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ASSOCIATION BETWEEN WEIGHT CHANGES AND ORTHODONTIC TREATMENT IN SOUTH INDIAN POPULATION- SURVEY

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ABSTRACT

Over the last decade overweight and obesity has become a problem in the economically developed world. The increasing number of overweight adults is alarming but also children and adolescents are affected to a dramatic extent. Aim of the study was to assess the changes in weight in patients undergoing orthodontic therapy. An Online survey was done among the patients and their response was tabulated. The survey was done with self administered, structured 12 questions. SPSS software is used for statistical analysis. In this study out of 709 participants, 28.91% of Male patients had weight loss, 13.96% had weight gain and 13.68% had no change in weight. In Females 22.14% had weight loss, 8.89% had weight gain and 12.41% had no change in weight. From the survey we may conclude that there was marked reduction in weight seen in patients undergoing orthodontic treatment. This can be due to the restricted diet pattern and due to difficulty in mastication.

Keywords: Weight; Orthodontic therapy; Obesity; health issues; dietary restrictions; south indian population

INTRODUCTION

Over the last decade overweight and obesity has become a problem in the developed world **[1]**. The increasing number of overweight adults is alarming but the children and adolescents are also affected to a dramatic extent **[2]**. In recent decades, a high demand for orthodontic treatment has been observed especially in young adults **[3]**. Previously we have worked on Possible complications of malocclusion, temporo-mandibular joint disorders, Orthodontic extrusion, Bonding Materials, Radiographic cephalometry etc and published it **[4-9].** This experience led us to work on the current topic.

According to Baldwin, **[10]** adults seeking orthodontic care for themselves or their children are motivated by a desire to improve appearance, regardless of structural or functional consideration. The major option of choice for treating them is fixed orthodontic treatment. During orthodontic treatment, patients are often advised by orthodontists to follow certain dietary restrictions such as to eat soft food during the initial stages of treatment for preventing pain and discomfort. Several factors were found to be associated with the discomfort accompanying orthodontic appliances, such factors include the type of appliance used, amount of force applied, previous experience of pain, emotional changes and the cognitive and environmental aspects .Studies have shown that orthodontic treatment has a potential impact on patients' daily life and may change or restrict their dietary habits **[11]**. This is because chewing and swallowing hard foods can be difficult for patients, and the masticatory ability is reduced at the first 24 hours after insertion of the fixed appliance.

Consequently, to minimize pain and discomfort patients usually tend to follow a soft food diet and decrease their dietary intake. A study predicted that the application of arch wires will result in restraining many types of food which is caused by the loss of pleasure to eat **[12]**. Very few studies have evaluated the effect of orthodontic appliances on weight. It is known that orthodontic treatment induces a physical, psychological and emotional stress that reduce nutrient utilization. Therefore, requiring the increase of the individual dietary intake **[2]**. Limited food intake or consuming only a soft diet will result in decrease of body weight and thus loss of body fat.

Also, the study is important to know weight changes in patients during orthodontic treatment and the difficulties they are undergoing. The aim of the study is to

determine the association between weight changes and orthodontic treatment in the South Indian Population.

MATERIALS AND METHODS

Study setting

This is the online survey based study, conducted among the South Indian population. A questionnaire **(Figure 1-12)** was created among people through an online link from the survey planet. The study was approved by the institutional ethical committee.

Sampling

The sample size was 709 patients who completed the Orthodontic therapy. Sampling method used was a simple random sampling. In order to minimise bias randomisation (i.e all variables were included) was done. Internal validity was the pre tested questionnaire. External validity was homogenisation, replication of experiment and cross verification with existing studies.

Data collection

The questionnaire contained 12 questions. Independent variables were demographics details such as age, gender. Dependent variables were weight changes and food restrictions. The collected results were entered in Microsoft excel.

Data analysis

Data analysis was done using SPSS software. Descriptive statistics were applied for the variables. Pie charts were drawn according to results obtained. Descriptive statistics for frequency and Chi square test was used to determine the correlation between the variables where p value < 0.05 is considered statistically significant.

RESULTS & DISCUSSION

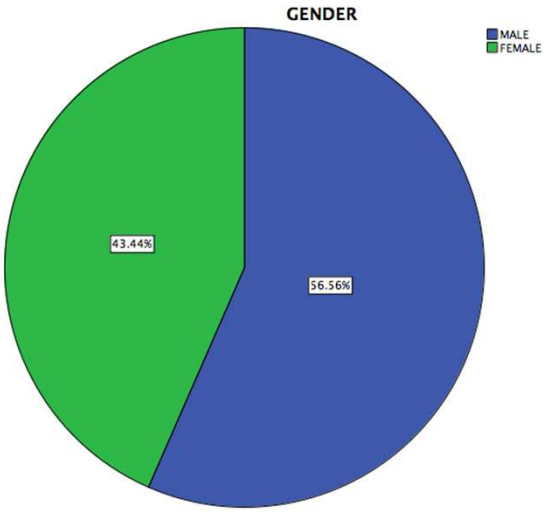

Figure 1: The pie chart represents the distribution of study participants based on gender. The graph shows a higher percentage of male participants with 56.56% and females with 43.44% . Blue represents male distribution and Green represents female distribution

