

# The effects of different concentration of Alum solutions on plaque and bleeding levels.

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## Abstract

Alum consider as various isomorphs double sulfates trivalent and univalent metals, used in previous to treatment oral medical conditions. Application of alum in periodontology was few studies our present study carried out regarding this subject.

The current study investigates the Plaque and bleeding levels among 15 healthy with mean age (27.40±22.14) apparently healthy subjects from different areas of Al Anbar city, the Mean difference of Alum concentration to the Plaque, the statistical analysis of results and a significant difference at the level of probability ( $P < 0.005$ ). The results of effect of Alum concentration in bleeding levels this clinical trial showed that treatment with 5gm/100ml, 10gm/100ml, 15gm/100ml alum both Day 15, and Day 30 exhibited significant reductions in bleeding and the reduction increase with the increase of treatment concentration and have significant correlation with the date the bleeding reduced to zero as show, also the results show that the bleeding decreased with increase of Alum concentration and theirs significant difference  $P$ .value significant  $< 0.005$  between the three subjected concentrations the most powerful concentration was 15gm/100ml

**Keywords:** Alum, plaque bleeding, treatment.

## INTRODUCTION

In periodontology, The Using of alum solution for mouth wash was studied but less practiced, and theirs only a few studies was carried out regarding this subject in Iraq [1] alum studies in different field of periodontology show positive effect of alum on gingival health was observed and an inhibitory effect on microbiota of oral [2] the cytotoxic effect of alum also recorded and its safe for oral human health [3].

Alum has demonstrated activity against bacteria of oral[4]. different studies clear that alum, inhibit the growth of bacteria and reduce plaque and bleeding levels[5]. In recent antimicrobial activity application of alum cleared against cariogenic streptococci, normal flora of oral and periodontal pathogens the anti-pathogenic activity done through inhibit of colonization on enamel surfaces and reduce the colloidal stability of bacterial oral [6]. Alum have properties as astringent and FDA's recommended it as category-I in active ingredient panel in mouthwashes [6]. In periodontology alum has shown activity against accumulation of plaque and reduce pathogenicity of the established plaque for 3-10 hours 0.02 M aluminum chloride 1-min rinse [7]. The efficacy of a daily use alum rinse lead to reducing the pathogenicity of bacteria and decrease bleeding In iraq and according to our literature there is not more study in this field. Therefore the present study aimed to investigate the effects of different concentration of Alum solutions on gingival disease.

## MATERIALS AND METHODS:

The study was carried out from September 2017 to February 2018 at a Al-Ramady care hospital. The study group age: 25-35year without any systemic disease or disorder. After screening questionnaire was filled to collect information such as age, gender and investigations. All patients have plaque index and bleeding index grade 3 (Gingivitis) use the mouthwash twice/daily without tooth brushing, the indices measured at day (0, 15 and 30). through the summation criteria of the following teeth 16, 12, 24, 36, 32, 44 and then dividing to six Each of the four surfaces of the teeth (buccal, lingual, mesial and distal)we

can reach to the criteria of all teeth and score given from 0-3[8]. The scores from the four areas of the tooth are added and divided by four in order to give the plaque index for the tooth with the following scores and criteria:

### Plaque index:

Grade 0: No plaque

Grade 1: A film of plaque adhering to the free gingival margin and adjacent area of the tooth. The plaque may be seen in situ only after application of disclosing solution or by using the probe on the tooth surface.

Grade 2: Moderate accumulation of soft deposit s within the gingival pocket, or the tooth and gingival margin which can be seen with the naked eye.

Grade 3: define as Abundance of soft matter within the gingival pocket and/or on the tooth and gingival margin.[9]

### Bleeding index:

Grade 0: Healthy (no bleeding)

Grade 1: some seconds after probing bleeding become

Grade 2: Bleeding immediately after probing

Grade 3: Bleeding spreading towards the marginal gingiva on probing

Index Grade 3 [10]. for plaque and bleeding and experimentally treated with Alum in different concentrations 5gm/100ml, 10gm/100ml, 15gm/100ml. The results analyzed at the date Day 0 (baseline), Day 15, Day 30<sup>th</sup> respectively.

### Statistical Analysis:

Results were subjected to statistical analysis .The significant differences are determined in rate of probability 5% as the statistical analysis includes one way analysis of variance (ANOVA). Also significant differences are examined between means using test of less significant difference LSD [11].

