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Research Article

Assessment of Oral Hygiene and Gingival Health Condition and their Relationship with Some Salivary Variables among Boxers

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ABSTRACT

Background: Background oral hygiene means the degree of cleanliness of the oral cavity. Good oral hygiene is necessary to prevent common oral diseases.
Objectives: to evaluate the relation of some salivary variables to oral hygiene and gingival health conditions among Iraqi boxers.
Subjects and Methods: There was a cross-sectional comparative study. The total sample consisted of 80 males, including 40 male boxing players with weights ranging from (46-60 kg) attending different sports clubs for boxers in Baghdad (study group). And 40 male school students from some schools in Baghdad (comparative groups), ages ranging from (15-16) years old. This study was conducted from January-2022 to the end of May -2022. The unstimulated salivary analysis included samples collected flow rate, pH, and Minerals (calcium and phosphate) and salivary immunoglobulin A. After that, the clinical Assessment of gingival disease, calculus and plaque were assessed.
Results: The results demonstrate that plaque and calculus are higher in the study group than in the control with a significant difference in plaque index and no significant difference in calculus. Concerning correlations, a weak negative significant correlation between flow rate and plaque index in control weakens the negative significance between Gingival index and PH, while other results are insignificant. Also, Findings show a weak negative significant correlation between plaque index and salivary IgA and a weak negative significant correlation between Gingival index and calcium and phosphorous in control.
Conclusions: In conclusion, boxer players were associated with high gingival index, calculus and plaque index compared to control groups.

Introduction

Oral hygiene means the degree of cleanliness of the oral cavity good oral hygiene is necessary to prevent common oral diseases such as periodontal disease (1.2). The term gingivitis refers to an inflammation of the gingival margins without any discernible loss of bone or connective tissue connection caused by local irritation of substance derived from microbial plaque accumulation on the tooth surface, the inflammation of the gingiva caused by plaque that is identified by erythema, oedema, and bleeding when brushing or probing. Healthy gingiva has pocket probing depths of <3mm, no bleeding on the probe, and no calculus/restoration overhangs present.

Persistent gingivitis can lead to irreversible periodontitis (3). It is one of the most prevalent and common oral diseases among adolescents is gingivitis (4). Dental Plaque induced gingivitis may exhibit various patterns of observable signs and symptoms of inflammation localized to the gingiva and initiated by accumulating a microbial biofilm on teeth (5-6). salivary components are important determinants of oral health status (7). Saliva consists of approximately 99.5% water for stimulated Saliva and 99.4% for unstimulated Saliva (8). The presence of saliva is necessary for the maintenance of healthy soft and hard oral tissues (9). In Iraq, different studies found an inverse association between salivary flow rate (FR) and gingival index (10).

It has been stated that a decrease in salivary flow rate due to loss of fluids during sportive activities may cause gingival diseases, these diseases have been affecting sports performance unfavorably as well as decreasing he quality of life (11). These changes in salivary pH and the characteristic of the pH to be recovered are expressed by Stephan's curve. pH recovery mechanism is not similar on all tooth surfaces: it faced greater difficulties in the mid-interproximal areas, in which it is more difficult for the saliva to reach, causing lower buffer effect and less dilution against the acids in the plaque and the inadequate oral hygiene habits which can decrease the pH value in sporting individuals that cause increase in gingivitis (12). Saliva has a lot of defense-related components and is crucial for oral metabolism. Salivary calcium is thought to be a major element in the development of periodontitis as well as severely affecting dental health due to its affinity for being readily absorbed by dental plaque. The exercise affected salivary secretion, which results in changes in the concentration, secretion rate, and composition of several salivary components as proteins, lactate, electrolytes, immunoglobulins, and hormones (13). low levels of IgA have been associated with an increased risk for periodontal disease (14).

However, stress and exercise factors may lead to changes in certain oral diseases, including gingival disease and salivary variables among boxing players. This study aims to evaluate the dental caries experience of Iraqi boxers with some salivary variables.

This study had some limitations and problems. The sample collection which was affected by club matches dates inside and outside Iraq, the student's exams and the limited Expire date of ELSA kit.

The sports dentistry field is branch of sports medicine, it has importance in society, the boxing and oral health are related, and that player in boxing might be less likely to engage in good oral health promotion efforts compared to other people.

