CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.2604310

Available online at: http://www.iajps.com ***Research Article***

A COMPARATIVE STUDY TO KNOW THE GREY MINERAL TRIOXIDE AGGREGATE (MTA) ANTIBACTERIAL ACTIVITY MIXED WITH DIFFERENT SUBSTANCES

[1]Dr.Fatima Arshad, [2]Dr.Muhammad Zeeshan Azam, [3]Dr.Abrar Ul Haq

[1]Fatima Memorial College Of Medicine and Dentistry, [2]Medical Officer RHC Qazian , Gujar Khan , Rawalpindi, [3]Medical Officer DHQ Hospital , Narowal.

Article Received: January 2019 **Accepted:** February 2019 **Published:** March 2019

Abstract:

Objective: *The aim of this study was to investigate the in vitro antibacterial effects of Grey MTA mixed with different substances on a mix of S aureus.*

Study Design: *A Comparative Study.*

Place and Duration: *In the Pathology and Dental department of Lahore Medical and Dental College for one year duration from June 2017 to June 2018.*

Methods: *MTA was mixed with local anesthetic, 0.2% Chlorhexidine and water. 24 hour set test materials were kept on the inoculated media surface and for 48 hours in appropriate atmospheres were incubated at 37 degrees centigrade. As a positive control, Augmentin suspension was used. Dry, sterile tin foil discs were used as a negative control.*

Results: *Each material antibacterial effects were evaluated by determining the diameter of the inhibition zones in millimeters. Chlorhexidine group had higher zone of inhibition significantly (P< 0.05).*

Conclusion: *In conclusion, 0.2% Chlorhexidine gluconate substitution for water increase the Grey MTA antimicrobial activity.*

Key words: *MTA, Grey MTA, Chlorohexidine.*

Corresponding author:

Fatima Arshad,

Fatima Memorial College Of Medicine and Dentistry

QR code

Please cite this article in press Fatima Arshad et al., ***A Comparative Study To Know The Grey Mineral Trioxide Aggregate (Mta) Antibacterial Activity Mixed With Different Substances.,*** *Indo Am. J. P. Sci, 2019; 06(03).*

INTRODUCTION:

The addition of mineral trioxide aggregate (MTA) by Torabinejad has been developed to maintain communication between the teeth and the external surfaces. This material was tested in an in vivo and in vitro study with a number of good sealing capacity and tissue behavior reports. New cement formation on the material has been experimentally reported in perforated furcation, root end and root canal of canine teeth. Dentine bridge was observed in the case of pulp coating and pulpotomy in monkey and canine teeth. Independent studies have shown that MTA shows antimicrobial capacity8. Since 2002, MTA has been marketed as ProRoot MTA (Tulsa I Dentsply, Tulsa, OK). ProRoot MTA is applied as an MTA powder mixed with sterile water supplied by the manufacturer. The mixture of MTA with chlorhexidine gluconate was previously reported in a study by Stowe et al.9. He found that replacement of chlorhexidine gluconate in 0.12% of water increased the antimicrobial activity of ProRoot MTA in tooth color. There is no published material on the effect of chlorhexidine gluconate on gray MTA. The purpose of this is the in vitro agar diffusion study determining whether the gray MTA has antimicrobial activity and determining whether the local anesthetic is 0.2% chlorhexidine gluconate substitute used instead of sterile water will increase this antimicrobial activity.

MATERIALS AND METHODS:

This Comparative Study was held in the Pathology and Dental department of Lahore Medical and Dental College for one year duration from June 2017 to June 2018.

The investigated microorganism was Staphylococcus aureus (15 MRSA strain No. 85/2082) from the microbiology department. The product tested was: Mineral Trioxide Aggregate® (MTA, Dentsply, Tulsa Dental, Tulsa, OK, USA)

Antimicrobial experiments

The strains were inoculated in 5 ml of brain heart infusion (BHI) and at 37 ° C were incubated for 48 hours. Using agar diffusion test, these substances were studied. Fifteen Petri dishes were inoculated with 20 ml BHI agar with 0.1 ml assay suspensions using sterile rods brushed from the medium to obtain growth at the junction. Three groups were evaluated; Ten examples per group. In the first group, the MTA was mixed with 0.2% chlorhexidine gluconate.

