TRABAJO DE INVESTIGACIÓN

AMERICAN BOARD OF ORTHODONTICS
discrepancy index applied in first and second-phase university clinics

Indice de discrepancia del Consejo Americano de Ortodoncia en clinicas de primera y segunda fase universitarias

POR

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Abstract

The aim of this study was to test the null hypothesis: there's no differences in malocclusion discrepancy in Carabobo and José Antonio Páez Universities (UC and UJAPU respectively)**.** ABO-DI definer los tests was applied in 50 continuous case discussion from August to December 2017. Descriptive and normality tests were calculated. Then Man-Whitney test was used to compare individual variables meanwhile t-test was used in total score**.** UC American Board Discrepancy Index (ABO-DI) total (12.520 StDev 7,445), UJAP ABO-DI total (13.960 StDev 9.076). when comparing medians, differences were present only at Crowding (p= 0.0442), ANB (p= 0.0321) and Others characteristics (p= 0.0323). Null hypothesis is accepted, patients who attended to X and Y for orthodontic purpose have the same discrepancy, regardless of age and occlusal characteristic.

KEY WORDS (MeSH): malocclusion, observer variation, universities, orthodontics

Resumen

El objetivo de este estudio fue comprobar que no existen diferencias en la discrepancia de maloclusiones entre los pacientes niños y adultos que fueron atendidos en las de las Universidades de Carabobo y la Universidad José Antonio Páez (UC and UJAPU respectivamente) en 50 discusiones de historias de Agosto a Diciembre de 2017. Fue calculada le estadística descriptiva y prueba de normalidad. Posteriormente se aplicaron pruebas de comparación Man-Whitney para cada variable individual y la prueba t para el puntaje final. El resultado del mencionado índice en la UC fue de 12,520, Desviación estándar 7,445 y en la UJAP el índice fue 13,960 y Desviación stándart 9,076. A la comparación de medianas, se encontraron diferencias solamente en apiñamiento (p= 0,0442), ANB (p= 0,0321) y otras características (p= 0,0323). Se acepta la hipótesis nula, los pacientes que asistieron a ambas universidades por razones ortodónticas tienen la misma dificultad, indiferentemente de la edad o característica oclusal.

PALABRAS CLAVE (DeCS): maloclusión, variaciones dependientes del observador, universidades, ortodoncia.

Introduction

Malocclusion is the single most frequent growth alteration in the oral cavity, whose etiology range from local factors to environmental-genetic influence [1]. However, as multiple occlusal combinations may arise, from single dental displacement to great skeletal discrepancies, the decision to start treatment is met when this condition is severe enough that affect patient's selfesteem [1].

Likewise, orthodontic practitioners have developed several indexes [2-7] to determine orthodontic definitive treatment, severity, forecast duration and realistic expectation of outcomes. From those indexes, The American Board of Orthodontics Discrepancy Index (ABO-DI) use calibrated instruments, plus a combination of dental and radiographic measurements to establish occlusal discrepancy while enhancing examiner reliability, as stated from their creators [8].

Although there's information about treatment results from early *vs.* late orthodontic treatment [9-13], this topic remains controversial. No studies have quantified initial discrepancy between adults and children. The purpose of this investigation is to test the null hypothesis, that there's no differences in malocclusion discrepancy in Universities of Carabobo (UC) and Jose Antonio Páez (UJAP). UC provides mainly fixed treatment in adults while UJAP offers first treatment therapy center.

Materials and methods

A descriptive, transversal, non-experimental design was applied. The inclusion criteria was a case discussion evaluation between students and the author in both Universities' Orthodontics clinics from August-December 2017. The main variables were based as described by the American Board of Orthodontics (ABO) [8]: *Overjet*: Greatest anterior posterior distance from vestibular face of lower incisor to incisal edge of the most protrude upper incisor. When an edge to edge or anterior cross bite is present, 1pt well be scored per mm in negative overjet. *Overbite*: Greatest vertical distance between incisal edges to theirs antagonist. *Anterior Open bite (Ant. open)*: Measured from incisal edges per antagonist from canine to canine up the greatest distance of any tooth with an open bite condition. Any integer number above 0.5 while be rounded up. Blocked tooth by crowding or partial eruption well be excluded. *Lateral Open bite (Lat. open)*: absent of intedigitation greater than 0.5 mm from their antagonist starting in first bicuspid to the last molar. Blocked tooth by crowding or partial eruption well be excluded. *Crowding*: Greatest osseous-dental discrepancy between arch and dentition from first molar mesial surfaces. The evaluation is only performed in the most crowed arch. *Occlusal relation*: Angle's guidelines whit models in full interdigitation. *Crossbite (X-bite ling)*: Any displacement of buccal cusp to palate from maxillary teeth

greater than 0 mm from antagonist buccal cusp (from bicups to second molars). *Scissor bite(X-bite buc)*: Any displacement of palate cusp to buccal greater than 0 mm from antagonist buccal cusp (from bicups to second molars). *Cephalometric*: Total scores from ANB, SN-Go/Me and IMPA angles. Since it's a complex variable, each angle and its total would be tabulated. *Others*: Alterations like supernumeraries, ankilosis, anomalous dental morphology, impacted tooth (except third molars), missing teeth, midlines discrepancies from 4mm, dental transposition, non-surgical treated skeletal asymmetries. *ABO-DI total*: Sum of individual scores from main variables without cut-off point.

