

A RETROSPECTIVE STUDY ASSESSING THE LIP COMPETENCY OF PATIENTS WHO UNDERWENT ORTHODONTIC THERAPY

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ABSTRACT

Clinical photography is essential to evaluate craniofacial and dental relationships. It can be used to assess soft tissue profiles changes in the long run. The study aims at assessing the lip competency of patients who underwent orthodontic therapy using preadjusted edge wise appliance. The retrospective study was carried out by collecting the Frontal and Profile views of photographs taken for the patients who underwent long-term fixed appliance therapy. It was seen that 41 patients had undergone Orthodontic therapy. Excel tabulation of the data was done followed by the results that were obtained after SPSS analysis. The statistical test performed was the chi-square test. 36.59% of patients with incompetent lips had undergone orthodontic therapy. 36.59% of patients in the age group of 21-30 had competent lips and 19.51% of the patients of the same age had incompetent lips. It was seen that during pretreatment, majority of frequency of the competent (39.02%) as well as incompetent (29.27%) lips were seen in females as compared to male patients. Chi square test shows p value >0.05, non significant association. Thus it was observed that all the patients were found to have competent lips after completion of orthodontic therapy.

KEYWORDS: Documentation; Frontal photos; Lip competency; Orthodontic therapy; Photographs, Preadjusted edge wise appliance.

INTRODUCTION

The application of photography in dental practice is simple, quick and used in documentation of work, assisting in patient education, helping in clinical evaluation that is benefiting the patient and dentist (Casaglia *et al.*, 2015). Dental digital photography is said to be a part of micro photography which enables easy and accessible training and documentation of patients. Digital images can be stored quickly and safely for academic purposes or legal protection of performed treatment when the need arises. This is the reason to believe that the digital camera is an indispensable part of dental equipment and dental photography training should be an integral part of dental education as the growing need for incorporating technology into clinical practice has become essential (Desai and Bumb, 2013).

When the lips can maintain anterior oral seal with minimum muscular effort, muscles of facial expression are in relaxed position and mandible is in endogenous posture is known as competent lips. Facial profile in orthodontic treatment commonly refers to lip protrusion or perioral area protrusion (Suntornlohanakul,

Tianviwat and Songwattana, 2004). Lip competence denotes a tonus in the lip muscles to provide passive lip contact with no clinical contraction of the mentalis muscle. A subject is classified as having competent lips when his/ her lips are in light contact at clinical rest (Gustafsson and Ahlgren, 1975), (Simpson, 1977), (Yemm, El-Sharkawy and Stephens, 1978). A subject is classified as having incompetent lips when his/her lips are apart at clinical rest or when his lips are in contact but present higher activity of the mentalis muscle, clinically verified by shrinkage of the chin skin (Yamaguchi et al., 2000). Usually, photographs taken in frontal view at rest position are used to evaluate the lip competency. It is taken with teeth in maximal intercuspation with the lips closed even if this strains the patient. This photograph serves as a clear documentation of lip strain and its esthetic effect (McKeown, Murray and Sandler, 2005).

While recording the soft tissues it is found that the colour balance is very essential. When concerned with soft tissues, a correct color rendition is an excellent method for distinguishing between healthy and diseased tissues and for recording pathological changes such as white patches, inflammation, ulceration, burns, lacerations, carcinoma, etc (Casaglia et al., 2015). Clinical photography skills are developed over a period of time of practice. Once a list of pictures to be taken are formulated standardization of the rules for framing each picture is to be made. It is essential to ensure that each and every picture is taken following the exact set of rules.

Intra oral photography enables the orthodontist to review the hard and soft tissues and to record the condition before the treatment begins (Nayak, 2017). Pictures of different views serve as an excellent analytical tool. Extra oral frontal smiles should be taken in such a manner that the anterior teeth are visible and overall smile esthetics is focused properly (Goenharto, 2018). Photographs are taken from the side view to demonstrate the overall over jet and overbite present which helps in the treatment planning (Liu, 2020). In the coming years quality control will become important to dentists. The photographs taken will help to self check on his or her results (Mladenović et al., 2011). Anyone who has photographed the stages of dental treatment, subsequently enlarging and designing the result is capable of verifying it (Taylor, 1984). The frontal dynamic smile demonstrates the amount of incisor smile as well as excessive gingival display. These pictures can help to determine and show the patient evident changes between each appointment during orthodontic therapy.