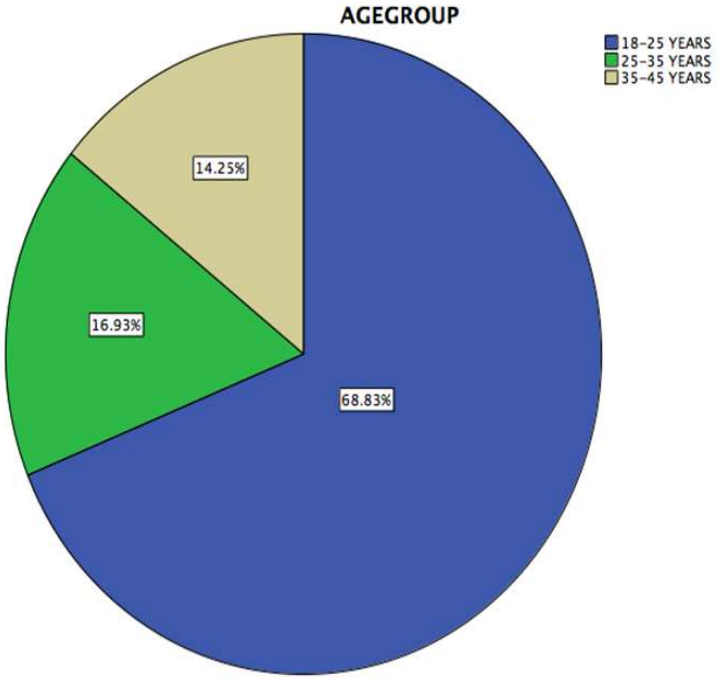

Figure 2: Pie chart showing distribution of study participants based on Age Group. The graph shows the highest frequency for participants in the age group of 18-25 years with 68.3% and the least number of participants in the age group of 35-45 years with 14.25 %. Blue denotes age group of 18-25 years , Green denotes age group of 25-35 years and Yellow denotes age group of 35-45 years.

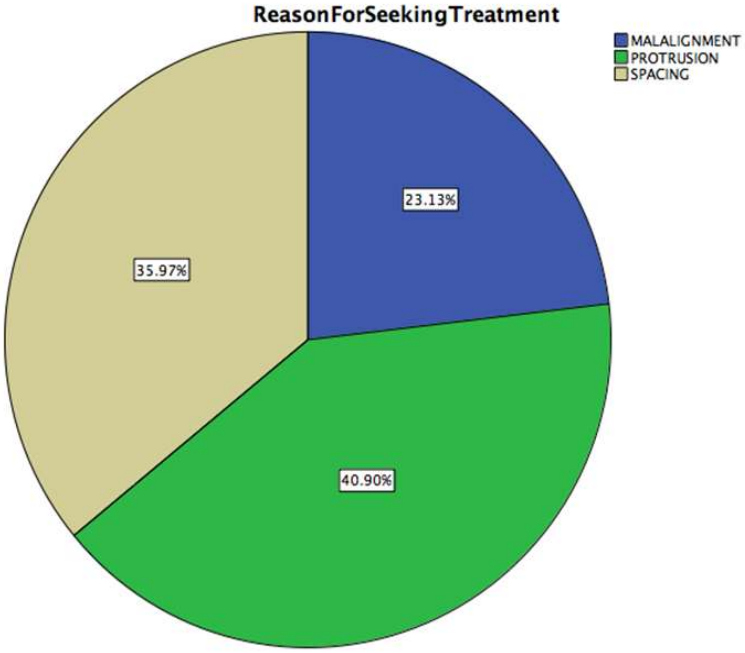

Figure 3: Pie chart representing frequency of the responses for the question, 'reason for seeking orthodontic treatment' with the maximum number of responses being protrusion with 40.9% followed by spacing with 35.97%, and malalignment with 23.13%. Green denotes protrusion, Blue denotes spacing and Yellow denotes malalignment of teeth.

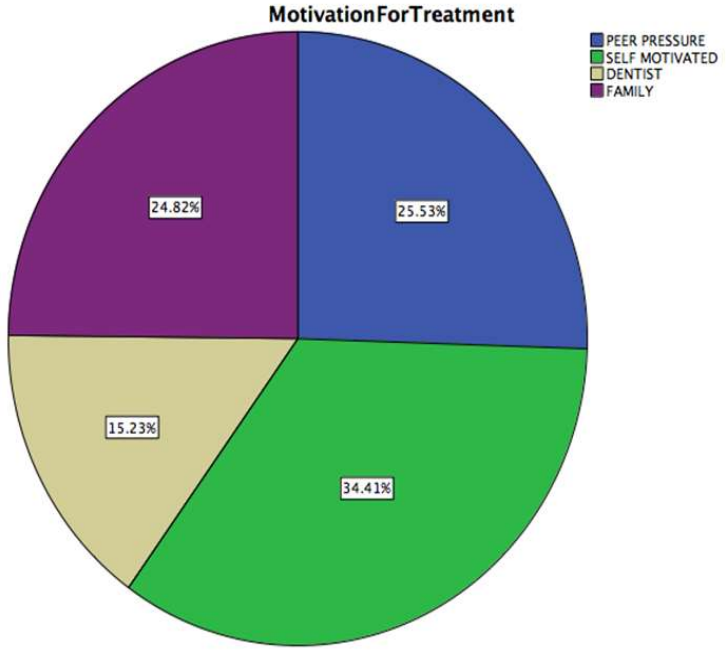

Figure 4: Pie chart representing frequency of the responses for the question, 'motivation for orthodontic treatment', with the highest number of responses for self motivated with 34.41%,followed by peer pressure with 25.53%, motivated by family with 24.82% and the least was motivated by dentist with 15.23%. Green represents self motivated, Blue indicates peer pressure , Purple indicates family and Yellow indicates motivated by dentists.

