

# Comparison of periodontal health status in relation to IQ in right- and left handed individuals

Nada K. Imran, B.D.S., MSc. <sup>(1)</sup>

## ABSTRACT

**Background:** Periodontal disease (PD) is a chronic inflammatory condition characterized by destruction of supporting structures of the teeth. Intelligence quotient (IQ) was potentially reported to significantly associated with prevalence of gingivitis. Mild gingivitis was obtained in high IQ levels while moderate gingivitis may be attributed to poor oral hygiene seen among the subjects having low IQ levels.

**Method:** One hundred volunteers aged between 20-45 years old were enrolled in this study, patients were equally divided into right- and left-handed (50 patients each) and each group then subdivided into patients with healthy gingiva (10), patients with gingivitis (20), and patients suffering from periodontitis (20). An IQ questionnaire was prepared to be answered by each patient, Periodontal health status was recorded by using clinical periodontal parameters, plaque index (PLI) and gingival index (GI).

**Results:** Analysis of data showed that there is no significant difference in parameters measured in the same group. Results of IQ score among healthy, gingivitis and periodontitis groups indicated presence of significant difference ( $P \leq 0.001$ ) between right- and left-handed as compare to healthy subjects, Furthermore, in left-handed patients, IQ score was significantly higher ( $P \leq 0.05$ ) in gingivitis group in comparison to periodontitis patients. In contrast, same groups in right-handed patients showed almost the same IQ score. The same pattern was observed in association with plaque index.

**Conclusion:** Left-handed individuals have higher potential in providing plaque control. However, IQ score did not affect oral hygiene level with increased severity of periodontal disease in both groups. (*J Bagh Coll Dentistry 2017; 29(4): 72-75*)

## INTRODUCTION

Dental biofilm is well-recognized for its role in the initiation and progression of periodontal disease <sup>(1)</sup>. Traditional periodontal treatment consists of professional removal of dental plaque and its retentive factor which should be followed by personal oral hygiene measure to ensure success of the treatment <sup>(2)</sup>.

Tooth brushing is the most effective, easiest, and cheapest method for eliminating and controlling formation of dental biofilm and hence preventing and reducing severity of periodontal diseases <sup>(3)</sup>. However, effectiveness of tooth brushing is variable among subjects due to several factors some are related to the quality of toothbrush itself, other factors are associated with individuals themselves such as manual dexterity, duration, frequency, and motivation <sup>(4, 5)</sup>. Nevertheless, correct brushing method is the key factor in achieving good plaque control <sup>(6)</sup>. Some researches debate about outcome of brushing between right- and left-handed individuals and their ability to mechanically remove dental plaque <sup>(7, 8)</sup>. Comparison of oral health status between right- and left-handed individuals showed that left-handed individuals have better oral hygiene as compared to right-handed group <sup>(9)</sup>. Intelligence quotient (IQ) can be defined as "Relative intelligence of an individual expressed as a score on a standardized test of intelligence" <sup>(10)</sup>. IQ could represent another potential factor that affect the level of oral hygiene <sup>(10, 11)</sup>.

Left-handedness is more common in distinct individuals such as mathematicians, musicians, and architects <sup>(12, 13)</sup>. This may suggest higher IQ in comparison to right-handed individuals <sup>(13, 14)</sup>.

Increase IQ level potentially increase awareness and understanding of the nature of periodontal disease. In addition, this could improve perception of motivation and execution oral hygiene instruction delivered by the dentist which may result in better oral health status. Thus, the aim of current study is to evaluate oral hygiene and gingival health in right and left-handed individuals in relation to IQ among periodontally-diseased patient in comparison to healthy individuals

## MATERIALS AND METHODS

### Study design:

One hundred volunteers aged between 20-45 years old were enrolled in this study. They were recruited from patients attending the clinics of College of Dentistry/Baghdad University. A signed consent was obtained from the patients participated in this study, after explaining to them the nature of the research. Patients were equally divided into right- and left-handed (50 patients each) and each group then subdivided into patients with healthy gingiva (10), 20 patients with gingivitis, and 20 patients suffering from periodontitis.

An IQ questionnaire was prepared to be answered by each patient which includes ability test and diagramed test.

(1) Assistant Lecturer, Department of Periodontics, College of Dentistry, University of Baghdad.

