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A Study on the Effects of Flossing

Oral diseases plague the United States as millions are living with gingivitis, a gum disease that causes inflamed gums. Even more, half of all Americans suffer from periodontitis, a gum infection that damages the gums, teeth, and jawbone. Most of all those affected are adults above the age of 30. Up to this day, dentists have widely supported daily flossing as a method to prevent and mitigate the effects of such oral diseases. More recent research, however, has revealed that flossing might not be as effective for promoting good oral hygiene as most have previously thought. Still, no conclusive evidence exists to undeniably disprove the supposed benefits of flossing. The goal, through my own experiment, is to definitively answer the question: does flossing prevent and/or mitigate the effects of gum diseases? Additionally, my experiment will provide innovative insight into whether different strains of bacteria will more influence the development of plaque.

Previous studies had control groups of people who only brushed their teeth, while the experimental groups brushed and flossed. The results varied widely from study to study, but are ultimately inconclusive. One study done on twin pairs over a few weeks by a group of NYU researchers found that decay-causing bacteria was overabundant in the twin that did not floss regularly, as opposed to the twin that did. On the other hand, a study conducted over the period of a few months by Jason Nickerson and his team on 1083 participants says otherwise. Nickerson had a control group of 501 participants only brush their teeth, while an experimental

group of 582 participants brushed and floss. Nickerson's study found that although flossing had some benefits over the course of a few days and weeks, flossing plus tooth brushing is not strongly associated with long-term reduction in plaque. Results from several studies on the effectiveness of flossing are inconsistent because according to a review conducted by Dr. Joanna Asadoorian, Director of the School of Dental Hygiene, at the University of Manitoba, Winnipeg, Canada, reports on the effects of flossing can be influenced. Asadoorian questions the benefits of flossing, stating that flossing should be recognized as having limited effectiveness, and should, at best, be used as an interdental cleaning technique alongside tooth brushing. Conclusions from professional dentists compiled by Kacey Deamer, a staff writer at Live Science, point to the idea that possible benefits of flossing still outweigh the inconvenience. Generally, dentists would argue that even if there is a small benefit, it would be worth all the while to prevent such diseases as periodontitis. However, a study ironically found evidence in the detrimental effects of flossing to oral health. This research conducted on 60 subjects by Kenneth Crasta and his team found that 40% of subjects tested positive for bacteremia, the presence of bacteria in the bloodstream, after flossing with a recommended technique. It was found that flossing can cause to papillary bleeding, which can lead to bacteremia in those with existing gum disease or infections.

These studies and reviews are, for the most part, inconsistent and inconclusive. This is understandable. It's challenging to acquire such evidence in determining a strong conclusion in the first place. There's an overabundance of factors that play into plaque buildup, or lack thereof, such as tooth brushing technique, diet, and the use of other oral products such as mouthwashes. It's difficult to find and monitor a large sample size to such a degree for months, which is the time it takes for oral diseases such as gingivitis and periodontitis to develop.

Additionally, these studies focused on flossing and its effects on the amount of plaque on teeth and gums. What these studies failed to acknowledge, however, are the specific strains of oral bacteria, which can possible influence the buildup of plaque, more so than other strains.

My experiment will track and label the strains of bacteria to validate the theory that different bacteria can cause plaque to develop quicker than others, and therefore, cause gum disease to occur earlier. My experiment will also standardize factors such as subjects' diet, tooth brushing and flossing techniques, and health conditions, factors which play a role in the buildup of plaque. My experiment will have a large sample size, as well as a prolonged study period, specifications which prevented prior studies from reaching concrete conclusions.

Although my experiment is inspired by prior studies, it is designed with the shortcomings of their failures in mind. It will also explore the hypothesis in that certain strains of bacteria cause plaque to build up quicker than others, thus leading to the earlier development of gum disease. To start, my experiment will include roughly 10,000 participants from the same city, all varying in race, age, and gender. It will run for approximately 5 years as it can take months for gum diseases to develop. Because of the large sample size and the relatively long duration, evidence found from this experiment will be undisputable. My experiment will also only take participants from the same city as to eliminate environmental variables that could affect oral health, such as air pollutants, tap water, etc. All participants must have no active dental diseases, must not be an active smoker, and must not be taking any recreational drugs or prescribed drugs that could influence oral health. Again, all of these requirements are to eliminate variables that could influence the results of the experiment. Of these 10,000 participants, 5,000 will be the control group, only brushing their teeth, while the other 5,000 will be the experimental group, brushing and flossing their teeth.

To eliminate as many factors as possible, standards must be held among all participants in the study for the entire duration of the experiment. For instance, all participants must share the same diet. All participants must brush their teeth using the same method for the same length of time, and roughly during the same times of the day. This same standard applies to those participants in the experimental group whom must also floss their teeth using a method recommended by dentists. All oral health products such as toothbrushes, toothpaste, and floss must be of the same brand and model. Additionally, no other oral health products can be used, such as mouthwashes, as this can influence the development of plaque. For the entire duration of this experiment, participants cannot alter their teeth in any way. This includes going to the dentist for cleaning, or getting braces, as these actions can influence the development of plaque. Lastly, participants must sleep for roughly the same amount of time during the night. This is because there is some evidence that sleep can influence oral health. Again, this is all to eliminate as many factors as possible for this experiment as to reach a more concrete conclusion.

Throughout the length of the experiment, participants are to come into the lab monthly to have bacteria samples taken from their teeth and gums. From these samples, I can map the presence of different kinds of bacteria and their volume in the mouth over a long period. I can then relate the presence and amount of these bacteria to each respective group in the experiment to determine whether flossing is effective in preventing plaque and gum disease. I can also use this data to explain outlying cases. For instance, if it's found on participants that there's an abundance of bacteria living on their teeth and gums, yet no plaque has developed, it can be explained that these bacteria are not the strains that promote rapid plaque growth. Thus, despite the existence of bacteria, plaque can take an indefinite time to develop.

My research will finally end the debate of the benefits of flossing. It will succeed all prior research which have all had their results influenced by external factors, and thus their evidence cannot be used to develop concrete conclusions. My experiment, however, eliminates these factors by having all 10,000 participants follow the same standards throughout the 5-year period. It will also offer insight in another factor that all previous research neglected: the different strains of bacteria that influence, or don't influence the development of plaque and gum disease. Because of the large sample size and the relatively long duration, two terms that most previous research lacked, evidence found from this experiment will be undisputable, as well as insightful in terms of the potency of certain oral bacteria.

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