Original Research Article

The Effect of Different Concentrations of Alum Solutions on Gingival Disease during Pregnancy

Aseel Mohsin Yousif[1*]

[1]Department of Oral Diagnosis, Oral Histology and Biology, College of Dentistry, University of Anbar, Iraq

*Corresponding Author: Aseel M.Yousif Alani
[1]Department of Oral Diagnosis, Oral Histology and Biology, College of Dentistry, University of Anbar, Iraq

Abstract: Gingival disease is inflammatory and destructive disease of supporting tissues tooth in pregnant women Alum solution has been used as a medication treatment. The present study investigates the Plaque and bleeding index levels among 20 pregnant women with mean age (29.50±71.14) sharing in the study from different from clinical privet in Baghdad city, The present result display and show the relationship between pregnant women and the gingival disease. In pregnant women included in the study group, the results display decrease of Plaque and bleeding index with the increase of alum concentrations the best activity of alum show in 9 gm/100ml. Also, when increase the time of exposure the subjected criteria decrease. The present experiment included 20 pregnant women with age range between 22-39year sever from Plaque and bleeding among from different private in Baghdad city, the results display significant decrease Plaque and bleeding in the pregnant women with the time and days. Statistical analysis appears significant difference with the probability value (P≥0.01).

Keywords: Alum, Plaque Bleeding, Treatment.

INTRODUCTION

Potassium alum, very soluble in water with chemical structure $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$, which in regular octahedral crystallizes . The solution of Alum is used in cases of gingivitis [1]. Inmucositis management during oral ulcers when treatment with alum in concentrations of 1000, 2000, to 4000 PPM which display significant effects in treatment [2]. Alum consider safe for oral human health when study its cytotoxic effects in women during pregnancy [3]. Activity against bacteria of oral treated using demonstrated alum [4]. Different studies applied using alum solutions, show inhibition activity of bacterial growth [5].Also consider as anti-pathogenic activity done through colonization inhibition and reduce the stability of bacterial colloidal oral [6].Alum concentrations recommended by FDA's it as active ingredient panel in mouthwashes category-I [6]. Alum used in periodontology application activity against of plaque accumulation and pathogenicity reducing through short time during the day [7]. The daily use lead to reducing the pathogenicity and bleeding resulted from pathogenic bacteria and yeasts.

A large number of studies have confirmed that periodontal pathogens and their metabolites can lead to adverse pregnancy. This study aimed to examine the effects of serial concentrations of Alum on plaque and bleeding index in pregnant women.

MATERIALS AND METHODS

The study was carried out from January to November 2022 at the private care hospital in Baghdad. The study group included 20 pregnant women have plaque and bleeding (Gingivitis) index Number 3, without another disorder the age range between: 22-39year. The information reported in questioner. solutions Preparation (pH 7.0-7.2) by dissolving a

tablet of Alum in 100 ml of deionized water DW the concentration prepared (3,6,9 gm/100ml) using C1V1=C2V2 equation then stored until the time of its use [8].

All pregnant women in study group use two times daily the mouthwash, the application measured at day (0, 7, 14, 21 and 30). Study the value of four surfaces of the teeth (mesial, lingual, buccal, and distal) then reported score given from 0-3 criteria as show below: [9].

	Plaque index	**Bleeding index**
0	Healthy	Healthy
1	Adhering plaque film of the A- free gingival margin B- tooth adjacent area in situ only plaque removed after using the probe on the tooth surface or application of alum solution.	seconds after probing bleeding become
2	A-soft deposit s accumulation within the pocket gingival. B- Naked eye margin of gingival and tooth seen.	Bleeding immediately after probing
3	Abundance of soft matter within the gingival pocket and/or on the tooth and gingival margin	Bleeding spreading towards the marginal gingiva on probing

Plaque and bleeding experimentally treated in present work with serial concentration Alum (3, 6,9gm/100ml) the appeared result reported in (0, 7, 14, 21) day respectively.

Statistical Analysis
The present data subjected for statistical analysis one way analysis of variance (ANOVA) and less significant difference LSD with significant differences probability rate 1% [9].

RESULTS AND DISCUSSION

The present result display in table 1 and 2 show the relationship between using the alum solution and the gingival disease in pregnant women included in the study group. The results display decrease of Plaque and bleeding index with the increase of alum concentrations the best activity of alum show in 9 gm/100ml. Also, when increase the time of exposure the subjected criteria decrease. The present experiment included 20 pregnant women with age range between 22-39year sever from Plaque and bleeding among from different private in Baghdad city, the result in table (1) and table (2) display significant decrease Plaque and bleeding in the pregnant women with the time and days. Statistical analysis appears significant difference with the probability value ($P \geq 0.01$).

