ANALYSIS OF PAIN THRESHOLD AND MATRIX METALLOPROTEINASE (MMP)-8 LEVEL GINGIVAL CREVICULAR FLUID AS A SUCCESSFUL TREATMENT INDICATORS OF DENTIN HYPERSENSITIVITY POTASSIUM NITRATE INDUCED BY IONTOPHORESIS

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ABSTRACT

Dentine hypersensitivity is a major problem in the field of dentistry. Attrition, abrasion, clinical occlusal adjustment, the crown fractures, gum recession, restoration iatrogenic, trauma orthodontist, can be the cause of dentin hypersensitivity. In general, more than 90% area is the opening of dentine hypersensitivity in tooth root area, usually on the buccal surface of teeth. The purpose of this study is to obtain the effectiveness of potassium nitrate iontoforesis on pain threshold values and levels of matrix metalloproteinase (MMP)-8.Quasi-experimental research conducted on male and female patients aged 20-40 years with dentine hypersensitivity in premolar or canine teeth that meet the criteria for inclusion, and were willing to be treated in RSGM FKG Unpad with iontoforesis. Data obtained by measuring the value of using dental pain threshold before and after iontoforesis vitalytester also measured levels of MMP-8 before and after iontoforesis with Elisa method on tooth gum recession that observed for 2 weeks. The research sample is divided into several treatment groups are conducted with material desensitasi iontoforesis various concentrations. Draft analysis to dab pain threshold levels of MMP-8 before and after iontoforesis by paired T-test and analysis of variance. To determine the effect of various concentrations of the materials to the threshold of pain is influenced by the time used multivariate of analysis. The results showed that the concentration of the solution, time, pain threshold value related. Potassium ions in solution is more effective in overcoming desensitasi dentine hypersensitivity.

Keywords: *Dentine Hypersensitivity,, Iontoforesis, Pain Threshold, Levels of MMP-8*

INTRODUCTION

One problem often encountered in the field of dentistry is dentin hypersensitivity with complaints of pain in his teeth a certain time. The pain is usually experienced when eating, drinking hot, cold or due to airflow passing through the mouth while breathing or talking as well as brushing teeth. Teeth with open roots common in canines and premolars.

Mechanism of excitatory in areas receiving the oral cavity is a series of processes consisting of excitatory acceptance, changes in stimuli into impulses, delivery impulses from peripheral receptors, the next impulse was taken along the path trigeminus nerve and ultimately to somatic sensory area of the cerebral cortex. Processes in the nervous system causes excitatory in the pulp caused a sensation of pain. This phenomenon arises because the pulp there is only one type of receptor that is the free end of nerve fibers without mielin.4, 5 .

Iontoforesis is an electronic technology that can drive ions into the dentin. Murphy and his colleagues reported that sodium fluoride (NaF) with iontoforesis in the treatment of dentin hypersensitivity to pain relief immediately after the 1-time application. 14-19

Potassium ions in toothpaste is often used as an ingredient desensitasi. Potassium ion is applied iontoforesis has never been done, it becomes interesting to study. Desensitasi potassium ions as the material cause depolarization at the nerve endings teeth. Potassium ion concentration will increase the concentration of extracellular potassium ions around the nerve section in dentin and pulp. Combined potassium salt ions have two effects in dealing with dentine hypersensitivity. The pain is described as dentin hypersensitivity reaction triggered by people with neurogenic and expressed through proinflammatory neuropeptides in gingival crevicular fluid (GCF). These neuropeptides activate imunoefektor cells and affect the secretion of matrix metalloproteinase (MMP) -8 as the major tissue destructive in GCF. MMP-8 is also thought to play a role in dentin matrix organization during the formation of dentin and secondary dentin formation. Measurement of MMP-8 levels from periapical fluids can be used as an indicator of biochemical or molecular markers to monitor the success of treatment of tooth root.

To find success in the treatment of dentine hypersensitivity iontoforesis with KNO3 can be measured with vitalitester pain threshold values, and examining levels of MMP-8 from gingival crevicular fluid (GCF). Use materials that contain potassium desensitasi more effectively, so that with a faster time to cope with dentine hypersensitivity.

MATERIALS AND METHODS

Type of research is quasi eksperimental.Objek study were patients aged 20-40 years with dentine hypersensitivity in premolar or canine teeth and are willing to be treated in RSGM FKG Unpad with iontoforesis. The study population was patients who come to the clinic RSGM Padjadjaran University Faculty of Dentistry Periodontology and Conservative Dentistry of the month from March to October 2009.

Materials research is a 2% NaF, various concentrations of potassium nitrate. Research tool is Desensitron II. This tool is used to perform iontoforesis with various concentrations of potassium nitrate on dentinal hypersensitivity patients who applied for 2 minutes.

1. Data Collection Procedures

The data collection procedure is as follows:

1. Submission of the research permit to the Dean of Faculty of Dentistry, Padjadjaran University and the Ethics Commission.
2. Make informed concent from the patient to be involved in the research.

