

**LEVEL OF KNOWLEDGE AND ATTITUDE TOWARDS
MALOCCLUSION AND ORTHODONTIC TREATMENT NEEDS BASED
ON AESTHETIC COMPONENT OF IOTN IN SMAN 15 MAKASSAR
STUDENTS**

THESIS

*Submitted to Complete One of the Requirements to Achieve a Bachelor's Degree
in Dentistry*



ABIGHAIL ANGELINE ANWAR FUTABARA

J011201165

DEPARTMENT OF ORTHODONTICS

FACULTY OF DENTISTRY

HASANUDDIN UNIVERSITY

2023

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VALIDATION SHEET

Title : Level Of Knowledge and Attitude Towards Malocclusion and Orthodontic Treatment Needs Based On Aesthetic Component of IOTN in SMAN 15 Makassar Students

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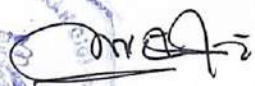
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PREFACE

All praise to God Almighty who always bestows His mercy, grace, and wisdom on the author, so that the author can complete the thesis entitled **“Level Of Knowledge and Attitude Towards Malocclusion and Orthodontic Treatment Needs Based On Aesthetic Component of IOTN In SMAN 15 Makassar Students”** well. The writing of this thesis is intended to fulfill one of the requirements to achieve a Bachelor of Dentistry degree at the Faculty of Dentistry, Hasanuddin University. In addition, this thesis is expected to be useful for institutions, readers, and researchers to increase knowledge especially in the field of orthodontics.

The author realizes that in the process of writing this thesis there are many obstacles that the author faces. However, thanks to the help, guidance, and support from various parties, the writing of this thesis can be completed properly. Therefore, the author would like to express deepest gratitude to:

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Makassar, 25 November 2023

Author

ABSTRACT

LEVEL OF KNOWLEDGE AND ATTITUDE TOWARDS MALOCCLUSION AND ORTHODONTIC TREATMENT NEEDS BASED ON AESTHETIC COMPONENT OF IOTN IN SMAN 15 MAKASSAR STUDENTS

Background : Malocclusion ranks third in the prevalence of pathological diseases in the mouth, below dental caries and periodontal disease, making malocclusion the third priority in oral health problems worldwide. The etiology of malocclusion originates from general and local factors but the main cause of the high rates of malocclusion is low level of individual knowledge. Based on the previous research, the adolescents are the highest rates who suffered from malocclusion that they should be the ones who needs the knowledge and attitude towards malocclusion and orthodontic treatment. **Purpose** : To find out the level of knowledge and attitude towards malocclusion and the need for orthodontic treatment in students of SMAN 15 Makassar. **Methods** : This type of research is a descriptive observational study with a cross-sectional approach. The subject of this study were 372 students at SMAN 15 Makassar. Each subject will be assessed the knowledge and level of the respondent's need for orthodontic treatment by filling out questionnaires and asked to assess the appearance of their own teeth based on the IOTN Aesthetic Component. **Conclusion** : Based on the results of research conducted regarding the level of knowledge regarding malocclusion among students at SMAN 15 Makassar, it can be concluded that there is no significant difference in the level of knowledge. This research shows that 142 students of SMAN 15 Makassar (38.2%) have a good level of knowledge. Meanwhile, regarding the need for orthodontic treatment based on the aesthetic component of the IOTN assessment, 326 (88%) students did not need treatment.

