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REVIEW ARTICLE - DEVELOPMENT AND OPTIMIZATION OF FENUGREEK EXTRACT LOADED NANOEMUGEL FOR THE TREATMENT ANTI-INFLAMMATORY ACTIVITY

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ABSTRACT

Fenugreek (Trigonella foenum graceum) have a pleasantly bitter-sweet flavour. These seeds are quite hard and are usually ground into a powder. Their flavour is typically compared to maple syrup. The seeds have a flavour that is remarkably similar to the leaves. For transdermal distribution of Trigonella foenum graceum extract, a nanoemulsion system was designed with Tween 80 as the surfactant, IPA as the co-surfactant, and Isopropyl myristate as the oil phase. In the pseudo-ternary phase diagram generated at various Tween 80, a region of nanoemulsion was discovered. Water (16.6%), Smix (75%), and Oil (8.3%) The gelling agent carbapol 934 was used to make a nanoemulsion-based gel. Quercetin absorption through the skin was shown to be faster in this nanoemulsion than in aqueous solution. The results imply that the W/O nanoemulsion is a suitable anti-inflammatory gel because nanoemugel improves drug bioavailability.

Key words: Trigonella foenum graceum extract, Nanoemulsion, Nanoemugel, Nanoemugel.

1. INTRODUCTION

Quercetin is a polyphenolic Flavonoid with potential chemo preventive activity. Quercetin also produces anti-inflammatory and anti-allergy effect. Quercetin is a Flavonoid found in many food and herbs and is regular component of a normal diet. Extract of Quercetin have been used to treat or prevent diverse conditions including cardiovascular Quercetin as a disease. Nutritional supplement is well tolerated. Quercetin has been separated from a crude plant extract by high-performance liquid chromatography.Human cannot make quercetin in their body but many fruits, vegetables, and drinks contain it.Flavonoids occur either as free molecules or as glyco- sides. They have widespread occurrence in plant kingdom. They occur in families like compositae, leguminoceae, po- lygonaceae, rutaceae etc. contain a large number of flavono- ids. Flavonoids have been reported in some green algae also. Chemically, flavonoids show a fifteen-carbon skeleton. Most of the Flavonoid have a carbonyl function situated at one end of the bridge. Quercetin is the most abundant of the Flavonoid. Plants containing various flavonoids have a long history of use in traditional medicines in many cultures, but the flavonoids themselves were not discovered until the 1930's. Quercetin first gained attention several decades ago when it was found to cause DNA mutations in bacteria, a possible sign that it might actually contribute to causing cancer

Foods and drinks that contain Quercetin include-

Sr.no	Name	Biological source	Part
1	Grapes	Vitis venifera	Fruit
2	Berries(blue)	Rubus	Fruit
3	Cherries	Prunus avium	Fruit
4	Apple	Malus sieversil	Fruit
5	Citrus	Citrus lemon	Flower
6	Onion	Allium cepa	Skin
7	Buckwheat	Fagopurum tatarium	Seed
8	Broccoli	Brassica oleracea	Flower, bud
9	fenugreek seed	Trigonella foenum graecum	Seed
10	Tomatoes	Solanum lycopersicum	Fruit
11	Black tea	Camellia sinensis	Leaves
12	Coffee	Coffea arabica	Fruit, flowers

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13	Wine	Vitis venifera	Fruit
14	Audhumber	Ficus racemosa	Seed
15	Amla	Phyllanthus emblica	Fruit

Quercetin is also present in herbal remedies such as Ginko-biloba and John's wort people can also take quercetin as a supplement

The pharmacological and biological functions of quercetin

Quercetin is a kind of flavonoid compound that human can get from food and plants. Compared with quercetin, the conjugated form of quercetin glycoside is better absorbed. Quercetin is mainly absorbed into intestinal cells in the form of glycosides, hydrolyzed into aglycone and enters the intestinal lumen, and its mechanism may be related to glucose transport. The transformation process occurs mainly in the intestines, and some can be done in the liver and blood.

Therapeutic activity of quercetin in cancer

Quercetin has shown significant beneficial effects on many diseases. Due to reasonable doses of quercetin have no obvious toxic side effects on normal cells, more and more researchers are paying attention to the therapeutic effect of quercetin on tumors. Numerous studies have shown that quercetin can exert anti-tumour functions in a variety of mechanisms and has been confirmed in in vitro and in vivo models of various tumors, with encouraging results Quercetin significant pre- vents cell cycle, promotes apoptosis, and inhibits angiogenesis and metastasis in vitro (Fig.1).