**Exclusion Criteria:**

The following were excluded from the study:

1. History of any systemic diseases.
2. History of antibiotic taking within the previous three months.
3. History of periodontal treatment during the last three months.
4. Smokers.
5. Pregnant females.
6. Female under contraceptive pills.

**Clinical Periodontal indices:**

Periodontal health status was recorded by using clinical periodontal parameters, plaque index (PLI), Gingival index (GI), was performed by using Michigan O probe.

**Statistical analysis**

Analysis of results was performed by utilizing Statistical Package of Social Science (SPSS). Comparison of multiple groups was assessed by one way-ANOVA test followed by Tukey's post-hoc test to calculate difference within groups. Statistical difference was considered significant when  $P \leq 0.05$ .

**RESULTS**

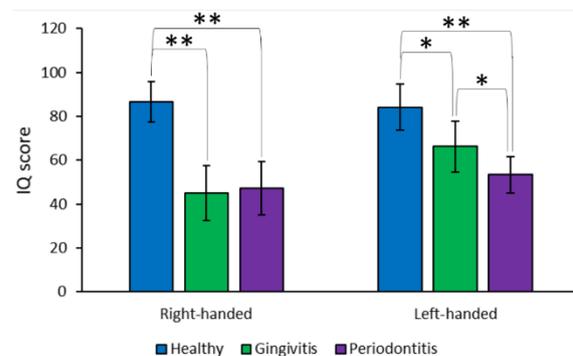
This study was conducted to investigate the relation between periodontal health status of right and left handed (healthy, gingivitis, and periodontitis patients) to their IQ score. Analysis of data showed that there is no significant difference in parameters measured in the same group. However, gingivitis group showed significant difference ( $P \leq 0.05$ ) between right- and left-handed patient in association with IQ score and PI (table 1).

**Table 1: Comparison of IQ, PLI, and GI between right- and left-handed groups**

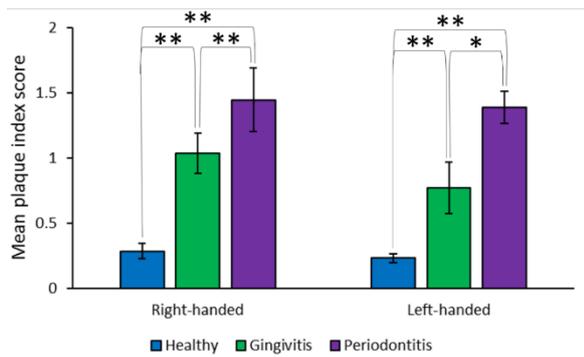
	IQ score		P-value
	Right-handed	Left-handed	
Healthy±SD	86.47±9.22	84.11±10.39	NS
Gingivitis±SD	44.99±16.46	66.17±18.49	$\leq 0.05$
Periodontitis±SD	47.05±14.15	53.33±16.16	NS
	Plaque index		P-value
	Right-handed	Left-handed	
Healthy±SD	0.28±0.05	0.23±0.03	NS
Gingivitis±SD	1.03±0.15	0.77±0.19	$\leq 0.05$
Periodontitis±SD	1.44±0.24	1.38±0.12	NS
	Gingival index		P-value
	Right-handed	Left-handed	
Healthy±SD	0.19±0.03	0.17±0.02	NS
Gingivitis±SD	0.97±0.11	0.88±0.15	NS
Periodontitis±SD	1.13±0.17	1.07±0.12	NS

Results of IQ score among healthy, gingivitis and periodontitis groups indicated presence of significant difference ( $P \leq 0.001$ ) when compared right- and left-handed healthy subjects (Fig 1). Furthermore, in left-handed patients, IQ score was significantly higher ( $P \leq 0.05$ ) in gingivitis group in comparison to periodontitis patients. In contrast, same groups in right-handed patients showed almost the same IQ score (Fig 1). The same pattern was observed in association with plaque index (Fig 2) were healthy subjects, both right- and left-handed, subjects showed significantly lower ( $P \leq 0.001$ ) plaque scores in comparison to gingivitis and periodontitis patients. In addition, plaque index scores in periodontitis group, both right- and left-handed, was significantly higher than gingivitis patients (Fig 2). Right- and left-handed patients, in gingivitis and periodontitis groups, showed significantly ( $P \leq 0.001$ ) higher gingival index score when compared to their healthy counterparts (Fig 3). However, in contrast to previously observed findings in association with plaque index, no significant difference was indicated in gingival index between right- and left-handed- patients of periodontitis and gingivitis groups.