Keywords : Knowledge, Attitude, Malocclusion, Orthodontic Treatment

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CHAPTER I

INTRODUCTION

1.1 Background

The health of the human body in general can be influenced by several factors, including genetics, lifestyle, environment, socioeconomic status, and oral health conditions. Knowledge of oral health is considered as an important factor for better body health. Dental and oral health problems are not only limited to dental caries and periodontal disease; however, malocclusion is now as important as any other oral health condition.¹

Malocclusion ranks third in the prevalence of pathological diseases in the mouth, below dental caries and periodontal disease, making malocclusion the third priority in oral health problems worldwide.²

In Indonesia, the prevalence of malocclusion is still high, which is around 80% and is one of the major dental and oral health problems after dental caries and periodontal disease.³ This is coupled with the level of awareness of dental care which is still low and the public is not yet aware of the importance of maintaining oral health.⁴ Previous studies have shown that the prevalence of different malocclusions in various countries varies from 11% - 93%. This is due to various reasons such as subject selection criteria and the country where the research was conducted.²

Malocclusion is a common problem found in all parts of the world and varies depending on genetics, environment, and race.⁵ Malocclusion is a condition where there is a deviation from normal occlusion which can cause aesthetic

dissatisfaction. Malocclusion indicates a relative imbalance in the size and position of the teeth, facial bones and soft tissues (lips, cheeks and tongue).⁶

The prevalence of malocclusion among adolescents in Indonesia is still high, ranging from 90% in 1983 to 89% in 2006.⁷ Research by Musyulianti (2010) on students at Eben Heazer 1 Middle School, Manado found that the need for orthodontic treatment was in the range of 3-28%. A similar study by Endang (2011) on high school students in the Malalayang District, Manado found that 5-17% needed orthodontic treatment. A similar study was conducted at Sekolah Menengah Pertama Negeri 2 Bitung, Manado by Monica (2014), with the result that 5-8% required orthodontic treatment.⁸ As for the prevalence of malocclusion among adolescents in few countries was found to be 16.4% in Saudi Arab in 1990, 11% in Kenya in 1993 and 19.6% in Punjab. Based on the research by Taylor, Kang et al stated that malocclusion affects the quality of life among adolescents.⁷

Adolescence is the stage of identity formation. Facial aesthetics and adolescent teeth play an important role in the formation of self-concept and self-esteem. According to Kustiawan, an unattractive facial appearance has an unfavorable impact on the psychological development of a teenager. The severity of malocclusion in adolescents has an impact on social interaction, psychological state, self-confidence, and dissatisfaction with appearance.

Graber (1962) revealed that the etiology of malocclusion originates from general and local factors. Common factors include congenital, hereditary, environmental, metabolic conditions, trauma, bad habits, posture, and nutritional deficiencies. Local factors include anomaly in shape and size of teeth, prolonged

retention, premature loss, anomaly in the number of teeth, caries, delayed eruption of permanent teeth, improper fillings, and ankylosis. Malocclusion can have an impact on the function of mastication, speech, and interfere with the patient's aesthetic function.⁹

Faruk's research in Indonesia in 2007 on elementary school students with a total of 118 children showed that 34.57% of the total sample had knowledge of malocclusion. These results were also supported by research conducted by Aikins in Nigeria in 2012 on school children aged 12–18 years showing that children's knowledge of malocclusion was 82.5% of the total sample.¹⁰

Knowledge is the result of knowing someone who is obtained from sensing an object, which has six levels, namely knowing, understanding, application, analysis, synthesis, and evaluation. The high rate of malocclusion can be caused by the low level of individual knowledge. Actions based on knowledge will be lasting.⁹

Based on the description above, the aim of this research is want to find out the knowledge and needs of orthodontic treatment in students of SMAN 15 Makassar. The researcher chose high school adolescents because many adolescents undergo orthodontic treatment without knowing the purpose of orthodontic treatment and the use of orthodontic devices is only used as a lifestyle for today's youth. SMAN 15 Makassar is one of the State Senior High Schools located on Jalan Prof. Dr. Ir. Sutami, South Sulawesi with approximately 600 students.

Therefore, this study involved students of SMAN 15 Makassar in measuring their knowledge and attitude towards malocclusion and the need for orthodontic

treatment based on Aesthetic Component of Index Of Orthodontic Treatment Need (IOTN).

1.2 Problem Formulation

Based on the background that has been described, the formulation of the problem are :

1. What is the level of knowledge and attitude towards malocclusion in students of SMAN 15 Makassar?
2. What is the need of orthodontic treatment for students of SMAN 15 Makassar?

