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COMPARISON BETWEEN DURASHIELD®, MI PASTE PLUS® AND CLINPRO VARNISH® IN HIGH CARIOGENIC RISK PATIENTS

KEY WORDS: Fluoride; Remineralization; White Spot Lesion; Caries

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ABSTRACT

Introduction: Dental caries consists of localized decay of susceptible hard tissue. This phenomenon shows visible reversible signs in its initial state through calcium, phosphate and fluoride reuptake. Objective: Compare Durashield®, Mi paste plus® and Clinpro Varnish® effectiveness in the treatment of caries in high risk patients, Pediatric dentistry class of Andrés Bello University. Materials and methods: This experimental, controlled clinical trial was conducted on 80 patients 4 to 10 years old, with high oral biological risk, presenting white spot active lesions or incipient caries lesions. The sample was divided in 4 groups so they could receive one of these different treatments during 3 months every 15 days: Durashield®, MI Paste plus®, Clinpro Varnish® and a mixture of Mi Paste plus® + Durashield®. The variables Opacity, Porosity, Association to plaque, Use of fluorides and Loss of substance were evaluated.. Results: Chi2 Pearson test was used for statistical analysis, which showed that in relation to the opacity there were significant differences ($p=0.018$), while Fisher's exact test was used to assess the correlation of caries activity, which found that among groups 1, 2 and 4 there were no significant differences in terms of its remineralizing effect ($p>0.05$). Conclusions: The high fluoride content treatments proved to be effective in reversing carious lesions and remineralizing affected tissues, but none proved to be statistically more effective than other.

INTRODUCTION

The current situation of oral health in children indicates that one of the most prevalent pathologies is dental caries; and affects between 60 and 90% of school-age children (1). Early childhood caries is a public health problem that continues to affect babies and preschool children worldwide (2).

Dental caries consists of the localized destruction of susceptible hard tissue from the demineralization of enamel. This phenomenon presents signs that are visible and at the same time reversible in its initial state. One of the clinical manifestations that can be identified is the presence of a white spot lesion that is defined as: "a carious lesion that has reached a stage where the mineral network under the tooth surface has been lost, producing changes in the optical properties of the tooth enamel " (3).

Although the etiology and development of dental caries is multifactorial, there are several variable risk factors that allow us to predict the presence of the disease, such as salivary flow and composition, consumption of sugars in the diet, exposure to fluorides and oral hygiene (3)

Being a major public health problem, its prevalence has been reduced in many developed countries (4). This is due to the fact that scientific and technological development has made available to Dentistry diagnostic instruments and novel materials that allow a less invasive and more conservative and safe therapeutic management, that is why Anderson et al., In 1993, that the best The way to treat caries lesions was not on the edge of the dental bur, but dentists had to see beyond the lesions to treat caries as the disease that it is and not only attend to its manifestations on dental tissues (5)

Thus, in the search to find components that intercept the evolution of dental caries, products such as fluoride, casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) and calcium triphosphate have been found; that have been used as remineralizing agents and protectors of incipient caries lesions (6).

Caries can be reversible in its early stages, white spot, and it is there, where remineralizing agents take on great importance. Remineralization constitutes a natural process of repair of the injuries produced by the imbalance between the loss of minerals and their subsequent recovery. This process has been known for more than 100 years, but only in recent decades has its therapeutic role in the control of dental caries been accepted (7). The objectives of remineralization focus on the possibility of reversing the initial processes of the disease, and it is a procedure that is increasingly used by dentists concerned about performing minimal intervention dentistry (6).

Therefore, an incipient lesion can be remineralized and there are various agents to promote remineralization, such as fluoride, whose ability to fulfill this objective is recognized. By definition, the term "topical fluoride" is used to describe those delivery systems which provide fluoride to exposed surfaces of the dentition, at elevated concentrations, for a local protective effect, and are therefore not intended for ingestion (8). The application of this element has been, until now, the best remineralization strategy; however, for some authors this therapy is limited (9).

At present, new strategies have been investigated to promote the tooth repair process thanks to the calcium and phosphorus present in saliva and in the biofilm. These are:

- Combine remineralizing agents with fluoride to increase the latter's anticaries effectiveness.
- Use dental remineralizing products as independent agents (9).