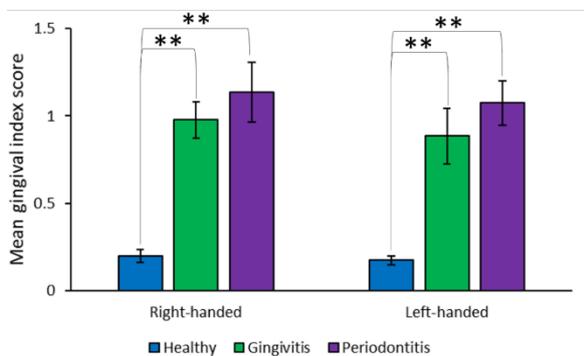
These results in general suggested better periodontal health status associated with increased IQ score. In addition, left-handed patients showed higher IQ score and better plaque control when compared to right-handed individuals.



**Figure 1: Comparison of IQ score shows significantly higher difference in IQ score of healthy group as compared to gingivitis and periodontitis groups in right- and left-handed individuals. \*= $P \leq 0.05$ , \*\*= $P \leq 0.001$ .**



**Figure 2: Comparison of PLI shows significantly higher difference in PLI of gingivitis and periodontitis groups as compared to healthy group in right- and left-handed individuals.  $*=P\leq 0.05$ ,  $**=P\leq 0.001$ .**



**Figure 3: Comparison of GI shows significantly higher difference in GI of gingivitis and periodontitis groups as compared to healthy group in right- and left-handed individuals.  $*=P\leq 0.05$ ,  $**=P\leq 0.001$ .**

## DISCUSSION

Nowadays, the relation between accumulation of dental plaque and severity of periodontal diseases is well-recognized (1). Severity of periodontal diseases is regulated by many factors such as difference in microflora and genetic susceptibility (15). Ability to maintain good oral hygiene is associated by many factors that could affect toothbrushing such as difference in manual dexterity between right- and left-handedness (7, 8) and IQ of the person (10). Thus, comparison of oral health status between right- and left-handed individuals in relation to their IQ was undertaken in the current study.

Data from this study showed that left-handed individuals have higher IQ score in gingivitis group associated with lower PLI when compared with right-handedness which is consistent with finding of previous studies (7, 9). The reason behind this could be due to that right-handed individuals usually fail to perform good plaque

control right side of the mouth. This finding was reported in previous study which indicated higher plaque accumulation and inflammation in right-handed individuals (16). In contrast, left-handed individuals showed almost equal efficiency to remove dental plaque from both sides of oral cavity with less severity of gingivitis (16). Furthermore, motor learning was reported to be better in left-handed individuals associated with higher IQ as compared with their right-handed counterparts (14). In addition, PLI and GI were significantly higher in gingivitis and periodontitis groups with lower IQ, in right- and left-handedness, in comparison to higher IQ-healthy controls. Further, gingivitis group showed significantly lower PLI associated with higher IQ than periodontitis group in left-handed individuals, which indicates better mechanical plaque control. These results were supported by results from previous study that indicated higher motor learning ability in subjects with higher IQ than lower IQ individuals (14). On the other hand, GI score did not show any difference between the two groups which is not consistent with other studies (14, 16). Results of present study showed that healthy and periodontitis group did not show any significant difference between right- and left handedness in all parameters investigated. This could be due to the need for higher sample size for better reveal of any difference exist. In addition, periodontitis represents the terminal stage of periodontal disease resulting mostly from neglected oral hygiene over a long time which could mask any difference in handedness or IQ level. Preference of handedness is related to many factors including cerebral dominance, neuromuscular functions, and inherited trait (17, 18). This potentially reflected on hand skills in performing oral hygiene measures. This notion is supported by reports from previous studies which indicated that jobs requiring high manual dexterity such as musician and artist are mostly belonging to left-handed group (19, 20), which also demonstrated success in maintaining better oral hygiene than right-handed subjects (21). In general, results of this study suggested that left-handed individuals have higher potential in providing plaque control. However, IQ score did not affect oral hygiene level with increased severity of periodontal disease in both groups.

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