1.3 Research Purposes

Based on the formulation of the problem that has been described, the objectives of this study are:

1. To find out the level of knowledge and attitude towards malocclusion in students of SMAN 15 Makassar.
2. To find out the need for orthodontic treatment in Students of SMAN 15 Makassar.

1.4 Benefits of Research

The benefits that can be obtained in this research are:

1. Expected to become a source of information regarding malocclusion knowledge and the need for orthodontic treatment in the suburban area.
2. Expected to be able to gain more knowledge and information, especially for students of SMAN 15 Makassar.

CHAPTER II

LITERATURE REVIEW

2.1 Knowledge

2.1.1 Definition of Knowledge

When viewed from the type of the word 'knowledge', it is included in a noun, which is an artificial noun which is composed of the root word 'know'. The definition of knowledge includes all activities with the methods and means used as well as all the results obtained. In essence, knowledge is all the results of knowing activities regarding an object (can be a thing or event experienced by the subject).¹¹

Knowledge comes from the word "know", in the Kamus Besar Bahasa Indonesia the word know has the meaning of understanding after seeing (witnessing, experiencing, and so on), knowing and understanding. Mubarak (2011), defines knowledge as everything that is known based on human experience itself and knowledge will increase according to the process of experience experienced. According to Bloom, knowledge is the result of knowing, and this occurs after people sense a certain object. Sensing occurs through the five human senses, namely : the senses of sight, hearing, smell, taste and touch. Most of human knowledge is obtained through the eyes and ears. Knowledge is a very important domain in shaping one's actions (over behavior).¹²

2.1.2 Knowledge Level

Benyamin Bloom (1908) an educational psychologist who explored the concept of knowledge and introduced the concept of Bloom's Taxonomy.

This domain includes the ability to restate concepts or principles that have been learned, which relate to thinking skills, competence to acquire knowledge, recognition, understanding, conceptualization, determination and reasoning. Learning objectives in the cognitive (intellectual) realm or what according to Bloom are all activities involving the brain are divided into 6 levels according to the lowest to the highest level which is symbolized by C (*Cognitive*), such as:

a. C1 (*Knowledge*)

This level emphasizes the ability to recall material that has been studied, such as knowledge of terms, special facts, conventions, tendencies and sequences, classifications and categories, criteria and methodologies. This level or level is the lowest level but is a prerequisite for the next level.

b. C2 (*Comprehension*)

At this level, understanding is defined as the ability to understand certain material being studied. These abilities are:

- 1) Translation (the ability to change symbols from one form to another)
- 2) Interpretation (ability to explain the material)
- 3) Extrapolation (ability to expand meaning).

At this level, students answer questions in their own words and by giving examples of both principles and concepts.

c. C3 (*Application*)

At this level, application is defined as the ability to apply information to real situations, where students are able to apply their understanding by using it in real

terms. At this level, students are required to be able to apply the concepts and principles they have to new situations that have never been given before.

d. C4 (*Analysis*)

At this level, it can be said that analysis is the ability to break down a material into clearer components. This ability can be:

- 1) Elemental analysis (analysis of material parts)
- 2) Relationship analysis (relationship identification)
- 3) Analysis of organizing principles/organizational principles (organizational identification)

At this level, students are asked to break down information into several parts, find assumptions, and distinguish opinions and facts and find causal relationships.

e. C5 (*Synthesis*)

At this level, synthesis is defined as the ability to produce and combine elements to form a unique structure. This capability can be in the form of producing unique communications, complete plans or activities, and abstract sets of relationships. At this level, students are required to produce their own hypothesis or theory by combining various sciences and knowledge.

f. C6 (*Evaluation*)

At this level, evaluation is defined as the ability to assess the benefits of something for a particular purpose based on clear criteria. This activity is related to the value of an idea, creation, way or method. At this level a person is guided to gain new knowledge, better understanding, new applications and unique new ways

of analysis and synthesis. According to Bloom there are at least 2 types of evaluation, namely:

- 1) Evaluation based on internal evidence
- 2) Evaluation based on external evidence

At this level, students evaluate information including making decisions and policies.¹²

2.1.3 Factors Influencing Knowledge

Knowledge possessed by individuals is influenced by many factors. In general, the factors that affect knowledge can be classified into two, namely internal factors (originating from within the individual) and external factors (originating from outside the individual).

1. Internal factors

a. Age

According to Hurlock, age is the age of an individual from birth to birthday. The more mature, the level of maturity and strength of a person will be more mature in thinking and working. In terms of public trust, someone who is more mature is trusted by someone who is not yet mature enough.⁽¹³⁾ Age is something that influences a person's comprehension and mindset. The more you get older, the more developed your comprehension and mindset will be, so that someone will be easier to receive information. Age affects one's comprehension and mindset. With increasing age of the individual, one's comprehension and mindset will be more developed, so that the knowledge he gets is getting better.

b. Gender

In the mid-19th century, researchers could tell the difference between women and men just by looking at their brains, although recent research suggests that there is no physical difference between the brains of women and men. However, according to research conducted by Verma, found there were significant differences between the brain circuits of women and men, even when they did the same thing. In 2015, Tel Aviv University conducted interesting research in comparing the brains of men and women. The researchers conducted research on 1400 people at the location of the gray matter in the brain. Researchers call this thinking pattern a brain road map. From this study, the workings of the female and male brains are referred to as the female end zone and the male end zone.

Women more often use their right brain, that is the reason women are better able to see from various points of view and draw conclusions. Still based on Ragini Verma's research, women's brains are more able to relate memory and social situations, this is the reason women rely more often on feelings. According to a Tel Aviv study, women can absorb information five times faster than men. This is the reason women are quicker to conclude something than men.

In contrast to women, men have much stronger motor skills than women. This ability can be used for activities that require good hand-eye coordination. This is one of the reasons men are better at sports that rely on throwing the ball.

According to Daniel Amen, men's brains are 10% bigger than women's, but that doesn't mean that men are smarter than women. Brain size does not affect a person's intelligence or IQ. According to Witelson, the male brain is more vulnerable than the female brain. In addition, the male brain undergoes sexual changes that are influenced by the hormone testosterone. Although usually the brain size of men is larger than that of women, the fact is that the hippocampus in women is larger than that of men. The hippocampus is the part of the brain that stores memory, one of the reasons women can process information faster as mentioned above.

The difference in response between women and men occurs because women have verbal centers on both sides of their brain, while men only have verbal centers on the left side of the brain. Usually this is what causes women to prefer to discuss, gossip, tell stories at length compared to men. Men prefer to see things that are easy, they don't have a good 'connection' about things that involve feelings, emotions, or outpourings. That's why, women like to complain that men are not sensitive enough, forgetting things that are considered important by women, such as wedding anniversaries. This is triggered because the male brain is not designed to be connected to feelings or emotions. Men usually when deciding something rarely involves feelings.

2. External Factors

a. Education

Education means the guidance that is given to someone for the development of other people towards certain ideals that determine humans to act and fill life

to achieve safety and happiness. Education is needed to obtain information such as things that support health so that it can improve the quality of life. Education is very important as a means to obtain information, for example in the health sector so that it has a positive influence on a person's quality of life. Education influences a person to participate in development and generally the higher the level of education a person has the easier it is to receive information. Someone who takes formal education will be accustomed to thinking logically in dealing with a problem.

Education is the guidance that is given to someone for the development of other people towards certain dreams or ideals that determine humans to act and fill life in order to achieve safety and happiness. Education is needed to obtain information in the form of things that support health so as to improve the quality of life. According to YB Mantra, education can affect a person, including behavior in lifestyle, especially in motivating attitudes and development in general, the higher a person's education, the easier it is to receive information.

b. Work

Work is basically an activity carried out by humans either to get a salary or activities carried out to take care of their needs such as doing homework or something else. The work environment can make a person gain experience and knowledge either directly or indirectly. Sometimes the work done by an individual will provide wider opportunities for individuals to gain knowledge or it could be that the work activities they have actually make the individual unable to access information.

