Poor Oral Health A Risk Factor For Inflammation?

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ABSTRACT

Periodontal disease, causes inflammation of the tissues surrounding the teeth. Gingivitis which is a form of periodontal disease resulting from poor dental care, and results in elevated C-reactive proteins (CRPs) levels. The CRP test can determine if there is inflammation, but cannot determine the location of the inflammation. Elevated CRP levels over long periods, can be a risk factor for people developing cardiovascular disease. The purpose of this study was to determine how poor dental health as determined by lack of brushing would affect CRPs, in a study population at BYU-Hawaii. The study included 17 participants (males and females age 20-30). There were eight in the control group and nine in the study group. The control group was instructed to brush their teeth at least twice daily throughout the study. The study group was instructed to not brush their teeth during the entire ten day study. Saliva samples and were collected on 18 March, 2011 in the afternoon. A second sample was taken ten days later on 28 March, 2011. Saliva was collected by salivet. Saliva samples were assessed for CRP by ELISA. After the ten testing days for the two groups, there was a significant difference. Not only were the CRP levels higher in the non-brushers groups (6333 pg/mL) than the control group (578 pg/mL), but the mean of the non-brushers group was also similar to the mean (6818 pg/mL) of individuals with acute urticaria. These results suggest a significant level of inflammation within the non brushing groups.

INTRODUCTION

C-reactive proteins (CRPs) are plasma proteins produced by the liver, and are important markers for inflammation (2, 6, 9). CRP facilitates the elimination of bacteria and viruses by binding to phosphocholine to assist with phagocytosis (6, 7). CRP levels raise several hundredfold in response to an acute inflammation (1,6,7). This rapid increase of CRPs can happen within the first 24-48 hours of a reaction (1). CRP tests are used to determine inflammatory diseases such as arthritis, autoimmune diseases, heart disease, inflammatory skin disease, or periodontal disease. They are also used to determine if an anti-inflammatory medication is effective. The CRP test can determine if there is inflammation, but cannot determine the location of the inflammation.

Periodontal disease, inflammation of the tissues surrounding the teeth, can result in teeth dissociating from the jaw bone. About half the adults in the United States have gingivitis which
is a form of periodontal disease (4). Poor dental care, resulting in elevated CRP levels over long periods, can be a risk factor for people developing cardiovascular disease (5, 8, 9). One study proposed that the same bacteria that initiates periodontal disease may also facilitate heart disease (3). Two studies suggested that oral health screening could be used as an effective cardiovascular heart disease risk assessment predictor (4,8). The relationship between high CRP levels and cardiovascular disease is most prevalent in men under 50 years of age (3). Periodontal disease increases the risk for a cardiovascular event by 25% in all men and by 70% in men under 50 years old (5). The purpose of this study was to determine how poor dental health as determined by lack of brushing would affect CRPs, in a study population at BYU-Hawaii.

**MATERIALS AND METHODS**

Approval for this study was obtained by the BYU-Hawaii Institutional Review Board. Consents were signed by the 17 participants (males and females age 20-30). There were eight in the control group and nine in the study group. The control group was instructed to brush their teeth at least twice daily throughout the study. The study group was instructed to not brush their teeth during the entire ten day study.

Saliva samples and were collected on 18 March, 2011 in the afternoon. A second sample was taken ten days later on 28 March, 2011. Saliva was collected by salivet. Both samples were taken in the afternoon at least two hours after the consumption of any food products. Saliva samples were assessed for CRP at Salimetrics by ELISA.

Data were analyzed by dependent and independent t-test. Significance was established at the 0.05 level.
**DATA**

An independent t–test was performed on the two groups, before the start of the study. There were no differences between the two groups (p-value = 0.195) (fig 1). The mean of the control group was 408 pg/mL (SD= 323). The mean of the non-brushers group was 2025 pg/mL (SD= 3412).

![Figure 1: A boxplot of the control and non-brushing groups before the start of the study. P=0.195](image)

A second independent t–test was performed between the two groups, after the ten test days. There was a significant difference in CRP levels between the two groups (p-value = 0.045) (fig 2). The mean for the control group was 578 pg/mL (SD= 618). The mean for the non-brushers group was 5624 pg/mL (SD= 6333).
A paired t-test was performed between the non-brushers before and after the completion of the study. There was a significant difference between the groups (p-value 0.047) (fig 3). The mean before the start of the study was 2025 pg/mL (SD = 3412). The mean for the non-brushers after the study was 5624 pg/mL (SD = 6333).
There was no difference between the before and after values of the control group (p = 0.197) (fig 4). The mean of the before for the control group (brushers) was 408 pg/mL (SD = 323). The mean for the after of the control group was 578 pg/mL (SD = 618).

DISCUSSION

Before the start of the study there were no significant differences between the control group and the study group. This is important because these samples were the baseline for the two groups, indicating that both groups started at statistically similar CRP levels.

There was no significant difference between the CRP values for the control before and after the study. This was expected and showed that outside interference was minimal. The mean of CRP levels before was 408 pg/mL and after the study was 681 pg/mL.

The t-test employed after the ten testing days for the two groups showed there was a significant difference. Not only were the CRP levels higher in the non-brushers groups (6333 pg/mL) than the control group (578 pg/mL), but the mean of the non-brushers group was also similar to the mean (6818 pg/mL) of individuals with acute urticaria (hives) (10). These results suggest a significant level of inflammation within the non brushing groups.
Statistically the group of non-brushers had higher levels of C-Reactive proteins than the brushers group after ten days. Not brushing your teeth for ten days does cause enough inflammation to increase the levels of C-Reactive proteins. According to other studies if these levels were raised for a prolonged amount of time, these people could be at a higher risk to developing cardiovascular disease than those of people who brush their teeth twice daily (3,4,5,7).

Works Cited:


