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Can a seaweed preparation applied perorally improve periodontal status? – A clinical pilot study
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Introduction
The oral cavity always contains various bacteria which are “fed” and multiply from the remains of food that readily gather around the gums (gingiva) and between the teeth, forming a sticky coating of food and bacteria known as plaque. To say thanks for the delicious meal, these types of bacteria produce various inappropriate substances: acids which can lead to “cavities in the teeth” (caries) and loosening of the teeth (periodontitis).
The substances formed by the bacterial plaque (acids and bacterial toxins) can rapidly lead to inflamed gums (gingivitis), which has been established to constitute the first clinical sign of one of the common bacterial diseases of the oral cavity, namely loosening of the teeth, or periodontitis. This bacterial plaque can also be mineralised and form what we call tartar which gradually builds up and allows new bacteria to be retained and further plaque to be formed.
Although gingivitis is the first sign of periodontitis, this does not mean that all cases of gingivitis will develop into periodontitis. If the gingivitis is allowed to continue to develop on account of the balance between attack and defence tipping in favour of the attack or bacteria, however, the “suspension system” of the teeth – known in technical terms as the periodont – which attaches the teeth to the underlying bone, dissolves over time and breaks down = periodontitis. If tooth loosening is allowed to progress too far, the teeth may lose so much of the underlying bone that they cannot be saved. A recent Swedish dental health information campaign actually pointed out that more than half the population aged over 40 are heading for tooth loss as a consequence of periodontitis! There are a number of individual factors, such as the quantity of saliva and bacterial flora, plus their composition, which together determine how readily individuals fall victim to the sadly all too common diseases of the oral cavity known as periodontitis and caries.

In addition to a basic balanced diet, top oral health requires regular check-ups and treatment by the dental care team, and this team also has to provide information and guidance on how people themselves need to look after their teeth. For example, after “complete cleaning” including depuration (tartar removal) by a dental hygienist, well planned care by the individual is required in order to keep the mouth clean and fresh.

Apart from keeping the mouth clean by brushing the teeth and using other mechanical aids, new research has now shown that perorally swallowed and thus a systemically applied dietary supplement, PlaqueOff, which contains special maritime algae, can considerably reduce the formation of plaque and tartar.

The aim of this study is to contribute new research results relating to the effects of the seaweed preparation PlaqueOff (both before and after depuration) on plaque, tartar and gingival bleeding, and thus on periodontal status.

Materials and methods
An open clinical trial at Marina Nordlund's dental clinic, Kungsholmen, Stockholm (this clinic has been run by Marina Nordlund since 1985).
22 volunteers, adults selected partly at random (15 men and 7 women aged 26-91, average age of 47) paying revision patients registered with the practice for a number of years, were called to the clinic to take part in the trials.
These people were informed that they would be asked to try out a maritime algae preparation, PlaqueOff, available as a dietary supplement in health food stores, for 10 weeks. PlaqueOff consists of a dried powder made from brown maritime algae, Ascophyllum Nodosum SW1313, and consists of approx. 52 % polysaccharides, 22 % minerals and trace elements, 6 % fibre, 6 % protein and 2 % omega-3 fatty acids. In addition, the preparation contains no colourings, preservatives, salt or sugar.
The trial subjects were informed that the purpose of the trial was to investigate whether the seaweed preparation has any positive effects on the formation of plaque and tartar. The trial subjects were told not to alter their oral hygiene habits. They were not told what would be examined and recorded, or which teeth.

The clinical trial included the recording of plaque, tartar and gingival bleeding in selected parts of the teeth (see below). The same data was recorded at the start of the trial, after 5 weeks, and after 10 weeks (the first part of the project ended at that point). The second part of the project is now in progress, new data being recorded after a further 10 weeks ✹ A total of four sets of clinical data recorded, all carried out by the same clinical dentist.
The quantity of plaque and tartar was graded zero, 1, 2 or 3. If there was no plaque or tartar clinically visible, this was graded zero. A grade of 1 was given if there were coatings, i.e. plaque or tartar, over 1/3 or less of the gingival area of the tooth surface examined. A grade of 2 was given if there were coatings over 2/3, and a grade of 3 meant that more than two-thirds was covered with coatings.
In addition, the dentist wrote information down if she discovered any other clear clinical change in the oral cavity.
The quantity of plaque was determined from the buccal surfaces of the incisors in the lower jaw (31, 32, 41 and 42), and the palatinal surfaces of the "sixes" in the upper jaw (16 and 26). The quantity of tartar was determined on the opposing surfaces of the same teeth, i.e. the lingual surfaces of the incisors in the lower jaw and the buccal surfaces of the "sixes" in the upper jaw. Gingival bleeding was recorded at the buccal, mesiobuccal, distobuccal and palatinal surfaces in the upper jaw (11-16 and 21-26). When recording gingival bleeding, a special periodontal deep measurement probe was used which was pushed into the gingival pocket. Bleeding within 10 seconds was recorded as a bleeding surface. This method is internationally established.

The first part of the project
All trial subjects were told to take two tablets of PlaqueOff a day (divided into two doses taken together with meals) throughout the entire first part, i.e. 10 weeks.
When the first part of the project is completed, the results may, among other things, be compared with earlier similar projects carried out by dentists Sune Wikner and

Bert Mattson, as well as Professor Jan Bergström and staff at the Karolinska Institute.

The second part of the project

Immediately after the third recording of plaque, tartar and gingival bleeding status, all the teeth of all the trial subjects were depurated (tartar and other coatings were removed using manual instruments and ultrasound). After that, half the trial group (random selection) continued with the PlaqueOff supplement for a further 10 weeks. The second half stopped taking the PlaqueOff supplement.