## RESULTS AND DISCUSSION

Detection of Plaque and bleeding based on special index: The current study investigates the Plaque and bleeding among 15 healthy with mean age (27.40±22.14) apparently healthy subjects from different areas of Al Anbar city, table (1) have shown Mean difference of Alum concentration to

the Plaque, the statistical analysis of results and a significant difference at the level of probability (P<0.005) . Table (1) and Figure (1). Show Plaque Index Grade 3 distribution with Alum concentration.the results analysed at the date Day 0 (baseline), Day 15 , Day 30<sup>th</sup> with Alum concentration 5gm/100ml, 10gm/100ml, 15gm/100ml respectively.

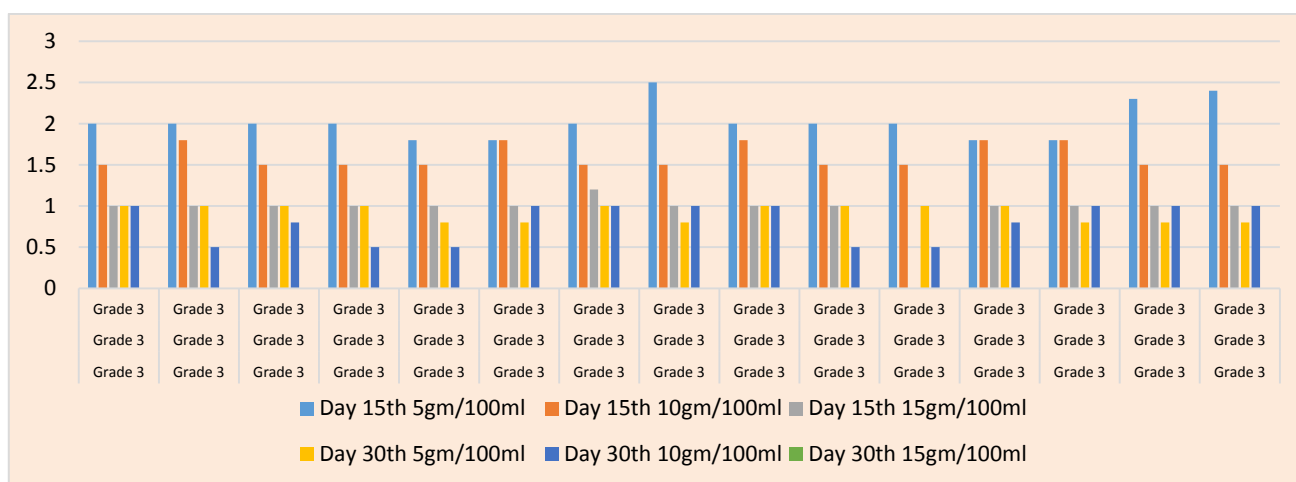
The results of this current clinical analysis showed that treatment with 5gm/100ml, 10gm/100ml, 15gm/100ml alum both Day 15 , and Day 30 exhibited significant reductions in counts Plaque Index based on the baseline values then the value compared with the values of post treatment after the 15<sup>th</sup> and 30<sup>st</sup> days. These results indicate that there is a clear decrease in the Plaque levels even within 15 days of regular practice of the Alum oral solution measures under study within 15 days within 30 days. The Plaque Index, however, did show significant change and plaque removed values when comparison with the values of baseline, appearing that the concentration

5gm/100ml did not reduce the value of plaque.at the other side the when compare based on Intergroup results indicated that there were no significant differences in the Alum concentration between the studied visitors based on baseline. This may be attributed to equivalent in groups before the start of treatment. At the same time significantly differences were showed between the groups 15 days after the treatment start, group showed equivalent reductions in plaque. But the results not seem to be like the index result, after 30 days, the groups of experimen showed statistically significant analysis. The initial decrease in the values of plaque and bleeding which refers to changes in the behavior of subjects that occur solely as a function of participation in an experiment, seen in the initial stages of clinical trials [12]. Among the experimental, statistically significant difference showed by alum over the group. That's consider alum rinse emerged mostly effectiveness for measuring the reducing plaque levels [13].