Extra and intra-oral photographs are an important diagnostic technique in orthodontics also used during orthodontic therapy to evaluate the progress of the treatment plan. The advancement and use of digital photography offers many advantages to orthodontists. High quality photographic documentation is used routinely throughout treatment with little direct cost to the clinician most often (Sandler, Gutierrez and Murray, 2012).

Various other comparative studies are also being carried on that can aid (Vikram et al., 2017)(Kamisetty et al., 2015)(Ramesh Kumar et al., 2011)(Ramesh Kumar et al., 2011; Felicita, Chandrasekar and Shanthasundari, 2012) in advancements (Sivamurthy and Sundari, 2016)(Krishnan, Pandian and Kumar S, 2015; Sivamurthy and Sundari, 2016)(Rubika, Sumathi Felicita and Sivambiga, 2015)(Krishnan, Pandian and Kumar S, 2015; Sivamurthy and Sundari, 2016; Felicita, 2017a) (Dinesh et al., 2013; Krishnan, Pandian and Kumar S, 2015; Sivamurthy and Sundari, 2016; Felicita, 2017a) and also are being considered as a breakthrough in orthodontics. Various reviews (Viswanath et al., 2015; Pandian, Krishnan and Kumar, 2018) (Viswanath et al., 2015; Felicita and Sumathi Felicita, 2018; Pandian, Krishnan and Kumar, 2018) (Felicita, 2017b) and clinical trials (Jain, Kumar and Manjula, 2014; Samantha et al., 2017) also have been conducted in order to create new views, approaches and effective treatment options for the future of orthodontics.

The study aims at assessing the lip competence of patients who underwent orthodontic therapy using preadjusted edge wise appliance.

MATERIALS AND METHODS

Ethical Approval

The ethical approval for the retrospective study was obtained from the university (SDC/SIHEC/2020/DIASDATA/0619-0320).

Data analysis

Chosen for evaluation are 41 patients who had reported to a Private Dental Hospital with a chief complaint of malocclusion and the patients had undergone orthodontic therapy using preadjusted edgewise appliance. Population selection was random. Population type was patients with malocclusion. The patient records were reviewed and analysed between June 2019 and March 2020. Cross verification was done by referring case sheets and photographs. To minimise sampling bias all available data was included. All the incomplete & censored was excluded. The inclusion criteria was all patients who required orthodontic therapy. The study was carried on in a university set up. The internal validity of the study was set by verifying all views of photographs taken for verifying the lip competence. .

Statistical Analysis

After Excel tabulation, the data was transferred to SPSS. The analysis was done using SPSS version 19. Descriptive statistics were used to correlate the data. The dependent variables were the views of photographs taken and lip competence. The independent variables were age and gender. The collected data was imported to SPSS and the chi square test was done. The type of analysis performed was correlation and association. The level of significance was set at 0.05.

RESULTS AND DISCUSSION

It was seen that 41 patients had undergone long-term fixed appliance therapy, 68.29% were females and 37.71% were males (Figure 1) 56.1% of the patients belonged to age group 21-30, 39.02% belonged to 10-20 years and only 4.88% of them belonged to 31-40 years (Figure 2) Out of the total study population , it was seen that 36.59% of the patients had incompetent lips at the beginning of the treatment (Figure 3). 36.59% of the patients of age 21-30 had competent lips and 19.51% of patients of the same age had incompetent lips (Figure 4). It was seen that most of the competent (39.02%) as well as incompetent (29.27%) lips were seen in females (Figure 5) The patients with incompetent lips during pre treatment had good lip seal at the end of treatment.(Figure 6).

