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Research Article

Azithromycin and Metals Complex Interaction: A Systemic Review on Drug-Metals Interaction

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Abstract

Azithromycin and metal interaction and successfully found there after interaction result. Also, the antimicrobial activity of drug and the metals complexes were determined. This has been seen that the Azithromycin interacts along with metal at the pH 7.4. The different essential metal intricate of the azithromycin has been synthesized in addition to characterized by the techniques like NMR, UV, atomic absorption, FT-IR as well as elemental analysis. Spectroscopic, IR Spectroscopic, disk diffusion method, Biological assay studies of complexes. On the other hand in this interaction there uses metals complex which are interaction with drug into our body. And have been use there various type of bacteria for finding zone of inhibition. Some paper there uses methanol and ethanol for disk diffusion result clearly showing. If we use Azithromycin in a single way then it has a high bioavailability and proportionally increasing the absorption with concentration. But if we use its interaction with metals then it bioavailability and absorption decrease and less half life. By using there a various of methods and study such as Antifungal study, Antibacterial study, Biological study with different type of spectroscopic analysis, Conductrometric, IR spectrometric and Disk-diffusion methods its shows that's less pharmacological action. So that after all discussion its concluded that if we taken Azithromycin then we will use the metals complex before two hours and after one hour. There is or will no interaction and in this we say well and get the best bioavailability and high pharmacological action.

Keywords: Azithromycin; Review; Interaction; Pharmacological Action

Introduction

Confirmation contacts between entity macrolides as well as a huge number of the pharmacologically energetic compounds with the purpose of are repeatedly co-administered to the patients through bacterial contagions is evaluated. Moreover, theophylline is also powerfully connected with erythromycin interface; clarithromycin can as well interact with drug. So, Azithromycin, rokitamycin as well as spiramycin do not emerge to have consequence on also theophylline pharmacokinetics [1]. Moreover, other therapeutic representatives believed are carbamazepine, cyclosporin, and warfarin, terfenadine utilized in management of the gastritis in addition to peptic ulcer as well as zidovudine. By means of exception of the interaction with the antacids, it is no confirmation that azithromycin, distinct most extra macrolides, act together with any of agents to create clinically momentous adverse effects. The clarification for variation emerges to be the azithromycin's incapability to induce in addition to bind to cytochrome P450 IIIA of the enzyme system. The Acid-peptic illness, in form of gastritis and ulcers is liable for much more morbidity [2]. Here macrolides of clanthromycin in addition to roxithromycin do not show to be unfavorable affected by concurrent management of the antacids, though the data stay limited [3]. Many authors finished that bioavailability of the roxithromycin is much more unaffected by the either of agents [4]. Similar to any drug, antimicrobial medicines are

prone to the pharmacokinetic drug - drug interactions. These drug – drug contacts are major apprehension in the clinical practice and they have a consequence on the efficacy in addition to toxicity. It describes drug-food in addition to drug-drug contact studies in our body and affecting antimicrobial medicines as well as concurrently administered drugs. So, knowledge regarding systems is of the paramount significance for sufficient management of the drug interactions and the most conceivable underlying system of drug contact is given when accessible [5]. This overview can be used in daily practice to support the management of pharmacokinetic drug interactions of antimicrobial drugs.

Materials and Methods

The present study and purpose in reviewing in this all articles is to find out how Azithromycin and metals complex show after interaction is they reduce the Bioavailability or reduces other pharmacological action.

Spectroscopic method [6]: The interaction of azithromycin with iron (II) salts was studied by the preparation of a series of methanolic solutions that contain a fixed concentration of $FeSO_4$ (like 1.00 x 10^{-4} Molar) as well as a changeable concentration of the azithromycin. In these solutions, the concentration of azithromycin was varied in a way that makes the total azithromycin to $FeSO_4$ concentration ratio range from 0 to 8. The solution was allowed to stand at 25°C for 1 hour to equilibrate and the optical spectra were measured. The coordination numbers of the complexes formed were further confirmed using Job's method of continuous variations.

Results and Discussion

Spectroscopic Investigation demonstrates spectra of a sequences of the solutions of the fixed concentration of the $FeSO_4$ (1.00 x 10^{-4}M) in addition to an inconsistent concentration of the azithromycin. In solutions, azithromycin to the Fe^{2+} ion the total concentration percentage was varied from 0 to 8 folds. This can be observed that the increasing azithromycin to the Fe^{2+} concentration percentage causes increase in absorbance at the all wavelengths. This absorbance enlarge starts to the levels off when azithromycin to the Fe^{2+} concentration percentage achieves a point indicating, it was caused by reaction of the azithromycin and Fe^{2+} ion. This shows observed change in absorbance at wavelengths 208 nm, 308 nm 352 nm upon increasing azithromycin to the Fe^{2+}concentration ratio. This can be seen increasing azithromycin concentration reasons an increase in the absorbance of wavelengths until azithromycin to the Fe^{2+} concentration ratio of the 1:1 is attained [7]. Subsequent to reaching the ratio absorbance remains basically constant. This shows changes in the absorbance at wavelengths of 360 nm, 320 nm, 260 nm, 240 nm as well as 220 nm for the set of the solutions in which total concentration of the azithromycin and concentration of the Fe^{2+} is stable while molar metal to the ligand ratio changes from single solution to the another. Moreover Azithromycin has also been related with the metal like Zn, antacids like $Mg(OH)_2$, $CaCO_3$ *in vitro* [8]. Finally it can say that by antimicrobial investigation it was observed the zone of inhibition of the drug Azithromycin with metal and antacid like Mg Zn and Ca reduced from 14 mm to 9 mm, 8 mm and 4 mm respectively [9].