From the above, the concern arises to establish a relationship between the various products, to determine that there are no significant differences in the effectiveness of one and the other.

METHODOLOGY

Sample selection

The following experimental study, a controlled clinical trial, was carried out with the participation of 80 patients between 4 and 10 years of age, with the prior informed consent of the attorney-in-fact, at the pediatric dentistry clinic of the Andrés Bello University in Santiago de Chile (UNAB). The patients were at high cariogenic risk, with active white spot lesions or incipient caries, on the vestibular surfaces of the teeth, whether temporary or permanent.

From the total number of patients, all those who presented: bad oral habits, some systemic disease associated with MIH syndrome (Molar-Incisive Hypomineralization), decreased salivary flow, alterations in their motor skills, hypoplasias, and hypomineralizations, were used. as a source of information, the clinical file of each patient, which allowed filling out a form with their data and selecting patients using theINTEGRAL ORAL HEALTH Clinical Guide FOR CHILDREN AND GIRLS AGED 6 YEARS OLD of the Ministry of Health of Chile; which establishes the presence of white spot lesions as an indicator of high oral biological risk.

Sample preparation

Once the study group was obtained, the clinical examination was carried out by visual inspection, evaluating the presence of incipient lesions on the vestibular faces of the teeth. For this, a prophylaxis was carried out prior to the clinical examination, in addition to a good management of lighting, to describe its optical characteristics and porosity.

Determination of study groups

A calibrated examiner, complete examination instruments (caries scanner, mirror and tweezers), triple syringe, and light source were available. Then, the study group was divided into 4, of 20 patients each, according to the type of treatment to be performed: Group 1 applied only Durashield®, Group 2 applied only My paste plus®, Group 3 applied only Clinpro® fluoride varnish, Group 4, My paste plus® was applied combined with Durashield®. The form of application was carried out according to the manufacturer's instructions and the frequency of these was every 15 days during a period of 3 months (12 weeks), time in which changes in the activity and size of the stain lesion have been evidenced white.

Table I: Description of the study groups

Groups	Brand	Comercial House	Composition
1	Durashield®	Sultan HC	5% Sodium Fluoride (22,600ppm F-)
2	My Paste Plus®	GC America ING	Recaldent / CPP-ACP (900ppm F-)
3	Clinpro Varnish®	3M	Calcium glyceratopho sphate
4	Durashield + Mi Paste Plus®	Sultan HC / GC America ING	5% Sodium Fluoride (22,600ppm F-) Recaldent / CPP-ACP (900ppm F-)

Application methodology

Group 1:

In the first session, each patient was clinically evaluated, then full mouth prophylaxis was performed with a soft brush and water, to later apply the Durashield® 5% fluoride varnish with a brush, following the manufacturer's instructions. Subsequent controls were carried out according to the protocol.

Figure 1. Durashield® clinical application.

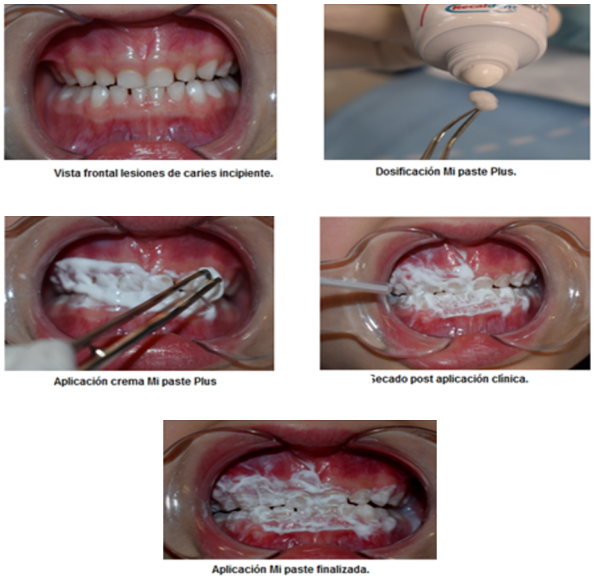


Figure 2. Mi paste plus® clinical application.