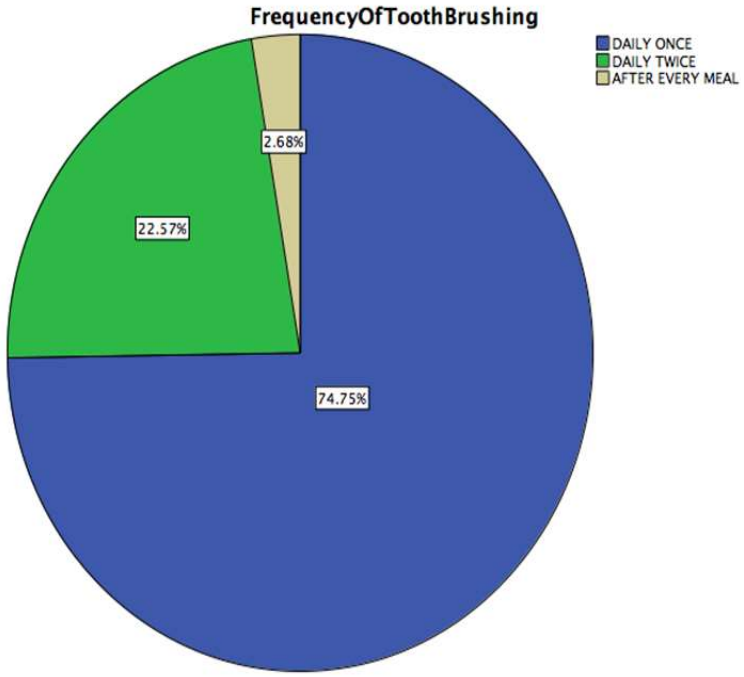

Figure 5: Pie chart represents the frequency of the responses for the, 'Frequency of tooth brushing in a day', Higher percentage of respondents brushed only once a day, with 74.75% followed by 22.57% brushing twice daily and 2.68% for brushing after every meal. Blue indicates brushing once daily, green indicates brushing twice daily and Yellow indicates brushing after every meal.

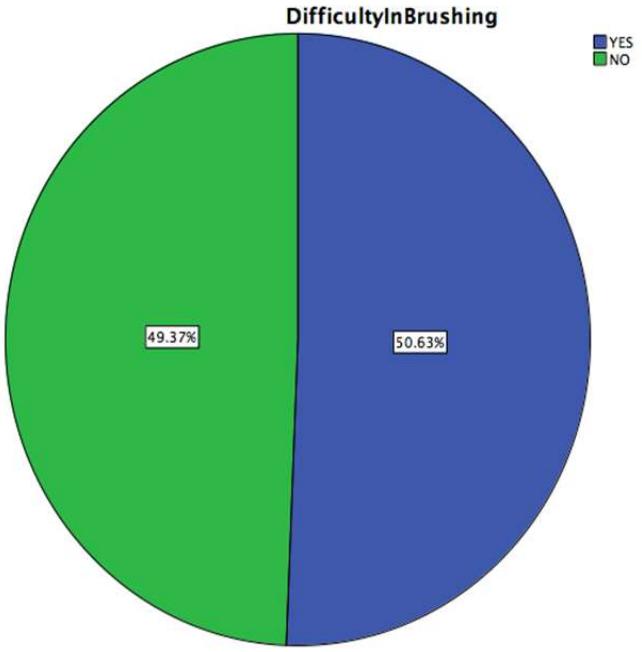

Figure 6 :Pie chart representing frequency of the responses for the question, 'Difficulty during brushing'. Higher (50.63%)percentage of respondents had difficulty during brushing while undergoing orthodontic therapy which is denoted by blue colour and 49.37% did not have any difficulty during brushing which is denoted by green colour.

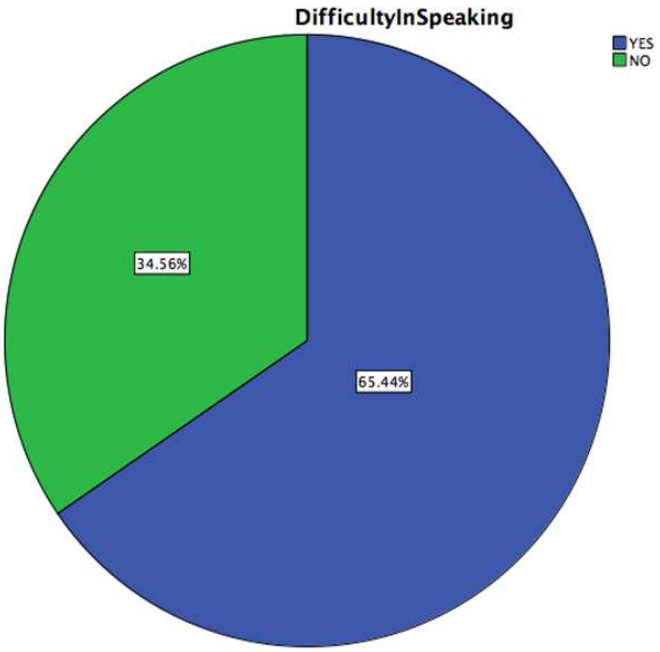

Figure 7: Pie chart representing frequency of the responses for the question, 'Difficulty in speaking during Orthodontic treatment'. Higher percentage of respondents had difficulty in speaking with 65.44% responses as 'Yes' which is denoted by blue colour and 34.56% did not have any difficulty in speaking during orthodontic treatment denoted by green colour.

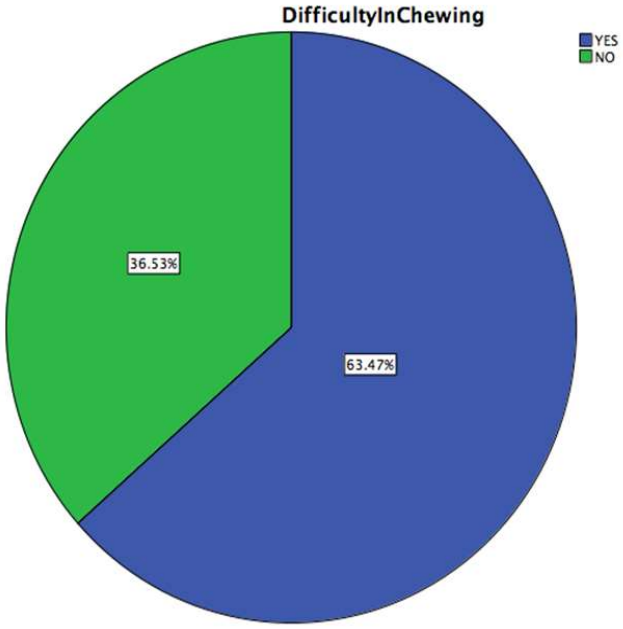

Figure 8: Pie chart representing frequency of the responses for the question, 'Difficulty in Chewing food during Orthodontic treatment'. Higher percentage of respondents with 63.47% had difficulty during chewing which is denoted in Blue and 36.53% did not have any difficulty during chewing which is denoted in Green.

