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Handedness differences in dental traumatic injuries of boxers

Aim: Previous studies reported the relation of left-handedness with dental and head traumas in normal population. In the present study, we aimed to investigate the relationship between dental traumas, such as non-vitality and fracture, and left-handedness.

Materials and methods: Twenty three Turkish international professional boxers were included in the study. Existence of teeth that had trauma and loss of vitality in these boxers were investigated.

Results: The mean number of non-vital teeth was higher in left-handers than in right-handers for right-lower, left-upper, left-lower, and total regions, but not for the right-upper region. However, there were no significant differences between right- and left-handers in terms of the mean number of fractured teeth. Besides, left-handed boxers had a higher number of non-vital molar teeth.

Conclusion: The higher dental trauma risk in the left-handed boxers compared to the right-handed ones may be due to the biological and environmental differences between them, and may not be associated with boxing.

Key words: Dental trauma, handedness, left-handedness, boxing

Boksörlerin dişsel travmatik hasarlarında el tercihi farklılıkları

Amaç: Önceki çalışmalar normal popülasyondaki kafa ve diş travmaları ile sol el kullanımının ilişkisini rapor ettiler. Mevcut çalışmada, biz sol el kullanımı ile fraktür ve vitalite kaybı gibi diş travmaları arasındaki ilişkiyi incelemeyi amaçladık.

Yöntem ve gereçler: Bu çalışmada 23 uluslararası profesyonel boksör yer aldı. Bu boksörlerde travma ve vitalite kaybına uğramış dişlerin varlığı araştırıldı.

Bulgular: Vital olmayan dişlerin ortalama sayısı sağ üst bölge haricindeki sağ alt, sol alt ve sol üst bölgelerde ve ağzın tümünde sağ elini kullananlara kıyasla sol elini kullananlarda daha fazlaydı. Bununla birlikte, sağ ve sol elini kullananlar arasında fraktüre dişlerin ortalama sayısı açısından anlamlı farklılıklar yoktu. Aynı zamanda sol elini kullanan boksörler ağzın molar bölgesi açısından daha fazla vital olmayan diş sayısına sahiptiler.

Sonuç: Sağ elini kullanan boksörler ile karşılaştırıldığında sol elini kullananlardaki daha yüksek dişsel travma riski muhtemelen boks sporu ile ilişkili olmayıp sağ ve sol elini kullanan bireyler arasındaki çevresel ve biyolojik farklılıklardan dolayı olabilir.

Anahtar sözcükler: Dişsel travma, el tercihi, sol el kullanımı, boks sporu

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Received: September 18, 2008
Accepted: August 05, 2009

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Introduction

In recent years, many studies focused on epidemiology and etiology of dental traumatic injuries. Dental trauma is associated with different etiologic and risk factors. The inferential factors were age (1-4), male gender (1-5), season/month (3,6,7), race/nationality (1,8), lip morphology (9-12), and overjet (9,12,13). Also, male gender, increased incisal overjet, and inadequate lip coverage are known risk factors for traumatic dental injuries (10-14). Obesity (14,15) and non-nuclear family (15) increased the risk of having traumatic dental injuries.

Accidents due to falls were the most common factor for dental traumas (3,9,16-18). Accidents resulted from sports, violence, collisions, and traffic accidents are also the other common causes of dental traumas (9,16-18).

Coren (19) and Halpern and Coren (20) reported that left-handers were more susceptible to accident-related injuries and more left-handers died in accidents than right-handers. Zverev and Adeloje (21) reported that left-handedness as a risk factor for head injuries obtained during confrontation activities. Also, an increased prevalence of left hand preference was found in a population of patients having traumatic brain injuries (22). Dane et al. (23) showed that left-handers may be more susceptible to sport-related injuries. Graham and Cleveland (24) and Wright et al. (25) suggested that left-handedness appears to be a risk factor for injury among adolescent school athletes. These data support the hypothesis that left-handed individuals may be more likely to experience accidents, particularly those involving motor vehicles.

Canakci et al. (26) reported that left-handedness had a significantly higher risk on dental trauma than right-handedness. Boxers have a higher rate of head and dental traumas compared to normal population. To the best of our knowledge, no study in the literature has specifically addressed the existence of the relationship between dental trauma and left-handedness in boxers. The objective of the present study was to investigate the relationship between dental trauma (the number of non-vital and fractured teeth) and handedness.

Materials and methods

Twenty three Turkish international professional boxers were included in the study. They ranged in age from 18 to 27 (M = 20.96, SD = 3.33) and ranged in sport age from 4 to 12 (M = 8.43, SD = 2.59). Handedness was ascertained using the Edinburgh Handedness Scale (27, 28). Written informed consent was obtained from all boxers.

The clinic examinations and radiographic assessments were performed in full-designed dental chairs in the Department of Oral Diagnosis and Radiology, Faculty of Dentistry, Ataturk University, Erzurum, Turkey. The clinical evaluations were carried out by 2 senior clinicians who participated in the training and calibration exercise for the criteria used to identify dental trauma. They were also blind as to the handedness data. Their non-vital and fractured teeth in right-upper and -lower, and left-upper and -lower regions were counted. All teeth having root canal therapy, restoration, active caries, dental bridge, or tooth crown were excluded.

For statistical evaluation, nonparametric Mann-Whitney U test for 2 independent samples and Wilcoxon test for 2 related samples in the SPSS 11.0 for Windows program were used.