**Table (1). Plaque Index distribution with Alum concentration.**

	Day 0 (baseline)			Day 15 <sup>th</sup>			Day 30 <sup>th</sup>		
	5gm/100ml	10gm/100ml	15gm/100ml	5gm/100ml	10gm/100ml	15gm/100ml	5gm/100ml	10gm/100ml	15gm/100ml
1	Grade 3	Grade 3	Grade 3	2.5	2	1.00	1	0.7	0
2	Grade 3	Grade 3	Grade 3	2.4	2	1.8	1.2	0.9	0
3	Grade 3	Grade 3	Grade 3	2.4	2	1.5	1.4	1	0
4	Grade 3	Grade 3	Grade 3	2.5	2	1.5	1.5	0.7	0
5	Grade 3	Grade 3	Grade 3	2.5	2.5	1.8	1.0	0.7	0
6	Grade 3	Grade 3	Grade 3	2.7	2	1.8	1.2	0.5	0
7	Grade 3	Grade 3	Grade 3	2.6	2	1.7	1.2	0.9	0
8	Grade 3	Grade 3	Grade 3	2.7	2.2	1.5	1.5	1	0
9	Grade 3	Grade 3	Grade 3	2.7	2	1.7	1.4	1	0
10	Grade 3	Grade 3	Grade 3	2.5	2	1.5	1.2	1	0
11	Grade 3	Grade 3	Grade 3	2.5	2.5	1.5	1.4	1	0
12	Grade 3	Grade 3	Grade 3	2.5	2	1.4	1.4	1	0
13	Grade 3	Grade 3	Grade 3	2.5	2	1.0	1.2	1	0
14	Grade 3	Grade 3	Grade 3	2.5	2	1.2	1.2	1	0
15	Grade 3	Grade 3	Grade 3	2.4	2.2	1.5	1.3	0.7	0

$\chi^2 = 10.182$ , indexed = 7.815 and a significant difference between age group (p< 0.05).