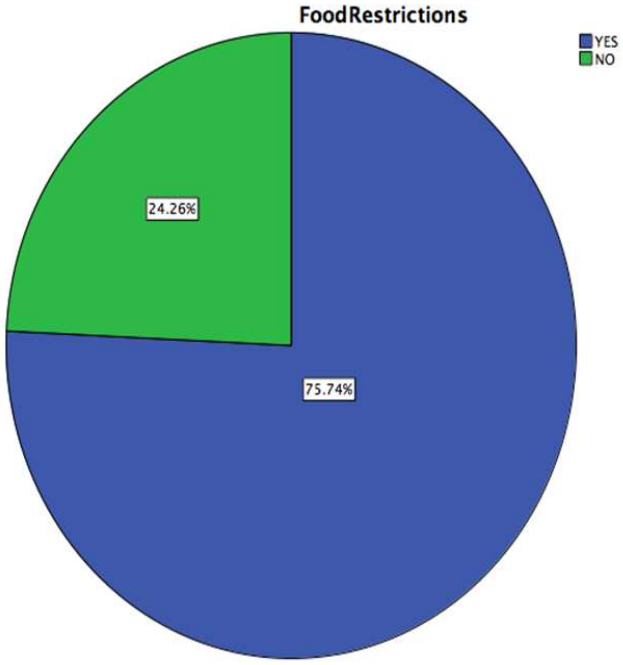

Figure 9:Pie chart representing frequency of the responses for the question, ' food restrictions during Orthodontic treatment'. Higher percentage of respondents, 75.74% had food restrictions denoted in Blue colour and 24.26% did not have any food restrictions during treatment which is denoted in Green colour.

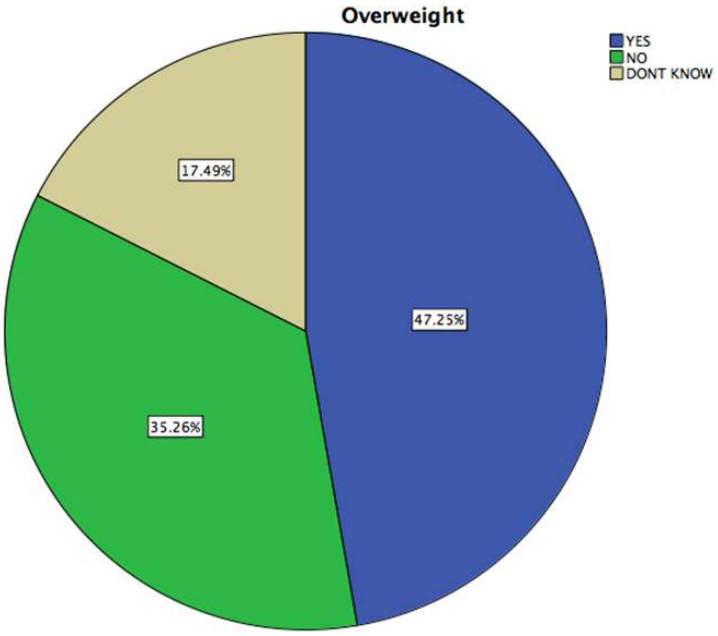

Figure 10: Pie chart representing frequency of the responses for the question, 'where you overweight when you started the orthodontic treatment', Higher percentage of respondents said 'yes' with 47.25% denoted in blue colour followed by 35.26% responding 'No' denoted in Green and 17.49% were not aware about their weight status which is denoted in Yellow colour.

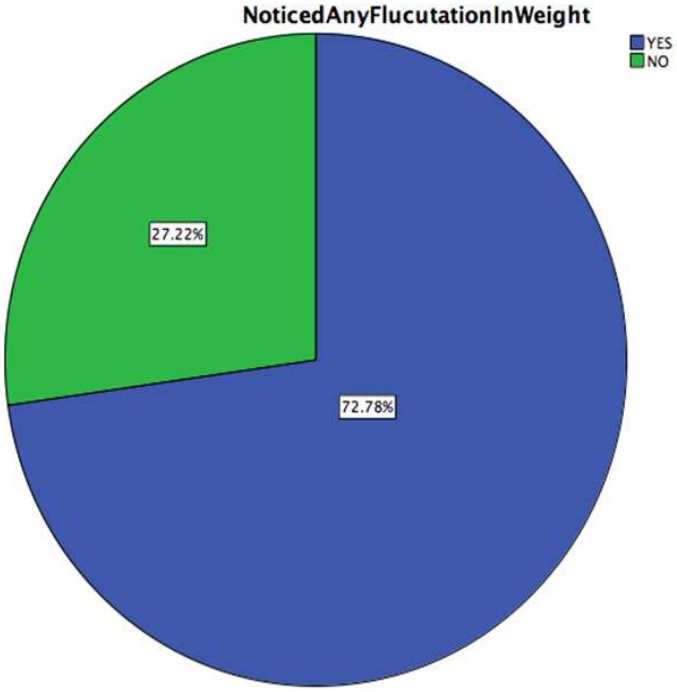

Figure 11 :Pie chart representing frequency of the responses for the question, ' Have you noticed any weight change during treatment'. Higher percentage of respondents said 'Yes' with 72.78% denoted in blue, 27.22% responded' No' denoted in green colour.

