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The Effect of Administering Casein Phosphopeptide Amorphous Calcium Phosphate (CPP_ACP) on ph Salivary and Children's Risk Caries Score

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Abstract
Background: *Remineralization therapy is a therapeutic method of caries prevention by applying Phosphopeptide Casein-Amorphous Calcium Phosphate (CPP-ACP) on dental caries in initial conditions manifested as "White Spot."*
The Objective: *This study aims to determine the effect of Amorphous Calcium Phosphate Casein Phosphopeptide (CPP-ACP) to the pH of saliva and score early childhood caries risk in children.*
Method: *This study is a quasi-experimental design with equivalent control group design with pre-test and post-test. The subjects of this study early childhood Qurratal Ayyun all children of Banda Aceh were 30 children and their parents as respondents, and then divided into two groups, intervention group consisted of 15 children given the application of CPP-ACP, and the control group included 15 children. Analysis of data using paired samples t-test and independent t-test.*
Result: *The results showed no differences between the mean values saliva acidity (pH of saliva) and the children's early childhood caries risk score in the control group were statistically significant (p> 0.05).*
Conclusion: *There is a change in the average value of saliva acidity (pH of saliva) and the children's early childhood caries risk score after the application of CPP-ACP in the treatment groups were statistically significant (p <0.05).*
Keywords: *CPP-ACP, the pH of saliva, Caries Risk Score.*

Introduction

Rampant caries is caries occur very quickly and on a few teeth and often cause pain that is difficult to eat and fussy child. Caries is commonly found in children aged less than five years old (toddlers), with the spread of the highest in children aged three years (Heriandi, 2001). Wei (1989) states that rampant caries occur because of the activities of microorganisms in plaque and saliva from consuming processed foods containing sucrose in between meals, as well as lowering the secretion of saliva.

Impact of caries for children is enormous, among others: pain, impaired chewing function that inhibits the consumption of food or nutrients, anemia, lack of sleep disorders such comfort and eventually reduce the quality of life of the child (Adyatmaka, 2012). Another effect is the

distraction of learning that will affect the learning achievement (Kemenkes. R.I, 2012).

Results Health Research in 2013 showed Indonesia's population has dental problems and mouth of 25.9% where 62.9% of the people in the province develop cavities (Riset Kesehatan Dasar, 2013). Based on the report of Banda Aceh Health Office in 2014, oral and dental disease (caries) ranks 14 of the 20 most massive illnesses with visits 4779 visits.

Tooth demineralization occurs when the acid concentration in the oral environment is having a pH below 5.5 which cause tooth enamel dissolution of inorganic minerals. Demineralization will stop if the pH back to normal and there is a calcium ion concentration or a high phosphate ion in saliva so it can happen remineralization process (Amerongen,1991).

Remineralization ingredients are beneficial to prevent demineralization and remineralization accelerate in mineral restore teeth that have been lost so that no further damage occurs. Remineralization ingredients that can be used include *Phosphopeptide Casein-Amorphous Calcium Phosphate* (CPP-ACP). These remineralization agents used as active ingredients in the products circulating in the community. Such products can be provided in the form of a topical paste (Mount, G.J.and W.R. Hume, 2005).

By remineralization therapy, caries process can be stopped even be reversed.

CPP-ACP is an anticariogenic agent. Remineralization agents such as CPP-ACP has the advantage of being able to stabilize calcium phosphate and prevent demineralization. CPP-ACP *nano complex* casein protein found in cow's milk. *Casein Phosphopeptides* (CPP) stabilize and localizes ions calcium, phosphate and fluoride to the tooth surface by binding pellicle and generate new bond structure is more stable. CPP-ACP when it combines with fluorine to form a bond CPP-ACFP that can raise the pH of the better and create more complex structures (Tinanof &. Douglass,2001).

Given the risks that occur in caries affect the growth process of children, then the way that early prevention is essential to do that is through the understanding and participation of older people. Childhood is the beginning of the formation of behavior. Children aged between 3-5 years old is the age group where children do not have a sense of responsibility/patterns of behavior towards action to clean the teeth and mouth so that the role of parents, especially the mother is indispensable in guiding and improving oral health (Budiharto, 2009).

So far some programs have been carried out various parties for a long time, either through government programs, mass media, advertising on television, or counseling at the health center, but less able to improve the dental health of the public sector (Herijulianti, 2002). Therefore, it needs innovative ideas so that dental health professionals to develop a model of health promotion and prevention of caries through caries risk factor control, one of them through the application of CPP-ACP.

Methods

The research is a Quasi-Experimental Design with the study design with pre-test and post-test (Bahar, 2011). Subjects in this study are all children of early childhood Ayyun Qurratal Banda Aceh were 30 children and their parents as respondents, and then divided into two groups, intervention group consisted of 15 children given the application of CPP-ACP, and the control group included 15 children. The sampling technique in this research is purposive sampling. Variable intervention in this study is the provision of CPP-ACP. The independent variable (effect) that the pH of saliva and caries risk scores before the intervention, while the dependent variable (affected) is pH Saliva and caries risk scores after the intervention.

Independent t-test is to determine the difference increase of pH salivary and caries risk children decrease in score between the treatment group and the control group.

Results

1. **Analysis of Difference *(Paired* sample-test)**
   a. **pH Salivary**
      1) pH Salivary in Group Treatment

Mean difference from *pre-test* to *post-test* I, *the post-test I* to *post-test* II, and *the pre-test* to *post-test II pH* salivary in the treatment group are presented in the following table:

Table: 1 Mean difference and standard deviation pH salivary in the treatment Group

Data	mean ± SD difference	t	p
pre-test to post-test I	-1.29 ± 0.467	-10.733	<0.001 *
Post-test to post-test I II	-0.42 ± 0.41	-3.925	0.002 *
pre-test to post-test II	-1 , 71 ± 0.55	-11.977	<0.001 *

Remarks * = significant

Table 1 showed that an increase in the value of the pH salivary in the treatment group from pre-test to post-test first with a mean difference of -1.29 from post- Test I to post-test II with a mean difference of -0.42 and from pre-test to post-test II with a mean deviation of 1.71. There are differences between the mean value of the pH salivary, which was statistically significant (p <0.05).

2) pH Salivary in the control group

Mean difference from pre-test to post-test I, the post-test I to post-test II, and the pre-test to post-test II pH salivary of the children in the control group presented in the following table:

Table: 2 Mean difference and standard deviation pH salivary in the Control Group

Data	difference mean ± SD	t	p
pre-test to post-test I	0.25 ± 0.27	3.570	0.073
Post- I test to post-test II	0.10 ± 0.24	1.740	0.060
The pre-test to post-test II	0.36 ± 0.38	3.674	1.000

Remarks * = significant

Table 2. showed that the pH salivary Control group of children at pre-test to post-test first with a mean difference of 0.25 from the first post-test to post-test II with a mean difference of 0.107 and from pre-test to post-test II with a mean difference of 0.36. There are no differences between the mean value of the pH salivary of the children were statistically significant (p> 0.05).

b. **Score Risk of Caries Children**

1) Risk Caries Children Score In Group Treatment

Mean difference from pre-test to post-test I, the post-test I to post-test II, and the pre-test to post-test II score caries risk children in the treatment group presented in the following table:

Table: 3 Mean and standard deviation difference in caries risk score child in treatment Group

Data	mean ± SD difference	t	p
pre-test to post-test I	18.80 ± 5.84	12.456	<0.001 *
Post-test I to Post-test II	18.07 ± 5.47	12791	<0.001 *
Pre-test to post-test II	36.87 ± 6.41	22.266	<0.001 *

Remarks * = significant

Table 3. showed that occur decrease of caries risk score children in the treatment group from pre-test to post-test first with a mean difference of 18.80, from the first post-test to post-test II with a mean difference of 18.07 and from pre-test to post-test II with a mean difference of 36, 87. There are differences between the mean scores of children whose caries risk was statistically significant (p <0.05).

2) Score of Risk Caries Kids In Control group

Mean difference from pre-test to post-test I, the post-test I to post-test II, and the pre-test to post-test II score of caries risk children in the control group are presented in the following table:

Table: 4 Mean difference and deviation score standard of caries risk children in the control group

Data	mean ± SD difference	t	p
pre-test to post-test I	3.27 ± 3.41	3,709	),067
Post-test to post-test I II	2, 33± 2.66	3.393	0.074
pre-test to post-test II	3.42 ± 3.11	6.969	0.060

Remarks * = significant

Table 4. showed that carries risk score of the control group of children at pre-test to post-test first with the mean difference of 3.27 from the first post-test to post-test II with a mean difference of 2.33 and from pre-test to post-test II with a mean difference of 3.42. There are no differences between the mean scores of caries risk children in the control group were statistically significant (p> 0.05).

2. **Analysis of the Difference between groups *(Independent* t-test)**

a. **pH Salivary of Children**

Results of study of pH salivary between the treatment and control groups as follows:

Table: 5 Mean and standard deviation of pH salivary between the treatment group and the control group

pH salivary	**group**	**mean ± SD**	**t**	**p**	**Ket**
Pre-test	treatment	of 5.69 ± 0.37	-2.585	0.510	Not Significant
	control	6.01± 0.32			
Post-test I	treatment	6 , 98 ± 0.19	12.894	<0.001 *	Significant
	Control	5.76 ± 0.32			
Post-test II	treatment of	7.40 ± 0.34	12.566	<0.001 *	Significant
	Control	5.65 ± 0.42			

Table 5. showed that there are no differences in the pH salivary significantly before the intervention *(pre-test)* between the treatment group and control group. This is demonstrated statistically significant p> 0.05. There are significant differences of pH salivary shortly after treatment *(post-test I)* between the treatment group and control group. This is demonstrated statistically significant p <0.05. There are significant differences pH salivary two weeks after treatment *(post-test II)* between the treatment group and control group. This is demonstrated statistically significant p <0.05.

b. **Caries Risk Score Children**

Caries risk score analysis results between treatment and control groups are as follows:

Table: 6 The average and standard deviation between the treatment group and the control group

Caries Risk score	**Group**	**Mean ± SD**	**T**	**p**	**Adj**
Pre-test	Treatment	95.73 ± 2, 71	0.640	0.527	Not Significant
	Control	94.93 ± 4.01			
Post-test I	treatment	76.93 ± 5.09	-7.614	<0.001 *	Significant
	Control	91.67 ± 5.50			
Post-test II	treatment	58, 87 ± 5 , 26	-15.60	<0.001 *	significant
	control	94.50 ± 5.43			

Table 6. showed that no differences were significant caries risk score before the intervention *(pre-test)* between the treatment group and control group. This is demonstrated statistically significant p> 0.05. There are significant differences caries risk scores after treatment *(post-test I)* between the treatment group and control group. This is demonstrated statistically

significant p <0.05. There are significant differences caries risk score two weeks after treatment *(post-test II)* between the treatment group and control group. This is demonstrated statistically significant p <0.05.

Discussion

Based on the analysis results between groups *(independent t-test)* showed that in the control group value pH Salivary is not an increase in the value pH Salivary. But the treatment group values pH Salivary after being given the CPP-ACP boost the amount of pH Salivary.

According to the analysis by analyzing the differences in the difference *(paired sample* t-test), pH Salivary in the control group showed no differences between the mean value of the pH Salivary of the children were statistically significant. But pH Salivary in the treatment group showed no differences between the mean value of the pH Salivary were statistically significant. These results suggest that topical application of preparation *GC Tooth Mousse.* Recaldent product containing a compound of derivatives *calcium phosphate* or CPP-ACP is applied as much as 1 mg.

CPP-ACP application can protect teeth from demineralization. CPP-ACP containing calcium and phosphate concentrate the required high gear. CPP-ACP is applied on the tooth surface, increasing the pH Salivary. Because of this, CPP-ACP maintains saturation that prevents enamel demineralization and enhances remineralization. Reviewing CPP-ACP is usually carried out continuously on a regular basis.

Several studies have concluded that increased dental caries status of a person characterized by increased biofilm is composed of bacteria *acidogenic* and acid-resistant acidity rises pH Salivary. Thus, by measuring the pH, Salivary and acidity can be estimated potential cariogenic biofilm bacteria. The pH Salivary and biofilm pH is an indicator of the risk of dental caries (Adyatmaka, 2008).

Based on the analysis between groups *(independent t-test)* respectively obtained the following results: in the control group decreased caries risk score. In the other hand, the treatment group reduced caries risk score.