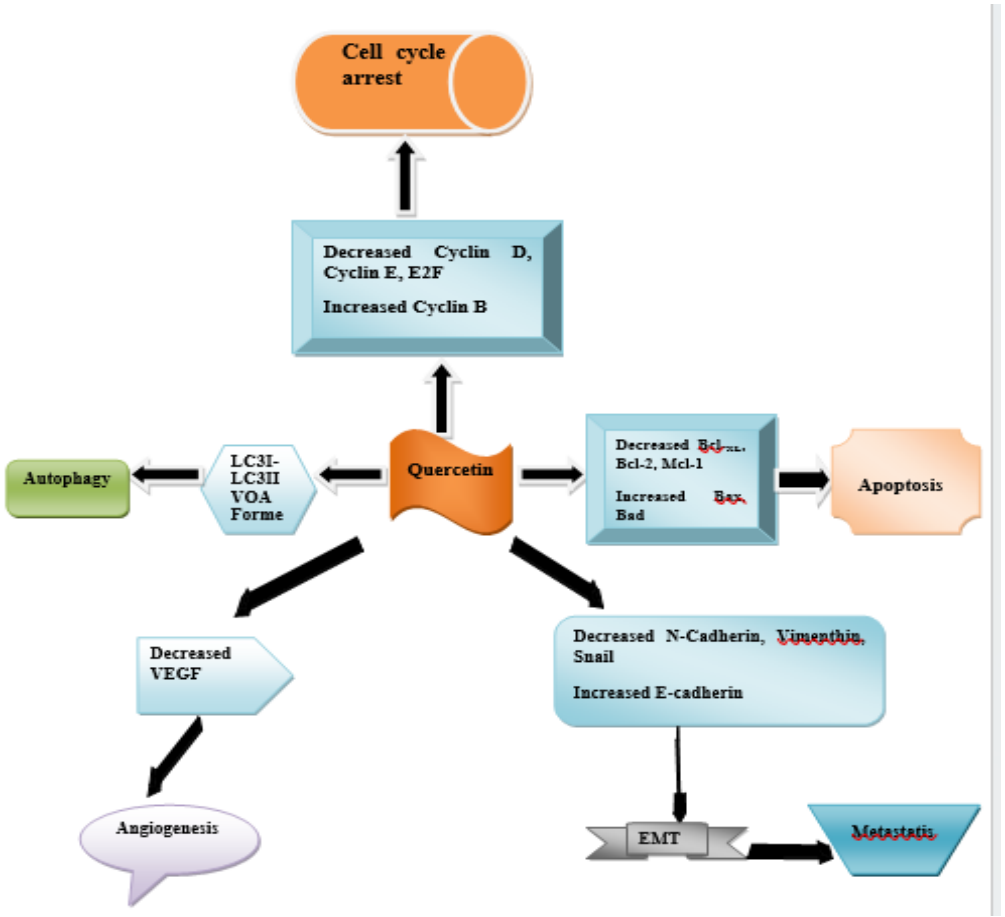

Fig 1 overview of the Anticancer effect of Quercetin

In vitro studies

Effect of quercetin on cell cycle of cancer cells The cell cycle is the basic process of cell division and is mainly divided into four phases: G1 phase (pre-DNA synthesis), S phase (DNA synthesis phase), G2 phase (late DNA synthesis phase), and M phase (mitotic phase), which is mainly regulated by Cyclin, Cyclin dependent kinesis (CDKs) and Cyclin dependent kinase inhibitor (CKI).The cell cycle is mainly regulated by the pRb network regulatory pathway. Cycling forms a complex with its corresponding CDK, which phosphorylates Rb, and then releases E2F and cAb1.Subsequently, E2F enters the nucleus to promoteG1 phase into S phase for cell autonomy division. In the cell

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cycle progression, one kind of CKI, INK4 (including p15, p16, p18, p19) competes with cyclinD1 for binding to CDK4/CDK6, inhibiting phosphorylation of Rb and inhibiting cell cycle progression.Another important pathway is mainly regulated by p53, which induces the expression of p21, GADD45, and Bax to regulate cell cycle division However, in studies of tumour pathogenesis, abnormal cell cycle activity and uncontrolled replication of tumour cells were found due to the abnormal expression of cycling.