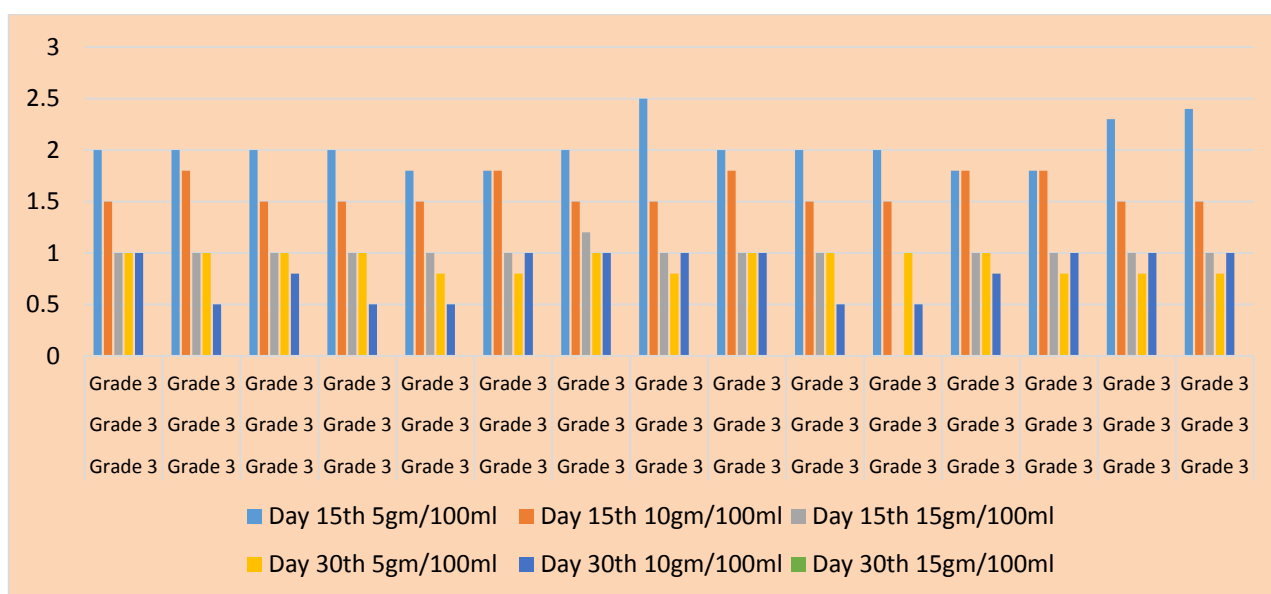


**Figure (1). Plaque Index distribution with Alum concentration.**

**Table (2). Bleeding Index distribution with Alum concentration.**

	Day 0 (baseline)			Day 15 <sup>th</sup>			Day 30 <sup>th</sup>		
	5gm/100ml	10gm/100ml	15gm/100ml	5gm/100ml	10gm/100ml	15gm/100ml	5gm/100ml	10gm/100ml	15gm/100ml
1	Grade 3	Grade 3	Grade 3	2	1.5	1	1	1	0
2	Grade 3	Grade 3	Grade 3	2	1.8	1	1	0.5	0
3	Grade 3	Grade 3	Grade 3	2	1.5	1	1	0.8	0
4	Grade 3	Grade 3	Grade 3	2	1.5	1	1	0.5	0
5	Grade 3	Grade 3	Grade 3	1.8	1.5	1	0.8	0.5	0
6	Grade 3	Grade 3	Grade 3	1.8	1.8	1	0.8	1	0
7	Grade 3	Grade 3	Grade 3	2	1.5	1.2	1	1	0
8	Grade 3	Grade 3	Grade 3	2.5	1.5	1	0.8	1	0
9	Grade 3	Grade 3	Grade 3	2	1.8	1	1	1	0
10	Grade 3	Grade 3	Grade 3	2	1.5	1	1	0.5	0
11	Grade 3	Grade 3	Grade 3	2	1.5	0	1	0.5	0
12	Grade 3	Grade 3	Grade 3	1.8	1.8	1	1	0.8	0
13	Grade 3	Grade 3	Grade 3	1.8	1.8	1	0.8	1	0
14	Grade 3	Grade 3	Grade 3	2.3	1.5	1	0.8	1	0
15	Grade 3	Grade 3	Grade 3	2.4	1.5	1	0.8	1	0

P .value significant < 0.005



**Figure (2). Bleeding Index distribution with Alum concentration.**

**Bleeding Index distribution with Alum concentration**

The results of this clinical trial showed that treatment with 5gm/100ml, 10gm/100ml, 15gm/100ml alum both Day 15, and Day 30 exhibited significant reductions in bleeding and the reduction increase with the increase of treatment concentration and have significant correlation with the date the bleeding reduced to zero as show, also the results show that the bleeding decreased with increase of Alum concentration and theirs significant difference P .value significant < 0.005 between the three subjected concentrations the most powerful concentration was 15gm/100ml in Table (2) and figure (2) the results of the study clear.

The results of the present study compared the three gradual concentration in reducing the plaque and bleeding levels. We found that all the subjected groups showed a highly reducing properties in plaque and bleeding levels post treatment periods. Researcher in different study studied the effects of alum (0.002 M alum) on the plaque and bleeding and observed a significant reduction in the levels. The findings reported by these authors are comparable to the reductions appeared during using alum in the study [14,15]. Age is consider the most critical factor in t selection because its related to the number of tooth surfaces at risk. And the chosen mean age important because they were in a period of high activity, In the present study, plaque and bleeding levels counts were determined at baseline, 15<sup>th</sup>

day and 30<sup>st</sup> day. Because treatments subjected immediately after prior[16]. The treatment show good results of reducing bleeding and plaque levels Studies regarding the effect of plaque removal and bleeding removal using natural compound in treatment not largely distributed throughout periodontal literature [17,18]. Result of the current experiment analysis came in agreement with these mentioned facts as it employs chemical antiplaque approaches[19]. The gradual observation during this study improvements with increasing the period of exposure and subjected alum solution concentration the reducing accepted logically because salty solutions with high concentration have stronger effects when compared those with low concentration. In a previous study carried out and were statistically non-significant [20]. The treatment of the present study one can see that the improvement in means may be related to using alum mouth wash after conventional root planning and also this reducing in plaque and bleeding levels to be statistically highly significant [21]. The strong property of the alum solution that lead to causes tissue shrinkage this lead to decreased bleeding levels therefor its important in its antibacterial property and wound healing[12].

The decreasing in bleeding tendency and tissue shrinkage related to astringent property reduction greater in patients using alum solutions as an adjunctive treatment[7,9].The logical argument results during our experiments needs to be investigated in more than study to use it in pharmaceutical application to decreased blood flow and plaque removal our results show acceptable decision about its using as adjunctive treatment in periodontal therapy[15].