Work is a bad thing that must be done in order to support his life and family life. Work is not interpreted as a source of pleasure, but is a way of earning a living that is boring, repetitive and has many challenges. Meanwhile, work is a time-consuming activity.

c. Experience

Experience is a source of knowledge as a way to get to the truth by repeating knowledge gained in the past to solve problems. Experience is an event experienced by someone in the past. In general, the more experience a person has, the more knowledge he gets. In this case, the knowledge of mothers who have given birth should be higher than that of mothers who have not given birth before.

d. Resources

One of the factors that can make it easier for individuals to acquire knowledge is by accessing various sources of information in various media. Technological developments that are happening at this time make it easier for someone to be able to access almost all the information needed. Someone who has more sources of information will have broader knowledge. In general, the easier it is to obtain information, the faster a person acquires new knowledge.

e. Interest

Interest will lead someone to try and start new things so that in the end they will get more knowledge than before. Interest or passion will help someone and act as a driving force to achieve something / desire that the individual has.

Interest is a high desire for something. Interest makes someone to try and pursue, so that someone gains deeper knowledge.

f. Environment

The environment is all the conditions that exist around humans and their influences that can affect the development and behaviour of people or groups. The environment is everything that is around the individual, both the physical, biological and social environment. The environment influences the process of entering knowledge into individuals who are in that environment. For example, if an area has an attitude of keeping the environment clean, then it is very likely that the surrounding community has an attitude of keeping the environment clean.

g. Socio-cultural

The socio-cultural system that exists in society can influence the attitude in receiving information. Someone who comes from a closed environment is often difficult to accept new information that will be conveyed. This can usually be found in certain communities.¹²

2.2 Attitude

2.2.1 Definition of Attitude

Attitude is the most important concept in social psychology which discusses elements of attitude both as individuals and groups. According to Notoatmodjo S. (1997): Attitude is a person's closed reaction or response to a stimulus or object.

Attitudes can also be interpreted as thoughts and feelings that encourage us to behave when we like or don't like something. Meanwhile, attitude itself contains

three components, namely: cognition, emotion and behavior and may or may not be consistent. Depends on what problems they are facing. Kraus found several factors that predict the consistency of a person's attitudes and behavior, namely: stable over time, carried out with high confidence. consistent with a person's emotional reaction to behavior, formed due to direct experience, easy to remember.¹³

2.2.2 Type of Attitude

Generally, there are three types of human attitudes:

- a. Cognitive**, which relates to what is learned, about what is known about an object;
- b. Affective**, or often called emotional factors, which relate to feelings (how one feels about an object);
- c. Psychomotor or conative**, namely behavior (behavioral) that is seen through a predisposition to an action.¹³

2.2.3 Factors that influence Social Attitudes and Behavior

Human's social development is influenced by several factors, namely:

1. Family

Family is the first environment to influence various aspects of children's development, including social development. The conditions and procedures of family life are a conducive environment for children's socialization. The educational process aimed at developing a child's personality is determined more by the family, social patterns, ethics of interacting with other people are largely determined by the family.

2. Maturity

To be able to socialize well requires physical and psychological maturity so that you are able to consider social processes, give and receive advice from others, requires intellectual and emotional maturity, besides that, maturity in language is also very important.

3. Socioeconomic Status

There is a lot of social life influenced by the socio-economic conditions of families in society. Children's behavior will pay a lot of attention to the normative conditions that have been instilled by their families.

4. Education

Education is a process targeted socialization of children. The essence of education as a process of operating normative knowledge, gives children the color of their social life in society and their lives in the future.