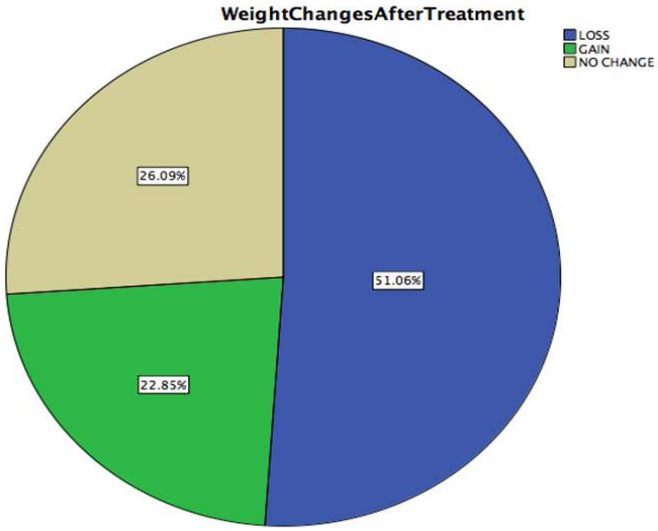

Figure 12: Pie chart representing frequency of the responses for the question, ' weight change after treatment'. Higher percentage of respondents had weight loss with 51.06% denoted in blue colour ,26.09% had no change in weight denoted in Yellow colour,and least response as 22.85% had weight gain denoted in green colour.

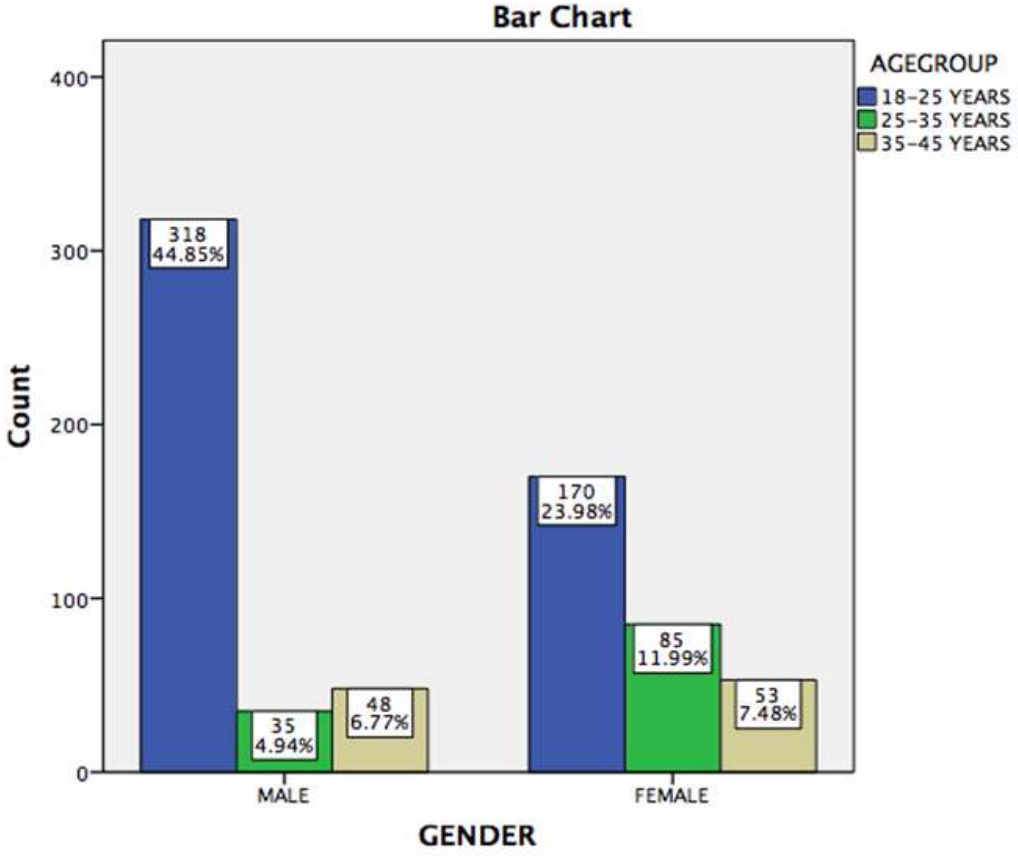

Figure 13- Bar chart showing the association between Gender (x-axis) and participants' age group (Y- axis), where Blue colour denotes 18-25 age group, Green colour denotes 25-35 age group and Yellow colour denotes 35-45 age group. 44.85% of Male patients are in the 18-25 age group, 4.94% are in the 25-35 age group and 6.77% are 35-45 age group. 23.98% of Female patients are in the 18-25 age group, 11.99% are in the 25-35group and 7.48% are 35 to 45 group.There is a significant difference in responses between the Age group. Pearson chi square value -54.709 ,P value - 0.00(< 0.05), Hence statistically significant.

