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Effect of yoga on dental care: Pranayama techniques or rhythmic breathing exercises on the oral hygiene and gingival bleeding

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Abstract

This paper highlighting the benefits of yoga (rhythmic breathing exercises) in the maintenance of oral hygiene and gingival bleeding. This is a two group comparative study. The participants of group A was practicing yoga for about 30 minutes and the participants of group B did not practice yoga. The study is carried out with three parameters, Debris index, Calculus index and Gingival bleeding index. These parameters were compared over the group B. The unpaired t-test was carried out to compare the two groups. The results showed that the group A has significantly lower debris and calculus value. The debris index have $P < 0.01$ and calculus index have $p < 0.001$, the oral hygiene index has the $p < 0.001$, which is significant. The average value of gingival bleeding index of group A is less than the group B. So the yoga is helpful in maintenance of oral hygiene and gum bleeding.

Keywords: Calculus, Debris, Gingivitis, Yoga, Oral hygiene

1. Introduction

The aim of this study is to assess the efficacy of yoga: pranyama techniques or rhythmic breathing exercises on the oral hygiene & gum bleeding with the help of different types of dental indices including OHI-S& GI index. It is a two group comparative study. Food debris are white small particles on the teeth, can be easily rinsed off. Dental plaque is a thin film of bacteria that sticks to teeth, yellow in colour can't be rinsed off, removed only by brushing & flossing. Calculus is calcified plaque, hard, brownish or darkish in colour only removed by scaling. If plaque is not removed regularly by tooth brushing and flossing, it hardens to create calculus (also known as tartar). Dental calculus is made from mineralized plaque and other deposits on the teeth surface. It is so hard and attached to teeth very tight. General tooth brushing process can not remove it. There is a closer relationship between tartar, calculus and periodontal diseases. Calculus can provide a good place for plaque attachment and bacteria growth. Calculus can absorb bacterial toxins that irritate the soft tissue, gingival edema and cause bleeding gums.

Dental Plaque deposit on teeth is a concern because of its cosmetic and pathogenic nature. Presence of plaque may be the culprit for dental caries, gingivitis, periodontal problem, and halitosis. Many mechanical aids are used world wide to remove or control plaque, including toothbrushes, dental floss, mouth rinses, and dentifrices. [1] Mechanical plaque removal is one of the most accepted methods of controlling plaque and gingivitis. Mechanical plaque control is time consuming and some individuals may lack motivation for these procedures. [2]

Yoga focuses on physical body, breathing and mind. [3] In this paper, we are considering a part of yoga - pranayama techniques or rhythmic breathing exercises. This is accomplished by Asanas (physical postures), pranayama (breathing techniques) and meditation. [4] Yoga prevents the impairment of cellular immunity seen in stress [5]. Yoga involves body - mind relaxation techniques and it cushions and relaxes the dental pain stress. Practicing yoga has few side effects, and a low risk of serious injury. Since yoga involves body-mind relaxation techniques (pranayama and meditation) along with mild to moderate physical exercise, it was hypothesized that practice of yoga may optimize the production of the pro-inflammatory cytokines [6]. Yoga has effects like it improves the oxidative status of the body so helpful in relieving the stresses of life [7]. Yoga (rhythmic breathing part) helps in improving the immune

system and body defence systems.^[8] It also helps in wound healing by reducing the mediators of inflammatory response.^[9] All these effects also helps in the maintenance of healthy gingival. As described yoga has many effects in the body specially it helpful in body-mind relaxation and reducing the stress level of body, and the mechanical plaque control (tooth brushing) is time consuming and requires lot of motivation, so yoga may helpful in this part of mechanical plaque control.

The hypothesis made in the paper is how the Yogic pranayama techniques are helpful in improving the oral hygiene and gingival health?. The clinical data is used in this study to justify the hypothesis

2. Method and material

In this study, 60 subjects were screened from Dental Clinic and Research Center Patanjali Ayurved hospital, Patanjali Yogpeeth, Haridwar. The age range is from 25 to 55 years. Ethical Approval was obtained from the institutional review board and signed consent form was obtain from the subjects

2.1 Inclusion criteria

Subjects who met the following inclusion criteria were included in this study: Having a minimum of 20 teeth, good general health, presence of established gingivitis, willing to give a written informed consent.

2.2 Exclusion criteria

Exclusion criteria were: presence of advanced periodontitis, probing depth > 4mm subjects under antimicrobial therapy, pregnant women, using orthodontic appliances, having used mouth rinse containing chemical agents in previous 3 months, and having a history of allergy to toothpastes.

3. Design

The study was designed as a two group comparative study. The subjects were divided into two groups each having 30 subjects. Group A subjects were practicing yoga for more than 6 months and group B subjects were those who were not practicing yoga.

The subjects were divided into two groups.

group-A: The subjects of this group were practicing yoga for more than 6 month. The age of subjects is between 25 to 50 years. Number of subjects in the group is 30.

GROUP-B: The subjects of this group were not practicing yoga. The age of subjects is between 25 to 50 years. Number of subjects in the group is 30.

3.1 Index Examination

A. OHI-S: This index is measured to access the oral hygiene of the patients by examining the debris index and calculus index.

B. Gingival Index (GI): This index is examined to assess the health of Gingiva by assessing their bleeding on probing by periodontal probe.

4. Observations & Results

Data analysis carried out by using t-test. The group A has significantly lower debris ($P < 0.01$) and calculus ($P < 0.001$) as compared to group B. In this study the average debris index and calculus index of group A is less than the group B. It means that the yoga is helpful in maintenance of oral hygiene by reducing the debris and calculus. The average gingival index of group A is less than the group B it means that the

yoga improves the antibacterial effect and hence reducing the inflammation of gingiva and bleeding from gums.

The Assessment is done using following the questionnaire

4.1. Simplified oral hygiene index (OHI-S)

As per.^[10] the simplified form of Oral Health Index (OHI -S). This index consists of two parts:

4.2 Debris Index – Simplified (DI - S)

Oral debris is the soft foreign matter loosely attached to the teeth. It consists of mucin bacteria and food and varies in color from grayish white to green or orange. This part of the questionnaire is to measure the surface area covered by debris. It is estimated by running the side of the explorer along the tooth surface examined. Then the examiner will measure as per the scale proposed from 0 to 3 debris deposition on a scale of 4 options.

4.3 Calculus Index-Simplified (CI-S)

Oral calculus is defined as deposit of inorganic salts composed primarily of calcium carbonate and phosphate mixed with food debris, bacteria and desquamated epithelial cells. There are two main types of calculus which are differentiated primarily by location on the tooth in relation to the free gingival margin. It may be Supragingival calculus or Sub gingival calculus. Then the examiner will measure as per the scale proposed from 0 to 3 calculus deposition on a scale of 4 options

4.4 Gingival Index (GI)

As per.^[11] for assessing the severity of gingivitis and its location in four possible areas by examining the qualitative changes(severity of the lesion)of the gingival soft tissue. The GI does not take into account of periodontal pocket depth bone loss or any other quantitative changes of the periodontium.

No prophylaxis was undertaken before the commencement of the study and no attempt was made to modify the volunteers oral hygiene habits.

5. Details about the yoga (rhythmic breathing exercise) practiced by the subjects

Different types of pranayams practiced by the participants is as follows

a. Bhastrika Pranayam b. kapalbhati pranayam c. bahya pranayam, d. Anulom-vilom pranayam e. brahmari pranayam f. udeet pranayam

The average time of practice in a day is 30 minutes

6. Data extraction

It is given by the formula; $OHI-S = DI-S + CI-S$, where abbreviations are defined elsewhere in the paper

6.1 Debris index scoring criteria

The scoring criteria are given by;

0 -No debris or stain present

1-Soft debris covering not more than one third of the tooth surface or presence of extrinsic stains without debris regardless of surface area covered

2-Soft debris covering more than one third but not more than two thirds of the exposed tooth surface

3-Soft debris covering more than two third of the exposed tooth surface

6.2 Calculus index scoring criteria

The scoring criteria are given by;

0- No calculus present

1-Supra gingival calculus covering not more than one third of the exposed tooth surface

2-Supra gingival calculus covering more than one third exposed tooth surface or the presence of individual flecks of sub gingival calculus around the cervical portion of the tooth or both.

3- Supra gingival calculus covering more than two third of the exposed tooth surface or a continuous heavy band of sub gingival calculus around the cervical portion of the tooth or both.

The DI-S and CI – S values range from 0 to 3. This is shown in Table 1.

Table 1: Grading for DI-S and CI –S

| Sl. No. | Range | Grading |
|---------|------------|---------|
| 1 | 0.0 to 0.6 | Good |
| 2 | 0.7 to 1.8 | Fair |
| 3 | 1.9 to 3 | Poor |

The OHI-S value ranges from 0 to 6 given in Table 2.

Table 2: Grading for OHI-S

| Sl. No. | Range | Grading |
|---------|------------|---------|
| 1 | 0.0 to 1.2 | Good |
| 2 | 1.3 to 3.0 | Fair |
| 3 | 3.1 to 6 | Poor |

6.3 Scoring criteria for Gingival Index

The scoring criteria for GI –S are given by;

0- Absence of inflammation / normal gingiva

1- Mild inflammation, slight change in colour, slight edema, no bleeding on probing

2- Moderate inflammation, moderate glazing, redness, edema and hypertrophy, bleeding on probing

4- Severe inflammation, marked redness and hypertrophy ulceration tendency to spontaneous bleeding

The numerical scores of the gingival index may be associated with varying degrees of clinical gingivitis as given in Table 3.

Table 3: Gingival Index Scoring Rates

| Sl. No. | Gingival score | Condition |
|---------|----------------|-----------|
| 1. | 0.1-1 | Mild |
| 2. | 1.1-2 | Moderate |
| 3. | 2.1-3.0 | Severe |

7. Data analysis and Results

The data of group A and Group B was compared by unpaired t-test and its average values with standard deviation are shown in Tables 4 and 5.

Table 4: Average values for OHI and GI

| Indicators | Group A | Group B |
|-----------------|-----------|-----------|
| Average OHI – S | 1.64±0.86 | 2.62±0.81 |
| Average GI | 1.45±0.32 | 1.53±0.34 |

Table 5: Average values for Debris Index and Calculus Index

| Indicator | Group A | Group B |
|----------------|-----------|-----------|
| Average DI – S | 0.96±0.42 | 1.29±0.43 |
| Average CI- S | 0.68±0.53 | 1.33±0.45 |

The data of both groups A and B is compared by unpaired t-test shows that the group A has significantly lower debris ($p <$

0.001), calculus ($p <$ 0.001) and gingival index value ($p <$ 0.05) as compared to group B.

8. Discussion

Dental plaque is the main culprit for gingival inflammation and dental caries. Chronic gingival inflammation may lead to tissue destruction and if left untreated may progress onto the more destructive stages of periodontitis. [1] Hence plaque and gingivitis control helps in maintenance of healthy oral cavity. This can be achieved effectively by mechanical plaque control using tooth brush and medicated. In this study the average debris index and calculus index of group A is less than the group B. It means that yoga is helpful in maintenance of oral hygiene by reducing the debris and calculus. The average debris index (DI-S) and calculus index (CI-S) of group A is 0.96±0.42 and 0.68±0.53 respectively while of group B is 1.29±0.43 and 1.33±0.45. The value of oral hygiene index (OHI-S) for group A and group B is 1.64±0.86 and 2.62±0.81 respectively. As it is clear from the above data that the average value of debris and the calculus index of group A is lesser than the group B, and hence the oral hygiene of group A is better than the group B

The average gingival index of group A is less than the group B. The average value of gingival index of group A and group B is 1.45±0.32 and 1.53±0.34 respectively. It means that the yoga have effect on reducing the inflammation of gingiva and bleeding of gums.

In the analysis by t-test the group A has significantly lower debris and calculus. The debris index have $P <$ 0.01 and calculus index have $P <$ 0.001. the oral hygiene index also has the $P <$ 0.001. which is significant. All these values are significantly lower. It proves that the yoga is efficient in maintenance of oral hygiene

Yoga is a safe, simple-to-learn, noninvasive and inexpensive practice requiring little in way of equipment or professional training. Although yoga has been practiced for over 5000 years, it has only newly gained popularity worldwide. [12] The yoga was originated in India and has been applied to relieve both mental and physical infirmities [13, 14, 15]. Yoga focuses on body, breathing and mind [3]. This is accomplished by Asanas (exercise postures), pranayama (breathing techniques) and meditation [4]. Yoga prevents the impairment of cellular immunity seen in stress. [5]Yoga involves body-mind relaxation techniques and cushions the changes related to stress. Practicing yoga has few side effects, and a low risk of serious injury. Since yoga involves body-mind relaxation techniques (pranayama and meditation) along with mild to moderate physical exercise (Asana), optimize the production of the pro-inflammatory cytokines [6].

Yoga improves the oxidative status of the body so helpful in relieving the stresses of life [7]. Yoga has been found to be beneficial in reducing oxidative stress in type 2 diabetes. [21, 22] Yoga (rhythmic breathing) helpful in improving the immune system and body defense systems.[8] Since yoga involves body-mind relaxation techniques (pranayama and meditation) along with mild to moderate physical exercise (Asana), it was hypothesized that practice of yoga may optimize the production of the pro-inflammatory cytokines.. It also helps in wound healing by reducing the mediators of inflammatory response [9]. The gingival inflammation is also due to the toxins produced by the bacteria which results in the chronic inflammatory reaction resulting in the swelling of gingiva and bleeding from gingiva, because yoga is improving the oxidative stress level and optimize the production of pro inflammatory cytokines and also improving the body immune

system. So yoga will reduce the chronic gingival inflammation, body defense can act more efficiently in gingival bacteria and all together will improve the symptoms of gingival inflammation and hence improve the health of gingiva. All these effects also helps in the maintenance of healthy gingiva.

The mechanical plaque control (Tooth brushing) is time consuming and require lot of motivation and stress may play a negative role in mechanical plaque control. Mechanical plaque control also depends on the life style of the individual that is delay wake up in the morning, will not have the sufficient time for tooth brushing etc. Yoga is helpful in reducing the stress and anxiety. Psychological stress and yoga are believed to be reciprocally related. Stress induces imbalance of the autonomic nervous system with decreased activity of the parasympathetic nervous system and increased activity of the sympathetic nervous system ^[16]. Yoga offers comprehensive solutions for managing health as a whole. It can lead to reduction of stress levels and thereby preventing autonomic deregulation. Reduction in perceived stress levels results in lesser negative feelings of anxiety and depression, improved sense of well-being, and better sensory-motor performance and hand grip endurance ^[17]. Yoga is proven to be useful in relieving pain ^[18] and stress ^[19, 20]. This reduced stress level will help in more efficient and regular plaque control. In yogic life style individuals wake up early in the morning for yoga so they have enough time for tooth brushing.

The primary purpose of this study was to evaluate the efficacy of yoga in maintenance of oral hygiene and gingivitis. No adverse reactions to yoga were observed during the trial in the present study. The present study has proved that yoga do not cause any adverse effects on the oral cavity and are effective in maintenance of oral hygiene and gingivitis

Conclusions

The group A practicing yoga is effective in terms of reduction of debris, calculus and Gingival index factor is statistically significantly lower. No adverse reactions of yoga were observed during the trial and therefore it may be concluded that clinically yoga helps in maintenance of oral hygiene and gingival ailments

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