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CONCOMITANT ORAL USE OF CLINDAMYCIN AND LACTIC ACID BACILLUS: A REVIEW

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ABSTRACT

Clindamycin, a broad-spectrum antibiotic, is commonly prescribed for the treatment of various bacterial infections. However, its use can be associated with adverse effects, including antibiotic-associated diarrhea and disruption of the natural gut microbiota. It exhibits potent antimicrobial activity against susceptible bacteria but also indiscriminately targets beneficial gut bacteria, leading to dysbiosis and the overgrowth of opportunistic pathogens such as *Clostridium difficile*. Lactic acid bacillus, a type of probiotic bacterium, has been extensively studied for its ability to restore and maintain a healthy gut microbiota. By supplementing clindamycin therapy with lactic acid bacillus, the aim is to minimize the disruption of the gut microbiome and potentially reduce the incidence of adverse gastrointestinal effects. Studies evaluating the concomitant use of clindamycin and lactic acid bacillus have demonstrated promising outcomes. Lactic acid bacillus has been shown to reduce the risk of antibiotic-associated diarrhea and *C. difficile* infection by preventing the colonization of pathogenic bacteria and enhancing the restoration of the intestinal flora. In conclusion, the concomitant use of clindamycin and lactic acid bacillus presents a potential strategy to mitigate antibiotic-induced gastrointestinal disturbances and restore microbial balance. This approach holds promise in reducing the incidence of antibiotic-associated diarrhea and *C. difficile* infection. However, careful consideration of dosage, patient selection, and long-term effects is necessary to fully understand the clinical implications and maximize the benefits of this therapeutic combination.

KEYWORDS: Clindamycin, lactic acid bacillus, concomitant use, oral administration, antibiotic-associated complications, gut microbiota.

INTRODUCTION

The indiscriminate use of antibiotics can disrupt the gut microbiota, leading to antibiotic associated complications. The microbiota is the group of microscopic organisms that live in the human gastrointestinal tract, most of which are bacteria but also include viruses, fungi, and protozoa. The intestine microbiota gives crucial capacities for the fermentation of non-digestible substrates like nutritional fibres and endogenous intestinal mucus.[1]

Clindamycin, a broad-spectrum antibiotic, is known to cause antibiotic-associated gastrointestinal symptoms, diarrhea and in some cases, *Clostridium difficile* infection due to its impact on beneficial gut bacteria. The concomitant oral administration of lactic acid bacillus, a probiotic organism, aims to restore the intestinal microbial balance and minimize the occurrence of antibiotic-associated complications.[2]

Clostridium difficile, a Gram-positive, spore-forming anaerobic bacillus, associated with antibiotic-related diarrhea, causing CDAD (*Clostridium-difficile* associated diarrhea) and the antibiotics most frequently associated with infection are clindamycin, ampicillin and/or amoxicillin, and cephalosporins.[3]

Clindamycin

The US Food and Drug Administration has authorized the use of the lincosamide antibiotic clindamycin to treat infections caused by *streptococci, staphylococci*, and *anaerobes*. Its major disadvantage is its propensity to cause antibiotic- associated diarrhea, including *Clostridium difficile* colitis.[4] Its range of activity is rather limited and comprises gram-positive cocci and bacilli, gram-negative bacilli, and anaerobic bacteria.[5] The oral dosage form was capsule and strengths available are 75, 150 and 300 mg. The bioavailability was oral (rapid; 90%) and peak serum time was within 60 min (PO). The excretion is through urine (10%) and feces (~4%) as active drug.

Mechanism of action: Bacteriostatic or bactericidal effects vary on medication dose, organism, and site of infection. Suppresses the production of proteins by binding to 50S ribosomal subunits.

Black box alerts: There have been reports of Clostridium difficile-associated diarrhoea (CDAD), which can range in severity from mild diarrhoea to deadly colitis. It could be necessary to stop using antibiotics going forward if CDAD is suspected or diagnosed.[6]

Lactic Acid Bacillus

Lactic acid bacillus is an antidiarrheal/ probiotic, or friendly bacteria (live bacteria that has health benefits). It is a beneficial lactic acid-producing bacterium that supports the growth of friendly bacteria in the intestine and maintains a healthy balance of microflora in the gut environment and utilized to replenish beneficial bacteria and lessen diarrhea and upset stomach. It treats infectious diarrhea as well as antibiotic-associated diarrhea.[7]

The common side effects of lactic acid bacillus are bloating and flatulence. When administered concurrently, antibiotics may lessen the impact of lactic acid bacteria. To reduce this risk, take lactic acid bacillus at least 2 hours before or after antibiotics.[8]

The recommended lactobacillus dosage was 1-2 pills taken orally, 1-10 billion CFUs administered orally divided TID-QID, and 8 ounces of yoghurt administered orally BID.

Mechanism of action: Promotes local immunity, restores healthy intestinal flora that prevents the formation of dangerous bacteria, and aids colon water absorption.[9]

Rationale for Concomitant Oral Use

Clindamycin exerts its antimicrobial effect by inhibiting bacterial protein synthesis, but it can also affect beneficial bacteria in the gut. Probiotics, like lactic acid bacillus on the other hand, introduce live beneficial bacteria that can help restore microbial balance and promote gut health.[10]

The bacterium that is causing the infection is typically not the only thing that antibiotics target. They also eliminate the beneficial bacteria that exist in our digestive tract and keep us healthy. There is evidence to suggest that this change in the gut microbiome's makeup can last for a maximum of two years after antibiotic medication. Antibiotic-induced alterations to the gut microbiota composition can be avoided or at least mitigated by taking probiotics together with antibiotics. In addition to reducing inflammation and fostering a healthy intestinal barrier, probiotics can also help rebuild the populations of some beneficial bacteria. This helps conserve species diversity.