Review information

According to all article after methods reviewing, it is found appropriate result which is, Azithromycin and metals complex interaction they decrease the bioavailability, half life, less absorption, decrease the zone of inhibition, and decrease remarkably.

- The existence of the complexion can affect bioavailability of drugs, other the essential elements and in order to the study probable interaction of the Azithromycin with the essential trace elements in attendance in body its less the duration of the half life.
- Among many synthesized drugs supported metal complexes like $Ca(Azi)_2$, $Fe(Azi)_2$, $Ni(Azi)_2$, $Co(Azi)_2$ in addition to $Zn(Azi)_2$ complexes similar to the antacid exhibits reduced activity aligned with Gram negative as well as Gram positive organisms.
- This can be terminated azithromycin might be used as the antifungal agent together with synthesized complexes in addition to interacted with metals its reduce zone of the inhibition, half- life and bioavailability.
- The UV-visible spectrophotometric studies of the complexes were performed in addition to compared by the antimicrobial investigation and it was seen that zone of the inhibition of drug decrease amazingly.
- In all the articles after reviewing, it can says it should take metals complex after 2 hours and before one hour at taken Azithromycin antibiotic.

Conclusion

The azithromycin demonstrates a bidentate behavior in addition to was seen the $N(CH_3)_2$ group of the desosamine as well as hydroxyl group of the azithromycin experienced complexation with the selected metals. So, it can be terminated that the azithromycin might be used as the antifungal agent with the synthesized complexes. It has been observed Azithromycin shows a sharp peak at the 235 nm. When calcium carbonate, zinc sulfate as well as magnesium hydroxide were combined with the azithromycin at the ratio 1:1 and intensity of peak changes amazingly. Absorption characteristics varied due to interaction but position of compound do not strictly shift. Moreover, the Job's plot has provided molar ratio of the complexes of the azithromycin with the antacids, metal. The zone of inhibition decreased remarkably. Which indicated the interaction of Azithromycin with metal and antacids. It has been observed by the antimicrobial investigation zone of the inhibition of drug Azithromycin along with metals like Mg Zn and Ca decreased from the 14 mm to 9 mm, 8 mm as well as 4 mm respectively. All the experiments were replicated at least the three times in addition to the average values were found for the obtaining various plots. In all cases the relative standard deviation of measurements was less than 2.5%. So, the clinical apply can present at the different picture. There are several groups of patients in whom the risks of interactions are greater and it is for this reason that the medical community is often first alerted to a potential interaction through a case report.

Bibliography

1. Taylor SP., *et al.* "Azithromycin for the Prevention of COPD Exacerbations: The Good, Bad, and Ugly". *The American Journal of Medicine* 128 (2015): 1362.

2. Rolfe RD and Finegold SM. "Comparative *In Vitro* Activity of Ceftriaxone Against Anaerobic Bacteria". *Antimicrobial Agents and Chemotherapy* 22.2 (1982): 338-341.

3. Laghari M., *et al.* "Spectrophotometric determination of ceftriaxone using 4-dimethylaminobenzaldehyde". *Pakistan Journal of Analytical and Enviromental Chemistry* 9.1 (2008): 1-7.

4. Izadi M., *et al.* "Levofloxacin Versus Ceftriaxone and Azithromycin Combination in the Treatment of Community Acquired Pneumonia in Hospitalized Patients". *Recent Patents on Anti-Infective Drug Discovery* 13.3 (2018): 228-239.

5. Islam SA., *et al.* "Bangladesh Pharmaceutical Industry: Perspective and the Prospects". *Bangladesh Journal of Medical Science* 17.4 (2018): 519-525.

6. Corrêa JC., *et al.* "Randomized, open-label, parallel-group, multicenter study of the efficacy and tolerability of IV gatifloxacin with the option for oral stepdown gatifloxacin versus IV ceftriaxone with the option for oral stepdown clarithromycin". *Clinical Therapeutics* 25.5 (2003): 1453-1463.

7. "Lack of interaction between azithromycin and carbamazepine". In Proceedings of the British Pharmacological Society, London (1991).

8. Ruff F., *et al.* "Effect of erythromycin, clarithromycin and azithromycin on the pharmacokinetics of terfenadine". *European Journal of Clinical Pharmacology* 39 (1990): 165-167.

9. Cummins LH., *et al.* "Theophylline determinations". *Annals of Allergy* 37 (1977): 450.