In order to avoid measurement and sample selection biases, a pilot study was carried out, thus ensuring the reliability of the results. The operator was trained by an orthodontist and the intra-observer variability was performed with a difference of one month. ODI measurement and APDI angles were almost perfect, thus ensuring the measurements reliability. Therefore, one of the strengths of the present study was related to the distribution of the groups in relation to sex and age. Although a difference in age was found between the control group and the open bite Class II group, all cases in this condition were young adults (19.88 ± 5.59 years old) in which the amount of growth is residual — by this reason, the researchers consider that groups were matched.

The results found in the present research demonstrate Kim's analysis efficiency on the ODI and APDI assessment.[4] In this study, ODI values for the balanced group were slightly lower than the values found by Kim on Caucasian individuals — the present results were slightly hyperdivergent. This could be due to racial differences in the composition of each sample. Similar results were found by Jones[8] in an African American sample, by Freudenthaler et al[10] in Japanese and European, by Kim et al[23] in Korean individuals, by Saloom[22] in Iraqis, as well as by Romero[14] and Castañeda[15] in Mexicans.

Furthermore, an ODI below the norm can mean a greater possibility of having a skeletal open bite. Conversely, a higher value can indicate a greater tendency for a deep bite. In this regard, the present research clearly shows different ODI values between the balanced group (higher values) and skeletal open bite groups (lower values), independently of the malocclusion, as found by other authors.[4,6,7,9,21] Moreover, the ODI values found in the present study were smaller than 68° for the skeletal open bite groups. This result corroborates Kim proposal,[4,6] which suggests that this measure was diminished on skeletal open bites. This demonstrates that the ODI value is a reliable indicator for the diagnosis of vertical problems, as several investigators verified in other populations.[4,6-10,12,14,15,21,24] On the other hand, the APDI is also considered an excellent parameter for the anteroposterior malocclusions evaluation.[11,13,25,26] In the present research, APDI values for the balanced group were slightly higher in relation to the values found by Kim and Vietas.[5] This could be due to racial differences in the composition of each sample, which was corroborated in the present results, similar to those found by Navarrete et al.[13] and Castañeda[15] in Latin American groups. However, Oktay[27] found lower values for the APDI than those found by Kim and Vietas.[5] A good indicator of sagittal malocclusions should yield different values for skeletal Class I, Class II and Class III malocclusions. In this sense, the APDI value complies with this requirement, since in this study significant differences were found in the groups with different malocclusions. Similar averages to those proposed by Kim were found on Class I group (balanced and with open bite). Class III group were approximately 6 degrees greater in relation to the group with open bite and Class I. Class II group reported values approximately 7 degrees lower than those of Class I with open bite. Similar results were found by different investigators.[9-15,21,23,25,26] Meanwhile, as expected, the skeletal open bite Class I group and the balanced group did not present statistically significant differences for APDI values.

In the present study, the multivariate analysis did not show the influence of the sex variable, nor age, except for the APDI, probably due to the fact that in general more women were evaluated in all groups, this distribution could be taken into account for future studies. However, Fatima et al[21] found no statistically significant differences between the mean values found for ODI and APDI between male and female individuals, nor between subjects in different age groups. Navarrete et al[13] also reported no statistically significant differences for APDI between genders, and Romero[14] found that the values of both indicators remained stable during growth.

This reaffirms that ODI and APDI values can be used in a Latin American population. The applicability of these values in different populations demonstrates the universal benefit of its use when evaluating different populations.

CONCLUSIONS

ODI and APDI indicators for Kim's cephalometric analysis demonstrated its efficiency when evaluated in a Latin American population. APDI and ODI are reliable indicators for evaluating an individual's sagittal and vertical patterns.

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