The extracted data display in table 1 and 2 in the present clinical analysis appear that treatment with alum solution with concentration 3gm/100ml, 6gm/100ml, 9gm/100ml in 7, 14 Day 30 reveal significant reductions in the present of Plaque and bleeding as appear on the baseline values when compare the extracted results in pregnant women in comparison with the percentage of the period after 30 [st] days post treatment. The present data in our paper represented Plaque value decreasing and bleeding levels begun within 14 days in the pregnant women included in the study program with practice in regular manner using solution usually with Alum determine under the period of study from 14- 30 days. The studied index Plaque and bleeding in the group display regular significant change in the index values in comparison with baseline values at the high concentration 9gm.

Table 1: Plaque Index in pregnant women subjected in the study with days and alum concentrations

	0 day/Index			7 day			14 day			21 day			30 day		
con	3	6	9	3	6	9	3	6	9	3	6	9	3	6	9
1	3	3	3	2.9	2.8	2.7	2.7	2.6	2.3	2	1.8	1.5	1.1	0	0
2	3	3	3	2.9	2.8	2.7	2.6	2.4	2.2	2	1.9	1.6	1.3	0	0
3	3	3	3	3	2.9	2.8	2.8	2.6	2.3	2	1.9	1.6	1.4	0	0
4	3	3	3	3	2.9	2.8	2.8	2.7	2.3	2	1.8	1.5	1.1	0	0
5	3	3	3	2.9	2.8	2.7	2.6	2.4	2.3	2	1.8	1.4	1	0	0
6	3	3	3	2.8	2.7	2.6	2.5	2.4	2	1.9	1.7	1.5	1	0	0
7	3	3	3	2.8	2.7	2.6	2.5	2.4	2.1	1.9	1.7	1.5	1	0	0
8	3	3	3	3	2.9	2.8	2.7	2.6	2.2	2.1	1.8	1.3	1	0	0
9	3	3	3	2.9	2.8	2.7	2.6	2.3	2	2	1.9	1.6	1.4	0	0
10	3	3	3	2.8	2.7	2.6	2.5	2.3	2	2	1.9	1.6	1.1	0	0
11	3	3	3	2.7	2.6	2.5	2.4	2.3	2	2	1.7	1.4	1.1	0	0
12	3	3	3	3	2.9	2.8	2.7	2.6	2.1	2	1.9	1.6	1.1	0	0
13	3	3	3	3	2.9	2.8	2.7	2.6	2.2	2	1.8	1.5	1.1	0	0

14	3	3	3	2.9	2.8	2.7	2.6	2.4	2	1.9	1.7	1.4	1.2	0	0
15	3	3	3	2.9	2.8	2.7	2.6	2.4	2	1.9	1.7	1.3	1	0	0
16	3	3	3	2.8	2.7	2.6	2.5	2.3	2	2	1.8	1.6	1.1	0	0
17	3	3	3	2.8	2.7	2.6	2.6	2.5	2.1	2	1.9	1.6	1.2	0	0
18	3	3	3	2.8	2.7	2.6	2.6	2.4	2.1	2	1.9	1.6	1.1	0	0
19	3	3	3	2.9	2.8	2.7	2.7	2.6	2.3	1.9	1.7	1.5	1.1	0	0
20	3	3	3	2.9	2.8	2.7	2.6	2.4	2	1.8	1.6	1.4	1.1	0	0

3, 6, 9gm/100ml, X^2= 12.186, indexed = 9.3456 difference significantly between concentrations based on value (P≥0.01).

Table 2: Bleeding Index in pregnant women subjected in the study with days and alum concentrations

