

Role of Doxycycline in Covid-19-A Review

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ABSTRACT

Coronavirus COVID-19 resulted in ubiquity with no proper remedies or vaccines. In order to overcome the mortality rate presently reuse of existing drugs is considered as a major alternative treatment. Based upon recent studies, tetracycline class of antibiotics is taken into consideration for the COVID-19 infection.

Doxycycline member of the tetracycline is a major antibiotic used currently for the COVID-19 infection. Doxycycline passes bacteriostatic property along with their activity against gram negative and gram positive bacteria. Doxycycline is a vital anti-inflammatory drug furthermore, they have antiviral activity. Therefore Doxycycline a tetracycline is a major therapeutic agent against coronavirus COVID-19 infection.

KEYWORDS: Coronavirus, Doxycycline, tetracycline

INTRODUCTION

Coronavirus COVID-19 breakout was initially reported in December 2019 in wuhan, china [1]. COVID-19 was considered as pandemic on march 11, 2020 by WHO[4]. The pandemic globally spread enormously. At first the COVID-19 causing virus was named as novel coronavirus [2019-nCoV] later on it was named as severe acute respiratory syndrome 2 [SARS-COV-2] by the International committee of taxonomy of viruses[4]. In order to overcome the less efficacy of antiviral agent and no known vaccines, antibiotic came into use against COVID-19[7]. Antibiotics either given alone or along with combination for the treatment of COVID-19.

Doxycycline is a broad spectrum antibiotic member of the tetracycline provide potential therapeutic action against COVID-19 inhibiting the replication in the lungs[5]. Moreover certain studies has proved that tetracycline has antiviral, antibiotic and anti-inflammatory property [5]. Doxycycline when compared to antiviral agent has major role in treatment of COVID-19[9].

MECHANISM OF ACTION

Doxycycline is a bacteriostatic at lower concentration and bactericidal at higher concentration [1]. Studies show that Doxycycline controlled both dengue and chikungunya [2]. Doxycycline is a protein synthesis inhibitor [6]. Doxycycline block cytokine production and prevent viral replication thereby reducing inflammation and virus production [1]. Doxycycline inhibit [MMPs] matrix metalloproteinase which are crucial for virus survival and replication [2].

PHARMACOKINETICS AND PHARMACODYNAMICS

Doxycycline is administered orally followed by complete absorption in stomach and small bowel [3]. Certain measures like avoiding during bedtime and consuming with adequate water is recommended [2]. The common serum half-life is 18-22 hours even in case of renal impairment [3]. As the Doxycycline creep into the body fluids they are seen in breast milk [2], lymphatic fluid, and peritoneal fluid and also in CSF with mean level of 14%-26%. Doxycycline causes teeth [3] discolouration due to stable calcium complex formation. Elimination of oral administration of Doxycycline takes place within 72 hours. Doxycycline exhibit post antibiotic effect [2].

DOSAGE AND ADMINISTRATION

The Initial recommended dose of Doxycycline is 200mg daily and followed by maintenance dose of 100mg in case of severe infections [14]. Intake either orally or through IV. Higher doses are recommended in case of malaria, syphilis, prophylaxis [15]. Lower dose of 20mg is recommended for condition like acne vulgaris, rosacea. In case of children, 2.2 mg/kg dosage is recommended [3].

DRUG INTERACTION

Drug absorption is inhibited by aluminium, calcium and magnesium salts [3]. Certain measures for the intake of Doxycycline are not taken along with Iron supplements, anticonvulsant, anticoagulants, oral contraceptives and chronic alcoholism [3].

INDICATIONS

Doxycycline usage during tooth development causes tooth enamel hypoplasia and teeth discolouration [3]. Doxycycline causes gastrointestinal irritation, so intake with excessive fluids is suggested [2]. As the Doxycycline cross the placenta it should be avoided during pregnancy [3]. Certain invivo studies show Doxycycline is carcinogenic [2].

CLINICAL USES

Doxycycline is used in both community acquired pneumonia and hospital acquired pneumonia [3]. It is used in endocarditis, pyrexia and retinitis as first line therapy.

It is used for both natural and bioterrorism anthrax [2]. Commonly used in treatment of malaria, dengue, chikungunya and genitourinary infections [3].

ROLE IN COVID-19

According to NICE UK Guideline Doxycycline is a major choice for community and hospital acquired pneumonia to prevent mortality [8]. According to certain studies Doxycycline is not used in general treatment of COVID-19. These are used as Therapeutic agents to control mortality [1].

CONCLUSION

Coronavirus-COVID-19 still exists as a major pandemic disease and COVID vaccine has been recently rolled out for Health care workers and for those who crossed 18 years of age in India. Certain existing medicines majorly Doxycycline and antibiotic can be used in prevention of mortality and for yielding anti-inflammatory properties in certain conditions. Doxycycline is said to be one of the major safety drug in treating COVID-19.

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