In the second group, MTA was mixed with distilled water from the material itself, and in the third group, the MTA was mixed with local anesthetic (1: 100,000 epinephrine, 2% xylocain with Dentsply Pharmaceutical). The MTA was mixed with these tools according to the manufacturer's instructions, using metal sleeves with a fixed amount of material and placed on the surfaces of the plates. The Augmentin suspension was used as a positive control. A negative control was dried and a sterile tin foil disk was used. The plates were aerobically incubated at 37 ° C for 48 hours. The diameters of the microbial inhibition zones were measured by a blind external controller. All tests were performed under aseptic conditions. Data from each MTA mixture group were subjected to an analysis of the t-test to determine whether there were significant differences in the inhibition sites between MTA / CHX, MTA / local anesthetic and MTA / water experimental mixtures. ANOVA was then used to determine the significant difference between all groups and post hoc tukey test was used to determine which group had a significant inhibition site. The confidence level was determined as $p > 0.05$.

RESULTS:

Data for inhibition sites are presented in Table 1. The MTA was always inhibitory, independent of the mixture used. The mean inhibition sites were 11.1 mm for MTA / CHX, 9.4 mm for MTA / water and 9.3 mm for MTA / local anesthesia. In the vicinity of MTA / CHX mixtures, greater inhibition sites were observed in all plates that were significantly different from the other groups when compared to MTA / water and MTA / local anesthetic mixtures.

TABLE 1: INHIBITION ZONE (mm)

Sample	Chlor-hexidine	Water	Local anesthetic
1	12.5 mm	9mm	8.5 mm
2	11.5 mm	8.5 mm	9.5 mm
3	11 mm	10.5 mm	9mm
4	10 mm	10 mm	10.5 mm
5	11 mm	9.5 mm	10 mm
6	12 mm	9mm	9.5 mm
7	10.5 mm	10mm	10mm
8	11.5 mm	9mm	8 mm
9	11 mm	8.5 mm	9mm
10	10 mm	9mm	9mm
Mean	11.1 mm	9.4 mm	9.3 mm

DISCUSSION:

In this study, the microorganism was selected to represent the aerobics in the infected root canals. Endodontic infection is polymicrobial in nature and lives in a symbiotic relationship to each microbiota, and cutting a member of this environment will cause destruction of the environment. It is better to test the material against E. faecalis because it is the most frequently isolated microorganism from endodontically treated cases. C. albicans has been shown in chronic apical periodontitis root-filled teeth, but Alnazhan et al. Fresh and dried MTA showed antifungal. Torabinejad et al. Reported that MTA had no inhibitory effect against E. faecalis, S. aureus or F. nucleatum.

Fig. 1. MTA/CX group

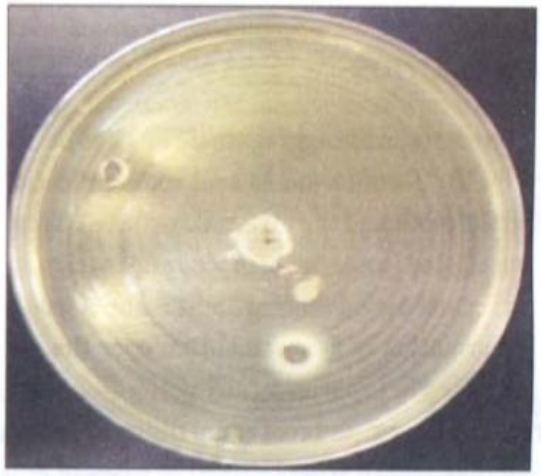

Fig. 2. MTA/LA group

In this study, MTA, S. aureus; This can be explained in different ways. First, the placement of the material was different. In both studies, the test materials were placed directly on the surface of the agar before incubation, but metal sleeves were used to have accurate and reproducible MTA volumes per sample. Another explanation may be the MTA's different formulation. In the previous study, "The Loma Linda

MTA used may be different from the commercial MTA which is available later, the MTA tested in this study is the third generation of the gray MTA shown above." In this study, MTA / CHX mixtures produced more inhibition sites than MTA / water and MTA / local anesthetic mixtures. Our results Stowe et al. 9 placed the cavities on the agar plates to increase the diffusion of the material. But in a real situation, the material is only in contact with the fabric. In addition, gray MTA was used in this study. However, it can be concluded from our studies and studies that CHX in the MTA blends is the active ingredient that produces the improved antimicrobial response.