5. Mental Capacity: Emotions and Intelligence.

The ability to think can influence many things, such as the ability to learn, solve problems, and speak. Emotional development has a big influence on children's social development. Children who have high intellectual abilities will have good language skills. Therefore, if the development of the three is balanced, it will greatly determine the success of the child's social development.¹³

2.3 Malocclusion

2.3.1 Definition of Malocclusion

Malocclusion is an abnormal arrangement of teeth or an abnormal relationship between the upper and lower jaws. The word "*malocclusion*" literally means a bad bite. This condition can be in the form of *irregular bites, crossbites, or overbites*. Malocclusion can also be in the form of *tilted teeth, protrusion, or crowded*. This may impair performance, phonetics, or mastication.¹⁴

According to Andrews LF, there are six characteristics of normal occlusion which are derived from the results of a study conducted on 120 subjects. These six characteristics are:

1. Proper relationship of first permanent molars.
2. Right angulation of the crowns of the incisors in the transverse plane.
3. Proper inclination of the dental crown – incisor teeth in the sagittal plane.
4. No rotation of individual teeth.
5. Accurate contact of the individual teeth in each dental arch, without gaps or crowding.
6. Flat or slightly curved occlusal plane.¹⁵

2.3.2 Etiology of Malocclusion

Malocclusion is a deviation from growth and development caused by certain factors. Broadly speaking, the etiology or causes of a malocclusion can be classified into several hereditary (genetic) factors and local factors. Sometimes the etiology of malocclusion is difficult to determine precisely because of various factors that affect growth and development.¹⁶

a. Hereditary Factor

In isolated primitive populations it is rare to find malocclusion in the form of a disproportion in the size of the jaws and teeth while the jaw relationships show the same relationship. In modern populations, malocclusion is more common than in primitive populations, so it is suspected that intermarriage causes an increase in the prevalence of malocclusion. Hereditary influences can manifest in two ways, namely:

1. Disproportion of tooth size and jaw size resulting in malocclusion in the form of crowded teeth or malocclusion in the form of multiple diastema.
2. Disproportion of size, position and shape of the maxilla and mandible which results in an inharmonious jaw relationship. Craniofacial dimensions, size and number of teeth greatly influence genetic factors while the dimensions of the dental arches are influenced by local factors.¹⁶

b. Local Factors

1. Premature primary teeth can have an impact on the arrangement of permanent teeth. The younger the patient at the time of the premature loss of the primary teeth, the greater the impact on the permanent teeth. Prematurely dated incisors are not as impactful but the primary canines will cause a midline shift.
2. The persistence of primary teeth can also be over-retained deciduous teeth, meaning primary teeth that have passed their date but are not dated.
3. Trauma to primary teeth can shift the germs of permanent teeth. If there is trauma while the crown of the permanent tooth is being formed, a dilaceration can occur which the root of the tooth that is distorted (usually crooked).

4. The influence of soft tissue, pressure from the muscles of the lips, cheeks and tongue have a great influence on the location of the teeth. Although the pressure of these muscles is much smaller than the pressure of the muscles of mastication, it lasts longer.
5. Bad habits, a habit that lasts at least 6 hours a day, high enough frequency with sufficient intensity to cause malocclusion. The habit of sucking fingers or other objects for a prolonged time can cause malocclusion.¹⁷

2.3.3 Malocclusion Classification

This system of classification formed the basic line of index in order to attain a specific system to distinguish malocclusion. The Angle's classification is the most widely accepted system and most widely used (Angle, E. H. 1907). This system was introduced in the year 1899 by Edward H. Angle which was mainly based on the mesio-distal relationship of the teeth, dental arches and the jaws.

1. Angle Classification

Angle Classification is the most frequently used classification system to date. Angle classifies malocclusion based on the relationship of the maxillary and mandibular first molars. Angle classification is divided, class I Angle, class II Angle, class III Angle.

a. Class I Angle (Neutroclusion)

The main feature of Angle class I is the class I molar relationship, the apex of the mesiobuccal cusp of the maxillary first molar is in the buccal groove of the mandibular permanent first molar with one or more malpositioned anterior teeth, crowding and diastema¹⁸