	0 day/Index			7 day			14 day			21 day			30 day		
con	3	6	9	3	6	9	3	6	9	3	6	9	3	6	9
1	3	3	2.9	2.8	2.7	2.7	2.6	2.5	2.4	2.4	2	1.3	1.2	1	0
2	3	3	2.9	2.8	2.7	2.7	2.7	2.6	2.3	2.1	1.7	1.2	0	0	0
3	3	3	3	3	3	2.9	2.9	2.7	2.6	2.4	2.1	1.5	1.3	1.1	0
4	3	3	3	2.9	2.7	2.7	2.6	2.5	2.5	2	1.4	1.1	0	0	0
5	3	2.9	2.9	2.7	2.7	2.6	2.5	2.3	2	1.6	1.4	0.8	0	0	0
6	3	3	3	2.8	2.8	2.7	2.6	2.5	2.4	2.3	2	1.3	0.6	0	0
7	3	3	2.9	2.9	2.8	2.7	2.4	2.3	2	1.8	1.6	1.1	0.7	0	0
8	3	3	3	3	2.7	2.7	2.7	2.5	2.4	2.3	2.1	1.4	1	0	0
9	3	3	3	2.8	2.7	2.4	2.3	2.2	2.1	2	1.3	1.3	1	1	0
10	3	3	2.9	2.9	2.8	2.7	2.6	2.6	2.5	2.3	2.1	1.4	1.1	0	0
11	3	3	2.7	2.6	2.5	2.4	2.3	2.2	1	1	0.9	0.5	0	0	0
12	3	3	3	3	2.8	2.8	2.7	2.6	2.5	2.4	2.1	2	1.2	0	0
13	3	3	3	3	2.9	2.9	2.8	2.7	2.5	2.1	1.4	1.2	1	0	0
14	3	3	3	2.9	2.8	2.7	2.6	2.2	2	1.8	1.7	1.4	1.2	0	0
15	3	3	3	2.9	2.8	2.7	2.6	2.4	2	1.9	1.7	1.3	1	0	0
16	3	3	2.8	2.7	2.7	2.6	2.4	2.3	2.1	2	1.8	1.6	1.1	0	0
17	3	3	3	2.8	2.7	2.7	2.6	2.5	2.2	2	1.9	1.3	1.2	0	0
18	3	3	3	2.8	2.8	2.7	2.6	2.4	2.1	2	1.7	1.2	1.1	0	0
19	3	3	3	2.9	2.8	2.7	2.7	2.6	2.3	1.9	1.7	1.5	1.1	0	0
20	3	3	2.7	2.7	2.7	2.6	2.5	2.4	2	1.6	1.5	1.2	0	0	0

3, 6, 9gm/100ml, X^2= 7.183, indexed = 6.2413, difference significantly between concentrations based on value (P≥0.01)

The comparison between the pregnant women study group in table 1 and 2 revel there is differences significantly in the applied Alum concentrations between the 20 pregnant women study group in comparison with baseline these results attributed to before begun of treatment in each groups equivalent, at the same time the groups after 21 day of treatment appear differences significantly when display plaque reductions. Also difference between bleeding and plaque, at the final stage of treatments represent behavior changes solely occur participation as a function an experiment when compared with clinical trials initial stages [10, 11]. The reduction of bleeding and plaque may be related to women hormonal changes during pregnancy and [12, 13].

The active reducing properties related to the properties of alum [14-16]. The results of activity also related to treatment continuous during experiment [17, 18]. The results agreed with different authors in the application of alum in treatment [14, 15]. The most critical factor selection of Age of pregnant women which related to risk tooth surfaces [17, 18]. Our present data agreed with the facts of using approaches chemical antiplaque [19]. The highly significant statistically in agree with after conventional root planning improvement, which lead to reducing levels bleeding and plaque [16]. The tissue shrinkage in mouth may lead to decreased bleeding levels when apply alum solution which have strong properties in wound healing and antibacterial activity [12]. The adjunctive treatment using alum solutions lead to decreasing shrinkage and then reduction in bleeding and plaque levels [7, 9].in periodontal therapy adjunctive treatment which required pharmaceutical application to reduce bleeding and plaque levels during pregnancy [15].

Present results indicated these results related to the activity of chlorhexidine action which increases with alum concentration increased our results agreed with [12] who found that the Alum solution protective effects increase with concentrations increase using of low Alum concentrations display positive adherence of the tooth surface, while stronger high concentrations show resemble the action which positive adherence in the pregnant women, this results agreement with [18]. This indicated that alum has a weak effect on the adherence of pregnant tooth surface.

CONCLUSION

The use alum solution in gradual different concentrations helps in improvement of clinical parameters in reducing plaque and bleeding index 3.Alum 9 mg/100ml concentrations were found the most powerful in reducing studying index.

