ORIGINAL ARTICLE

INVESTIGATION OF VARIATION IN CURVE OF SPEE, OVER JET AND OVERBITE AMONG CLASS- I AND CLASS-II MALOCCLUSION SUBJECTS AND TO FIND SEXUAL DIMORPHISM, IF ANY

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ABSTRACT:
Background: To investigate the variation in curve of spee, Over jet and Overbite among class-I and Class-II malocclusion subjects and to find any sexual dimorphism. Materials and methods: Study material consisted of pre-treatment Orthodontic patients and their dental casts of 100 routine patients reported to Department of Orthodontics Bhojia Dental College and Hospital Baddi Distt. Solan (H.P). Subjects were divided into three groups according to the depth of curve of spee. Overjet and Overbite was also taken in to consideration. Differences between the Spee groups and between sexes were assessed. Data was analyzed, using statistical package program SPSS Version18. In addition, correlation coefficients between the depth of curve of Spee and other variables were calculated. Results: Overall findings of the present study suggested that, the amount of over jet and overbite was significantly greater among deep spee groups then the normal groups. Conclusion: The correlation coefficient from the study confirmed these results. The gender of the subject had no significant effect on variables assessed.
Key words: Curve Of Spee, Over Jet, Overbite, Malocclusion.

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INTRODUCTION
Curve of Spee is an anatomic curvature of the occlusal alignment of the teeth, beginning at the tip of the lower canine, following the buccal cusps of the natural premolars and molars and continuing to the anterior border of the ramus[1]. It is named after the German embryologist Ferdinand Graf von Spee. It has a radius about 6.5to7.0 cm (Fig 1,2).
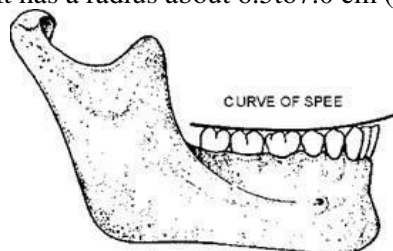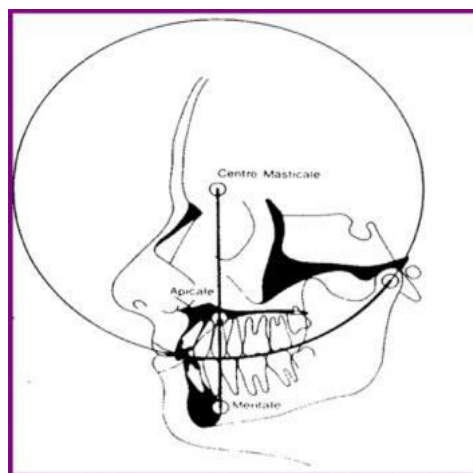

Figure1: Curve of Spee

Figure 2: Curve of Manson

This normal occlusal curvature is required for an efficient masticatory system[3].The development of curve of spee is not very well understood as yet.

21

Some suggest that its development probably results from a combination of factors including growth of orofacial structures, eruption of teeth, and development of the neuromuscular system[3,4].

Figure 3

The functional significance of the curvature has not been completely understood. However it has been suggested that the curve of spee has a biomechanical function during food processing by increasing the crush –shear ratio between the posterior teeth and the efficiency of occlusal force during mastication.[5]

Exaggerated curve of Spee: Is frequently observed in dental malocclusions with deep overbites(Fig4,5). Such excessive curve of Spee alters the muscle balance, ultimately leading to improper functional occlusion.

Figure 4: Deep Bite

Figure 5: OVER JET

There is a significant change in the curve of Spee as patients grow older. Clinicians should be aware that the occlusal adjustments with age have gradually altered the curve of Spee of youth toward a more favorable individual occlusal curvature.

Thus the determination of this relationship may be useful to assess the feasibility of levelling the curve of spee by orthodontic treatment.

Hence, the aim of present study was to investigate the relationship between variation in depth of Curve of Spee in relation to over jet and overbite, in subjects with Angle's Class-I and Class-II malocclusion and to find existence of any sexual dimorphism.

MATERIAL AND METHODS

The cross sectional study material comprised of pre-treatment dental casts of 100 routine patients reported to Department of Orthodontics Bhojia Dental College and Hospital Baddi Distt. Solan (H.P).