In our study it is seen that among the patients who had undergone orthodontic treatment 68.29% were females and 37.71% were males and also 56.1% of the patients belonged to age group 21-30, 39.02% belonged to the age group 10-20 years and only 4.88% of them belonged to 31-40 year age group. It was found that mostly young females were found to undergo orthodontic therapy. This might be because of the high demand of their esthetical appearance (Lagorsse and Gebeile-Chauty, 2018). The most prevalent age group undergoing the therapy were the younger adults , 75.6% of them followed by 25.4% of the children undergoing the therapy. 14.6% of them were 25 years old. The need for them to undergo the treatment depends on their psychological factors that would create harmony with the social environment and well-being (Souza et al., 2013).

It was seen that all patients had been taken with a pre op and post op frontal and profile photograph. It is recommended that in order to take a proper extra oral photography a proper white or dark or a wall mounted background is required (Terry, Snow and McLaren, 2008) (Sandler and Murray, 2002). Golkari et al. in a study on 110 schoolchildren concluded that photographic method was much more sensitive, effective than direct clinical examination (Golkari et al., 2011). This is taken in order to maintain the best definition of the soft tissue profile of the patient with no distraction in the background.

In our study, out of the total population, it was seen that 36.59% of the patients with incompetent lips had undergone orthodontic therapy. 36.59% of the patients of age 21-30 had incompetent lips and 19.51% of

the patients of the same age had incompetent lips. It was seen that most of the competent (39.02%) as well as incompetent (29.27%) lips were seen in female patients. Various studies that have studied the incompetency of patients who require orthodontic therapy state that the presence of incompetent lips may be attributed to more than one factor and not only bimaxillary protrusion (Hassan, Turkistani and Hassan, 2014). Lip incompetence in adolescents and adults is a very common finding due to problems such as allergic rhinitis or other airway obstructions. In such conditions, it is seen that the lips remain open and often the lower jaw is hinged slightly open as a way of maintaining the oral airway for breathing. Lip incompetence can lead to speech errors and dental alignment changes if the lips are apart in the rest posture along with mandible dropping down to an open position to help facilitate oral breathing. Lips are apart in rest posture in children under age 12-13 mostly and is not expected to have achieved a lips-together rest posture (lip competence) as it is said to be the growing phase. Children will eventually develop normal dental arches in spite of having had a lips-apart rest posture in their early age (Mason, no date). Thus if lip incompetence is persisting beyond the stage of growth phase, orthodontic therapy is always looked into as a best treatment option.

Studies highlight the importance and the use of taking a pre-op and post op frontal smile and overjet pictures (Zeisse, 1951; Stutts, 1978). The need of a frontal picture is for the sake of analysing the incisal visibility in addition to analysing the aesthetics of the smile (Ghaleb, Bouserhal and Bassil-Nassif, 2011). Photography can be divided into three broad areas namely preparation of the patient, background and intraoral sites, preparation of camera (Barut and Ertlav, 2011).

Intraoral photographs in addition also prove to be a viable alternative to dental casts for attaining dental arch relationships in cleft lip and palate patients thereby reducing the cost and inconvenience (Liao, Huang and Lin, 2009). A survey done by the members of the Angle Society of Europe showed that 60% of orthodontists took their own clinical photographs whereas 35% assigned the task to an auxiliary and 5% hired professional clinical photographers. Sandler et al. showed that most of the photos taken by the 3 groups of photographers were judged to be good or acceptable. Orthodontists rather produced significantly more good-quality intraoral photographs than others (Sandler et al., 2009). The primary use of dental photography is mainly to assist the operator on the initial examination of the patient so as to help him in the diagnosis and control of the medical care outcome over time. Thus it is essential that dental photography must be considered as a diagnostic tool, similarly to X-rays, or other tests and investigations. During the first examination, the operator cannot see many details and photography is an effective method to analyze the preoperative dental status at a later date. So a complete set of oral images, collected on first examination, is valuable to get to a certain diagnosis, to provide dental treatment options and is not only useful for recording a baseline of oral health (Casaglia et al., 2015).

In future scope of the studies, in addition to the above views of photographs, photographs in 45° smile views can also be taken and kept for further references as pictures clearly depict the wonders that an orthodontic treatment has done to enhance a person's esthetics. Similar recommendations are given that several views should be taken for all the patients like the frontal view that incorporates full facial profile and entire dentition the dentist is going to work on. Other views like lateral and oblique lateral, occlusal mandibular-maxillary and a three-quarters profile view for esthetic purposes can be of greater use for analysis (Schaaf et al., 2009).

