

Influence of Photodynamic Antimicrobial Chemotherapy on Multi-resistance *Staphylococcus aureus* by using Low Power Laser Light Diode with Methylene Blue.

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Abstract

Background: Methicillin resistant *Staphylococcus aureus* (MRSA) causes serious infection of hospital-acquired patient. In recent years photodynamic inactivation (PDI) has been proposed as a therapy for a large variety of localized infection caused by MRSA.

Objective: To assess the effect of photosensitizer low power laser light diode with methylene blue in the reduction the viability of *Staphylococcus aureus* (MRSA).

Patients and Methods: Thirty five isolates of *Staphylococcus aureus* bacterial were isolated and identified using standard methods (Beta hemolytic in blood agar and mannitol fermentation) and Vitek2 system from (16 urine, 8 wound, 7 pus, 4 eye) during the period from January 2014 to November 2015. The bacterial isolates were taken from Rizgary Teaching Hospital in Erbil city. All isolated were tested susceptibility to antibiotic test by Vitek2 system against 8 antibiotics, Methicillin resistance susceptibility test (MRSA) by using Cefoxitin and Oxacillin disk, production of Biofilm by using Congo red agar method, with explore photodynamic inactivation of MRSA by using Methylene blue (MB) in combination with diode laser (red 650 nm, 5 mW) at different time of exposure.

Results: We obtained in this study (35) isolates of *Staphylococcus aureus* isolated from (urine, wound, pus, blood, eye), (45.7%) isolates multi-resistance showed the resistance to more than 4 antibiotics from different classes, in our results also the isolated bacteria showed the percentage resistance of Cefoxitin was highest 35 (100%), resistant for Oxacillin was 21 (60%), thus all 35 clinical strains of *Staphylococcus aureus* isolates 100% were considered to be MRSA. Furthermore the investigation showed that (22%) black (complete) to slightly black on published congo red agar in which considered to be positive in forming biofilm and (78%) red color on published congo red agar in which considered to be negative in forming biofilm. We achieved in vitro study to explore photodynamic inactivation of methicillin resistant *Staphylococcus aureus* bacteria by using Methylene blue (MB) in combination with diode laser (red 650 nm, 5 mW). After one hour of laser illumination of bacteria we achieved a reduction more than half numbers of each isolated of MRSA.

Conclusion: Reduction in number of colony-forming units by the Laser (physicochemical properties of photosensitizers) combination with Methylene blue dye treatment of *S. aureus* which have a great effective to destroy the microorganism.

Key words: *S. aureus* (MRSA), Methylene blue (MB) in combination with diode laser.

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Received: 30th January 2017

Accepted: 12th March 2017

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