2. Phase study

Research phase consists of:

1. Examination of patients with dentine hypersensitivity in premolar or canine teeth.
2. Explanation to the patient about the research to be conducted later to fill the informed consent.
3. Measurement of tooth pain threshold values using vitalitester.
4. Iontoforesis procedure performed on patient groups with various concentrations of potassium nitrate.
5. Iontoforesis procedure performed for 2 minutes.

3. Large Sample Estimates

The formula n = 2 (Z1-α / 2) 2 б2 used to calculate the number of samples, d 2 then divided into treatment groups: the group of patients is 2% NaF iontoforesis materials, various concentrations of potassium nitrate.

4. Draft Analysis

The design analysis for pain threshold and MMP-8 levels before and after iontoforesis by paired T-test and analysis of variance. To determine the effect of various concentrations of the materials to the value of pain threshold and levels of MMP-8 is affected by time used mulivariate of analysis.

RESULTS AND DISCUSSION

This research was conducted to analyze the differences before and after iontoforesis desensitasi with various materials. It is also to analyze the relationship between pain threshold and levels of MMP-8, analyzing the differences antarbahan and effectiveness of the materials to dentine hypersensitivity which gum recession. Desensitasi materials used in a way iontoforesis in canines or premolars are experiencing gum recession with dentine hypersensitivity complaint. Examination of pain threshold values and levels of MMP-8 performed before and after iontoforesis with material desensitasi various concentrations of potassium nitrate.

Table 4.1 Result of Pain Threshold Value Before Iontoforesis

Perlakuan	n_i um	Minimum (skala)	Maksimum (skala)	Rata-rata	Simpangan baku
PreARNaF 2%	28	1.0000	3.0000	2.1071 43	0.8317 445
PreARKNO$_3$ 3%	17	1.0000	3.0000	2.1176 47	0.6966 305

PreARKNO$_3$ 2%	7	1.0000	2.0000	1.2857	0.3933
				14	979
PreAR KNO$_3$ 4,8%	8	1.0000	3.0000	1.7500	0.7071
				00	068
Valid N (listwise)	7				

Table 4.2 Result of Threshold Value of Pain After Iontophoresis

	n	Minimum (skala)	Maksimum (skala)	Rata-rata	Simpangan baku
PosARNAF2%	8	2 00	1.00 0	4.000	2.39 2857	0.7373 268
PosARKNO$_3$ 3%	7	1 00	2.00 0	4.000	2.58 8235	0.7122 871
PosARKNO$_3$ 2%	7	7 00	2.00 0	3.000	2.21 4286	0.3933 979
PosARKNO$_3$ 4,8%	8	8 00	2.00 0	3.000	2.12 5000	0.3535 534
Valid N (listwise)	7					

Graph 4.1 Average Difference Threshold Value Iontoforesis Pain Before and After

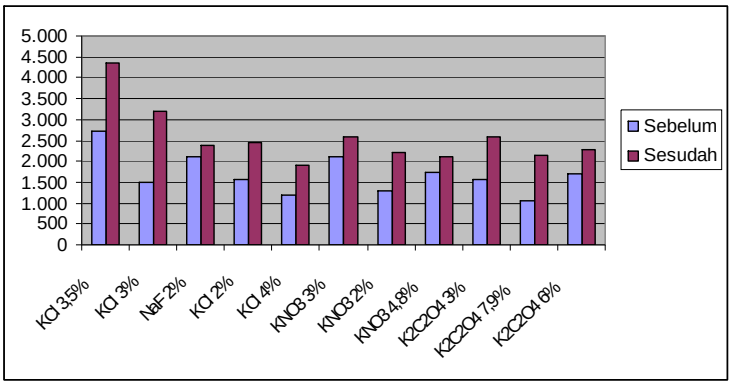


Table 4.3 Result of MMP-8 levels before Iontoforesis

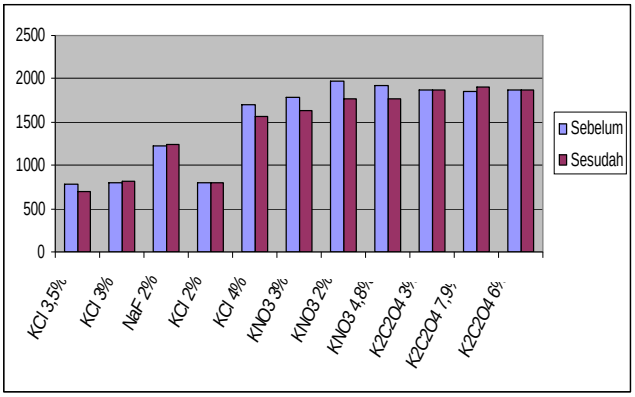
	n_i	Minimum (ng/ml)	Maximum (ng/ml)	Rata-rata	Simpangan baku
Premmp8NaF2	28	0.6620	1.8350	1.229719	0.4503329
Premmp8$KNO_3$3	17	1.8433	2.193	1.793918	0.1828845
Premmp8$KNO_3$2	7	1.8450	2.163	1.980729	0.1339073
Premp8K$NO_3$48	8		2.251	1.928550	0.1396024
Valid N	7				

(listwise)					