CONCLUSION

Within the limitations of the study it was seen that majority of patients with competent lips had undergone orthodontic treatment than the patients with incompetent lips. All the patients were found to have competent lips after completion of orthodontic therapy.

LIMITATIONS

The limitations of the study include that the study is done among people who belong to different ethnicities and can be performed only with patients who require orthodontic therapy.

FUTURE SCOPE

The study can further aim at determining the success rate of orthodontic therapy. It can aid in effective treatment planning and to educate and motivate the patient to undergo treatment and also to highlight the importance of clinical photography and documentation.

AUTHOR CONTRIBUTIONS

First author, Preethi Mariona performed the data collection by reviewing patient details, filtering required data, analysing and interpreting statistics and contributed to manuscript writing.

Second author, Dr. Remmiya Mary Varghese contributed to conception of study title, study design, analysed the collected data, statistics and interpretation and also critically revised the manuscript.

Third author, Dr. Sreedevi Dharman participated in the study and revised the manuscript. All the three authors have discussed the results and contributed to the final manuscript.

CONFLICT OF INTEREST

The authors have no potential conflict of interest.

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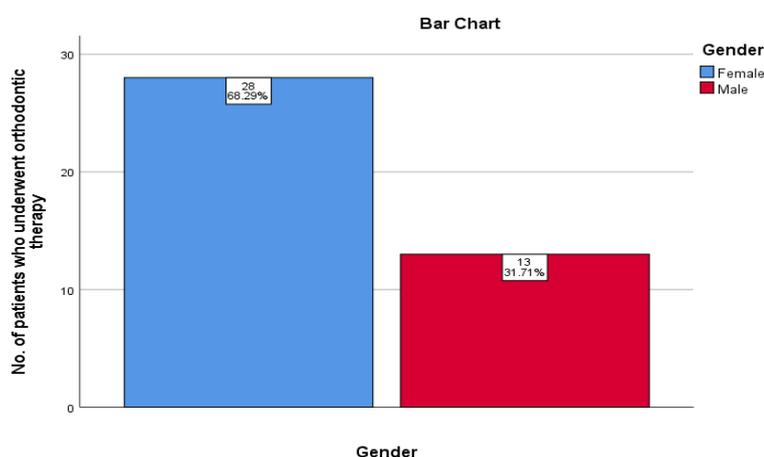


Figure 1: Bar graph represents the distribution of gender of patients who underwent orthodontic therapy. X axis denotes the gender and the Y axis denotes the number of patients who underwent orthodontic therapy. Majority of females (blue) had undergone orthodontic treatment when compared to males (red).

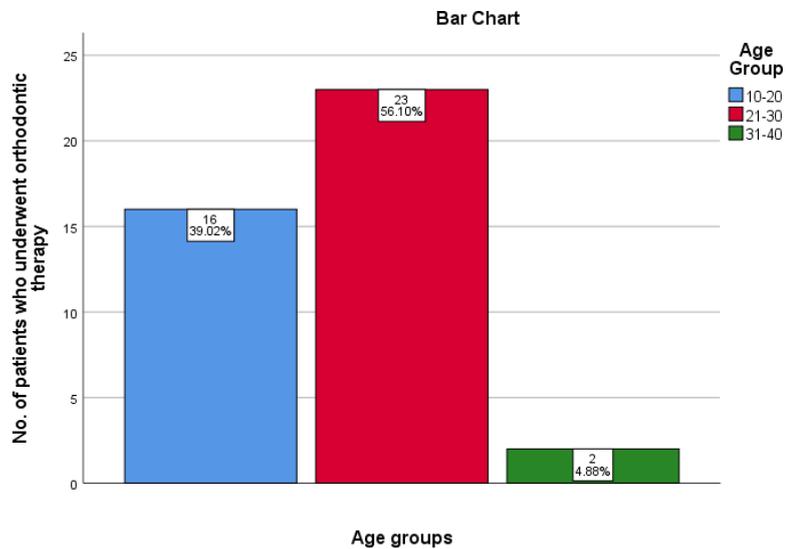


Figure 2: Bar graph represents the distribution of age of patients who underwent orthodontic therapy. The X axis denotes the age group and the Y axis denotes the number of patients who underwent orthodontic therapy. Maximum patients were in the age group of 21-30 (red) followed by patients in the age group of 10-20 years (blue) and 31-40 (green).