Subjects and Methods

There was a cross-sectional comparative study. The total sample consisted of 80 males, including 40 male boxing players with weights ranging from (46-60 kg) attending different for the following sports clubs for boxers in Rusafa sectors / Baghdad: Al jinsia Club,Al Seyaha Club,Jiser Diyala Club and Al Talabia Club (study group). And 40 male school students from different for the following sitting in Rusafa sectors / Baghdad: Al-jazeera preparatory, Al-hader high school, noon and the kalam middle school schools and Batal Khyber preparatory (comparative group). This study was conducted from January-2022 to the end of May -2022. Before starting the study, approval was achieved from the following institutions: the Iraqi boxing federation and the Ministry of Education. Verbal consent was obtained from all boxing players, and the protocol of the study was accepted by the ethics committee of the University of Baghdad's College of Dentistry at date: 2-6-2022, Ref. number: 579. In an age range from (15-16) years old for both study and control groups. Dental plaque thickness was assessed using the plaque index (PLI) of silliness and Loe (1964). The mouth mirror and dental explorer were used in scoring this index and dental calculus was assessed according to the periodontal disease index (PDI) criteria by Ramfjord (1959).

While gingival was assessed using the gingival index (GI) of Loe and Silness (1963). The unstimulated salivary samples were collected; the subject should be instructed to avoid smoking, food intake, chewing gum, and beverages one hour before saliva collection. The person should have a seat, then rinse her mouth with distilled water and relax for at least five minutes. The person should be asked to reduce her movement and instructed to fix her forehead above the test tube kept beneath it. The person should be required to keep her mouth open to allow the drain of Saliva in the tube for five minutes. At the end of the collection period, the subject was asked to collect any remaining saliva in the mouth and spit it very quickly into the test tube. Depending on the time, the actual trail should last for five minutes. Then, after calculating the salivary flow rate and pH, Saliva was sent to the lab in a cooling box and centrifuged for 10 minutes at 3000 rpm. Then the supernatant was separated by a micropipette and kept in deep freezing (-20C) (Carvalho et al., 2010). From there, specific salivary constituents were analyzed using specialized kits following the manufacturer's instructions. Salivary calcium was measured using a spectrometer, Spain and Spinreact, a kit, measured salivary phosphate. The concentration of Immunoglobulin IgA level was identified using an ELISA kit (enzyme-linked immunosorbent assay).

Using Statistical Package for Social Science (SPSS version -22, Chicago, Illinois, USA) for data description, Analysis and presentation were performed. It was classified into two categories:

1. Descriptive Analysis:
   A. Frequency is the percentage for qualitative variables, while mean, Standard Deviation (SD) and Standard Error (SE) are for the quantitative variable.
   B. Graphs: Cluster chart bars

2. Inferential Analysis:
   A. Independent Sample T-test: the parametric test of the difference between two groups.
   B. Pearson correlation: parametric test for the linear correlation between two quantitative variables.
   C. Levene test: test the homogeneity of variance among groups.

Level of significance as: Not significant $P>0.05$, Significant $P<0.05$

Results

The results demonstrate that both plaque and Calculus are higher in the study group than those in control with a significant difference in plaque and no significant difference in calculus as in Table (1), concerning correlations of this study related that there is a

significant negative correlation between flow rate and plaque in the control groups. At the same time, there is a negative significance between gingiva and pH, while other results are insignificant, as in Table (2). And findings in a recent study show a weak negative significant correlation between flow rate with a plaque in control weak negative significant between gingiva and pH. At the same time, other results are not significant, as in Table (3). Also, there is a weak negative significant correlation between plaque and salivary IgA and a weak negative significant correlation between the gingiva and salivary phosphorous in control. At the same time, other results are not significant correlations as in Table (4).

Table (1) Descriptive and statistical test of oral health cleanliness among groups.

Vars.	Groups							
	Study			Control				
	Mean	**±SD**	**±SE**	**Mean**	**±SD**	**±SE**	**T-test**	**P value**
PLI	0.849	0.228	0.036	0.667	0.492	0.078	2.122	0.038 Sig.
Calculus	0.071	0.165	0.026	0.025	0.110	0.017	1.450	0.152

Table (2) Correlation between PLI, CAL and GI among groups.

Groups		Calculus		GI	
		R	P	R	P
Control	PLI	0.022	0.894	0.081	0.619
	Calculus			0.130	0.425
Study	PLI	0.421	0.007	0.378	0.016
	Calculus			0.316	0.047

Table (3) Correlation between PLI, CAL, GI, salivary flow rate and PH

Groups		PH		FR	
		R	**P**	**R**	**P**
Control	PLI	-0.067	0.682	-0.420	0.007
	Calculus	0.079	0.628	0.013	0.936
	GI	-0.220	0.172	0.066	0.686
Study	PLI	-0.295	0.064	-0.103	0.527
	Calculus	-0.185	0.252	0.059	0.719
	GI	-0.334	0.035	-0.033	0.840

