحليل المعلومات إحصائياً.

النتائج: تم العثور على علاقات إيجابية بين كل من طول و عرض الأسنان و الاظافر التي تم فحصها. وقد أيدت الإحصاءات ذلك ($P 0.001$).

الخلاصة: يوجد علاقة واضحة و معرفة بين شكل الاظافر و الأسنان. لذا قد يكون شكل الاظافر من احدى العوامل التي تؤخذ في الاعتبار عند اختيار شكل الاسنان الأمامية الاستعاضية في التعويضات السنية.

INTRODUCTION

Selection and replacement of the anterior teeth is one of the key determinants in the rehabilitation of the oral and stomatognathic system. In the absence of pre-extraction records, various parameters like intraoral anatomic landmarks, extra oral anatomical landmarks, geometric and mathematical measurements have been proposed as aids for effective artificial tooth selection.

Williams classification¹ of facial form proposed in 1974 has been accepted as the universal method of determining anterior tooth form. Conversely, studies by Mavroskoufis et al and Varjao FM et al^{2, 3} have questioned its reliability.

Nails have been accepted as relatively good indices of the health of an individual. They have a high sensitivity to many internal and external factors. They have also been used as a diagnostic tool in detecting recent health imbalances.

Genetically and embryologically, nails and tooth share a common factor. Genetically MSX1 gene⁴ has been found to be critical in the normal development of fingernails, toe nails, teeth and other structures in the mouth. Embryologically,⁵ nail and tooth share an ectodermal origin and develop during the 9-10 wk intra uterine.

Based on a hypothesis, the aim of this study was to investigate the correlation of nail form to tooth form and its prospects in anterior tooth selection. Similar studies have not been mentioned in literature.

MATERIAL AND METHODS

Seventy five females and 35 male subjects of Indian origin and age group 20-30 years were examined to determine the correlation of nail form to tooth form.

Ethical clearance was obtained from the ethical committee framed by the institution. An informed consent was obtained from each subject. It conformed to the Declaration of Helsinki.

The left maxillary central incisor and the nail of the left hand's forefinger were considered as index points. Tooth involving any evidence of gingival alteration, history of orthodontic treatment, history of any incisal edge or proximal tooth alteration and any evidence of malalignment were excluded. Nails involving any

evidence of nail abnormalities and alteration with respect to color, shape, size and texture were excluded.

A calibrated manual vernier caliper was used to record the measurements. The longest apical - coronal length (IL) and the widest mesial - distal width at the contact points (IW) of the left maxillary central incisor were measured⁶ (Fig. 1, 2).



Fig.1: Apical-coronal length of incisor measured (IL).

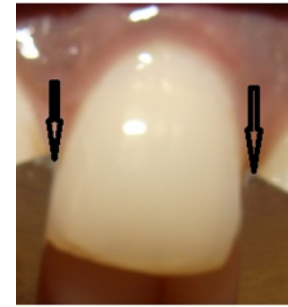


Fig.2: Mesio-distal width of incisor measured (IW).

Similarly, the longest proximal - distal length (NL) extending from the proximal nail fold to the distal nail fold of the nail was measured⁷ (Fig. 3). The point of maximum convexity of the radial and ulnar surfaces of the nail measured the radial - ulnar width of the forefinger's nail (NW)⁷ (Fig. 4).

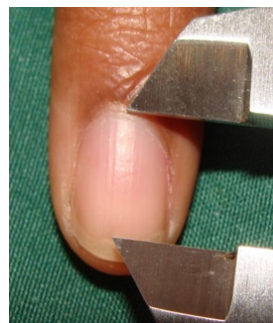


Fig.3: Proximal-distal length of nail measured (NL).

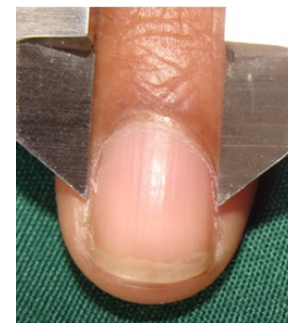


Fig.4: Radial-ulnar width of nail measured (NW).

The mesial surface of the nail was considered the radial surface and the distal surface of the nail was considered the ulnar surface. The average of three successive readings was tabulated. Using the statistical analysis software SPSS 11.0, Pearson's correlative analysis was done to determine the relationship of nail form to tooth form.

RESULTS

Within the scope of this study and for the samples

DISCUSSION

investigated, NL to IL displayed a positive correlation coefficient of 0.2 with P 0.001 (Fig.5). Similarly, NW to IW displayed a positive correlation coefficient of 0.2 with P 0.001 (Fig.6). NL to NW displayed a correlation coefficient of 0.3 with P 0.001 (Fig. 7). 80% correlation was observed of the nail form to tooth form. Consistent relationships were also observed between these measurements. $IL = NL \pm 1mm$, $IW = NW \pm 2mm$.