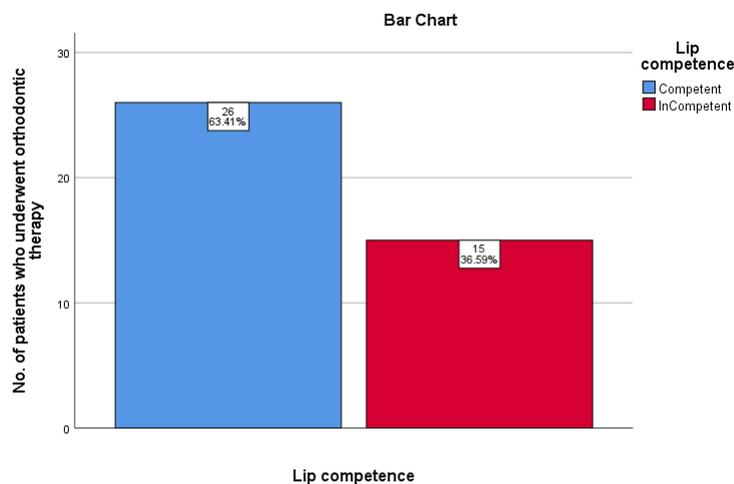


Figure 3: Bar graph the distribution of Lip competence of patients who underwent orthodontic therapy. X axis denotes the lip competence status and the Y axis denotes the number of patients who underwent orthodontic therapy. Majority of the patients who underwent orthodontic therapy had competent lips (blue) than patients with incompetent lips (red).

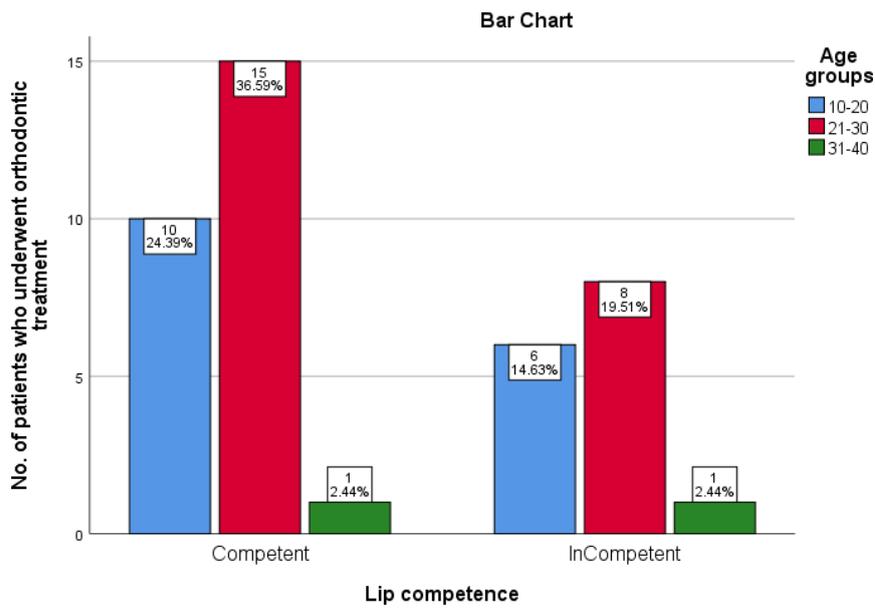


Figure 4: Bar graph shows association between Lip competence of patients who underwent orthodontic therapy and age group of patients. X axis denotes the lip competence with age group and the Y axis denotes the number of patients who underwent orthodontic therapy. Majority of the patients with competent lips and incompetent lips belonged to the age group of 21-30 (red) when compared to patients of 10-20 years (blue) and 31-40 years (green). Chi square test shows p value= 0.908 ; not significant. Hence proving that there is no significant association between the age of patients and lip competence of patients undergoing orthodontic treatment.