REFERENCES

1. Calixto, N. R. V., Alves, C. M. C., Abreu, L. M. G., Thomaz, E. B. A. F., Vidal, F. C. B., Suzart Filho, I., & Lopes, F. F. (2019). Detection of periodontal pathogens in mothers of preterm birth and/or low weight. *Medicina oral, patologia oral y cirugia bucal*, *24*(6), e776. doi: 10.4317/medoral.23135
2. Caneiro, L., Lopez-Carral, J. M., Martin-Lancharro, P., Linares, A., Batalla, P., & Blanco-Carrion, J. (2020). Periodontitis as a preterm birth risk factor in Caucasian women: a cohort study. *Oral Health Prev. Dent*, *18*, 77-83. doi: 10.3290/j.ohpd.a44116
3. de Oliveira, L. J., Cademartori, M. G., Schuch, H. S., Barros, F. C., Silveira, M. F., Correa, M. B., & Demarco, F. F. (2021). Periodontal disease and preterm birth: Findings from the 2015 Pelotas birth cohort study. *Oral diseases*, *27*(6), 1519-1527. doi: 10.1111/odi.13670.
4. Figuero, E., Han, Y. W., & Furuichi, Y. (2020). Periodontal diseases and adverse pregnancy outcomes: Mechanisms. *Periodontology 2000*, *83*(1), 175-188.
5. Jang, H., Patoine, A., Wu, T. T., Castillo, D. A., & Xiao, J. (2021). Oral microflora and pregnancy: A systematic review and meta-analysis. *Scientific reports*, *11*(1), 16870. doi: 10.1038/s41598-021-96495-1
6. Khan, K. S., Wojdyla, D., Say, L., Gülmezoglu, A. M., & Van Look, P. F. (2006). WHO analysis of causes of maternal death: a systematic review. *The lancet*, *367*(9516), 1066-1074. doi: 10.1016/s0140-6736(06)68397-9
7. Ma'ayeh, M., Rood, K. M., Kniss, D., & Costantine, M. M. (2020). Novel interventions for the prevention of preeclampsia. *Current hypertension reports*, *22*, 1-8.
8. Mahapatra, A., Nayak, R., Satpathy, A., Pati, B. K., Mohanty, R., Mohanty, G., & Beura, R. (2021). Maternal periodontal status, oral inflammatory load, and systemic inflammation are associated with low infant birth weight. *Journal of Periodontology*, *92*(8), 1107-1116. doi: 10.1002/jper.20-0266
9. Márquez-Corona, M. D. L., Tellez-Girón-Valdez, A., Pontigo-Loyola, A. P., Islas-Zarazúa, R., Robles-Bermeo, N. L., Gonzalez-López, B. S., & Medina-Solís, C. E. (2021). Preterm birth associated with periodontal and dental indicators: a pilot case-control study in a developing country. *The Journal of Maternal-Fetal & Neonatal Medicine*, *34*(5), 690-695. doi: 10.1080/14767058.2019.1613363
10. Mata, K., Nobre, A. V. V., Felix Silva, P. H., Oliezer, R. S., Fernandes, C., Amaral, J., ... & Salvador, S. L. (2021). A new mixed model of periodontitis-induced preeclampsia: A pilot study. *Journal of periodontal research*, *56*(4), 726-734. doi: 10.1111/jre.12869
11. Mei, F., Xie, M., Huang, X., Long, Y., Lu, X., Wang, X., & Chen, L. (2020). Porphyromonas gingivalis and its systemic impact: current status. *Pathogens*, *9*(11), 944. doi: 10.3390/pathogens9110944
12. Mourughan, K., & Suryakanth, M. P. (2004). Evaluation of an alum-containing mouthrinse for inhibition of salivary streptococcus mutans levels in children--a controlled clinical trial. *Journal of the Indian Society of Pedodontics and Preventive Dentistry*, *22*(3), 100-105.
13. Offenbacher, S., Katz, V., Fertik, G., Collins, J., Boyd, D., Maynor, G., ... & Beck, J. (1996). Periodontal infection as a possible risk factor for preterm low birth weight. *Journal of periodontology*, *67*, 1103-1113. doi: 10.1902/jop.1996.67.10s.1103
14. Tanneeru, S., Mahendra, J., & Shaik, M. V. (2020). Evaluation of microflora (viral and bacterial) in subgingival and placental samples of pregnant women with preeclampsia with and without periodontal disease: A cross-sectional study. *Journal of International Society of Preventive & Community Dentistry*, *10*(2), 171.
15. Vanterpool, S. F., Been, J. V., Houben, M. L., Nikkels, P. G., De Krijger, R. R., Zimmermann, L. J., ... & Reyes, L. (2016). Porphyromonas gingivalis within placental villous mesenchyme and umbilical cord stroma is associated with adverse pregnancy outcome. *PLoS One*, *11*(1), e0146157. doi: 10.1371/journal.pone.0146157
16. Wan, A. K. L., Seow, W. K., Walsh, L. J., & Bird, P. S. (2002). Comparison of five selective media for the growth and enumeration of Streptococcus mutans. *Australian dental journal*, *47*(1), 21-26.
17. White, G., & Armaleh, M. (2005). Tongue scrapping as a means of reducing oral mutans streptococci. *Journal of Clinical Pediatric Dentistry*, *28*(2), 163-166.
18. Xing, W. (2018). Report of the fourth national oral health survey. *Beijing: People's Medical Publishing House*, 12-37.
19. Ye, C., & Kapila, Y. (2021). Oral microbiome shifts during pregnancy and adverse pregnancy outcomes: Hormonal and Immunologic changes at play. *Periodontology 2000*, *87*(1), 276-281. doi: 10.1111/prd.12386