Group 2:

In the first session, the same initial clinical examination procedure was performed and prophylaxis of the entire mouth was performed with a soft brush and water, to later apply Mi Paste Plus® with a brush, according to the manufacturer's instructions. Controls were carried out according to the protocol

Group number 3:

In the first session, a clinical examination was performed, and then a prophylaxis of the entire mouth was performed with a soft brush and water, to later apply with a Clinpro Varnish® brush, according to the manufacturer's instructions. Subsequent controls were carried out according to the protocol

Figure 3. Clinpro varnish® clinical application.

Group 4:
In the first session the same procedure was carried out as in the previous groups. Subsequently, prophylaxis of the entire mouth was performed with a soft brush and water, to later apply with a Durashield® brush, during the first week and then Mi Paste Plus®, the following week, all this according to the manufacturer's instructions. In the same way as in the previous groups, the subsequent controls were carried out.

After this, the patients were referred to controls after 6 months to determine and evaluate regression and remineralization of these lesions using the same conventional methods mentioned above.

RESULTS
To carry out the statistical analysis of the results obtained, these were tabulated according to each study group, and the presence or absence of the different variables, for which dichotomous tables were made where the items opacity and porosity were considered as indicators of activity. cavities.

Table 2: Summary behavior of the different groups observed in each variable at the different evaluation times

Groups	Weather	Opacity	Porosity	Plate association	Use of fluorides	Loss of substance
Group 1	0	20	8	20	12	4
	30 days	12	8	12	20	4
	60 days	6	8	7	20	4
Group 2	0	20	7	9	11	3
	30 days	20	7	9	11	3
	60 days	18	7	4		3
Group number 3	0	20	7	10	10	4
	30 days	16	7	8	20	4
	60 days	6	5	2	20	2
Group 4	0	18	10	16	8	8
	30 days	14	10	13	20	8
	60 days	7	6	4	20	8

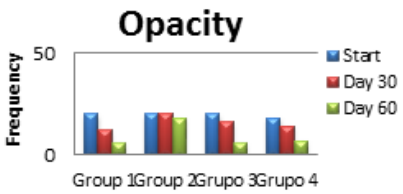
Table 2 indicates the qualitative variables to be analyzed within each group at the beginning of therapy, where it is shown that there are no significant differences between them, applying Pearson's Chi2 tests, with a 95% confidence interval, where for Opacity (p = 0.104), Porosity (p = 0.741); both variables as an indicator of caries activity, the same situation is obtained from the variables Use of fluorides (p = 0.626)); and Loss of substance (p = 0.254). However, when analyzing association with plaque, if there is a significant difference and this may affect the success of some of the therapies over the others (p = 0.0003).

After 30 days of treatment, the first control of the patients was carried out, the data obtained allow a correlation between the different variables by means of Pearson's Chi2 tests where it is obtained that Opacity (p = 0.018), Porosity (p = 0.741), Plaque association (p = 0.333), Fluoride use (p = 1.124) and Substance loss (p = 0.254). This indicates that there are significant differences in relation to the opacity of the caries lesions in the different study groups, while the other variables do not present differences.

Table 2 shows the distribution of the different groups after 30 days of treatment according to the different observed variables, where it is possible to appreciate statistically significant differences in terms of the presence of opacity and use of fluorides, however in relation to porosity and loss of substance, it is observed that they still remain constant, and that in terms of association with plaque, although there is a positive movement of the sample, this is not significant within the analysis. It is also possible to observe that in group 2 there has not been a shift from the presence to the absence of opacity yet.

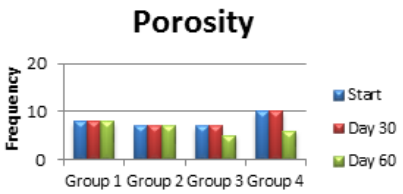
It is also possible to observe the behavior of the different groups after 60 days of treatment in each of the variables, it follows that the opacity variable is the one that reflects important differences between the groups, and remains in positive evolution in relation with the other characteristics, despite the fact that there is still a movement in the variables porosity, white association and loss of substance; this is not significant.

From the analysis obtained, it was possible to determine which distribution occurred in each variable and at the different times of evolution, and this is what is observed, for example, in Graph 1, in which the opacity in groups 1, 3 and 4 is in a decrease from the 30th, a phenomenon that continues towards the 60th; a situation that is not generated in group 2, in which on day 30 it remains the same at the beginning and on day 60 it presents a slight decrease.