Results

The mean number of non-vital teeth was significantly higher in left-handers than in right-handers for right-lower, left-upper, left-lower, and total regions, but not for the right-upper region (Table 1). However, there were no significant differences

Table 1. The mean number of non-vital teeth by handedness.

Region	Total Sample (N = 23)	Right-handers (N = 14)	Left-handers (N = 9)	Z	P
Right-upper	1.22 ± 1.48	1.14 ± 1.79	1.33 ± 0.87	1.26	ns
Right-lower	0.74 ± 0.86	0.36 ± 0.75	1.33 ± 0.71	3.04	<0.01
Left upper	1.52 ± 1.76	1.14 ± 1.88	2.11 ± 1.45	2.11	<0.05
Left-lower	0.52 ± 0.95	0.21 ± 0.58	1.00 ± 1.23	2.06	<0.05
Total	4.00 ± 4.22	2.86 ± 4.56	5.78 ± 3.07	2.31	<0.05

between right- and left-handers in terms of the mean number of fractured teeth (Table 2). Also, left-handed boxers had a higher number of non-vital molar teeth ($Z = 3.47, P < 0.001$).

In all right- and left-handed boxers included in the study, the mean number of non-vital teeth was higher in the posterior region than in the anterior region of the mouth (Table 3). There was no anterior-posterior difference for the number of fractured teeth.

Also, there were no differences in terms of the mean number of non-vital and fractured teeth in both right and left regions between right- and left-handed boxers.

Discussion

In the present study, left-handed boxers had higher non-vital teeth compared to the right-handed ones for the right-lower, left-upper and lower, and posterior regions of the mouth and in terms of the sum of all. These results support the recent study performed by Canakci et al. (26). They studied the traumatic injuries to the permanent incisors in 13-17 years old normal healthy adolescents. It can be accepted that the boxing

sport has trauma risk for head and especially teeth. Also, these results are consistent with those of some other studies associated with sport injuries (23) and head injuries (21). Also, the rate left-handedness was elevated in men diagnosed with fractures as compared with all other male patients (29) and it was demonstrated that non-right-handers were at greater risk for bone breaks and fractures (30).

In the present study, the higher dental trauma risk in the left-handed boxer compared to the right-handed ones may be due to the biological and environmental differences for the right- and left-handed individuals. These differences associated with dental traumas may not be associated with boxing. Canakci et al (26) suggested that left-handers may be more prone to fall, collision, and home and sport accidents compared to right-handers. Coren (19) suggested that environmental biases against left-handers were the most likely the reason for the increased injury risk in left-handers. Furniture, doors, playgrounds, and automobile constructions are designed for a right-handed world. Biological differences between right- and left-handers may also play a role for an increased injury risk for left-handers. For example, the differences in terms of ear advantage

Table 2. The mean number of fractured teeth by handedness.

Region	Total Sample (N = 23)	Right-handers (N = 14)	Left-handers (N = 9)	Z	P
Right-upper	0.30 ± 0.56	0.29 ± 0.61	0.33 ± 0.50	0.49	ns
Right-lower	0.17 ± 0.49	0.07 ± 0.27	0.33 ± 0.71	1.08	ns
Left upper	0.30 ± 0.56	0.36 ± 0.63	0.22 ± 0.44	0.41	ns
Left-lower	0.35 ± 0.49	0.36 ± 0.49	0.33 ± 0.50	0.11	ns
Total	1.12 ± 1.22	1.08 ± 1.22	1.21 ± 1.30	0.27	ns

Table 3. The mean number of non-vital teeth on the anterior and posterior regions.

Region	Anterior	Posterior	Z	P
Right-handers (N = 23)	0.92 ± 1.66	1.94 ± 2.71	2.12	<0.05
Left-handers (N = 23)	0.97 ± 1.00	4.81 ± 3.88	2.38	<0.05
Total (N = 23)	0.78 ± 1.41	2.87 ± 3.26	3.14	<0.01

(31,32), eye preference (33-35), nasal cycle (36,37), reaction time (39), and bone mineral density (40) between right- and left-handers may contribute to the higher rate of injury in left-handers than in right-handers. Right-handers have the right ear advantage and left-handers have the left ear advantage (31,32). In studies of Turkish young population, the rates of left-eyedness were between 10.15% and 10.26% in the right-handers and between 46.66% and 50% in the left-handers (33-35). Right-handers have the right nasal dominance and left-handers have the left nasal dominance (36,37). Left-handed athletes have shorter or more advantageous reaction time than right-handed ones (38). Right-handed individuals have higher both right- and left-femoral bone mineral densities than left-handed ones (39).

In a recent study, Gursoy (40) reported that left-handed boxers were more successful than right-handed ones. Also, left-handed tennis players were found to be more successful compared to right-handed ones (41). It has been reported that there is a

high proportion of left-handers among top sportsmen and sportswomen (42,43). Additionally, it has been suggested that left-handers have an intrinsic advantage over right-handers due to superior spatio-motor skills, and that the relatively high proportion of top left-handed sportsmen and sportswomen is a reflection of this innate superiority. Therefore, it can be stated that the higher dental trauma risk in left-handed boxers may not be associated directly with boxing.

In the present study, for both right- and left-handed boxers, the mean number of non-vital teeth was higher in the posterior region than in the anterior region of the mouth. These results suggest that boxing has a dental trauma risk for especially molar teeth.

In the light of the present results, some recommendations can be made to prevention dental traumas of boxers. Left-handed boxers should be alerted to the dangers of dental traumas. Especially left-handed individuals must use mouth guards during amateur or professional boxing matches.

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