ORIGINAL ARTICLE

EVALUATION OF CURVE OF SPEE AMONG PATIENTS SEEKING ORTHODONTIC TREATMENT IN A TERTIARY CARE HOSPITAL

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ABSTRACT

This study was done to determine mean of radius of curve of spee in different vertical patterns.

It was cross sectional study design with 106 patients from department of Orthodontics, dental OPD Karachi Medical and Dental College, Abbassi Shaheed Hospital, Karachi, Pakistan. The data collection procedure was non–probability consecutive. After thorough history and clinical examination for evaluating the inclusion and extrusion criteria patients were recruited for the study. All measurements were recorded on a predesigned Performa. Frequency test was applied for radius of curve of spee and mean value was 33, 56 and 17 for high, normal and low angle respectively. Test shows that highest angle noted is normal that has 56 value for collected data. Low angle is rarely present that is 17 and high angle is present in between with values of 33. It was found that value of radius of curve of spee was highest for normal angle followed by high angle then low angle subjects

Key Words: *radius of curve of spee, cephlogram, vertical measurements*

INTRODUCTION

During oral growth and development, the resulting occlusal plane does not arise simply by chance. It has been postulated for almost a century, that the anteroposterior occlusal plane is curved because of the sagittal inclination of the teeth. The original article was written in 1890 by Ferdinand Graff Spee, and it has been recently represented that this anteroposterior curve, or curve of Spee, was defined as the anatomical curve established by the occlusal alignment of the teeth, as projected onto the median plane, beginning with the cusp tip of the mandibular canine and following the buccal cusp tips of the premolar and molar teeth, continuing through the anterior border of the mandibular ramus, and ending at the anterior aspect of the mandibular condyle.

Several authors emphasized a critical law of occlusal physiology that occlusal strength must be directed to the long axis of each tooth.A similar study was conducted in korea to determine the relationship of curve of spee with the facial morphology. Study showed that the depth of the curve of spee in the mandibular arch was significantly related to overbite, overjet, and the sagittal position of the mandible with respect to the anterior cranial base. The curve of Spee was not affected by gender.

Exaggerated curves of Spee are frequently observed in dental malocclusions that present with deep vertical overbites. During orthodontic treatment such excessive curves of spee are usually leveled and, in most instances, this leveling will result in a reduction of the anterior overbite.

In the sagittal view, Spee connected the anterior Surfaces of the mandibular condyles to the occlusal surfaces of the mandibular teeth with an arc of a circle tangent to the surface of a cylinder lying perpendicular to the sagittal plane. He suggested that this geometric arrangement defined the most efficient pattern for maintaining maximum tooth contacts during chewing and considered it an important tenet in denture construction. This description became the basis for Monson's spherical theory.

Andrews described the six characteristics of normal occlusion and found that the curve of Spee in subjects with good occlusion ranged from flat to mildly curved, noting that the best intercuspation occurred when the occlusal plane was relatively flat. He proposed that flattening the occlusal plane should be the treatment goal in orthodontics.

A simple correlation analysis between the radius or the depth of the curve of Spee and skeletal facial types was conducted. Farella et alreported, before orthodontic treatment, a weak association between the variation of the curve of Spee and the horizontal and

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vertical position of the mandible. Only one study has analyzed the variation of some morphologic characteristics with orthodontic treatment according to facial type and reported significant differences in overbite correction between low-angle and high-angle subjects after treatment. However, no studies have analyzed whether vertical skeletal patterns influence orthodontic movements during leveling of the curve of spee.

METHODOLOGY

It was cross sectional research work that was conducted at the Department of Orthodontics, Dental OPD Karachi Medical and Dental College, Abbassi Shaheed Hospital, Karachi**.** Sampling technique was Non–probability. Sample size was calculated by using WHO calculator, on the bases of pilot study taking statistics of radius of curve of spee in low angle cases as 63.3333mm$\pm$6.05530mm in margin of error 0.969 at confidence of interval 90%, the calculated sample size will be 106. Inclusion criteria. No previous history of orthodontic treatment, healthy subjects having complete dentition**,** second molars erupted and except for third molars no other maxillary and mandibular teeth were absent**.** Exclusion criteria were: Any syndromic or cleft lip and palate subject, who had history of trauma and patients with facial asymmetry. All the patients were examined by researcher. After thorough history and clinical examination for evaluating the inclusion and extrusion criteria patients were recruited for the study. Verbal informed consent was taken from the patients and then the lateral cephlogram was recorded, taken in centric relation, surveyed and classified by observation into the three categories of vertical relationships as normal angle, high angle and low angle. All the findings were recorded by single researcher under the observation of his supervisor in order to avoid observer bais. The measurements were recorded on a predesigned Proforma. The study was done to determine mean of radius of curve of spee in different vertical pattern

To determine the vertical measurements, Sella nasion to mandibular plane(SNMP) was taken as an angle form between sella-nasion line and mandibular plane. Its norm is 32$\pm$4 degree.

To determine the mean curve of spee with cephlometric vertical measurements there were two steps: First, determination of the radius of curvature (cephalometric analysis), and to determine the vertical measurements on the Cephlogram. and the present associations were noted. The technique is described below:

A transparent card was transported over a radiograph and the circle that adapted most closely was selected as a radius of curve of spee (along the cuspal tips of canine pre-molars and all molars)

RESULTS

To test the hypotheses descriptive and inferential statistical method was applied. To test the radius of curve of spee frequency, test was run on data collected by 106 number of orthodontic patients. t-test was applied for radius of curve of spee and mean value was 33, 56 and 17 for high, normal and low angle respectively. Test showed that highest angle noted is normal that had 56 value for collected data. Low angle is rarely present that was 17 and high angle was present in between with values of 33.

TABLE 1: FREQUENCY TEST IS APPLIED FOR RADIUS OF CURVE OF SPEE

	n	Mean
High Angle	106	33
Normal Angle	106	56
Low Angle	106	17

DISCUSSION

The finding of the study showed that curve of spee was present at highest level in normal angle class. One of the longitudinal study was done that showed the development of curve of Spee from primary dentition to the permanent dentition in a sample of normal occlusions. The findings showed that the primary occlusal plane was relatively flat.

There is a large increase in depth of curve of Spee after the eruption of the permanent first molars. There is another large increase in depth of the curve of Spee after the eruption of the permanent second molars and is relatively stable throughout late adolescence through adulthood. The permanent incisors and first molars erupt significantly more than the primary second molars and the development of the significant increase in curve of Spee during the transition from the primary to the permanent dentition. The above mentioned research is one of the initiatives for knowing curve of spee in normal population at different age levels. There are more studies needed to be done for studying radius of curve of spee.

There are more studies done for measuring the radius of curve of spee that support the findings of present study.

One of the study was done in India for awareness of the standard value of the maxillary and the mandibular curves of Spee which may aid the clinician in developing occlusion in the sagittal plane and would be useful when providing prosthetic rehabilitation for patients with occlusal derangement[7] .The aim of the study was to assess and compare the radius and depth of curve of Spee in maxillary and mandibular arches in

men and women, in a group of young Indian population for which 25 men and 25 women between the age of 19 to 24 years were taken.

The findings of the study showed that radii and depths of curve of Spee were larger in maxillary than mandibular arches in both men and women. Also, the difference in the radii of mandibular arch was statistically significant between men and women. It is noted that gender difference is also present in radius and depth of curve of spee in maxillary and mandibular arches of participants.

CONCLUSION

Value of radius of curve of spee was highest for normal angle followed by high angle then low angle subjects

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