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Comparative Evaluation Of The Depth Of Curve Of Spee In Kerala Adult Population: An In Vivo Study

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Abstract
Aim:
This study is to compare and evaluate the effects of gender on the curve of Spee inthe mandible of human permanent healthy dentition in Kerala adult populationusing conventional technique.
Settings and Design: *In-vivo - Comparative*
Materials and methods:
Fifty Kerala adults (25 men and 25 women) with permanent healthy dentitions participated. Stone models were undertaken for manual measurements, followed by which the rigid plate will be positioned in such a way that it touches the cusp tip of the mandibular canine and the distobuccal cusp tips of the mandibular second molar. Distances between the mesiobuccal cusp tips of the mandibular first molar and rigid plate were measured.
Results*: The curve of Spee showed a mean value on the right side of the cast of approximately 1.716mm in males and 1.644 mm in females; on the left side of the model is 1.812 in males and 1.708 in females. The mean value of both sides is 1.766 in males and 1.68 in females. Between these two genders, the depth of the Spee curve was statistically the same.*
Statistical Analyses Used: *Independent 't'-test.*
Conclusion: *The curve of Spee is maintained throughout life. There is no statistical difference between the two genders in the depth of the Spee curve.*
Keywords*: Curve of Spee, Conventional technique, Mandibular arch, Occlusion, Gender.*

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I. INTRODUCTION

A curved line formed by plane of occlusion that is convex for the maxillary arch and concave for the mandibular arch is formed if an imaginary line is traced through the buccal cusp points of the posterior teeth from the sagittal view [1]. F. Graf Von Spee initially described this curve in 1890, and it is therefore known as the curve of speed [2].

The anatomic curve created by the occlusal alignment of the teeth, as projected onto the median plane, commencing with the cusp tip of the mandibular canine and continuing to the buccal cusp tips of the premolar and molar teeth, is known as the Speecurve [3]. Total posterior disclusion on mandibular protrusion is possible with correct anterior teeth guiding. D'Amico first proposed the concept of disclusion in 1961, and it is reported to be useful in removing damaging forces during eccentric movements. The anterior, condylar guidance and the cusp form component have all been investigated in relation to this disclusion[4]. This study aimed to compare and evaluate the effects of gender on the curve of Spee in the mandible of human permanent healthy dentition in Kerala adult population using conventional method.

II. Materialsand methods:

1. Perforated metal stock impression tray
2. Rubber bowl
3. Vibrator
4. Base former
5. Rigid measuring scale
6. Digital Vernier Caliper
7. Straight spatula

Method

Criteria for choosing subjects

A total of 50 healthy human volunteers between the ages of 20 and 50 were chosen for this investigation. Two study groups (group A- Male and group B-Female) were formed based on a complete questionnaire and clinical examination verification. The stone models (dental casts) of 25 males with healthy (nonattrited) dentition make up Group A. Stone models of 25 female individuals with healthy (nonattrited) dentition makeup Group B. All of the participants were chosen using Ferrario et al approved inclusion and exclusion criteria [5].

Inclusion Criteria

1. Complete permanent dentition (minimum of 28 teeth) with bilateral Angle's class I permanent molar and canine connection with a horizontal and vertical overlap of 2 to 4 mm. **Exclusion Criteria**
1. Clinical mandibular abnormalities of moderate to severe (no temporomandibular joint [TMJ] sounds, soreness of TMJ and masticatory muscles on examination, and painful restrictions of mandibular movements)
2. Restorations that are extensive, cast restorations, or cuspal coverage
3. Orthodontic treatment in the past or present
4. Crossbite (anterior or lateral)
5. Periodontal diseases that are pathological.

Prerequisiteofthestudy

The subjects were given informed consent and on the basis of a detailed questionnaire and verification through clinical examination, study group included 50 individuals with healthy (nonattrited) dentition. The age of the patient has a substantial impact on COS; the age group chosen wasbetween 20 and 50 years old. The curve of spee was measured on the mandibular models once the participants were chosenby Conventional technique.

Impression making

The patients were seated in a calm and upright position in the dental chair. To make an irreversible hydrocolloid impression of the mandibular arch, a sterilised perforated stock metal tray of adequate size was chosen. The manufacturer's recommended water powder ratio was followed, and the mixing process began with the addition of a specified amount of water to a clean flexible rubber bowl. After that, the powder was added in the proper proportions.