A prescription for probiotics does not appear to be warranted when antibiotics are prescribed, based on the human data that is currently available.[11]

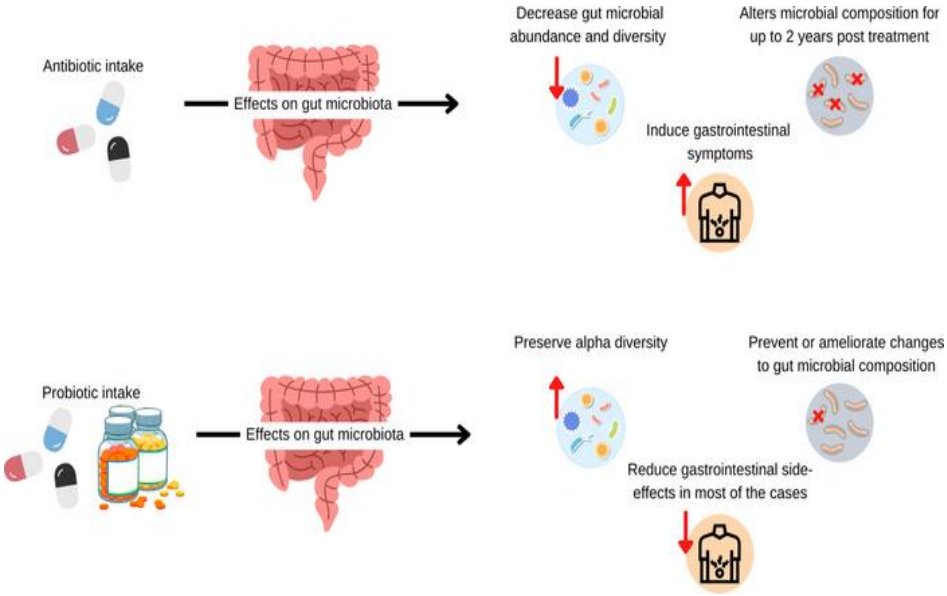

Fig. 1: Conceptual model of the effect of antibiotics and/or probiotics on the gut microbiota.[11]

Optimal Timing and Duration

The duration of probiotic supplementation, including pre-, co-, and post-antibiotic therapy, might influence the outcomes. Standardized dosing regimens need to be established to ensure consistent and effective use.

Determining the optimal timing and duration of lactic acid bacillus supplementation during clindamycin therapy remains an area of ongoing research. Current recommendations suggest separating the administration of clindamycin and lactic acid bacillus by a few hours to minimize any potential interaction.

Response to probiotics can vary among individuals due to variations in baseline gut microbiota composition and host factors. Personalized approaches considering patient-specific factors may be necessary to optimize outcomes.[12]

Clinical Evidence

Based on the available evidence, it is recommended to consider lactic acid bacillus supplementation alongside clindamycin treatment, especially in patients at higher risk of AAD or CDAD. The studies have shown that lactic acid bacillus administration during clindamycin therapy can significantly reduce the incidence and severity of antibiotic-associated diarrhea (AAD) and decrease the risk of *C. difficile*-associated diarrhea (CDAD). Furthermore, lactic acid bacillus has been reported to help restore the gut microbiota composition after clindamycin treatment.

However, individual patient factors, such as the severity of infection, comorbidities, and antibiotic resistance patterns, should also be considered. Further research is warranted to determine optimal dosing, duration, and specific patient populations that would benefit the most from this concomitant therapy.[13]

Safety Profile

Several studies have explored the safety of co-administration of clindamycin and lactic acid bacillus. Overall, the concomitant use appears to be well-tolerated, with no significant increase in adverse events compared to clindamycin alone. Adverse events associated with lactic acid bacillus are generally mild and transient, with few reports of serious complications. However, caution should be exercised in patients with a history of probiotic-related infections or immunocompromised individuals.[2]

Drug interaction: Coadministration of oral probiotic preparations with oral antibiotics may reduce the efficacy of the probiotic. It has been theorized that concomitant antibiotics may kill the live organisms found in lactic acid bacillus containing oral probiotic preparations.

Management: Although data are limited, it may be prudent to advise patients to take oral probiotics at least 1 to 2 hours before or after an oral antibiotic.[14]

Future Directions

Further research is needed to establish standardized protocols for the concomitant use of clindamycin and including lactic acid bacillus. It should focus on elucidating the precise mechanisms by which lactic acid bacillus interact with clindamycin and studying their long-term effects. Additionally, large-scale randomized controlled trials are needed to confirm the efficacy and safety of combining clindamycin with lactic acid bacillus, considering different patient populations and antibiotic treatment durations.[15,16]

CONCLUSION

The concomitant oral use of clindamycin and lactic acid bacillus offers a promising approach to mitigate the adverse effects of clindamycin on the gut microbiota. The available evidence suggests that this combination therapy can help restore microbial balance, reduce the incidence of antibiotic-associated complications like AAD, CDAD and improve clinical outcomes. However, further research is warranted to establish optimal dosing regimens, identify specific patient populations that would benefit most, and elucidate the long-term effects of this treatment approach. Healthcare professionals should consider individual patient factors and make informed decisions when considering the concomitant use of clindamycin and probiotics.

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