

## OVERVIEW OF MALOCCLUSION SEVERITY AND ORTHODONTIC TREATMENT NEEDS BASED ON THE INDEX OF COMPLEXITY, OUTCOME, AND NEED (ICON) IN PATIENTS AT THE UNIVERSITAS UDAYANA DENTISTRY PROFESSION CLINIC

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### ABSTRACT

Malocclusion is an abnormal occlusion that can affect facial esthetics, oral function, risk of periodontal disease, also physical and psychosocial quality of individuals. Malocclusion complexity, treatment need, and treatment success can be analyzed using the Index of Complexity, Outcome, and Need (ICON). The Dental Profession Clinic of Universitas Udayana is an educational clinic that provides health services for teeth and mouth, including orthodontic treatment using removable appliances. Patients who come for orthodontic treatment have different levels and needs of orthodontic treatment. The objective of this study is to describe the severity of malocclusion and the need for orthodontic treatment based on ICON in patients at the Dental Profession Clinic at Universitas Udayana. This study used a cross-sectional approach involving 48 samples that had appropriate to the inclusion and exclusion criteria and were selected using the purposive sampling method. The collected data were processed using descriptive statistical tests and univariate analysis. Finally, the results were presented in terms of frequency and percentage. The severity of malocclusion was mostly in the “easy” category (64.6%) and most cases of malocclusion in this study (77.1%) did not require treatment. Based on the analysis, the highest severity of malocclusion is in the “easy” category and the lowest is in the “mild” category. The level of need for orthodontic treatment showed that most of the samples did not require orthodontic treatment.

**Keywords :** Orthodontic, Malocclusion, Index of Complexity, Outcome and Need (ICON)

### INTRODUCTION

According to the World Health Organization (WHO), malocclusion is a functional disorder that can hinder a person's physical and emotional health. The impact of malocclusion can affect facial aesthetics, problems with oral function, the risk of periodontal disease which will then affect the physical and psychosocial quality of the individual.<sup>1,2</sup>

Measurement of the prevalence of orthodontic treatment needs has been carried out in 10 industrialized countries in 1995 by WHO, which is 21 to 64%. Research conducted by Massler and Frankel by comparing the arrangement of human teeth in the 20th century and the 16th century showed that the prevalence and severity of malocclusion are increasing and require orthodontic treatment.<sup>3</sup> Based on research conducted in Indonesia using data from the *Survei Kesehatan Indonesia* (SKI) in 2023, the national prevalence of malocclusion was 80% of the population.<sup>4</sup> In line with this, the prevalence of malocclusion which is still high shows that the need for orthodontic treatment is also increasing along with the increasing number of malocclusion cases in society.<sup>5</sup>

The Index of Complexity, Outcome and Need (ICON) is included in one of the malocclusion indices. ICON can be said to be a multifunctional index because ICON is able to measure the complexity of malocclusion, treatment needs and success of treatment, so that ICON offers more value than other orthodontic indices.<sup>5</sup> Occlusal characteristics as an assessment component of ICON are various conditions that form an occlusion including; aesthetic component index, crowded teeth (crowding) or distance between teeth (diastema) in the upper jaw, crossbite, anterior vertical relationship (openbite or overbite) and antero-posterior relationship of the buccal segment of the teeth.<sup>6</sup>

Based on the description above, the data obtained is expected to help operators in determining the best treatment for patients with malocclusion cases and can facilitate operators in conducting CIE (Communication, Information, and Education). Based on this background, this study aims to know the description of the severity of malocclusion and the need for orthodontic treatment in patients at the Universitas Udayana Dental Profession Clinic based on the Index of Complexity, Outcome and Need (ICON).

## MATERIALS AND METHOD

This study used a cross-sectional design involving 48 people who had met the inclusion and exclusion criteria as samples and were taken using a purposive sampling method. The data collection method in this study was by using intra-oral aspect photos and study models from the samples. Analysis of intra-oral photos and study models was carried out based on the ICON index, namely taking aesthetic component data, taking crowding or maxillary diastema data, taking crossbite data, taking anterior vertical relation data, and taking buccal segment anteroposterior relation data. Record and enter the score on each ICON component on the ICON assessment sheet. Then, the score assessment is carried out by multiplying each weight listed on the ICON assessment sheet. Furthermore, the summation of the five components is carried out after being multiplied by each weight. The collected data was analyzed using descriptive statistical tests, univariate analysis to explain the characteristics of each sample

studied. The results of the data analysis are presented in the form of frequencies and percentages.

