

GINGIVAL CREVICULAR FLUID AND ORAL HYGIENE IN SAUDI DENTAL STUDENTS AND INTERNS

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ABSTRACT

Periodontal diseases refer to a number of inflammatory diseases affecting the periodontium (the tissues that surround and support the teeth). Several studies have shown an increased volume of gingival crevicular fluid (GCF) with an increase in the severity of gingival inflammation. The objectives of this study were to compare the GCF volumes among the interns and first year dental students at dental school in King Saud University and correlate the GCF with other clinical parameters such as plaque index, probing depth and bleeding on probing. A total of 24 interns (23-27 years old) and 20 first year dental students (19-22 years old) from the dental school, King Saud University were included in the study group. Periodontal probing depths (PPD), Plaque index (PI) and Bleeding on probing (BOP) were measured. The gingival crevicular fluid was collected by using the Periotron System (Periotron 8000®). The mean age of the interns and dental students was 24.67 ± 0.92 and 19.6 ± 0.75 years respectively. Interns have lower plaque index in comparison to first year dental students ($20.83 \pm 14.12\%$ and $41.25 \pm 18.63\%$ respectively). Interns have lower probing depth in comparison to first year dental students ($1.39 \pm 0.25\text{mm}$ and $1.8 \pm 0.46\text{mm}$ respectively). The bleeding on probing was lower among interns than among students ($3.33 \pm 7.6\%$ and $16 \pm 10.95\%$ respectively). The mean of the GCF volume was $0.147 \pm 0.042 \mu\text{l}$ among interns and $0.24 \pm 0.094 \mu\text{l}$ among first year dental students. It can be concluded that GCF volume was lower among interns compared to first year dental students. The GCF volume showed a correlation to the clinical gingival status of the studied groups.

INTRODUCTION

A periodontal disease refers to the inflammatory processes that occur in the tissues surrounding the teeth in response to bacterial accumulations on the teeth. These serious bacterial infections if left untreated, can lead to loosening and subsequent loss of teeth. These infections are caused by convergence of bacteria that adhere to and grow on the tooth surfaces, along with an overly aggressive and destructive immune response against these bacteria¹.

The primary etiology of periodontal diseases is the accumulation of the bacterial matrix at the gingival margin which is called dental plaque, in addition to other contributing and risk factors such as age, poor nutrition, socioeconomic status, gender, genetic predisposition, certain systemic conditions such as diabetes, smoking and bacterial colonization²⁻⁴. Periodontal diseases may lead to the destruction of the gingival

fibers, the gum tissues separate from the tooth and deepened sulcus and form periodontal pocket. Subgingival bacteria colonize the periodontal pockets and cause further inflammation in the gum tissues and progressive bone loss.

Many studies have looked into the association between the oral hygiene level and the development of periodontal diseases. In a study that was done to evaluate the oral hygiene and gingival health in dental students and faculty showed that the 1st-year students had the poorest hygiene and gingival health. The oral hygiene has improved among the 2nd-year students who had completed a course in preventive dentistry including oral hygiene techniques. Further improvement was found among 4th and 5th year students who were participating in the clinical courses. It was concluded from the study that regular patient contact influences the personal attitude towards oral hygiene, and that professional activity emphasized on the differ-

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ent aspects of the curriculum may be reflected in the attitude of health professionals toward oral health ⁵⁻⁶. In 2006 Maatouk et al ⁶, assessed the effect of 5 years dental studies on dental students oral health practices and dental health and found that students had achieved a better dental health status and tooth brushing rate was much higher and periodontal pockets decreased.

Gingival crevicular fluid (GCF) is a fluid that emerges between the surface of the tooth and the gingival epithelium. The exact nature of the fluid, its origin and composition, has been a subject of controversy. Studies showed that in gingival health the initial fluid accumulation represents a transudate of gingival interstitial fluid produced by an osmotic gradient and in periodontal disease the fluid is transformed into an inflammatory exudate. ^{7,8}

Several studies have shown an increased volume of GCF with an increase in the severity of gingival inflammation. ^{9,10,11} It was suggested that the quantitative measurement of the GCF volume may be better measures of the early signs of inflammation than the clinical measures of color, bleeding, and the composite nature of the gingival index ^{9,10,12,13,14}.

The purpose of this study was to compare the GCF volumes among the interns and 1st year dental students at King Saud University. To correlate the GCF with other clinical parameters such as plaque index, probing depth and bleeding on probing.

METHODOLOGY

Study population

A total of 24 interns (23-27 years old) and 20 first year dental students (19-22 years old) from the College of Dentistry, King Saud University comprised the study group. Only healthy non-smokers with no history of periodontal or antibiotic treatment within the last six months were enrolled in the study.

Clinical Periodontal Examination

A full record and documentation of the medical history were obtained through a written questionnaire and an interview of duration 30 minutes. Full extraoral and intraoral examinations were done. Periodontal probing depth (PPD), Plaque index (PI), Bleeding on probing (BOP) and oral hygiene status were assessed.