Ethno pharmacological actions of Quercetin-

1) **Fighting free radicals.**
2) **Reducing inflammation.**
3) **Reducing the risk of cancer.**
4) **Preventing neurological disease.**
5) **Relieving allergy symptoms.**
6) **Preventing infections.**
7) **Reducing the risk heart disease.**
8) **showering high blood pressure.**

Dose - people can get quercetin through their diet by eating a range of fruit and vegetables each day.Fenugreek have the highest level of quercetin compared to other tested produce containing approximately 300mg per kilogram.

Side effect of quercetin-

1) headach (oral use)
2) Numbling and tingling (oral use)
3) Shortness of breath (intravenous use)
4) Nausea and vomiting (intravenous use)
5) Kidney damage

Structure of Quercetin-

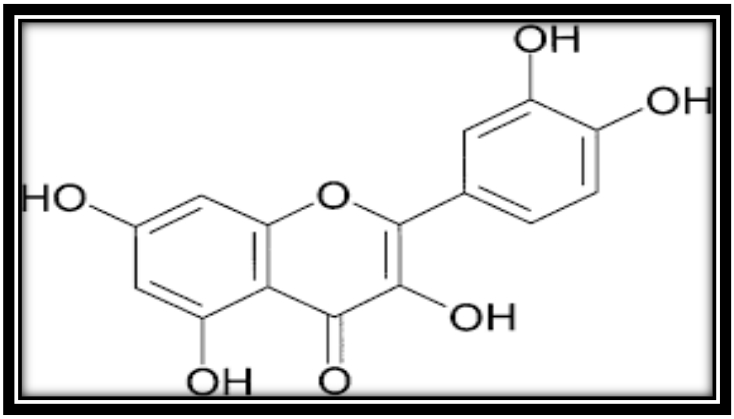

Fig .2

Classification- Flavonoid

Properties-crystalline nature

Solubility- solubility in water-practically in soluble in water soluble in aqueous alkaline Solution

Sr.no	Plant	Family	Part	Method of extraction	Solvent extraction	Reference
1	Enonymus alatus	Celastruceae	Flower	Maceration Refluxing	Ethanol-methanol	1
2	Cuscata campestris	Cuscutaceae	Seed	Extraction incubation	ACN (acetonitrile) 0.1 Formic acid	2
3	Buckwheat	Fagopyrum tataricum	Grains	Extraction steaming	Methanol	3
4	Ginko-leaves	Ginkgoaceae	Leaves	Solid phase extraction	0.1% sodium hydrochloride Ethylene glycol	4

5	Black tea and green tea	Theaceae	Leaves	Hydrolysis	Ethanol HCL	5
6	Nicotiana attenuata	Solancaceae	Flower	Extraction	ACN dimethyl ether	6
7	Magnifera indica	Anacardiaceae	Fruit	Supercritical fluid extraction Subcritical fluid extraction	Ethanol	7
8	Umbelliferaceae	Apiaceae	Fruit	Extraction	HCL	9
9	Grapes	Vitaceae	Fruit	Fermentation maceration	Sulphur dioxide	10
10	Citrus	Rutaceae	Flower	Extraction	Methanol acetonitrile	11
11	Broccoli	Brassicaceae	Flower	Extraction	Ascorbic acid	12
12	Fenugreek seed	Fabaceae	Seed	Soxhlet apparatus extraction	HCL ethanol acetone methanol	13
13	Kiwi fruit	Actinidiaceae	Fruit	Extraction /TLC	Sodium hydrochloride	17

2. CONCLUSION

Nanoemulsion Carbapol 934 (NEIG) was also incorporated with good homogeneity. The nanoemulsion incorporated in Carbapol gel enhances its permeation, according to an in-vitro diffusion study. Alone. Due to the convenience of drug delivery through the skin to the systemic circulation for a variety of clinical conditions, there has been a lot of interest in this area. NEIG has significant anti-infl ammatory properties. The nanosize of the extract is responsible for its rapid and complete absorption, which improves its therapeutic effect. The use of nanoemulsion in transdermal drug delivery is an important area of research in drug delivery, as it improves the effectiveness of the drug. therapeutic efficacy and also the bioavailability of the drugs without any adverse effects. It is also regarded as a promising technique with many advantages including, high storage stability, low preparation cost, thermodynamic stability, absence of organic solvents, and good production feasibility.

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