

A REVIEW OF RATE OF BIOENHANCER IN THE TREATMENT OF A CANCER

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Abstract: -

Cancer is defined as the formation of abnormal cell which divides themselves into many in tissues and organs in other word- "cancer is result of the gathering of multiple genetic abnormality and epigenetic modification known as cancer metastasis. Bio enhancer's are defined or known as those substances which increases the bioavailability of the drug .And due to increase in bioavailability the dose of the drug absorbs in the systemic circulation, which reduces the side effects. Novel drug delivery systems are known as the advancement of new techniques for drug delivery. The drug delivery techniques acquires the controlled release of drug, sustained release of drug, targeted delivery of drug to tissues and increases the duration of action.

Keywords: - Cancer, Novel drug delivery systems, Bioavailability.

1. INTRODUCTION:-

Herbal medicines are widely used since centuries. Pharmacological active ingredients are extracted from plant origin and used as a medicine in ayurvedas. [1] Herbal plant extract which are poorly bioavailable are unable to cross the lipid membrane so to come in an account (NDDS) Novel drug delivery systems, are made to improve the bioavailability; To enhance the rate of release targeting release, prolonged release, bioavailability enhancers are used to enhance the bioavailability.[2]

Cancer is defined as the formation of abnormal cell which divides themselves into many in tissues and organs in other word- "cancer is result of the gathering of multiple genetic abnormality and epigenetic modification known as cancer metastasis.[3-5]

Bio enhancer's are defined or known as those substances which increases the bioavailability of the drug .And due to increase in bioavailability the dose of the drug absorbs in the systemic circulation, which reduces the side effects.[6-9]

Novel drug delivery systems are known as the advancement of new techniques for drug delivery. The drug delivery techniques acquires the controlled release of drug, sustained release of drug, targeted delivery of drug to tissues and increases the duration of action.[10-12]

1.1 ROLE OF BIO ENHANCERS

The concept and the practice of herbal medicines have been carried out since long centuries, for the improvement of bioavailability.

Various potent drugs are combined with herbal bio enhancers to improve the bioavailability.[13]

The word "bioenhancer" was first described by Bose in 1929, who combine long pepper with vasika leaves for increases in the action and properties of antiasthmatic.[14]

The concept and knowledge to use the natural bioavailability enhancer were put in use in the ancient ayurvedic time. [15]

The word 'bioavailability enhancers' are the drug helper which do not shows their own activity but only helps to enhance the activity of the drug molecules which shows increasing the bioavailability.[16]

1.2 TYPES OF BIOENHANCERS

- a. Piperine
- b. Quercetin
- c. Nitrile glycosides
- d. Genistein
- e. Curcumin
- f. Naringin
- g. Sinomenine
- h. Glycyrrhizin
- i. Z.officinale
- j. C.cyminum

2. METHOD OF ACTION OF BIOENHANCER

1. Piperine-

Source: piperine is an alkaloid which is obtained from *p. nigrum* linn (black pepper) and *p.longum* linn (long pepper).[17-19]

Mechanism: piperine can increase bioavailability by-

- By rapid absorption of drugs.
- Regulating blood supply to gastro intestinal track.
- Prevent enzyme in biotransformation of drugs.[20-23]

Table 1: - Mechanism of Piperine.

S.No	BIOENHANCER	SOURCE	ACTIVE DRUG	CONCLUSION	REFERENCE
1	Piperine	Piper longum	Paclitaxel, docetaxel, Cisplatin, mitoxantrone, Doxorubicine	Rapid absorption of drug	17-23

2. Quercetin-

Source: is a flavanoid which is obtained from various citrus fruits.[24-26]

Mechanism:

- Increases bioavailability
- Increases blood level
- It has been noted that increased amount of quercetin administered along with drug increases the absorption.
- It increases the bioavailability of the active agent paclitaxel.[27,28]

Table 2: - Mechanism of Quercetin.

S.No	BIOENHANCER	SOURCE	ACTIVE DRUG	CONCLUSION	REFERENCE
1	Quercetin	It is a flavonoid found in fruits (apple, citrus fruits like red grapes, raspberries)	Diltiazem, Digoxin, epigallocatechingallate	Increase blood level / bioavailability	24-28

3. Nitrile Glycoside

Source: niaziridins is isolated from the pods of drumsticks (moringa olifera) [29-32]

Mechanism:

Niaziridin as a bioenhancer reduces the total quantity of drug which increases the bioavailability and due to that reduces the adverse effect. [33-36]

Table 3: - Mechanism of Nitrile Glycoside.