Alginate(Tropicalgin) was uniformly put onto the designated impression tray. The loaded tray was transported to the mouth and placed in the centre of the teeth. To obtain an accurate impression of the mandibular arch, uniform pressure was applied. The impression was removed with a sharp jerk from the mouth after the substance had set and was inspected for faults under adequate illumination before being cleaned. A sharp knife was used to remove any excess unsupported alginate. To eliminate any spit or blood, individuals with thin serous saliva impressions were washed with cold water. A tiny layer of dental stone powder was sprinkled onto the surface of the impression for a patient with thick, ropy saliva, which sticks to saliva and works as a disclosing agent. The saliva may be visible when the impression is placed under flowing tap water and can be removed with a light brushing with a wet camel's brush.

To obtain a cast, impressions were disinfected by immersing them in 2 percent glutaraldehyde for 5 minutes, and pouring was accomplished by mixing Type III dental stone under the vacuum mixing machine. To achieve uniform height of the cast, the cast was removed and the base was poured using the appropriate base former for all of the models.

Conventional method

Manual measurements were made using stone models, and the rigid plate (measuring scale) (Figure-1) was positioned so that it touched the cusp tip of the mandibular canine and the distobuccal cusp tips of the mandibular second molar [2].

The stiff plate and the mesiobuccal cusp points of the mandibular first molar was measured at perpendicular distances(Figure-2).

In total, 25 stones models from each group were subjected to measurements of the depth of the curve of spee on both sides, with the mean taken for statistical analysis.

III. Results:

The curve of Spee showed a mean value on the right side of the cast approximately is 1.716mm in male and 1.644 mm in female. On the left side of the cast is 1.812 in male and 1.708 in female. Mean value of both the sides is 1.766 in male and 1.68 in female (Table-1). Between these two genders, the depth of the Spee curve was statistically the same. The deepest cusp tip was the mesiobuccal cusp of the first molar in the mandibular arch.There was no gender difference in the depth of the curve of Spee between men and women ($P<0.05$).

IV. Discussion

For nearly a century, it has been assumed that the occlusal plane is curved due to the sagittal inclination of teeth [1]. This morphological configuration, known as the curve of Spee, is convex for the maxillary arch and concave for the mandibular arch when viewed from the side [5].

Correct anterior tooth guidance gives the Curve of spee allows for entire posterior disclusion on the mandibular protrusion. In circumstances where teeth are rotated, tipped, or extruded, the curve of spee may be pathologically changed [6,7]. Restoring the dentition to its original occlusal plane can result in posterior protrusive interference. The masseter and temporalis muscles in the mandibular elevator muscles have been shown to have aberrant activation as a result of this interference. Furthermore, excursive interference has been linked to tooth attrition, restorative fractures, and temporomandibular joint dysfunction [8].

Dentists can use the COS to figure out how the occlusion is developing in the sagittal plane. The curve of Spee of maxillary and mandibular curves could be used as a single point of reference in prosthetic and orthodontic reconstruction. The sagittal organization of the teeth is an important determinant of total denture stability and may play a role in implant-supported restoration failure. Standardized digital images were created on the sagittal plane, which portrays a flat, 2-dimensional plane despite its ease of use [9]. In this study there was no effect on depth of the curve of Spee due to gender difference. The sample size was tiny, and it was limited to the Kerala population; there may be genetic features that distinguish this group from others.

V. Conclusion

The gender of the people of kerala tested had no effect on the curve of spee($P<0.05$).In the discipline of prosthodontics, comprehending the curve of spee is critical, as a prosthodontist must deal with it in almost every patient he sees. Occlusion begins in the deciduous dentition and progresses through many forms influenced by numerous circumstances until an individual's edentulous condition. The Curve of Spee is one of the most crucial aspects of the rehabilitation process in order to attain the best results. The current study demonstrates that the depth of the Spee curve is maintained throughout life. Between the two groups, there is no statistical difference in the depth of the Curve of Spee.

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Figure 1 – Stone model and ridge plate

Figure 2 - Conventional technique of measurement of depth of curve of spee.

Table 1: Curve of spee in normal dentition in male and female using conventional technique.

	Gender	N	Mean
MEAN VALUE (mm)	Male	25	1.766
	Female	25	1.68