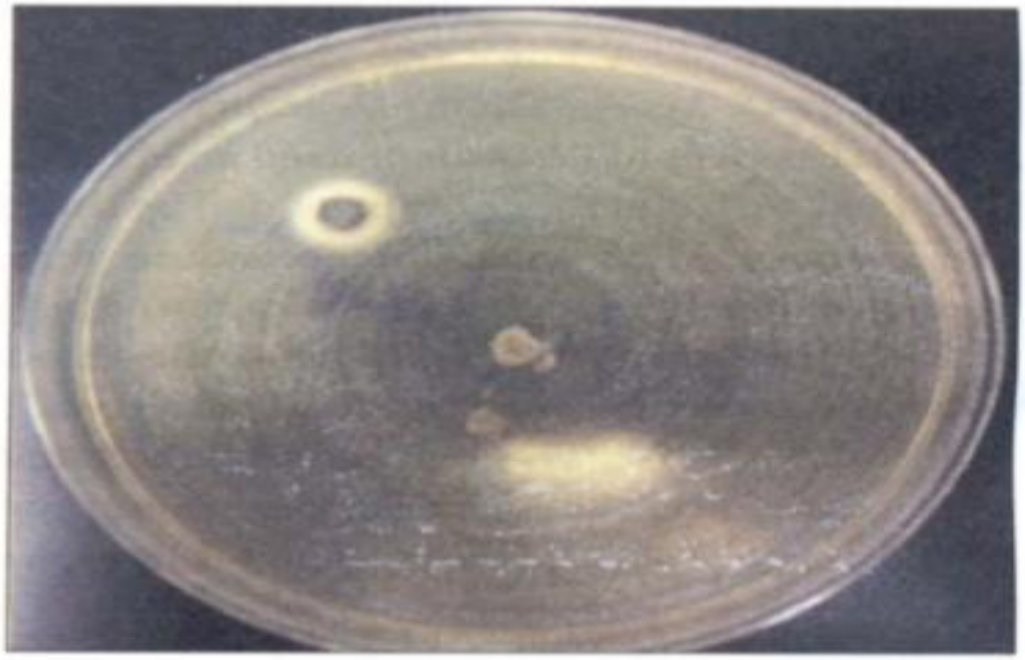

Fig. 3. MTA/water group

Changing the vehicle will produce new material, so it is necessary to examine the physical properties, chemical properties and basic analysis of this new material. Additional studies are needed to determine these properties and the effect of CHX on MTA.

CONCLUSION:

The use of 0.2% chlorhexidine gluconate with gray MTA increased the antimicrobial effect of in vitro material against S. aureus.

REFERENCES:

1. Araghi, Solmaz, Atefeh Khavid, Mostafa Godiny, and Mahshid Saeidipour. "In vitro evaluation of coronal discoloration following the application of calcium-enriched mixture cement, Biodentine, and mineral trioxide aggregate in endodontically treated teeth." *Dental Research Journal* 16, no. 1 (2019): 53.
2. Aksel, Hacer, Selen Küçükkaya Eren, Sevinc Askerbeyli Õrs, and Eda Karaismailoğlu. "Surface and vertical dimensional changes of mineral trioxide aggregate and biodentine in different environmental conditions." *Journal of Applied Oral Science* 27 (2019).
3. Lee, Li-Wan, Sheng-Huang Hsiao, Yun-Ho Lin, Po-Yu Chen, Ya-Ling Lee, and Wei-Chiang Hung. "Outcomes of necrotic immature open-apex central incisors treated by MTA apexification using poly (ε-caprolactone) fiber mesh as an apical barrier." *Journal of the Formosan Medical Association*118, no. 1 (2019): 362-370.
4. Kalay, Tugba Serin. "Effects of intracoronal bleaching agents on the surface properties of mineral trioxide aggregate." *Odontology* (2019): 1-8.
5. Aly, Mariam Mohsen, Sherine Ezz El-Din Taha, Manal Ahmed El Sayed, Randa Youssef, and Hany Mahmoud Omar. "Clinical and Radiographic Evaluation of Biodentine and Mineral Trioxide Aggregate in Revascularization of Non Vital Immature Permanent Anterior Teeth (Randomized Clinical study)." *International journal of paediatric dentistry* (2019).
6. El Meligy, Omar Abd El Sadek, Najlaa Mohamed Alamoudi, Sulaiman Mohamed Allazzam, and

Azza Abdel Mohsen El-Housseiny. "Biodentine TM versus formocresol pulpotomy technique in primary molars: a 12–month randomized controlled clinical trial." *BMC oral health* 19, no. 1 (2019): 3.

7. Cuppini, Marla, Kelly Cristine Zatta, Letícia Boldrin Mestieri, Fabiana Soares Grecca, Vicente Castelo Branco Leitune, Sílvia Stanisçuaski Guterres, and Fabrício Mezzomo Collares. "Antimicrobial and anti-inflammatory drug-delivery systems at endodontic reparative material: Synthesis and characterization." *Dental Materials* (2019).
8. Uesrichai, N., A. Nirunsittirat, P. Chuveera, T. Srisuwan, T. Sastraruji, and P. Chompu-inwai. "Partial pulpotomy with two bioactive cements in permanent teeth of 6-to-18-year-old patients with signs and symptoms indicative of irreversible pulpitis: a non-inferiority randomised controlled trial." *International endodontic journal* (2019).
9. Choi, Yoorina, Jong-Lye Bae, Hee-Jin Kim, Mi-Kyung Yu, Kwang-Won Lee, and Kyung-San Min. "Effects of dodecacalcium hepta-aluminate content on the setting time, compressive strength, alkalinity, and cytocompatibility of tricalcium silicate cement." *Journal of Applied Oral Science* 27 (2019).
10. Kalyan, KSD Ravi, C. Vinay, Arunbhupathi, K. S. Uloopi, R. Chandrasekhar, and K. S. RojaRamya. "Preclinical Evaluation and Clinical Trial of Chlorhexidine Polymer Scaffold for Vital Pulp Therapy." *Journal of Clinical Pediatric Dentistry* (2019).
11. Sun, Yan, Jun Liu, Tao Luo, Ya Shen, and Ling Zou. "Effects of two fast-setting pulp-capping materials on cell viability and osteogenic differentiation in human dental pulp stem cells: An in vitro study." *Archives of oral biology* (2019).
12. Patil, Urjita, Mahantesh Yeli, Sharmila Tapashetti, Balaram Naik, and Mahima Tilakchand. "Effect of varying durations of intracanal medicament application used in regenerative endodontic treatment on the push-out bond strength of a novel cement: NeoMTA Plus." *Journal of conservative dentistry: JCD*22, no. 1 (2019): 48.
13. Rani, Priyanka, Dilipkumar Pal, Mohammad Niyaz Hoda, Tahseen Jahan Ara, Sarwar Beg, M. Saquib Hasnain, and Amit Kumar Nayak. "Dental pulp capping nanocomposites." In *Applications of Nanocomposite Materials in Dentistry*, pp. 65-91. Woodhead Publishing, 2019.
14. Hussain, Sarah Saad. "Evaluation of pulpal and dentin regeneration by different pulp-capping materials using mouse model." PhD diss., UCLA, 2019.
15. Razdan, Ankur, Ana Raquel Benetti, and Lars Bjørndal. "Do in vitro solubility studies on endodontic sealers demonstrate a high level of evidence? A systematic review." *Acta Odontologica Scandinavica* (2019): 1-11.