Secondary variables: *University*: UC and UJAP.

All measurements were done by main author using ABO calibrated gauge under the same conditions. Previously, author calibration was done following guidelines from You tube's ABO channel[14]. ABO-DI scoresheet[15] was use to score each case.

The statistical analysis applied were mean, median, standard deviation, standard error of mean and mode were calculated for both group. Afterward, Andersson-Darling normality test was performed to all main variables. According to normality test results, mean or median difference test were performed between groups. Minitab Express Software for Mac was used.

Results

Research results are from **TABLE 1 TO 5**. In overall, low and no scores were presents for all variables **(TABLE 1 AND 2)**. Even so, UC mean scores were: Cephalometric (2.680), Crowding (2.120), Occlusal relation (1.440) and ABO-DI total (12.520 StDev 7.445). On the contrary, UJAP had: Cephalometric (7) Occlusal relation (1.800), Overjet (1.640) and ABO-DI total (13.960 StDev 9.076).

Normality test were accepted for all variables except ABO-DI total **(TABLE 3)**. For this reason, all further statistical comparison were non-parametric, highlighting that no scissor bite was found in UJAP's University, blocking any further comparison on that aspect.

Mann-Whitney median test **(TABLE 4)** showed differences for Crowding ($P=0.0442$), ANB ($P=0.0321$) and others ($P=0.0323$). With respect of ABO-DI total, t-test for mean was 1.44 ($P=0.5427$ CI $=-6,166; 3,283$) therefore accepting null hypothesis of absence of discrepancy between Universities **(FIGURE 1)**.

Discussion

Patients diagnosed for malocclusion from both Universities under the study period had a low discrepancy with different occlusal characteristics. UC's cases had a crowding range from 3 to 5 mm plus Angle's key alterations with Lower incisor

protrusion. On the other hand, UJAP's cases showed skeletal whit Angle's key alterations plus Overjet. ABO-DI's total from both Universities are lower to current literature[13,16-20].

Reported literature from first and comprehensive treatment at universities shows same prevalence of main variables as scored in this paper[12,13,16,17,19,20]. This is significant, because it certifies patient's definitive treatment is needed with enough discrepancy for teaching and research.

Skeletal features and Overjet found in UJAP's patients are suitable to treat with functional appliances as had been reported in previous studies[9,10,12,13,21,22].

With regards to limitations found in this research, there were not performing and reporting systematic errors for measurements and a small sample size. Therefore, further research is recommended to evaluate discrepancy trends and treatment effectiveness, as suggested by recent systematic reviews[22,23,26].

TABLE 1.

ABO-DI FROM UNIVERSITY OF CARABOBO

VARIABLE	N	N*	MEAN	STDEV	SE MEAN	MODE	N FOR MODE
Overjet	25	0	1.360	1.729	0.345	0	13
Overbite	25	0	0.840	1.179	0.235	0	16
Anterior open bite	25	0	0.840	2.374	0.475	0	22
Lateral open bite	25	0	0.400	1.414	0.282	0	23
Crowding	25	0	2.120	2.521	0.504	0	9
Occlusal relation	25	0	1.440	2.200	0.440	0	15
Crossbite (X-bite ling)	25	0	0.240	0.723	0.144	0	22
Scissor bite (X-bite buc)	25	0	0.240	0.879	0.175	0	23
Cephalometric	25	0	2.680	3.986	0.797	0	9
ANB	24	1	0.7919	1.8173	0.3710	0	20
SN-Go/Me	24	1	0.6667	1.7611	0.3595	0	19
IMPA	24	1	1.7083	2.8050	0.5726	0	15
Others	25	0	1.280	1.768	0.353	0	13
ABO-DI Total	25	0	12.520	7.445	1.489	6.10	3

TABLE 2.