All clinical recordings were done by the same examiner.

Gingival Crevicular fluid

The gingival crevicular fluid was collected by using the Periotron System (Periotron 8000®, Harco Electronics Ltd., USA). The area was isolated with cotton rolls, supragingival plaque was removed and the clean surface dried with a gentle stream of air. A sterile dry filter paper strip (Periopaper, Ora Flow Inc., Amityville, NY, USA), 15mm x 3mm, was inserted to the base of the pocket or until minimum resistance was felt (intra-crevicular technique) for 3 seconds to empty the crevicular pool; this filter strip was removed and discarded ¹⁵. After 27 seconds, another sterile dry filter paper was placed at the sulcus orifice for three seconds, with the total elapsed time being 30 seconds. The filter paper strip was immediately placed between recording sensors so that entire moistened area of the filter strip was in contact with the sensors. With the switch on the no hold mode, the highest numerical readings were recorded. The digital numerical values were recorded to fluid volume by dividing the readings by 200. ¹⁵

Data analysis

The data was tabulated and analyzed using SPSS program (SPSS Version 12. Chicago, IL, USA). Comparisons were made between groups using Students' t test.

RESULTS

The purpose of this study was to compare the oral hygiene levels in relation to the gingival crevicular fluid volume between Saudi dental students and interns. The mean age of the interns and dental students was 24.67 ± 0.92 and 19.6 ± 0.75 years respectively. Clinical parameters were measured such as plaque index; probing depth and bleeding on probing were assessed and presented in the figures below. Interns have lower plaque index in comparison to 1st year dental students ($20.83 \pm 14.12\%$ and $41.25 \pm 18.63\%$ respectively). Interns have lower probing depth in comparison to 1st year dental students ($1.39 \pm 0.25\text{mm}$ and $1.8 \pm 0.46\text{mm}$ respectively). The bleeding on probing was lower in interns than in students ($3.33 \pm 7.6\%$ and $16 \pm 10.95\%$ respectively). The mean of the GCF volume was $0.147 \pm 0.042\mu\text{l}$ in interns and $0.24 \pm 0.094\mu\text{l}$ in 1st year dental students.