S.No	BIOENHANCER	SOURCE	ACTIVE DRUG	CONCLUSION	REFERENCE
1	Niaziridin	Nitrile glycoside isolated from pods of moringa olifera lam.	vitamine B12, rifampicin, ampicillin, nalidixic acid, azole	Increase bioavailability / reduce adverse effect	29-36

4. Curcumin

Source: it is obtained from curcuma longa (turmeric).[37-39]

Mechanism:

- Curcumin suppress cellular transformation.
- Eliminate proliferation of cancer cells.
- And suppresses carcinogenic effects.
- Curcumin itself or when it combines with other drugs of anticancer shows that it inhibits clonogenicity in cancer cells.
- They eventually help when chemotherapeutic drugs are given as they improve cytotoxic effect.
- Curcumin is safe even when it is taken at high dose of i.e. 12g with low side effects.[40-42]

5. Genistein

Source: it is a major compound of isoflavon; it is present in high soya bean diet.[43-45]

Mechanism:

- Genistein inhibit the growth of cancer cells through its pleiotropic mechanism which works against ER, cell proliferation, apoptosis, and metastasis.
- Genistein hormonal actions exert anticancer effects.[46,47]

Table 4: - Mechanism of Genistein.

S.No	BIOENHANCER	SOURCE	ACTIVE DRUG	CONCLUSION	REFERENCE
1	Genistein	It is an isoflavone (glycine max linn.)	Paclitaxel, epigallocatechin Gallate	Inhibit the growth of cancerous cell	43-47

6. Naringin

Source: it is a major flavonoid glycoside found in grapefruit-(Citrus paradisi, Citrus sinensis, Citrus unshiu, Citrus nobilis vs. Citrus tachibana, Citrus junos vs. Artemisia selengensis), roots of Cudrania cochinchinensis var. Geronatogea and Citrus species.[48-50]

Mechanism:

- Naringin a metabolite of naringenin has an antiproliferative effects against different cancer cells.
- By acting on the regulatory naringenin has an antiproliferative effects on different cancer cells of p53 genes.
- Effect of naringin inhibits the cell proliferation and increases apoptosis.
- Naringenin metabolites cross blood brain barrier.[51,52]

Table 5: - Mechanism of Naringin.

S.NO	BIOENHANCER	SOURCE	ACTIVE DRUG	CONCLUSION	REFERENCE
1	Naringin	It is a flavanone occurs naturally in citrus fruits.	Paclitaxel, verapamil, Diltiazem.	Antiproliferative effect, increases apoptosis	48-52

7. Sinomenine

Source: it is an active alkaloid extracted from Chinese medicinal plant sinomenium acutum. [56,53]

Mechanism:

- It is used to enhance the bioavailability of paeoniflorin.
- It could decrease the efflux transport of paeoniflorin by p-glycoprotein.
- Paeoniflorin has a poor absorption thus have low bioavailability when administered orally, so that's why sinomenine improves the bioavailability of paeoniflorin studied in rats. [54,55]

Table 6: - Mechanism of Sinomenine.

S.No	BIOENHANCER	SOURCE	ACTIVE DRUG	CONCLUSION	REFERENCE
1	Sinomenine	Sinomenium acutum thumb.	Paeoniflorin	Enhance bioavailability of paeoniflorin, decreases efflux of paeoniflorin	53-56

8. Glycyrrhizin

Source: It is a saponin glycoside which is obtained from roots of glycyrrhiza glabra.[57,58]

Mechanism:

- Glycyrrhizin enhances the absorption by converting the intestinal bacterial enzyme glucuronidase to glycyrrhetic acid.[59]
- Glycyrrhizin and glycyrrhetic acid had opposing effect on cell viability and cell death due to etoposide.[60]

Table 7: - Mechanism of Glycyrrhizin.

S.No	BIOENHANCER	SOURCE	ACTIVE DRUG	CONCLUSION	REFERENCE
1	Glycyrrhizin	Dried root of Glycyrrhiza glabra linn.	Taxol, Vitamin-B1 Vitamin-B12	Enhance absorption by converting glucuronidase to glycyrrhetic acid	57-60

9. Zingiber officinalis (Z.Officinale)

Source: ginger it is a rhizome which is having active constituents known as gingerols.[61]

Mechanism:

- It enhances the bioavailability of intestinal function by promoting drug absorption.[62]

- The effect of bioavailability enhancers of bioactive fraction obtained from *Z. officinale* is by enhancing bio efficacy of various drugs.[63,64]

Table 8: - Mechanism of Ginger.