INCLUSION CRITERIA:

All the subjects selected for study were healthy with no history of orthodontic treatment.

EXULUSION CRITERIA:

Subjects with history of orthodontic treatment, severe craniofacial disorders, such as cleft palate and subjects with missing maxillary or mandibular teeth except third molars.

METHOD

Impressions of all the selected patients were taken and plaster casts were prepared with prior verbal consent.

The curve of spee was measured on the study models with a vernier calliper as a perpendicular distance between the deepest cusp tip and a flat plane that was laid on top of the mandibular dental cast, touching the incisal edges of the central incisors and the distal cusp tips of most posterior teeth in the lower arch (Baldridge method).

Figure 6: The measurement of Curve of Spee

The measurement was taken on right and left side of the dental arch and mean of these two measurements was taken as the depth of curve of spee.
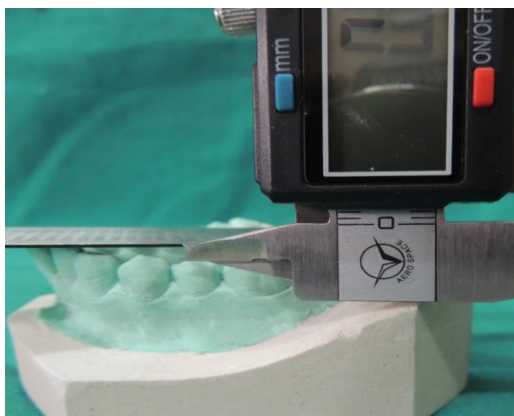
Figure7

Similarly over jet and overbite was measured on the prepared dental cast in occlusion with the help of ruler and divider. To evaluate measurement error 20 dental casts were selected at random and the experimental procedure was repeated by the same observer.
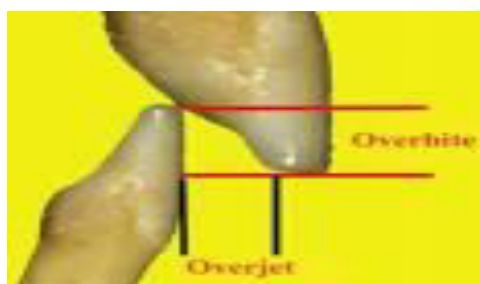

Figure 8

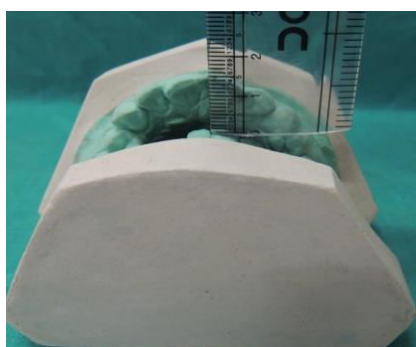**Figure 9:** Measurement of over bite.
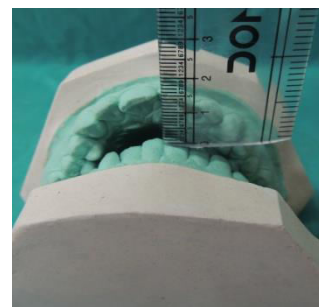

Figure10: Measurement of over bite.

Figure11: Measurement of over jet with ruler

The subjects were divided into three groups according to the depth of curve of spee as follows:-

Table1

S. No.	Name of Group	No. of Subjects	Depth of Spee
1	Normal spee group	62	2mm
2	Flat Spee Groups	18	< 2mm
3	Deep Spee Group	20	>4mm

Sample was further divided in to sub groups as below:

Group 1: Angles Class I malocclusion
Total 62 subjects, 29 males ,33 females

Group 2: Angles Class II malocculusion
Total 38 subjects, 16 males, 22 females

Data was analyzed, using statistical package program SPSS Version18.Descriptive statistics, including the mean and standard deviation (SD) values, were calculated for all variables in each spee group. The pearson's correlation analysis was used to determine correlation coefficients between the depth of curve of spee and other variables used in the study p- values of .05 or less were considered statistically significant.