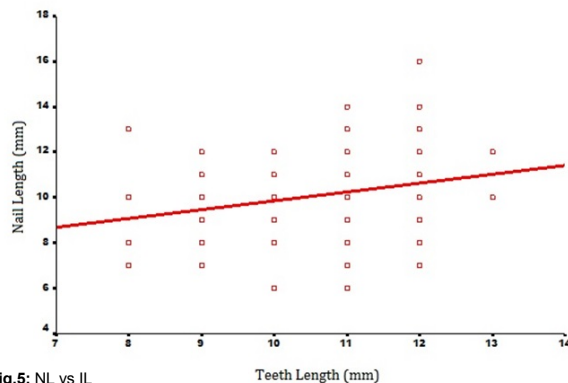


Fig.5: NL vs IL

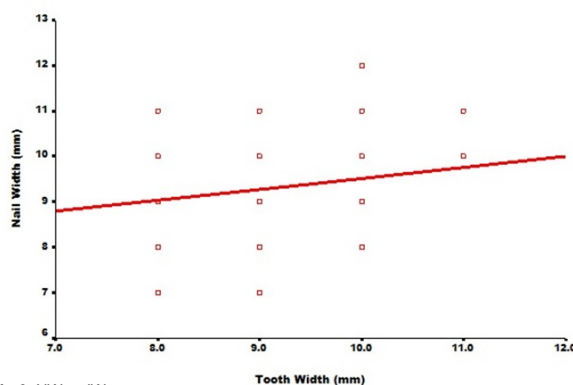


Fig.6: NW vs IW

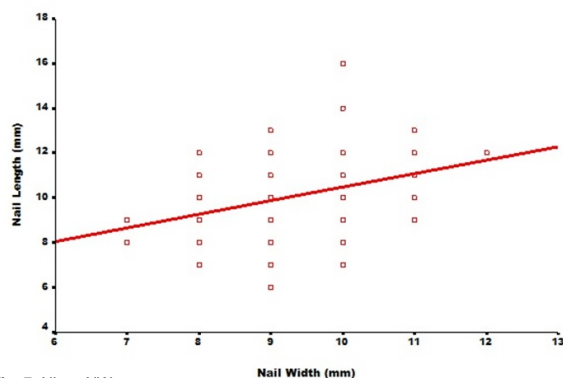


Fig. 7: NL vs NW

Genetically, MSX1 gene⁴ has been found to be critical in the normal development of fingernails, toenails, teeth and other structures in the mouth. MSX1 gene is a part of a family of homeobox genes namely msh homeobox 1. Its function is to provide instructions for the formation of a protein that regulates the activity of other genes. Its association to certain health conditions has been noticed. Wolf – Hirschhorn syndrome has been characterized by disruption in the formation of oral structures in early development. Witkop syndrome (tooth -and - nail syndrome) has been characterized by hypodontia and abnormalities of fingernails and toenails.

Embryologically, nail and tooth share an ectodermal origin⁵ and develop during the 9-10 week intrauterine. Nail is an epidermal layer that develops from ectoderm that later specializes into mitotically active germinal layer. Nail development starts with the appearance of a thickened area of epithelium near the tips of the digits termed the primary nail field. These thickenings settle into the dermis, proximal and lateral borders of the nail field to later thicken as nail folds. Continued mitotic activity produces a toughened nail plate (nail) of keratinized epithelium that grows forward over the nail plate. Before birth, nail development and growth involves all of the germinative cells of the nail field. By birth, growth is restricted to the nail root. Similarly, teeth develop from the ectoderm of the oral cavity and surrounding mesoderm. Ameloblasts produce enamel. All other dental tissues develop from mesoderm (mesenchyme). Cementoblasts produce cementum.

Nails have a high sensitivity to many internal and external factors. Hence, they serve as diagnostic indicators of recent health imbalances. The left hand rather than the right hand was chosen due to its decreased mechanical exposure to daily wear. Amongst the digits of the left hand, the nail of the forefinger was chosen as an index due to its near morphological similarity to the left maxillary central incisor.

Within the scope of this pilot study with a limited sample size, a positive correlation was found between nail form and tooth form. The Pearson's correlation coefficient of tooth length to nail length and tooth width to nail width was 0.2 with a P value of 0.001. Consistent relationships

were also observed amongst the measurements. It was also observed that tooth dimensions were $\pm 2\text{mm}$ of nail dimensions. It can be inferred that nail form can be used as an additional parameter in anterior tooth selection. A definite conclusion of this hypothesis requires further studies involving larger sample size, samples of higher age groups, investigator variability, influence of varied racial groups and the relationship of the other digits to the anterior tooth form.

This study is a prospective study which will include a larger sample size and also determine the digital correlation of the nail outline form to the maxillary central incisor using digital photography.

CONCLUSION

A positive correlation exists between nail form and anterior tooth form. It can be inferred that nail form can be considered amongst other parameters in determining the anterior tooth form.

CLINICAL IMPLICATIONS

Though various parameters like intraoral anatomic landmarks, extra oral anatomical landmarks, geometric and mathematical measurements have been proposed as aids for effective artificial tooth selection, nail form can also be used as a reference in determining the anterior tooth form especially in patients with congenitally or acquired facial deformities.

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