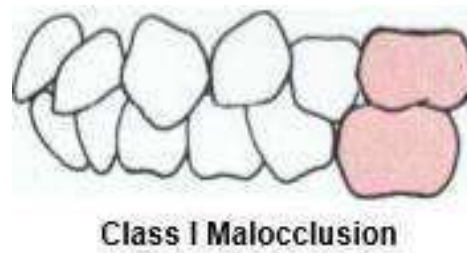


Figure 1 : Class I Malocclusion

Source: Proffit RW, Fields WH, Sarver MD, Contemporary orthodontics, 6th ed; Singh G. Elsevier . 2019. p.3

b. Class II Angle (Distocclusion)

The maxillary first permanent molar is located more mesially than the mandibular first permanent molar or the apex of the mesiobuccal cusp of the maxillary first permanent molar is more anterior to the buccal groove of the mandibular first permanent molar.¹⁸

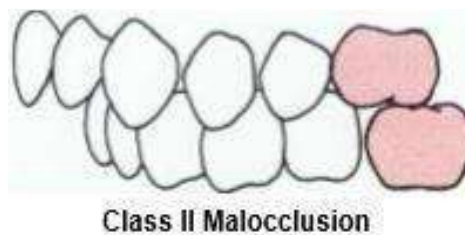
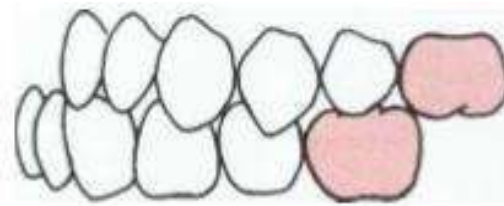


Figure 2 : Class II Malocclusion

Source: Proffit RW, Fields WH, Sarver MD, Contemporary orthodontics, 6th ed; Singh G. Elsevier . 2019. p.3

c. Class III Angle (Mesioocclusion)

In Angle class III, the maxillary first permanent molar is located more distal than the mandibular first permanent molar or the apex of the mesiobuccal cusp of the maxillary first permanent molar is located posteriorly from the buccal groove of the mandibular first permanent molar.¹⁸



Class III Malocclusion

Figure 3 : Class III Malocclusion

Source: Proffit RW, Fields WH, Sarver MD, Contemporary orthodontics, 6th ed; Singh G.

Elselvier . 2019. p.3

2. Dewey's Modification of Angle Classification

Dewey introduced a modification of Angle's classification of malocclusions.

Dewey divided Angle class I into five types, and class III Angle into three types.

a. Class I Dewey Modification

1. Type 1 is a class I malocclusion with crowded anterior teeth.
2. Type 2 is a class I malocclusion with protrusive maxillary incisors.
3. Type 3 is a class I malocclusion with anterior crossbite.
4. Type 4 is a class I malocclusion with posterior crossbite.
5. Type 5 is a class I malocclusion in which the permanent molars have moved mesially.

b. Class III Dewey Modification

1. Type 1 is a class III malocclusion, with the upper and lower jaws looking normal when viewed separately. However, when the jaw was occluded the patient showed incisors that were edge to edge, which then caused the mandible to move forward.
2. Type 2 is a class III malocclusion, with crowded mandibular incisors and a lingual relation to the maxillary incisors.

3. Type 3 is a class III malocclusion, with crowding of maxillary incisors and cross-biting of the mandibular anterior teeth.¹⁷

2.4 Orthodontic Treatment Need Index

Standards in the assessment of malocclusion involve transferring the assessment results from the occlusal state to an index of need for treatment based on the higher the occlusal deviation score, the greater the need for treatment.¹⁹ Aesthetics is the reason for seeking orthodontic treatment. Poor dental esthetics is one of the main criteria in providing orthodontic treatment. Poor dental esthetics is a direct effect of occlusal irregularities.²⁰ To determine the need for orthodontic treatment according to the degree of malocclusion, several indices have been introduced, for example the *Index Of Orthodontic Treatment Need*.^{21,22}