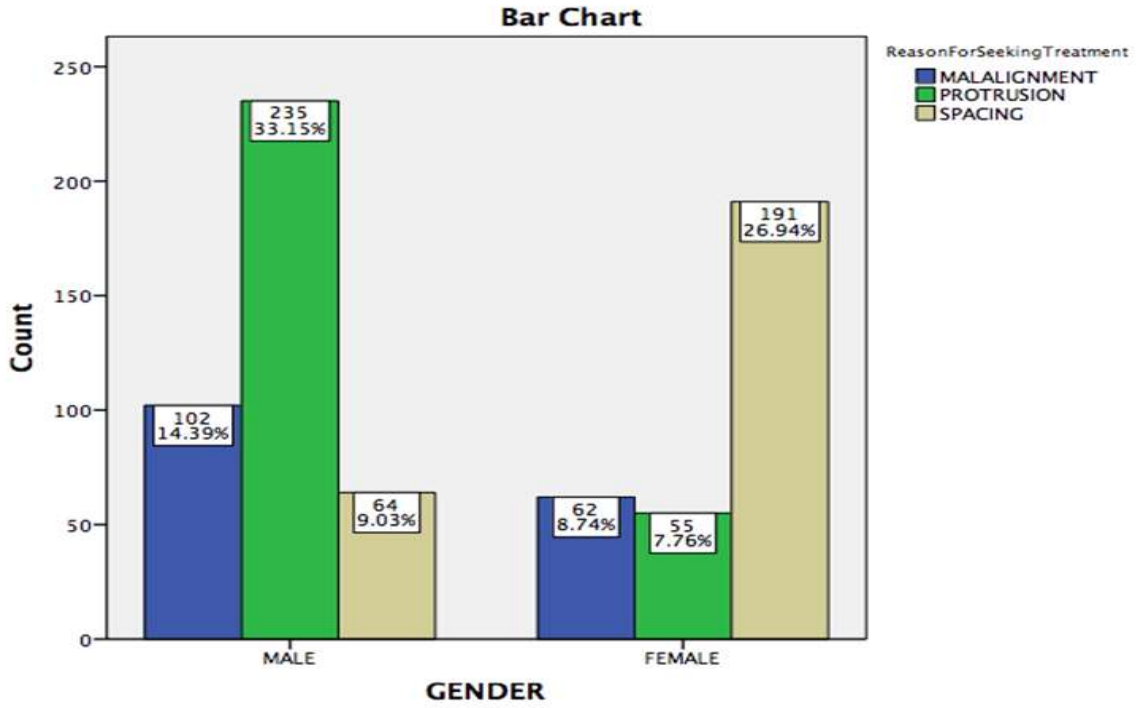

Figure 14: Bar chart showing the association between Gender (x-axis) and responses to reason for seeking(Y- axis) orthodontic treatment, where Blue colour denotes malalignment, Green colour denotes protrusion and Yellow colour denotes spacing. 33.15% of Male patients had protrusion, 14.39% had malalignment and 9.03% had spacing. In Females 26.14% had spacing, 8.74% had malalignment and 7.76% had protrusion. Pearson chi square value 175.553 , P value - 0.00(< 0.05) statistically significant.

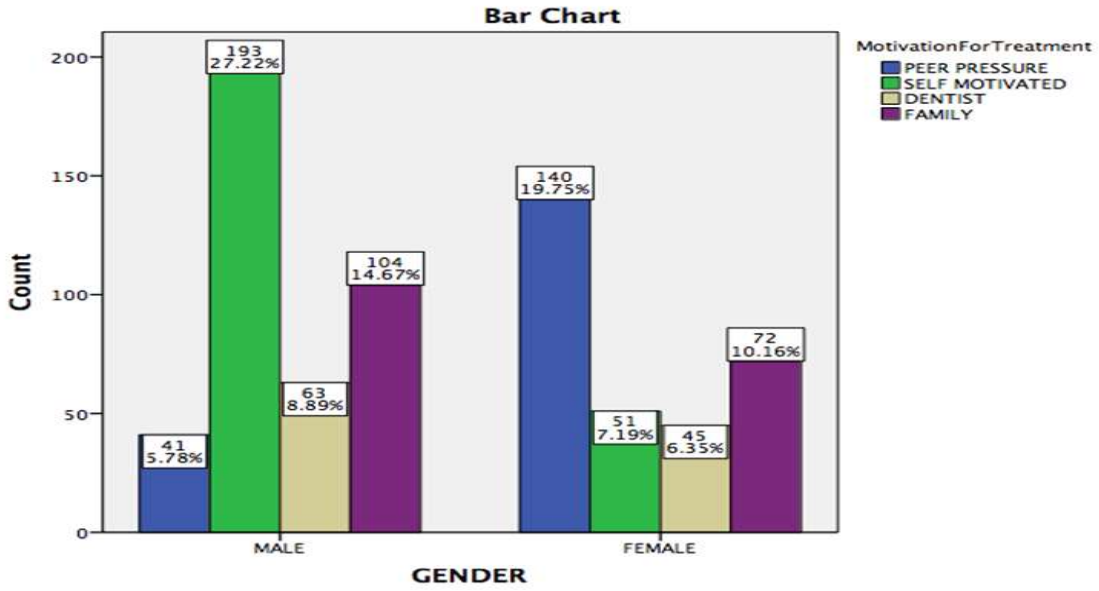

Figure 15- Bar chart showing the association between Gender (x-axis) and responses to motivation for treatment (Y- axis), where Blue colour denotes peer pressure, Green colour denotes self motivated and Yellow colour denotes dentist and purple color denotes family 27.27% of Male patients were self motivated, 14.67% were family and 8.89% were dentist and 5.78% were peer pressure. In Females 19.75% had peer pressure, 10.16% were family and 7.19% were self motivated,6.35% were dentist.Pearson chi square value - 135.743 , P value - 0.00(< 0.05), Hence statistically significant.