ABO-DI FROM UNIVERSITY JOSÉ ANTONIO PÁEZ

VARIABLE	N	N*	MEAN	STDEV	SE MEAN	MODE	N FOR MODE
Overjet	25	0	1.640	1.604	0.320	0	9
Overbite	25	0	0.720	1.601	0.212	0	16
Anterior open bite	25	0	1.080	3.054	0.610	0	21
Lateral open bite	25	0	0.080	0.400	0.080	0	24
Crowding	25	0	1.040	2.030	0.406	0	16
Occlusal relation	25	0	1.800	2.121	0.424	0	12
Crossbite (X-bite ling)	25	0	0.320	0.988	0.197	0	22
Scissor bite (X-bite buc)	25	0	0	0	0	0	25
Cephalometric	25	0	7.000	6.770	1.354	0	9
ANB	24	1	2.20	2.7343	0.5581	0	13
SN-Go/Me	24	1	3.333	5.297	1.081	0	15
IMPA	24	1	1.3750	3.5851	0.7318	0	18
Others	25	0	0.400	0.816	0.163	0	20
ABO-DI Total	25	0	13.960	9.076	1.815	6	3

TABLE 3.

ANDERSON DARLING NORMALITY TEST

| VARIABLE	N	MEAN	STDEV	AD-VALUE	*P*
Overjet	50	1.500	1.656	3.41	<0.0050
Overbite	50	0.780	1.111	7.61	<0.0050
Anterior open bite	50	0.960	2.710	13.75	<0.0050
Lateral open bite	50	0.240	1.041	16.99	<0.0050
Crowding	50	1.580	2.330	6.15	<0.0050
Occlusal relation	50	1.620	2.146	4.77	<0.0050
Crossbite (X-bite ling)	50	0.280	0.858	14.62	<0.0050
Scissor bite (X-bite buc)	50	0,120	0,627	17,91	<0.0050
Cephalometric	50	5.340	5.748	2.81	<0.0050
ANB	48	1.50	2.4057	0.54	<0.0050
SN-Go/Me	48	2.00	4.1308	9.21	<0.0050
IMPA	48	1.5417	3.1888	8.94	<0.0050
Others	50	0.840	1.433	7.29	<0.0050
ABO-DI Total	50	13.240	8.248	0.67	0.0758

*= Statistical difference

TABLE 4.

MANN-WHITNEY TEST FOR MEDIAN DIFFERENCES BY UNIVERSITY **= NOT CALCULATE FOR ABSENCE OF TWO UNIQUE VALUES.

VARIABLE	UNIVERSITY	MEDIAN	DIFFERENCE	CI FOR DIFFERENCE 95%	*P- VALUE ADJUSTED FOR TIES*
Overjet	UC	0	0	-1;0	0.4314
	UJAP	2			
Overbite	UC	0	0	0;0	0.8199
	UJAP	0			
Anterior open bite	UC	0	0	0;0	0.7235
	UJAP	0			
Lateral open bite	UC	0	0	0;0	0.5400
	UJAP	0			
Crowding	UC	1	1	0;2	0.0442*
	UJAP	0			
Occlusal relation	UC	0	0	-2;0	0.4180
	UJAP	2			
Crossbite (X-bite ling)	UC	0	0	0;0	0.9726
	UJAP	0			
Scissor bite (X-bite buc)	UC	0	**	**	**
	UJAP	–			
Cephalometric	UC	4	-2	-7;0	0.1463
	UJAP	7			
ANB	UC	0	0	-3;0	0.0321*
	UJAP	0			
SN-Go/Me	UC	0	0	-2;0	0.1029
	UJAP	0			
IMPA	UC	0	0	0;0	0.3594
	UJAP	0			
Others	UC	0	0	0;2	0.0323*
	UJAP	0			

FIGURE 1.

BOXPLOT FOR ABO-DI TOTAL T-TEST.
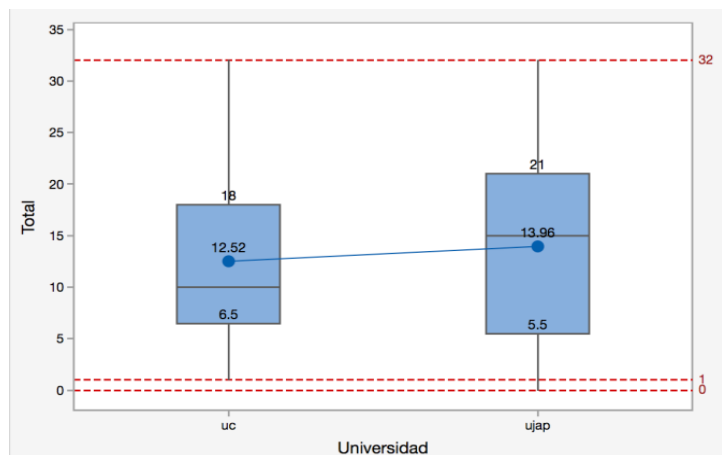
Conclusion

Null hypothesis is accepted, patients who attended to UJAP and UC for orthodontic purpose have equal discrepancy, regardless of age and occlusal characteristic.

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