### CONCLUSION

The use of alum solution in gradual different concentrations helps in improvement of clinical parameters in reducing plaque and bleeding index. Alum 15gm/100ml concentrations were found the most powerful in reducing studying index.

### REFERENCES

- Shoskes DA, Radzinski CA, Struthers NW, Honey RJ. Aluminum toxicity and death following intravesical alum irrigation in a patient with renal impairment. *J Urol*.1992 Mar; 147(3):697-9.
- Kleber CJ, Put MS, Smith CE, Gish CW. Effect of supervised use of alum mouth rinse on dental caries incidence in caries susceptible children: a pilot study. *ASDC J Dent Child* 1996; 63(6):393-402.
- Kleber CJ, Put MS. Investigation of the effect of the aluminum mouth rinses on rat dental caries and plaque. *Caries Res* 1995; 29(3): 237-42.
- Olmez A, Can H, Ayhan H, Okur H. Effect of alum containing mouth rinse in children for plaque and salivary levels of selected oral microflora. *J Clin Pediatr Dent* 1998; 22(4) 335-40.
- Putt MS, Kleber CJ, muhler JC. Studies of prophylaxis pastes containing sodiumpotassium aluminum silicate and fluoride *J Dent Res* 1979; 58(7): 1659-63.
- Axelsson P, Kristofferson K, Karlsson R, Brathall D. A 30-month longitudinal study of the effects of some oral hygiene measures on Streptococcus mutans and approximal dental caries. *J Dent Res* 1987;66:761-5.
- White GE, Armaleh MT. Tongue scrapping as a means of reducing oral mutans streptococci. *J Clin Pediatr Dent* 2004;28:163-6.
- Tencate JM, Marsh PD. Procedures for establishing efficacy of antimicrobial agents for chemotherapeutic caries prevention. *J Dent Res* 1994;73:695-703.
- Wei SH. Conference report: Special symposium; scientific update on fluoride and public health. *J Dent Res* 1990;69:1343-4.
- Bihani SN, Damle SG. Evaluation of an alum-containing mouthrinse on plaque and gingivitis inhibition over 2 weeks of supervised use. *J Indian Soc Pedod Prev Dent* 1997;15:34-8.
- Kleber CJ, Putt MS. Aluminium and dental caries: A review of the literature. *Clin Prev Dent* 1984;6:14-25.
- Simonsen T, Glantz PO, Edwardsson S. Effects of cations on the colloidal stability of some oral bacteria. *Acta Odontol Scand* 1988;46:83-7.
- Olmez A, Can H, Ayhan H, Okur H. Effect of an alum-containing mouthrinse in children for plaque and salivary levels of selected oral microflora. *J Clin Pediatr Dent* 1998;22:335-40.
- Mourughan K, Suryakanth MP. Evaluation of an alum containing mouthrinse for inhibition of salivary Streptococcus mutans levels in children: A controlled clinical trial. *J Indian Soc Pedod Prev Dent* 2004;22:100-5.
- Brambilla E, García-Godoy F, Strohmenger L. Principles of diagnosis and treatment of high caries risk subjects. *Dent Clin North Am* 2000;44:507-40.
- Gold OG, Jordan HV, van Houte J. A selective medium for Streptococcus mutans. *Arch Oral Microbiol* 1973;18:1357-64.
- Wan AK, Seow WK, Walsh LJ, Bird PS. Comparison of five selective media for the growth and enumeration of Streptococcus mutans. *Aust Dent J* 2002;47:21-6.
- Putt MS, Kleber CJ, Smith CE. Evaluation of an alum containing mouthrinse in children for plaque and gingivitis inhibition during 4 weeks of supervised use. *Pediatr Dent* 1995;18:139-44.
- Kleber CJ, Putt MS, Smith CE, Gish CW. Effect of supervised use of an alum mouthrinse on dental caries incidence in caries-susceptible children: A pilot study. *ASDC J Dent Child* 1996;63:393-493.
- Wyne AH, Guile EE. Caries activity indicators: A review. *Indian J Dent Res* 1993;4:39-46.
- Klein H, et al. The epidemiology of dental disease. U.S. Public Health service, 1948. In: Finn SB, editor. *Clinical Pedodontics*. 4 th ed. Philadelphia: W.B. Saunders company; 1999. p. 454-74.