Table (4) Correlation between salivary biomarkers with PLI, CAL and GI

Groups		SIGA		Phosphorous		Calcium	
		R	**P**	**R**	**P**	**R**	**P**
Control	PLI	-0.330	0.037	-0.102	0.529	-0.135	0.407
	Calculus	0.046	0.778	-0.106	0.516	0.058	0.724
	GI	-0.118	0.468	-0.346	0.029	0.058	0.721
Study	PLI	-0.124	0.446	-0.019	0.908	-0.137	0.399
	Calculus	0.011	0.946	0.035	0.833	0.018	0.913
	GI	-0.167	0.303	-0.031	0.850	-0.129	0.426

SIGA: salivary immunoglobulin A

Discussion

In general, gingivitis is thought to be a site-specific inflammatory disorder brought on by dental biofilm buildup, marked by gingival redness and oedema and unaffected by the loss of periodontal attachment (15). Dental plaque was composed of living, dead bacteria, and their products together with organic and inorganic compound derived from saliva (16). There are a number of factors contributing high risk to poor oral health among athletes for example endurance sports might compromise dental health changes in saliva composition and athletes are supposed to have an irregular lifestyle with limited priority to oral health, while oral health behavior is the key factor indeterminant of oral health (17).

Unfortunately, there is no previous Iraqi study concerning their results. Results in this study demonstrate that plaque and calculus are higher in the study group than in the control group, with a significant difference in PLI and no significant difference in calculus. And demonstrate that gingival health deteriorated in the study group than in student groups with a significant difference. This may be the high calculus scores in the study may attribute to the higher plaque accumulation level that recorded in this study among in compared to control one, since dental calculus is amineralized dental plaque (18-19) .And the most crucial factor that may contribute to other hand this may be related to the neglect of oral hygiene ,changes in dietary intake these condition is associated with risk of gingival disease (20-21).The findings of the present study showed that there is a positive weak significant correlation between plaque, calculus and Gingival index (GI) in the study group and positive weak, not significant results in the control group. Simple explanations for these findings may be attributed to that when dental plaque decreases, bacteria decrease in number with a decrease in bacterial toxins leading to decrease in gingival disease (22).And may be dental calculus is a retentive area for plaque accumulation that may increase severity of periodontal disease ,other factors, such as decreased saliva production during exercise, may also play a role in the development of these disorders. These factors predispose to oral diseases and need to be controlled (23).

The findings above show a weak negative significant correlation between FR and PLI in the study, while other results are not significant. This may be related to the flow rate of saliva playing an essential role in relation to plaque deposition since decrease in salivary flow rate of saliva lead to decrease of irrigation action of saliva so, plaque deposition decreases. This may be the Stress and athletes' diets, which are high in carbohydrates, raise the risk of periodontal disease. Stress-related endocrine changes, neglect of oral hygiene, changes in dietary intake and decreased salivary flow are all factors that appears to effect on oral health as associated with gingival diseases. Athletes frequently have the conditions above, which are all related to physical activity (24-26).

The results of the present study showed a weak negative significance between GI and PH, while other results are not significant. This may be related to the mouth-breathing habit observed in approximately half of the athletes analyzed, which can contribute to an increase in dental plaque levels, consequently leading to the development of periodontal diseases. This could be due to the absence of self-cleansing salivary action, and Saliva has an essential role in regulating and maintaining the pH of the oral cavity due to its buffering action (21).And the finding in this study showed that salivary flow rate for study group was lower therefore pH low As noticed, the results of the present study showed a weak negative significant correlation between GI and salivary calcium and phosphorous in control. This may be due to the dental plaque is the main etiological factor responsible for periodontal disease. Minerals like as calcium, phosphorus, and others make up the inorganic parts of plaque. Dental plaque easily absorbs salivary calcium and phosphorus, resulting in calculus that can cause gingivitis (27). The presented study demonstrated a weak negative significant correlation

between PLI and salivary IgA. A simple explanation may be that the high salivary IgA levels that are directed against dental plaque may prevent gingivitis from developing (28).

In the present study findings of increased level of the dental caries and periodontal parameters with low level of salivary physicochemical properties among those Iraqi boxing players indicate the need for a public preventive program for them involving dental health education and improvement of dental knowledge and attitude towards both oral hygiene to reduce the risk of oral diseases. Also controlling level of nutrition and diet program leads to avoiding or delay occurrence of any complications including oral health complications. They need more protective instructions about mouth gourd and tell him about it is importance of oral health and preventing of direct force on oral structures. Encourage to increase the interest of the sports dentistry in Iraq due to it is related to the prevention and therapy of oral diseases occurring in athletes.

Conclusion

players were associated with a high mean of gingival, calculus and plaque, also low salivary flow rate and salivary pH with a decrease in the salivary immunoglobulin (IgA), calcium and phosphor. furthermore, all correlations were positive for gingival index, calculus and plaque index while negative for all study of salivary variables.

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Conflict of Interest

Authors declare no conflict of interest.

Data availability

Data are available upon reasonable request.

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