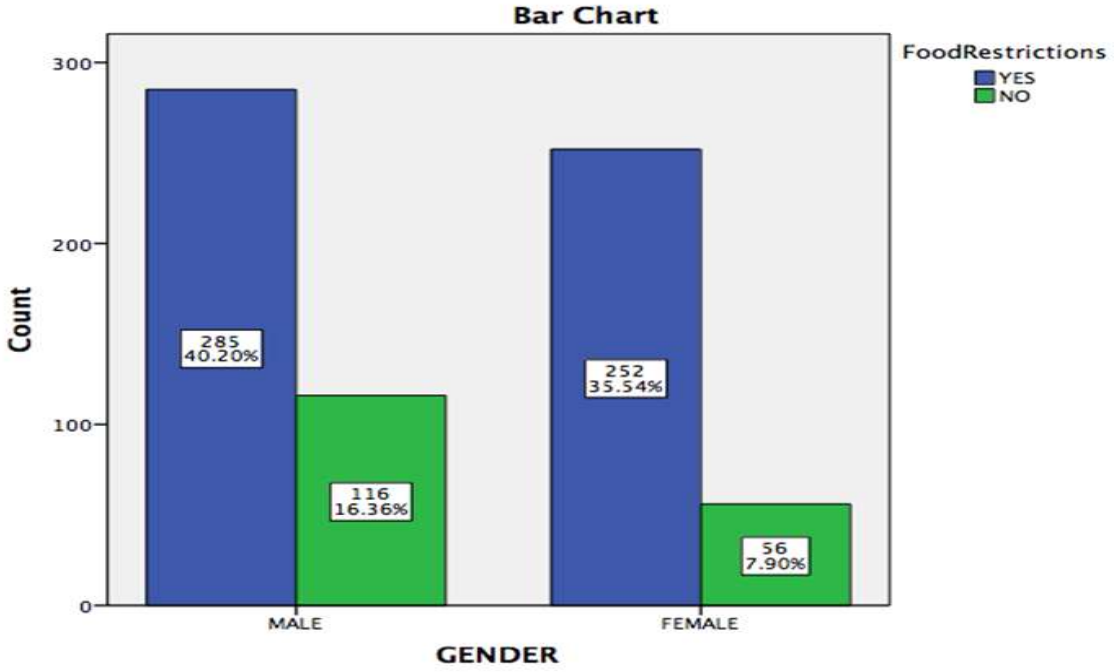

Figure 16- Bar chart showing the association between Gender (x-axis) and responses to food restrictions (Y- axis) during orthodontic treatment, where Blue colour denotes Yes, Green colour denotes No. 40.20% of Male patients had food restrictions, 16.36% had no restrictions. In Females 35.54% had food restrictions,7.90% had no restrictions.Pearson chi square value -10.948 , P value - 0.01(< 0.05), Hence statistically significant.

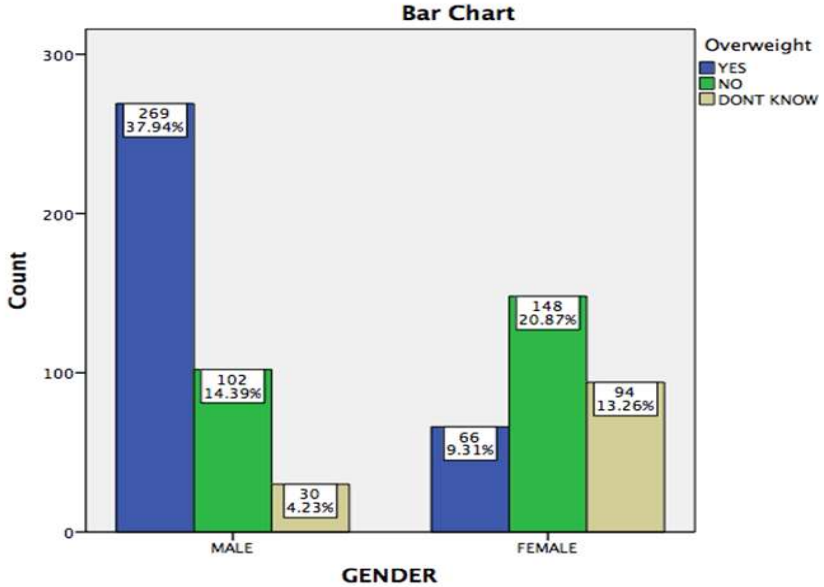

Figure 17: Bar chart showing the association between Gender (x-axis) and responses to whether overweight (Y- axis) before orthodontic treatment, where Blue colour denotes Yes, Green colour denotes No and yellow denotes Don't know. 37.94% of Male patients were overweight before treatment 14.34% were not overweight and 4.23% don't know. In Females 9.31% were overweight,20.87% were not overweight and 13.26% dont know about their weight status .More male patients were over weight as compared to female patients.Pearson chi square value -154.976 , P value - 0.00(< 0.05), Hence statistically significant.

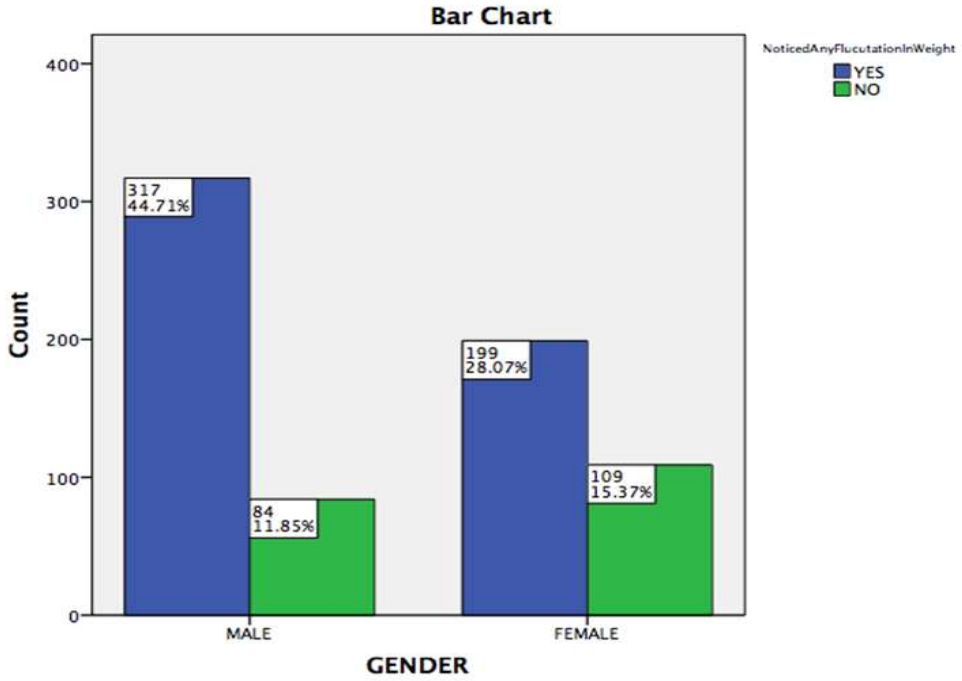

Figure 18: Bar chart showing the association between Gender (x-axis) and responses to fluctuation in weight (Y- axis) during orthodontic treatment, where Blue colour denotes Yes, Green colour denotes No. 44.71% of Male patients had weight fluctuations, 11.85% had no fluctuations. In Females 28.07% had fluctuations,15.3% had no fluctuations. Male patiwents had more weight fluctuations as compared to females.Pearson chi square value -18.340, P value - 0.00(< 0.05), Hence statistically significant.