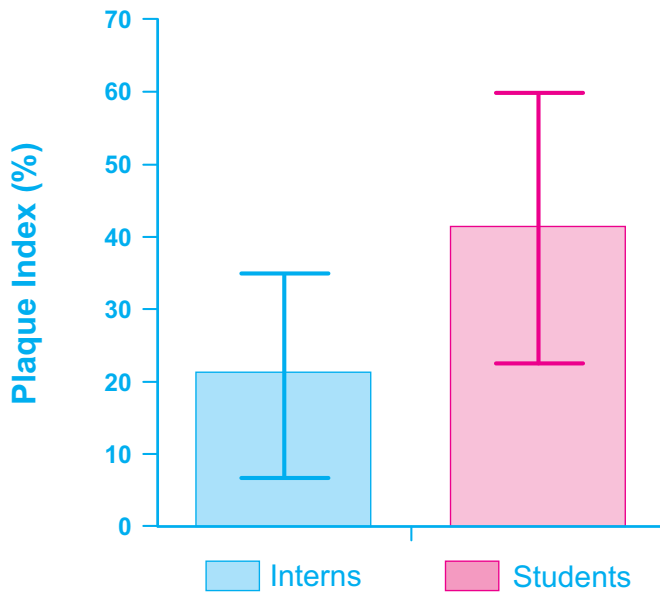


Fig 1: The plaque index (PI) in interns and first year dental students

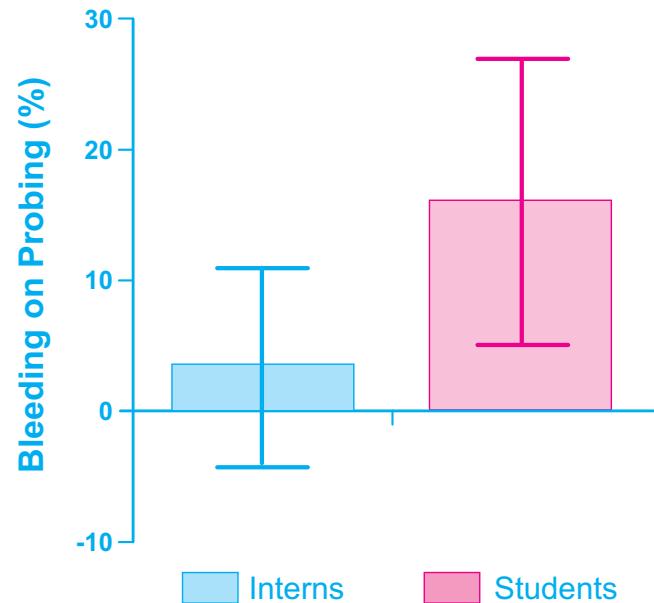


Fig 3: The bleeding on probing (BOP) in interns and first year dental students

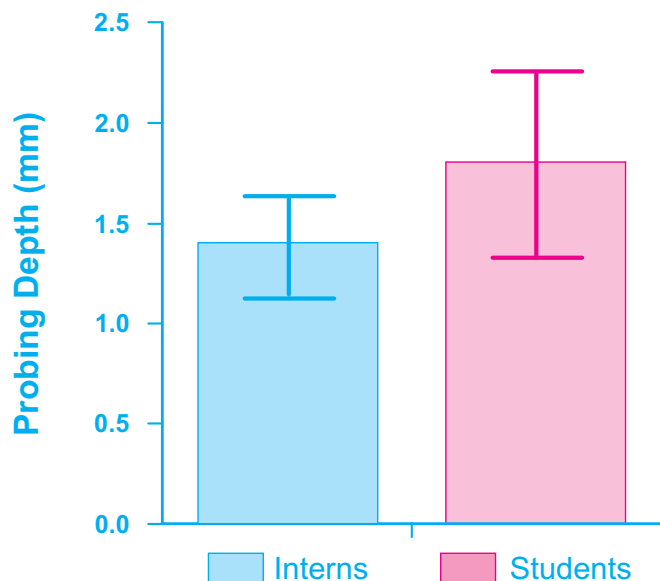


Fig 2: The probing depth (PD) in interns and first year dental students

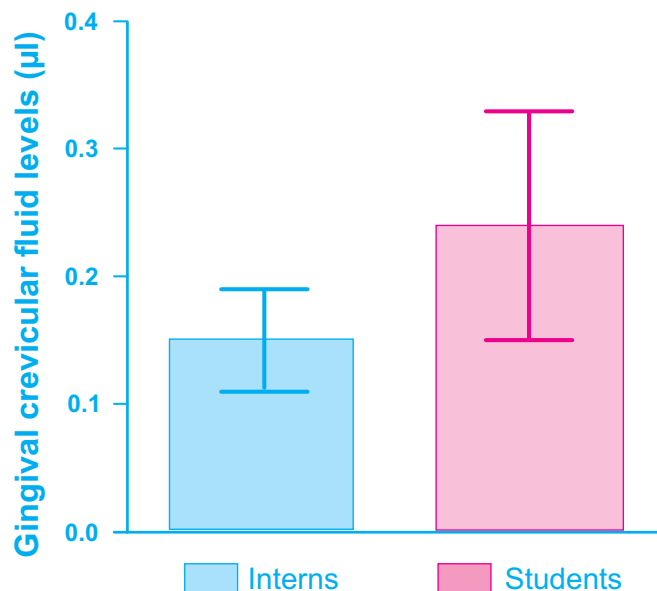


Fig 4: The gingival crevicular fluid levels in interns and first year dental students

DISCUSSION

GCF has beneficial effects and it is an important component of the protective mechanisms of the gingival crevicular region¹⁶. It has flushing effect that can remove carbon particles and bacteria which had been introduced into the gingival crevice.¹⁷ In addition, it may have an important role in transporting antibacterial substances to the crevicular space.¹⁸ In health, the osmotic pressure of the sulcular compartment (plaque derived molecules) exceeds that of tissue fluid and that

will result in production of initial pre-inflammatory fluid (interstitial fluid) that was considered to be a transudate; while on stimulation this fluid change to and become an inflammatory exudates.^{7,19}

The Volume of GCF may vary at sites which are clinically healthy. The sampling technique plays a role in the volume of GCF. The intra-crevicular sampling technique was found to be more sensitive to detect GCF compared to the method of collection from orifice of the gingival crevice.^{9, 11-20} The collection of GCF can be

affected by different factors such as contamination by dental plaque²¹, sampling time²², sample evaporation and type of paper²³.

Many studies have shown that the increase in GCF volume is associated with the increase in the severity of the inflammation in the gingiva⁹⁻¹¹. Also the associations between the GCF volume and clinical and histological signs of inflammation have been investigated.^{9,10,12-14,24}

In the present study the GCF volume among the interns was lower than the GCF volume in the first year students at the dental school. Also the present study showed that the dental students have more bleeding on probing than interns which coincided with plaque index. This is in agreement with the observations of Lang et al.⁵ They found that first year dental students had the poorest oral hygiene and gingival health and the fourth and fifth year students showed an improvement in their oral hygiene and gingival health.

Maatouk et al.⁶ showed that students achieved a better dental health status, higher tooth brushing rate and a reduction in periodontal pockets at the end of their five year dental studies. This is in agreement with the results of the present study, the interns showed a decrease in the probing depth and bleeding on probing percentage in comparison with the first year dental students. The study also found a positive correlation between the probing depth and the GCF among the interns and first year students. This observation is in agreement with earlier study.²⁵

The findings of the present study suggest that a higher GCF volume among the first year dental students could be attributed to the decreased oral hygiene status. The inverse relationship between the GCF volume and oral hygiene level is confirmed by the higher plaque index, probing depth and bleeding on probing. These observations showed GCF volume can be used as predictor for gingival inflammation.

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