RESULTS

Our result showed that 62 patients had a normal curve of Spee, 20 had a deep curve and 18 had a flat curve of Spee. The minimum depth recorded was 0.0mm and maximum was 7mm and mean depth of Curve of Spee in Class I malocclusion was 2.70mm. The study concluded that the mean value of curve of Spee in Angles Class I males and females were 2.89mm and2.71mm respectively which is within normal range as in table 1. It revealed that mean difference between male and females for curve of spee(t=0.48,p>0.05),overjet(t=0.10,p.0.05) and overbite(t=0.33,p>0.05) found to be non significant at 0.05 level of significance
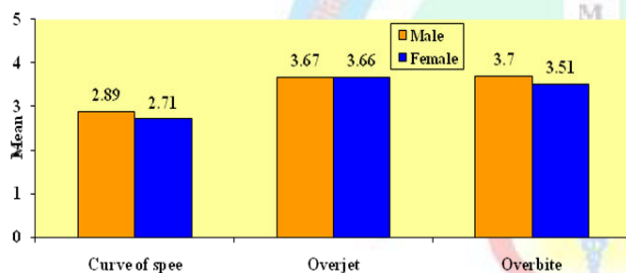
23

Table3: Correlation between Curve of spee , over jet& overbite for Angle Class- I Malocclusion group.

	Curve of Spee	Overjet	Overbite
Pearsons Correlation	1	0.51	0.58
Sig(2-tailed)		.000	.000
N	62	62	62

**. Correlation is significant at the 0.01 level (2-tailed).
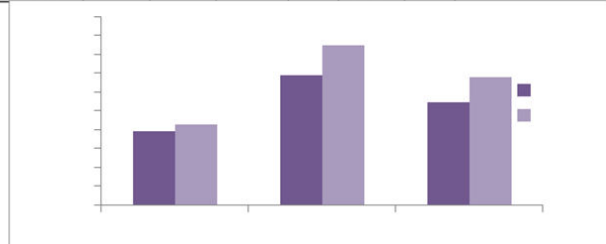Significant relation was found for over jet(r=0.51,p<0.01)and overbite(r=0.58,p<0.01) at 0.01 level of significance.

	Male (N=27)		Female (N=35)		t value	df	p value
	Mean	SD	Mean	SD			
Curve of spee	2.89	1.34	2.71	1.49	0.48	60	0.63
Over jet	3.67	2.45	3.66	3.51	0.01	60	0.99
Overbite	3.70	2.22	3.51	2.31	0.33	60	0.75

non significant

Table4: Mean, SD and t value for a Angles Class- II malocclusion group

	Male		Female		t value	df	p value
	Mean	SD	Mean	SD			
Curve of spee	3.90	1.20	4.30	3.59	-0.91	36	0.37
Over jet	6.87	4.75	8.48		-1.19	36	0.27
Over bite	5.47	2.10	6.78	3.00	-1.48	36	0.15

non significant

The mean difference between male and female for curve of spee (t=0.91,p>0.05),over jet (t=-1.19,p.0.05) and overbite(t=1.48,p>0.05) found to be non significant at 0.05 level of significance .

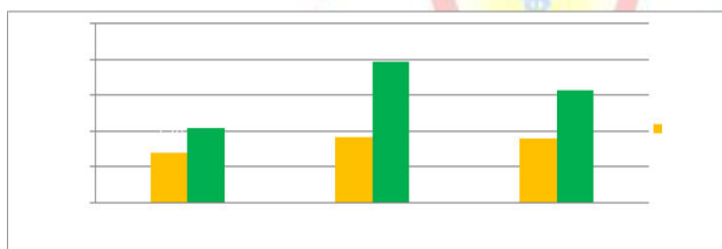**Table 5:** Correlation between curve of spee , over jet &overbite for Angles Class- II malocclusion group.

	Curve of Spee	Over jet	Over bite
Pearsons Correlation	1	0.22	0.54
Sig (2-tailed)		0.19	.000
N	38	38	30

**p<0.01

Table 6, Graph 3: Mean, SD and **t** value between **Classification I and II**

	Classification I		Classification II		t value	df	pvalue
	Mean	SD	Mean	SD			
Curve of spee	2.79	1.42	4.14	1.34	-4.737	98	0.00**
Over jet	3.66	3.07	7.84	4.10	-5.807	98	0.00**
Over bite	3.60	2.25	6.26	2.73	-5.300	98	0.00**

showed more significance in classification II as compared to classification I.