S.No	BIOENHANCER	SOURCE	ACTIVE DRUG	CONCLUSION	REFERENCE
1	Ginger	Rhizomes of plant <i>zingiber officinale</i> .	Rifampicin, Pyrazinamide and isoniazid	Increases bioavailability of intestine, enhancing bio-efficacy of various drugs.	61-64

10. *C. cyminum*

Source: *cuminum cyminum* linn. Is commonly known as jeera. *C. cyminum* oil contains cuminaldehyde, terpinene.[65]

Mechanism:

- Extracted oil and its bioavailability fraction containing raise the systemic bioavailability of various drugs.
- *C. cyminum* is combined with active pharmaceutical excipients and to piperine to study bioavailability enhancing property.
- Bioavailability enhancing property in *c. cyminum* range from 25 -335%.
- *C. cyminum* components like volatile oils, and other flavonoids are considered to influence bio enhancing activity.[66,67]

Table 5: - Mechanism of Cumin.

S.No	BIOENHANCER	SOURCE	ACTIVE DRUG	CONCLUSION	REFERENCE
1	Cumin seeds	Dried seeds of <i>cuminum cyminum</i> linn.	Erythromycin, cephalexin Zidovudine and 5-fluorouracil	Increases systemic bioavailability of many drugs.	65-67

Bioenhancement mechanism (herbal drugs)

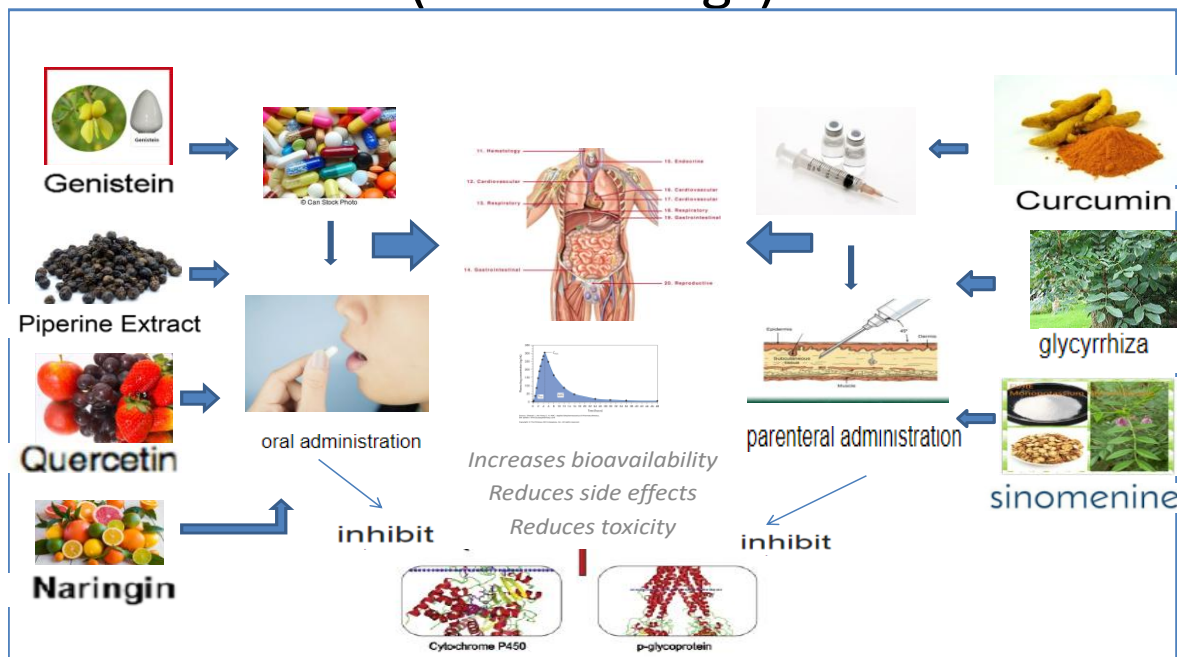


Figure 1: - Mechanism of Bio enhancer.

3. Conclusion:- In summary, I had defined the main points of my review article in introduction, which relates to the whole topic itself; i.e. 'cancer'-(definition), & the word "cancer" is derived from Greek word carcinoma which means tumour.

'Bioenhancer'-which increases the bioavailability and is an important part in the treatment of cancer as it reduces the side effect. And the last novel drug delivery systems (NDDS)-which is the soul part of my topic which gives advancement in the treatment of cancer; which gives a significant effect on its efficacy.

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