## RESULT

This study was conducted from April 1 to May 1, 2022. The sample in this study amounted to 48 samples consisting of 16 men and 36 women, with an age range of 15 to 34 years who had met the inclusion and exclusion criteria. Data collection was carried out by measuring the study model and assessing the patient's intraoral photos from the anterior aspect. The data obtained were then described as follows: characteristics of the study sample, distribution of malocclusion severity, distribution of orthodontic treatment needs, cross-tabulation of sample characteristics with malocclusion severity and orthodontic treatment needs

**Table 1.** Distribution of Research Sample Characteristics

Characteristics of Research Samples	Sample (n)	Percentage (%)
Gender		
Male	16	33,3
Female	32	66,7
<b>Total</b>	<b>48</b>	<b>100</b>
Age Group		
15-20 years	11	22,9
21-26 years	34	70,8
27-32 years	2	4,2
33-38 years	1	2,1
<b>Total</b>	<b>48</b>	<b>100</b>

The characteristics of the research sample are that the sample is dominated by female gender as many as 32 people (66.7%). The average age of the sample is 22.73 (SD±3.706) years with an age range of 15-34 years. If grouped into age groups, most of the samples come from the age group 21-26 years (70.8%), while the lowest age group is 33-38 years (2.1%).

**Table 2.** Distribution of Research Samples Based on Malocclusion Severity

Severity of Malocclusion	Number of Samples (n)	Percentage (%)
Easy	31	64,6
Mild	17	35,4
Moderate	0	0
Difficult	0	0
Very Difficult	0	0
<b>Total</b>	<b>48</b>	<b>100</b>

Table 2 is the distribution of malocclusion severity levels from the research samples. Only two categories of severity were found in this study, namely "Easy" and "Mild". A total of 31 research samples (64.6%) showed malocclusion severity in the "easy" category, while in the "mild" category there were 17 samples (35.4%).

**Table 3.** Distribution of Research Samples Based on Orthodontic Treatment Needs

Level of Need for Orthodontic Treatment	Number of Samples (n)	Percentage (%)
No Treatment Required	37	77,1
Borderline Case	7	14,6
Need Treatment	4	8,3
<b>Total</b>	<b>48</b>	<b>100</b>

Table 3 shows the distribution of the level of orthodontic treatment needs of the study sample. Most of the malocclusion cases in this study, namely 77.1%, did not require treatment. Only 8.3% of malocclusion cases fell into the category of requiring orthodontic treatment.

**Table 4.** Cross Tabulation of Gender and Severity of Malocclusion

Gender	Severity of Malocclusion					Total
	Easy N (%)	Mild N (%)	Moderate N (%)	Difficult N (%)	Very Difficult N (%)	
Male	10 (62,5)	6 (37,5)	0 (0,0)	0 (0,0)	0 (0,0)	16 (100,0)
Female	21 (65,6)	11 (34,4)	0 (0,0)	0 (0,0)	0 (0,0)	32 (100,0)

Table 4 shows that the proportion of male samples experienced more mild severity levels of 37.5% compared to females at 34.4%. The severity level with the "easy" category was found more in female samples at 65.5% compared to male samples at 62.5%.

**Table 5.** Cross Tabulation of Gender and Level of Need for Orthodontic Treatment

Gender	Level of Need for Orthodontic Treatment			Total
	No Treatment Required N (%)	Borderline Case N (%)	Need Treatment N (%)	
Male	12 (75,0)	3 (18,8)	1 (6,3)	16 (100,0)
Female	25 (78,1)	4 (12,5)	3 (9,4)	32 (100,0)

Table 5 shows that the level of need for orthodontic treatment in the female sample is greater than in the male sample, namely 9.4% compared to 6.3%.

**Table 6.** Cross Tabulation of Age Groups with Malocclusion Severity

Severity of Malocclusion	Age Group				Total N(%)
	15-20 N (%)	21-26 N (%)	27-32 N (%)	33-38 N (%)	
Easy	5 (16,1)	24 (77,4)	2 (6,5)	0 (0,0)	31 (100,0)
Mild	24 (35,3)	10 (58,8)	0 (0,0)	1 (5,9)	17 (100,0)
Moderate	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)
Difficult	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)
Very Difficult	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)	0 (0,0)

Table 6 shows the severity of malocclusion based on age group, the proportion of "easy" and "mild" categories is most common in the 21-26 year age group, namely 77.4% and 58.8%.

**Table 7.** Cross Tabulation of Age Groups with Level of Orthodontic Treatment Need

Level of Need for Orthodontic Treatment	Age Group				Total
	15-20 N (%)	21-26 N (%)	27-32 N (%)	33-38 N (%)	N(%)
No Treatment Required	8 (21,6)	27 (73,0)	2 (5,4)	0 (0,0)	37 (100,0)
<i>Borderline Case</i> Need	3 (42,9)	4 (57,1)	0 (0,0)	0 (0,0)	7 (100,0)
Orthodontic Treatment	0 (0,0)	3 (75,0)	0 (0,0)	1 (25,0)	4 (100,0)

Table 7 shows the level of orthodontic treatment needs based on age group. The proportion of orthodontic treatment needs is 75% in the 21-26 year age group.