Table 4.4 Result of MMP-8 levels after Iontoforesis

	n_i	Minimum (ng/ml)	Maksimum (ng/ml)	Rata-rata	Simpangan baku
Posmmp8NaF2	28	0.6840	1.8500	1.235943	0.4494456
Pommp8KNO$_3$3	17	1.5300	1.7817	1.625194	0.1037313
Posmmp8KNO$_3$2	7	1.7467	1.8483	1.771657	0.0351030
Posmp8KNO$_3$48	8	1.7400	1.8200	1.766238	0.0252479
Valid N (listwise)	7				

Graph 4.2 Average difference in levels of MMP-8 Before and After



Tabel 4.5 Hasil Uji Beda Berpasangan Nilai Ambang Nyeri Sebelum dan Sesudah

Kelompok Sebelum-Sesudah Iontoforesis		Beda Berpasangan						T	k	Sig. (2-pihak)
		Rata-rata	Simp.baku	Rata-rata simp.baku	95% Batas kepercayaan					
					Batas bawah	Batas atas				
Beda 1	Pre ARNaF2 – Pos ARNaF2	-0.2857143	0.5998236	0.1133560	-0.5183016	-0.0531270	-2.521	7	.018	0
Beda 2	Pre $KNO_3$3 – Pos $KNO_3$3	-0.4705882	0.5144958	0.1247835	-0.7351175	-0.2060589	-3.771	6	.002*	0
Beda 3	Pre $KNO_3$2 – Pos $KNO_3$2	-0.9285714	0.3450328	0.1304101	-1,2476735	-0.6094693	-7.120		.000*	0
Beda 4	Pre $KNO_3$48 – Pos $KNO_3$48	-0.3750000	0.5175492	0.1829813	-0.8076819	0.057 6819	-2.049		.080	0

Table 4.6 Pairwise Difference Test Results Levels of MMP-8 Before and After Iontoforensis

Kelompok Sebelum-Sesudah Iontoforesis			Beda berpasangan					t	k	Sig. (2-pihak)
			Rata-rata	Simpangan baku	Simp.baku rata-rata	Batas kepercayaan 95%				
						Batas bawah	Batas atas			
eda 1	NaF	premmp8–posmmp8	-0.0062286	0.05786854	0.0109361	-0.0286676	0.0162105	-0.570	7	0.574
eda 2	– posmmp8KNO_3 3	premmp8	0.1687235	0.1012608	0.0245593	0.1166600	0.2207870	.870	6	0.000*
eda 3	– posmmp8 $KNO_3$2	premmp8	0.2090714	0.1407204	0.0531873	0.0789267	0.3392161	.931		0.008*
eda 4	– posmmp8KNO_3 48	premmp8	0.1623125	0.1458418	0.0515629	0.0403857	0.2842393	.148		0.016

Table 4.5 shows the results significant at α = 0.01 (asterisks) for different test paired values before and after the pain threshold that is material KNO3 iontoforesis 3%, 2% KNO3. Of a significant group mean differences before and after the smallest 3% KNO3 material shown with standard deviation of 0.5144958. Materials 2% KNO3 has significance 0.000, with the smallest standard deviation of 0.3450328 and an average difference of the largest - 0.9285714

Table 4.6 looks significant value at α = 0.01 (asterisks) for MMP-8 levels before and after iontoforesis on material KNO3 KNO3 3% and 2%. with significant value 0,000, has the smallest average value and standard deviation 0.0755692 0.0439075smallest. Other materials which are of significance KNO3 KNO3 3% and 2%.

Tables 4.5 and 4.6 obtained results in line is there are different pain threshold values and levels of MMP-8 on the material desensitasi KNO3 KNO3 3% and 2%. Table 4.1 and Table 4.3 before iontoforesis shows that a low pain threshold values and high levels of MMP-8, meaning the state of pain arising from dentine hypersensitivity which can be demonstrated with clinical indicators of low pain threshold that triggers MMP-8 released from neutrophils as the protection of the body and can be as an indicator of laboratories.

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Table 4.5 the results of different test pairs pain threshold values and the results showed significant desensitasi material KNO3 materials 3%, 2% KNO3. Table 4.5 and Table 4.2 gain material KNO3 KCl 3% and 4% is a significant ingredient in the correlation and the paired difference test before and after iontoforesis for pain threshold value.

Table 4.6 analyzes the results of different test pairs for MMP-8 levels before and after iontoforesis, found significant results at α = 0.01 for material desensitasi 3% KNO3, KNO3 2%. .

Table 4.6 and Table 4.4 to get 3% KNO3 material is a significant ingredient in the correlation and the paired difference test before and after iontoforesis for MMP-8 levels.

CONCLUSION

1. The effectiveness of Potassium Nitrate 3% desensitasi accordance desensitasi significance test is the most effective ingredient in improving the value of pain threshold and lower levels of MMP-8. .
2. Other desensitasi material that can be used in iontoforesis is in addition to NaF 2% KNO3 commonly used. .
3. Correlation of KNO3 3% before and after iontoforesis line for both pain threshold values and levels of MMP-8.