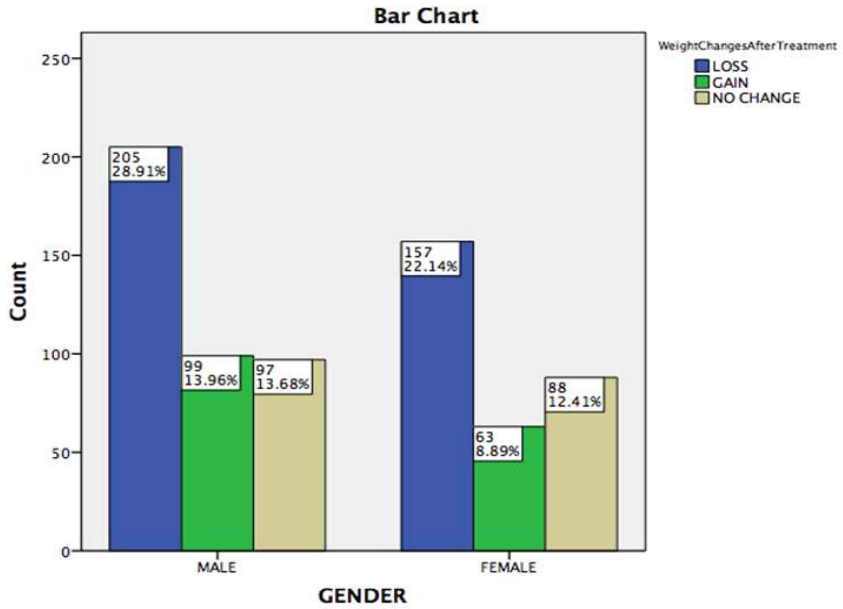

Figure 19: Bar chart showing the association between Gender (x-axis) and responses to weight changes(Y- axis) after orthodontic treatment, where Blue colour denotes weight loss, Green colour denotes weight gain and Yellow colour denotes no change in weight. 28.91% of Male patients had weight loss, 13.96% had weight gain and 13.68% had no change in weight. In Females 22.14% had weight loss, 8.89% had weight gain and 12.41% had no change in weight. Male patients had more weight loss as compared to female patients. Pearson chi square value - 2.6499. P value - 0.266 statistically not significant

22.14% (157) of female patients had weight loss, 8.89% (63) had weight gain and 12.41% (88) had no change in weight .13.96%(99) of Male patients had weight loss, had 13.68% (97) weight gain and 12.41% (88) had no change in weight **(Figure 19)**. **Sai Sandeep *et al*** showed weight alteration in both male and female of the study group undergoing Orthodontic treatment. It is observed that there is a definite weight reduction during active orthodontic treatment **[13]**. In our study 44.71% (317) of Male patients had weight fluctuations, 11.85% (84) had no fluctuations, 28.07% (199) of female patients had weight fluctuations, 15.3% (109) had no fluctuations **(Figure 18)**.

Orthodontic treatment is a dynamic treatment. This includes application of pressure at different points on the tooth surface **[14]**. The pressure delivery starts from the point of insertion of a separator in the first molar for band application which is done in the subsequent appointment **[15]**. The discomfort patients are going to experience is high. This affects the daily routine of the patient **[16]**. The food intake by the patient drastically varies **(Figure 16)** as the patient lends to eat little due to the discomfort the experience **[17]**. This in turn affects the body metabolism, body weight and therapy having a direct effect on the BMI of the individual **[18]**.

Patients seek orthodontic treatment to improve facial and dental aesthetic **(Figure 14, 15) [19]**. Body weight is often used to assess health stability and health risk both in clinical setting state and in epidemiological analysis **[20]**. In India, the prevalence of overweight among adolescents varies between 10% and 30% **[21]**. In our study it is seen that 37.94% (269) of Male patients and 9.31% (66) of female patients were overweight before treatment **(Figure 17)**. Variables regarding obesity itself and patients overall health in addition to variables regarding tooth movement are plenty **[22 23]**. Chi square test applied which showed that the resultant p value is lesser than 0.05.so its statistically significant. Our study shows that there is significant relationship between change in weight and orthodontic treatment which may be due to food restrictions **(Figure 16)** and limited food intake due to difficulty in mastication. Study results showed that there is a significant role for orthodontic treatment for the change in the weight.

Previously our team has conducted numerous original studies **[4, 10, 24-30]** over the past ten years. Now we are focusing on epidemiological surveys. The idea for this

survey stemmed from the current interest in our community.

LIMITATION AND FUTURE DIRECTION

The limitations of this study mainly include the study being unicentric, unequal distribution, geographical variation and a small sample size. Further studies need to be performed on a large scale with a variant geographical distribution thereby a greater sample size including different ethnicities can procure better results.

CONCLUSION

There was marked reduction in weight seen in patients undergoing orthodontic treatment. This study confirms the loss of weight and discomfort among patients who undergo orthodontic treatments. This can be due to the restricted diet pattern difficulty in mastication. The findings of this study are of importance among the orthodontic centres and practitioners highlighting the importance of their guidance in structured diet planning and advice after treatment.

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