This revealed that significant mean difference was found for curve of spee(t=4.74,p<0.01), Overjet (t=-5.81,p<0.01), Overbite(t=-5.30,p<0.01) at 0.01 level of significance. From mean value, it was cleared that curve of spee (M=4.14), Over jet (M=7.84) and overbite (M=6.26) showed more significance in classification II as compared to classification I.

DISCUSSION
Although leveling the curve of Spee is an everyday occurrence in orthodontic practice, little research has been dedicated to the examination of the relationship between the depth of the curve of Spee and different malocclusions.

Our study results showed that depth of curve of Spee , over jet and overbite was within normal range in subjects with class I occlusion . This coincides with the previous reports that the subjects with normal curve of Spee had near normal over jet and overbite(Bulent Baydas,et al.[8,9]

Variation in the curve of spee has influence on over jet and overbite as shown by statistically

significant correlation between three parameters in Class-II Malocclusion.

Our study in accordance with Shannon and Nanda who found that Class II malocclusion had significantly deeper pre-treatment curve of Spee with deep bite measurements than Class I malocclusions[6].

In the present study, with a mean value of 2.06 mm to the curve of occlusal plane. An excessive overbite can be an indication of incorrect curve of Spee; in the same way, an exaggerated curve of Spee can be accompanied by an increased overbite. In this study the gender of the subjects had no significant effect on the variables assessed which confirms previous reports of the absence of sexual dimorphism in the curve of Spee. (Bulent Baydas,et al)[8].

The clinical evaluation should be associated and considered in orthodontic treatment planning. One of the orthodontic treatment purposes is leveling the curve of Spee. Analysis of the curve of Spee might assist dentists in determining the sagittal organization of the teeth.

Several studies have compared treatment techniques to deal with exaggerated curves of Spee and the stability of those treatments, Our findings provide insight into the magnitude of the curve of Spee in different malocclusions.

CONCLUSION

Overall findings of the present study suggested that, the amount of over jet and overbite was significantly influenced by the variation in the curve of spee. The over jet and overbite in the deep spee groups were significantly longer than the normal groups. The correlation coefficient from the study confirmed these results. The gender of the subject had no significant effect on variables assessed.

SCOPE FOR THE STUDY

Very few such studies has been conducted in India on Indian population so for. Hence such study is required to be conducted with relatively larger sample group with better reliable equipments to assess the various malocclusion relationships with curve of spee, which can be used to plan out better treatment options of levelling the curve of spee for the benefits individuals with mal occlusion.

REFERENCES

1. Sal Carcara C, Preston B, Jureyda O. The relationship between the curve of spee, relapse, and the Alexander discipline. Semin orthod. 2001;7:90–9.
2. Spee FG. The gliding path of the mandible along the skull. J Am Dent Assoc. 1980;100:670–5.
3. Hitchcock HP. The curve of Spee in Stone Age man. Am J Orthod. 1983;84:248–53.
4. Marshall SD, Caspersen M, Hardinger RR, Franciscus RG, Aquilino SA, Southard TE. Development of the curve of Spee. Am J Orthod. 2008;134:344–52.
5. Braun S, Hnat WP, Johnson BE. The curve of Spee revisited. Am J Orthod Dentofacial Orthop 1996; 110: 206-10.
6. Shannon KR, Nanda R. Changes in the curve of Spee with treatment and at 2 years post treatment. Am J Orthod Dento facial Orthop. 2004; 125: 589-96.
7. Baldridge DW. Leveling the curve of Spee: its effect on the mandibular arch length. JPO J Pract Orthod 1969; 3: 26-41.
8. Bulent Baydas,et al investigation in changes in in the position of upper and lower incisors ,over jet and overbite and irregularity index in subjects with different depths of curve of spee. Angle orthodontist2004;74:349-355
9. Andrews FL. The six keys to normal occlusion. Am J Orthod 1972; 62: 296- 309.
10. Tweed CH. Clinical orthodontics. St Louis: Mosby; 1966; pp 84-180.
11. Ash M. Wheeler's dental anatomy, physiology and occlusion.7th ed. Philadelphia: W.B. Saunders; 1993.