Graph 1: Distribution of the variable Opacity in the different groups in the 3 study periods.

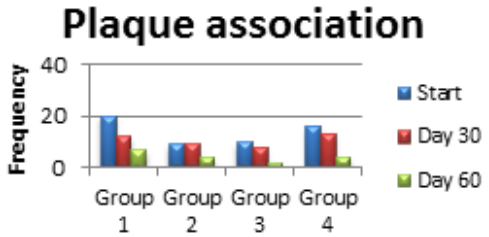
When analyzing Graph 2, a constant in porosity is observed in all groups after 30 days of treatment, while at 60 days only groups 3 and 4 show a decrease, which when comparing both groups in the period that comprises of At 30 to 60 days, it is observed more important in group 4.



Graph 2: Distribution of the variable Porosity in the different groups in the 3 study periods

The same analysis is applied to the plaque association

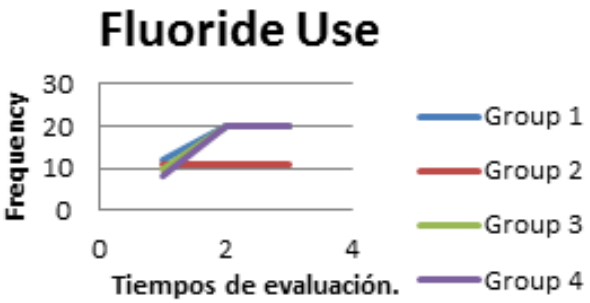
variable observed in graph 3, which shows a progressive decrease in each period and in groups 1, 3 and 4; while No. 2 remains constant for the period of 30 days and only after 60 days a variation occurs. In group 1 it was where it decreased the most and this factor may be predictive in the success of the treatment.



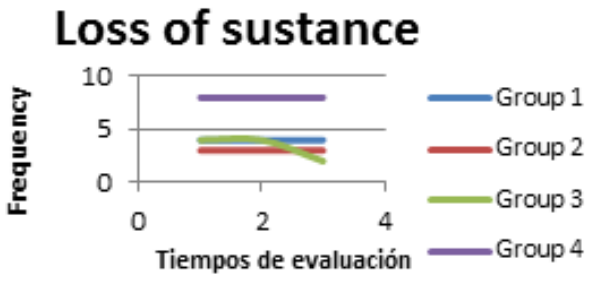
Graph 3: Distribution of the variable Association to plaque in the different groups in the 3 study periods

Graphs 4 and 5 show the distribution of the variables fluoride use and substance loss respectively, it is possible to observe; in the case of the use of fluorides, that group 2 remained constant during the 3 evaluation periods, and groups 1, 3 and 4 started with a low use of these, and then after 30 days and all members of the group adhered to the use of different agents that present fluorides.

In the case of substance loss, groups 1, 2 and 4 remained unchanged throughout the treatment, while group No. 3 presented a slight decrease only after 60 days of treatment, which is not to a great extent conclusive.



Graph 4: Distribution of the variable Fluoride use in the different groups in the 3 study periods.



Graph 5: Distribution of the Loss of substance variable in the different groups in the 3 study periods.

Caries activity correlation

To analyze the evolution of the study groups between 30 and 60 days of treatment in relation to caries activity, the opacity and porosity variables mentioned above were used as indicators. For the data crossing, 2x2 tables were used and their correlation was based on Fisher's exact test. From the results obtained, it is clear that group 3 presents significant differences in relation to the rest of the groups when observing the opacity variable, and that the porosity variable does not present statistically significant variations in any of the groups; Therefore, it is possible to deduce that the treatments after reaching 30 days behave in a similar way as at 60 days, this in groups 1, 2 and 4. However, group 3 continues in a positive evolution (Table 3) .

Table 3: Correlation results of caries activity between 30 and 60 days applying Fisher's exact test

Groups	Opacity	Porosity
1.- Durashield®	p = 0.111	p = 1
2.- My paste plus®	p = 0.487	p = 1
3.- Clinpro white varnish®	p = 0.004	p = 0.731
4.- Durashield / Mi paste plus®	p = 0.056	p = 0.333

DISCUSSION

The objective of this work was to carry out fluoridation and remineralization measures of incipient caries lesions. It was possible to clinically observe the behavior of the lesions during this repair process in terms of caries activity indicators such as the presence of opacity and porosity in these, and in turn its association with the presence of bacterial plaque, use of fluorides and loss of substance dental.