## DISCUSSION

The results of the study of 48 patient study model samples in the Orthodontics Division of the Universitas Udayana Dental Profession Clinic showed that all samples were in two categories of malocclusion severity, namely easy at 64.6% and mild at 35.4%. This condition is not much different from the results of the study conducted at Universitas Brawijaya Hospital with a sample size of 35, showing that most samples were in the easy (28.57%) and mild (57.14%) categories.<sup>6</sup>

The consistency of these findings is due to the basic competence of general dentist professional education in the orthodontics division, namely treatment using removable orthodontic appliances. Removable orthodontic appliances themselves are indicated for mild malocclusion cases by individually repositioning the teeth to be able to return to the arch without involving skeletal malocclusion.<sup>7</sup> Based on the results of this study, it can be seen that the severity of malocclusion in patients treated at the Universitas Udayana Dental Profession Clinic is in accordance with the indications for removable appliances, removable appliances themselves are the competence of general dentists in Indonesia.<sup>6,8</sup> In line with this, evaluation of the severity of malocclusion before treatment with removable orthodontic appliances by the operator is important to be carried out in order to obtain the effectiveness of the treatment.<sup>9</sup>

In this study, researchers also observed the level of need for orthodontic treatment. Based on table 3, the level of need for orthodontic treatment at the Universitas Udayana Dental Profession Clinic shows that the majority of cases in the sample do not require orthodontic treatment based on the ICON Index. The findings in this study are similar to a study conducted in 2016 by Adnexa Firdausy at the Universitas Brawijaya Teaching Hospital. The results of the study showed that 69% of samples did not require orthodontic treatment.<sup>10</sup> However, a study conducted by Massal in 2019 at the Universitas Hasanuddin Dental Hospital found different results, namely 80% (24 samples) required orthodontic treatment.<sup>5</sup> A higher proportion of treatment needs was also found in a study conducted at the Universitas Trisakti Dental Hospital. In this study, of the 48 samples studied, 75% (36 samples) required orthodontic treatment.<sup>11</sup>

The contradictory findings in various studies were caused because most of the samples in the study at the Universitas

Udayana Dental Profession Clinic and the Universitas Brawijaya Teaching Hospital experienced malocclusion with easy and mild severity levels. In practice, the decision to undergo orthodontic treatment is not only based on the malocclusion index. The patient's desire to undergo treatment must also be a consideration in decision making. Therefore, the basis for decision making to undergo orthodontic treatment must be based on a combination of clinical evaluation and patient desires.<sup>12</sup> This statement supports the decision to continue orthodontic treatment in patients with easy and mild severity at the Universitas Udayana Dental Profession Clinic. Although based on the ICON index most patients do not need treatment, patients still have the desire to correct their malocclusion. This condition can also occur because in ICON, the aesthetic component gets the highest proportion of value. This is because orthodontic treatment is mostly carried out to build the appearance of the patient's teeth so that the assessment of the aesthetic component is the most important thing.<sup>13</sup>

The distribution of malocclusion severity based on gender as shown in Table 4, shows that women are more dominant in experiencing malocclusion at the "easy" severity level, while men are more dominant in experiencing malocclusion at the "mild" severity level. This condition can indicate that male patients treated at the Orthodontics Division of the Universitas Udayana Dental Profession Clinic experience a higher level of malocclusion severity than women. This is in line with research conducted by Karim et al., in their research it was found that the proportion of malocclusion severity was higher in men than women, namely 46.1% compared to 41.5%.<sup>14</sup>

One of the factors that causes women to have malocclusion with a lower severity than men is the parental factor. Parents are known to tend to pay more attention to the dental and oral health of their daughters compared to sons, parents are said to seek more dental care for their daughters compared to sons.<sup>15</sup> Treatment for local factors of the etiology of malocclusion, namely caries and persistence of deciduous teeth, is known to receive more treatment in girls.<sup>16</sup> Treatment for these conditions will certainly be a preventive measure against the occurrence of malocclusion in permanent teeth.

Distribution of the level of need for orthodontic treatment based on gender as shown in Table 5, shows that women tend to be more interested in undergoing orthodontic treatment, this is evidenced by the number of female samples undergoing removable orthodontic treatment at the Universitas Udayana

Dental Profession Clinic being greater than men. Based on measurements carried out using the ICON index, it was found that female samples at the Universitas Udayana Dental Profession Clinic needed orthodontic treatment more than men. The results of the study were in line with research conducted by Almahdi et al. (2018), namely that women were 58% more likely to need orthodontic treatment than men 42%.<sup>17</sup> Although in this study women experienced malocclusion with a lower level of severity than men. However, women tend to pay attention to and prioritize their physical condition compared to men, so this is what encourages women to immediately seek help by undergoing orthodontic treatment to correct their malocclusion.<sup>14</sup>

Tables 6 and 7 show that the 21-26 age group is the majority age group in this study. Based on the severity of malocclusion, the 21-26 age group experienced the most severity in the "mild" category compared to other age groups. Based on the level of need for orthodontic treatment, the 21-26 age group had the highest need for orthodontic treatment compared to other age groups. This indicates that there is a match between the severity of malocclusion and the level of need for orthodontic treatment in the 21-26 age group in the results. The high number of cases of malocclusion with a "mild" severity level in the 21-26 age range encourages the desire of patients in this age range to undergo orthodontic treatment to correct the malocclusion they experience.

## 1. CONCLUSION

The highest severity of malocclusion is in the "easy" category and the lowest is in the "mild" category. The level of need for orthodontic treatment shows that most samples do not need orthodontic treatment.

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