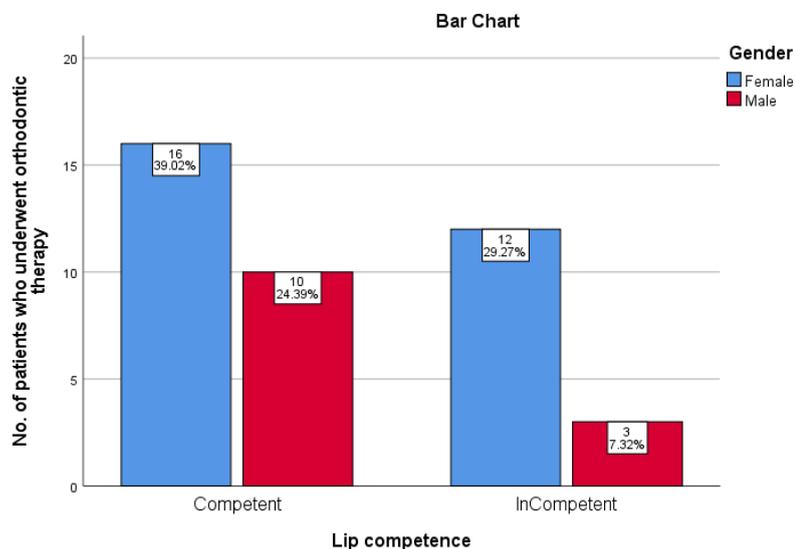


Figure 5: Bar graph association between Lip competence of patients who underwent orthodontic therapy and gender of patients. X axis denotes the lip competence with gender and the Y axis denotes the number of patients who underwent orthodontic therapy. Majority of females (blue) had competent and incompetent lips when compared to males (red). Chi square test shows p value= 0.221 ;not significant. Hence proving that there is no significant association between the gender of patients and lip competence of patients undergoing orthodontic treatment.

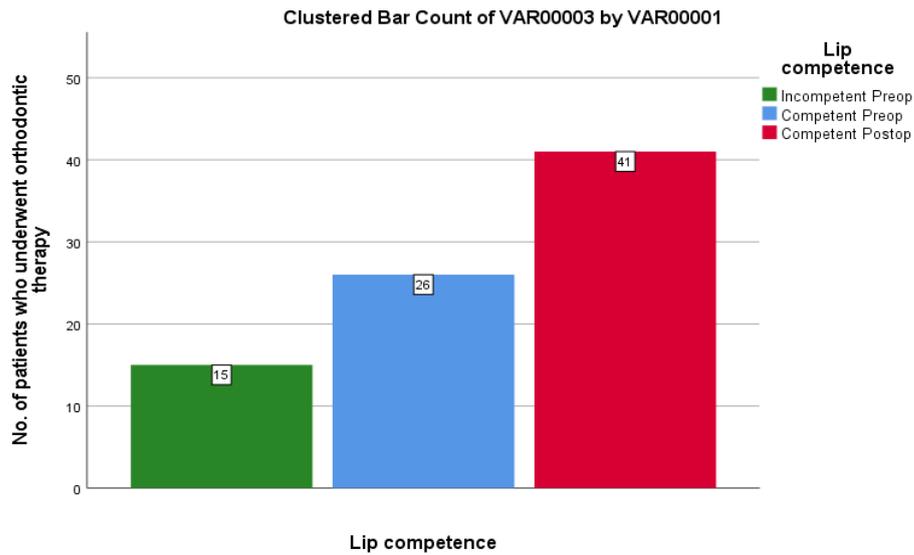


Figure 6: Bar graph shows the distribution of lip competence of patients before and after Orthodontic therapy. X axis denotes the lip competence and the Y axis denotes the number of patients who underwent orthodontic therapy. The pre treatment competent lips (blue) and pre treatment incompetent lips (green) have all been observed as competent lips post orthodontic treatment (red).