Index of Orthodontic Treatment Need (IOTN) has been recognized internationally because it is proven valid, reliable, and easy to use. IOTN was first compiled by Brook and Shaw, then modified by Richmond in 1989, serves to measure the need for orthodontic treatment, to determine the severity of malocclusion before and after carrying out orthodontic treatment, and to assess the success rate of orthodontic treatment. This index was created to help determine the possible impact of malocclusion on a person's dental health and psychosocial health.²²

There are two components in the *Index of Orthodontic Treatment Need* (IOTN), namely the *Aesthetic Component* (AC) and the *Dental Health Component* (DHC). *Aesthetic Component* (AC) to assess a person's perception of the appearance of the teeth which is assessed by comparing the results of photos of the

patient's teeth with standard photos from the existing *Index of Orthodontic Treatment Need* (IOTN). In the *Aesthetic Component* (AC) standard photo there are 10 points that show the level of appearance of the teeth that represent aesthetically from the most attractive to the least attractive. *Dental Health Component* (DHC) is an assessment that assesses several checkpoints on the teeth such as reverse bite, cross bite, contact point displacement, open bite, bite height and bite distance.²³

Aesthetic component (AC) was developed to examine the esthetic state of the teeth from a malocclusion which might have an impact on a person's psychosocial condition. The *Aesthetic Component* (AC) consists of 10 levels in a standard photo. Color photos are used when there are patients and black and white photos are used when making comparisons with models.¹⁶

The *Aesthetic Component* Index, only assesses based on 6 anterior teeth which only includes class 1 and class 2 division 1 based on incisor relationship and not class II division 2 or class III based on incisor relationship.²⁴ In use, the *Aesthetic Component* is not bound or dependent on the *Dental Health Component*, but the results of the *Aesthetic Component* can support the results of the *Dental Health Component*. The *Aesthetic Component* is easy to use, by means of scores obtained subjectively and is widely used for patient or community education.^{25,26}

Assessment in the *Aesthetic Component* is carried out subjectively which can be done by lay people and orthodontic specialist dentists. The color of the teeth, the cleanliness of the oral cavity, or the condition of the gums does not affect the assessment of the *Aesthetic Component*. There are two ways to inspect the aesthetic component using a mirror/camera.²⁷ The cheek retractor is attached to the sample's

mouth, then the sample is asked to see the condition of the teeth through the mirror or to be photographed using a camera. Next, the sample is asked to choose/identify which of the standard photos in the *Aesthetic Component* is closest to the state of the teeth on the front/anterior. The criteria for taking photos with a digital camera to assess the *Aesthetic Component* (AC) are the appearance of the six front teeth in each jaw (if they are still present) in a state of centric occlusion, then the photos are printed and assessed according to the existing assessment standards.²⁶

Based on the *Aesthetic Component* (AC) photo it is divided into 10 levels which are further divided into 3 categories, namely grades 1-4: not requiring treatment (no treatment need), grades 5-7 requiring average treatment (borderline treatment need), and grades 8-10 really need treatment (great treatment need).²⁰

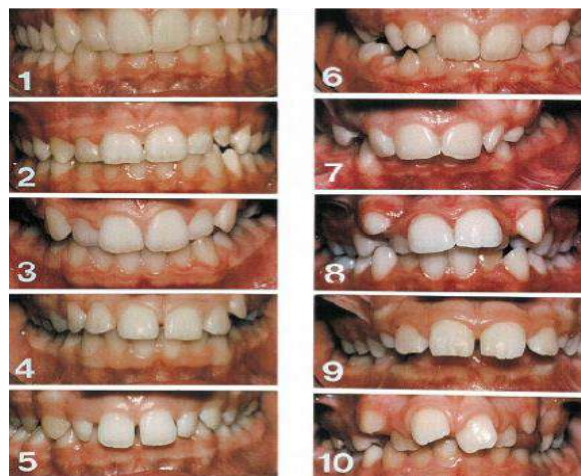


Figure 4 : Aesthetic Component Standard Photo

Source: Kaolinni W, Hamid T, Winoto ER. Dental student's perception to Aesthetic Component of IOTN and demand for orthodontic treatment. Vol. 46. 2013.