

Bioenhancers: A review

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Introduction

Herbal bioenhancers are Phyto molecules that, in controlled doses, enhance the biological activity of therapeutics or their bioavailability. Their development is based on ancient knowledge of Ayurveda. The herbal bioenhancers are easily available, safe and relatively free from side effects, minimizes drug toxicity, shortens the duration of treatment, lowers the drug resistance problems and minimizes the cost of treatment. An effective bioenhancer is nontoxic to both humans and animals, easy to concoct, and highly responsive, even when its concentration in a given enhancer/drug combination is low. Use of bioenhancers is found essential with the drugs which are toxic, expensive, and poorly absorbable and administered for long period of time. Therefore, bioenhancers can be used in combination therapy with drugs such as antihypertensives, antimicrobials, anticancer, antiviral, antitubercular and antifungal drugs and nutrients such as vitamins, minerals, herbal extracts and amino acids. Hence for the treatment of infectious diseases combination therapy can be applied in human and veterinary medicine.

About 250 million doses of antibiotics are consumed annually and 20-50 % of its use is unnecessary or irrational. Indiscriminate use of antibiotics promotes multiple drug resistance and infected individuals have to consume more amount of antibiotics may be due to reduced absorption in gut, restrictive uptake by target microbe and operation of efflux pump. Antibiotics along with feed additives have been used in the livestock and poultry industry in a large scale since long time. Implementation of a ban on antibiotics as the feed additive, forced us to go for some alternative treatment. Emergence and spread of Anti-Microbial Resistance (AMR) and Multiple Drug Resistant (MDR) infections and antibiotic associated health ailments as a sequel of antibiotic therapy made researcher focus on alternative medicine. Among alternates, the

traditional herbal medicines making possible to identify novel bioactive compounds has attracted the attention of researcher's world over.

Several herbal bioenhancer compounds including piperine, quercetin, genistein, naringin, sinomenine, curcumin, glycyrrhizin and cow urine distillate have demonstrated capability to improve the pharmacokinetic parameter of several potent Active Pharmaceutical Ingredients.

Piperine

Piperine is an amide alkaloid found in plants like *Piper longum* (long pepper), *Piper nigrum* (black pepper). It enhances the bioavailability of various drugs such as rifampicin, oxytetracycline, nimesulide, propranolol etc.



Turmeric

Turmeric or curcumin (*Curcuma longa*) is a common household item used as remedy for various ailments. The bioenhancer nature of curcumin is similar to piperine.



Allicin

Active bioenhancer phytomolecule in garlic (*Allium sativum*) is Allicin. It enhances the fungicidal activity.



Ginger

Ginger (*Zingiber officinale*) acts powerfully on GIT mucous membrane. The role of ginger is to regulate intestinal function to facilitate absorption.



Capsaicin

It is an active component of *Capsicum annum* and other chilli species. It enhances the bioavailability of theophylline.



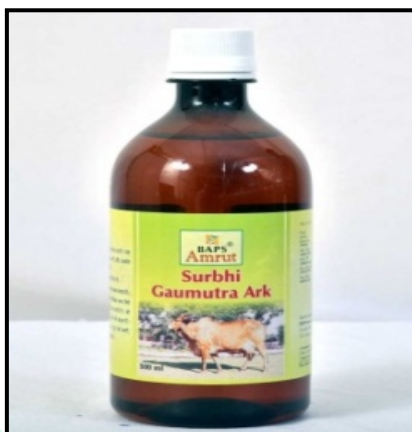
Indian Aloe

Aloe (*Aloe vera*) is an important source of phytochemicals and increases the absorption of vitamins C and E.



Cow urine distillate

Cow urine distillate is more effective as a bioenhancer than cow urine. It enhances the transport of antibiotics like rifampicin, tetracycline and ampicillin across the gut wall by 2-7 folds.



Other important bioenhancers include liquorice, black cumin, morning glory plant, drum stick pods, peppermint oil, quercetin etc.

Conclusion

Bioenhancers introduce a more recent theory in the discovery that is based on the conventional Indian medicinal system. The advancements to this approach will undoubtedly result in a decrease in the price of drugs, their toxicity, and other negative effects, as well as a positive impact on the country's economy. It is safe, effective, economical, easily procured, non-additive too. Thus, the use of bioenhancers in healthcare provision is important, and the development of bioenhancers from other sources has become urgently necessary.

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