The project was brought to an end after two months with the last recording of data for all trial subjects. The results are expected to be able to provide a good view of how effectively PlaqueOff can prevent the recurrence of plaque and tartar and so also gingival bleeding.

Statistical methods
Statistical calculations have been carried out with a distribution-free test, Wilcoxon's one-sample test*.

Results
The results show that plaque, tartar and gingival bleeding are reduced perceptibly after taking the seaweed preparation PlaqueOff for 10 weeks. All positive changes are statistically assured ($p < 0.01$ with the distribution-free Wilcoxon's one-sample test).

In this trial, the reduction in plaque, tartar and gingival bleeding, and hence the improvement in periodontal status, is deemed to have mainly taken place over the first 5 weeks in which the supplement was administered.

Figure 1. Average quantities of plaque and tartar
At various times in relation to the start of the trial.

Index surfaces
Weeks

Figure 2. Average for gingival bleeding
At various times in relation to the start of the trial.

Index bleeding
Weeks

If we “dress up the results in clinical terms” in a more readily accessible manner, we can state that seven trial subjects experienced considerably fewer surfaces with plaque, and none had more (if the difference in the number of surfaces is two or more, this is deemed to be a clinically relevant difference). With a corresponding judgement, seven have considerably fewer surfaces with tartar, and two had, in contrast, considerably more surfaces with tartar. Fifteen trial subjects experienced considerably reduced gingival bleeding and none had considerably more bleeding (here, a difference of four or more surfaces was deemed clinically relevant).

Discussion

The statistical calculations demonstrate that plaque, tartar and gingival bleeding have been reduced and that the periodontal status has hereby been improved in the trial subjects during the period when they were taking the PlaqueOff seaweed preparation supplement.

As this is a restricted open clinical trial, it is necessary to exercise caution before drawing too far-reaching conclusions regarding the significance of PlaqueOff to the positive effects (see below). However, the results are interesting when viewed in relation to the results of two other recent trials, of which one was a double blind, placebo controlled trial (Jan Bergström and staff, for publication). This trial was the first one to include gingival bleeding, which is the first sign of periodontitis. However, it is not surprising that gingival bleeding, and hence the degree of inflammation in the gingiva, were reduced when there was a reduction in the formation of plaque and tartar. Measurements did not demonstrate any statistically assured difference between five and ten weeks of taking the seaweed preparation supplement. The positive effects became apparent within five weeks and then stabilised. In the above mentioned trial by Prof. Jan Bergström and staff, the quantity of plaque and tartar was measured after four and eight weeks. In this trial, a further improvement was noted in the period between four and eight weeks, and the best results were found in a sub-group that increased its intake of PlaqueOff. This indicates a dose-response link and emphasises the fact that one should place emphasis on the dosage issue in continued trials.

This open trial demonstrates actual clinical results and so various levels of improvement in the trial subjects. Like other open trials, however, one has to grapple with various “confounding factors”, as they are known, i.e. factors which cannot be included in the calculation model but which may nevertheless have been of significance with regard to the results. For example, it is not possible to entirely rule out the fact that the patients – who are aware that they are taking part in a trial and are being given a preparation either with or without their knowledge – may start to do a better job of their oral hygiene. Nor is it possible to know with any certainty whether they took all the seaweed tablets as correctly or regularly over the entire ten-week period. For example, were they less conscientious about taking the tablets over the last five weeks?

However, the results from this trial of PlaqueOff are in line with what has been demonstrated previously and indicate clinical improvement from the PlaqueOff seaweed preparation. Continued research is important. Not least because periodontitis from a global perspective is a major problem among the adult and, above all, the ageing population.

The statistical calculations, which will be reproduced in their entirety in the coming publication, have been implemented by Jan Weiner, statistician at the Swedish Work Environment Authority.

Figure 1.

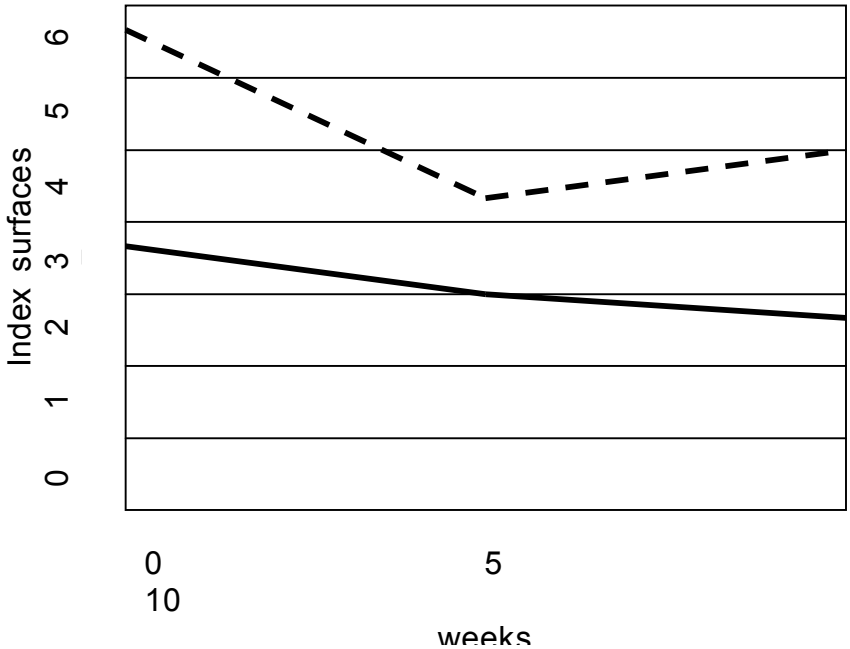

Figure 2.