The results show that these varnishes are possible to apply independently and in combination, showing positive evolutions in groups 1, 3 and 4 in terms of opacity, an aspect that showed greater changes over time, obtaining significant differences in both evaluation periods p = 0.018 and p = 0.000 respectively; While the porosity variable only showed changes after 60 days of evaluation in groups 3 and 4, not being statistically significant in either of the two, however, No. 4 was the one that in relation to the observed frequency, it was stated a greater number of patients with a decrease in this characteristic, which could already indicate that the combined therapy of Durashield® fluoride varnish with Mi paste plus® yielded higher levels of remineralization in the patients studied;

In relation to the association with bacterial plaque, it was found that in groups 1, 3 and 4, it was again those that showed an important improvement, being N ° 1 the one that achieved greater adherence to treatment; Although the differences obtained in this aspect are not significant, it is a determining factor or predictor in the success of any therapy to have achieved that the patients improved their hygiene control, since when observing group 2 in which there were no large variations, the caries activity did not cease in relation to the variables previously observed. Have Cate and Featherstone,

The relationship of the treatments used with the use of fluorides is also important, for each patient, since it coincides that those groups in which all its members included fluorides as a complement to their habit of oral hygiene; showed a positive evolution in terms of caries activity and association with plaque; this could indicate and demonstrate that fluoride remains the gold standard agent for the control and regression of incipient caries lesions or white spot. That is why it is necessary to consider the influence that the age of the patients has since, in general, patients between the ages of 4-7 years receive oral hygiene from their parents and they should also have been included in the plaque control of the patient and incorporate the use of fluoridated pastes in them,

The loss of tooth substance was also the variable that made the difference in the three groups that repeatedly showed changes throughout the therapy, since at 60 days it was possible to show that group 3 showed the first changes since it recovered dental tissue, as porosity decreased and although they are not significant, it prevailed over groups 1, where Durashield® was applied, and 4, which used Durashield® and Mi paste plus®.

Therefore, it can be determined that all the treatments that used fluoride as an agent and / or as a complement to it; helped repair the affected dental tissue, therefore promoting remineralization, however there are various factors that influence the success of these treatments as it was possible to

observe in the study, even investigations reveal that any protocol for the application of fluoride varnishes must be based on the caries risk of each patient and the evidence of the efficacy of the use of fluoride in promoting remineralization in children and adolescents is clear (12).

Regardless of the product used, those that contain greater amounts of fluoride in their composition yielded better results, however, within the observed groups, there were no significant differences between them. What is conclusive is that group 2 did not show a positive response in terms of the remineralizing process and it is agreed that there was not a good control of bacterial plaque and it was not supplemented with a habit of hygiene based on fluorides, in most of the patients. cases. Various authors have shown and maintained that fluoride therapy decreases the demineralization rate and increases mineral reuptake each time the Ph falls below the critical level. This can occur several times during the day, therefore, fluoride must be present when this occurs (12, 13).

CONCLUSIONS

Recognizing the lesions that caries produces as a result of demineralization and remineralization processes, makes it necessary to establish early diagnoses and estimate the risk of the patient to propose non-invasive treatments in an individualized way, such as the application of fluorides at variable time intervals, and thus to be able to determine which therapy to use will be achieved successfully

According to the study carried out, it was found that Durashield® and Clinpro varnish® behaved in a similar way in promoting remineralization, during the study time.

Those patients who used combination therapy with Durashield® and Mi paste plus® did not obtain significantly better results than the groups that used Durashield® alone, however, both products were able to enhance their effect, since the use of therapy with Mi paste plus® for On its own, it did not produce major remineralizing effects in patients.

Monitored oral hygiene measures are needed to combat and prevent the progression of incipient caries lesions in high-risk patients, since otherwise no remineralizing therapy would be fully effective.

It is necessary to control the behavior of each patient after the therapy has been performed, in order to know whether or not the indications given after each application were carried out.

Finally, it is proposed to carry out a study with a more homogeneous group of patients, in order to reduce the variables that affect this study, such as the affected tooth, type of dentition, the patient's age and adherence to treatment.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest in this publication.

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