According to the analysis by analyzing the differences in the difference *(paired sample* t-test) scores caries risk in the control group showed no differences between the mean value of the pH Salivary of the children were statistically significant. But the caries risk scores in the treatment group showed no differences between the mean value of the pH Salivary were statistically significant. There is a tendency after doing basting CPP-ACP changes caries risk score in either direction. With the CPP-ACP application of the indispensable role of a mother, a mother should know the risk factors that can lead to caries in children and how to prevent it because of the risk to each child is different and varies over time. This is following Jones' et.al (2005) opinion saying that the indispensable role of parents in guiding, giving understanding, remembering and provide facilities to the children so that children can maintain dental hygiene and mouth. Besides the parents also have a significant role in preventing the accumulation of plaque and caries in children. Mother is trying to do the direct observation to detect cavities, mother to prevent cavities in children by helping children brushing teeth, limiting eat sweet foods and also applying cream Mother teeth *(CPP-ACP)* in children. To realize the real action will require supporting factors or conditions that allow, among other facilities (Santhosh, et.al, 2012). In this study, researchers provide cream *CPP-ACP* to take home by the mother so that train mothers to prevent the occurrence of caries by giving supplements *of calcium phosphate*, in particular, to maintain the balance of demineralizing –demineralizing process into a positive. Once someone knows a stimulus or health object then conducted an assessment or opinion on what is known, the next operation is expected child, and the mother will be

able to implement or practice of what is known or considered good (Notoatmodjo, 2010).

Caries risk is the possibility of developing caries in an individual or a change in health status that favor the occurrence of caries in a given period. Caries risk varies between individuals depending on the balance of precipitating factors and inhibiting the presence of caries. Caries risk is divided into three levels, namely a high caries risk, medium and low. To identify the risk of caries in children using a caries risk assessment.

Conclusion

1) There is no significant difference in the mean value of the acidity of saliva (salivary pH) of the children in the control group.
2) There are significant changes in the mean value of the acidity of saliva (salivary pH) of the children after the application of CPP-ACP in the treatment group.
3) There is no significant difference in mean score caries risk children in the control group.
4) There are significant changes in the mean value of the acidity of saliva (salivary pH) of the children after the application of CPP-ACP in the treatment group.

References

1. Adyatmaka, I. Model Simulator Risiko Karies Gigi Pada Anak Prasekolah. (Disertasi) Fakultas Kedokteran Gigi Universitas Indonesia. 2008; 11-13
2. Adyatmaka, I. *Donut Irene versi Manual 1.3. "Simulator Risiko Karies".* Kementerian Pendidikan Nasional. CHAMPS-FKM- Universitas Indonesia. Jakarta. 2012; 1-16
3. Amerongen A, van Nieuw. Ludah dan kelenjar ludah. Yogyakarta: Gadjah Mada University Press; 1991. h. 1–42, 157–71
4. Bahar, A. Paradigma Baru Pencegahan Karies Gigi. Fakultas Ekonomi Universitas Indonesia. Jakarta. 2011; 4-39
5. Budiharto. *Pengantar Ilmu Perilaku Kesehatan dan Pendidikan Kesehatan Gigi.* EGC. Jakarta. 2009; 1-73
6. Dye BA, Early childhood caries American academy of pediatric dentistry, 2007(284):.1-3
7. Heriandi Y. Silver diamine fluoride salah satu alternative impregnasi karies rampan pada anak Majalah ilmiah kedokteran gigi, 2001(46):167-173
8. Herijulianti, E. Pendidikan Kesehatan Gigi. EGC. Jakarta. 2002; 35-60
9. Jones Sheila, Brian A. Burt, Poul Erik Petersen, Micheal A. Lennon. The effective use of fluorides in public health. Bulletin of the world organization. 2005;83(9):670-6
10. Kemenkes. R.I. *Pedoman Usaha Kesehatan Gigi Sekolah (UKGS).* Jakarta. 2012; 11-46
11. Mount, G.J.and W.R. Hume, eds. *Preservation and Restoration of Tooth Structure*. 2nd ed. Dental Caries The major Cause of Tooth Damage, ed. J.M. McIntyre. 2005, Knowledge books and software: Queensland.
12. Notoatmodjo, S. Promosi Kesehatan, Teori dan Aplikasinya. Rineka Cipta. Jakarta. 2010; 43-310.
13. Santhosh, Jethmalani P, Shashibhushan KK, Subba Reddy VV., Effect of phosphate containing chewing gum on salivary concentration of calcium and phosphorus: An in vivo study. J Indian Soc Pedod Prev Dent., Apr-Jun 2012;(30)2.pp. 146-150
14. Riset Kesehatan Dasar, 2013, Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan
15. Tinanoff, N. And J.M. Douglass. *Clinical Decision-Making for Caries Management in Primary Teeth.* J Dent Educ. 2001; 65(10): 1133-1142.