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ANTIMALARIAL ACTIVITY OF CINCHONA BARK

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ABSTRACT
Malaria ek serious aur life-threatening disease hai jo parasite Plasmodium ke dwara hoti hai aur infected female Anopheles mosquito ke bite se spread hoti hai [1]. Cinchona bark ek important medicinal plant hai jo Quinine provide karta hai, jo ek potent antimalarial agent hai. Is article me cinchona bark ke history, phytochemistry, mechanism of action, pharmacological uses aur limitations ko explain kiya gaya hai.

1. INTRODUCTION

Malaria duniya bhar me ek major public health problem hai, especially developing countries me [1]. Yeh disease RBCs ko affect karti hai aur untreated rehne par severe complications ya death tak ho sakti hai.
Cinchona bark, jo Cinchona officinalis se obtain hoti hai, malaria ke treatment ke liye sabse pehla effective natural remedy tha. Is bark se isolate kiya gaya quinine aaj bhi important antimalarial drug hai [2].

2. MALARIA

Cause and Transmission

Malaria ka main cause parasite Plasmodium falciparum aur Plasmodium vivax hai [1].

Transmission Process

- Infected mosquito bite karta hai
- Parasite bloodstream me enter karta hai
- Liver aur RBCs me multiply karta hai

Symptoms

- High fever
- Chills
- Sweating
- Headache
- Fatigue



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3. HISTORY OF CINCHONA BARK

Cinchona ka use South America ke indigenous log fever treat karne ke liye karte the. 17th century me ise Europe me introduce kiya gaya aur "Jesuit's bark" naam mila [2].

Baad me scientists ne is bark se quinine isolate kiya jo malaria ke treatment me revolution le aaya. Yeh discovery modern pharmacology ke liye ek milestone thi.

4. BOTANICAL DESCRIPTION

Cinchona ek evergreen tree hai jo Rubiaceae family se belong karta hai.

Classification

- Kingdom: Plantae
- Family: Rubiaceae
- Genus: Cinchona

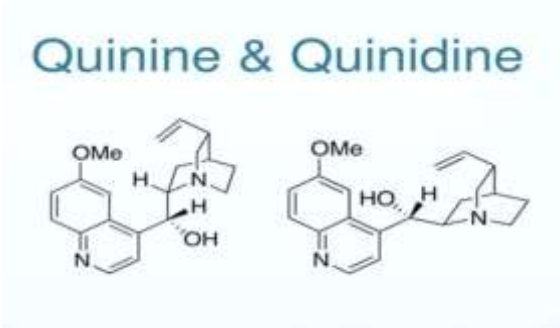
Morphology

- Height: 5–15 meters
- Bark: Brown, rough, bitter
- Leaves: Opposite, oval shaped

5. CHEMICAL CONSTITUENTS

Cinchona bark me kai important alkaloids hote hain:

- Quinine
- Quinidine
- Cinchonine
- Cinchonidine



6. MECHANISM OF ACTION

Quinine malaria parasite *Plasmodium falciparum* ke erythrocytic stage par act karta hai.

Parasite RBC ke andar hemoglobin digest karta hai jisse toxic heme release hota hai. Normally parasite ise non-toxic hemozoin me convert karta hai.

Quinine is process ko block karta hai, jisse toxic heme accumulate hota hai aur parasite ki death ho jati hai [8].

7. ANTIMALARIAL ACTIVITY

Quinine ek blood schizonticidal drug hai jo malaria ke blood stage parasites ko destroy karta hai [1].

Yeh especially effective hai:

- Plasmodium falciparum
- Plasmodium vivax

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8. PHARMACOLOGICAL USES

- Acute malaria treatment
- Severe malaria cases
- Combination therapy (quinine + antibiotics)

9. ADVERSE EFFECTS

Quinine ke side effects ko cinchonism kehte hain:

- Tinnitus
- Headache
- Nausea
- Dizziness
- Blurred vision [5]

10. DRUG RESISTANCE

Kuch malaria parasites quinine ke against resistance develop kar rahe hain. Fir bhi yeh drug severe malaria me effective hai [8].

11. MODERN PERSPECTIVE

Aaj ke time me artemisinin-based drugs zyada popular hain, lekin quinine abhi bhi important hai, especially resistant malaria ke cases me [1].

12. ADVANTAGES AND LIMITATIONS

Advantages

✔ Natural origin

✔ Effective in severe malaria

Limitations

- Side Effects.
- Resistance

14. PHARMACOKINETICS OF QUININE

Quinine ki pharmacokinetics uski absorption, distribution, metabolism aur excretion ko describe karti hai [5].
Absorption: Oral administration ke baad achhi tarah absorb hota hai.
Distribution: Body tissues aur RBCs me distribute hota hai.
Metabolism: Liver me metabolize hota hai.
Excretion: Mainly urine ke through eliminate hota hai .

15. PHARMACODYNAMICS

Quinine ek blood schizonticidal drug hai jo malaria parasite Plasmodium falciparum ke metabolism ko disrupt karta hai [8].
Parasite ke food vacuole me act karta hai
Heme detoxification ko block karta hai
Parasite ki growth aur multiplication rokta hai.

16. EXTRACTION AND ISOLATION PROCESS

Cinchona bark se quinine nikalne ke liye acid-base extraction method use hota hai [2].

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Steps

○ Bark ko powder me convert kiya jata hai
○ Acid solution me treat kiya jata hai
○ Alkaloids ko extract kiya jata hai

17. STANDARDIZATION OF CINCHONA BARK

Herbal drugs ki quality maintain karne ke liye standardization zaroori hai [4].

Parameters

- Alkaloid content
- Moisture content
- Ash value
- Extractive value

18. ROLE IN MODERN MEDICINE

Cinchona bark se derived quinine aaj bhi important hai:

- Severe malaria treatment me
- Drug-resistant cases me
- Combination therapy me [1]

19. COMPARISON WITH ARTEMISININ

Modern drugs jaise artemisinin zyada fast acting hain, lekin quinine ka importance abhi bhi hai [1].

Feature.	Quinine.	Artemisinin
Source	Natural	Natural
Action	Slow	Fast
Use	Severe malaria	First-line therapy

20. FUTURE PROSPECTS

- New quinine derivatives develop ho rahe hain
- Herbal drug research badh raha hai
- Drug resistance overcome karne ke liye studies chal rahi hain [7]

21. DIAGRAM IDEA (DRAW KARMKK(Ŭ)

Mechanism Flowchart

Mosquito bite
↓
Parasite enters blood
↓
RBC infection
↓
Hemoglobin breakdown
↓
Quinine blocks heme detox
↓
Parasite death

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22 . CONCLUSION

Cinchona bark ek historically aur pharmacologically important medicinal plant hai. Isse milne wala quinine malaria ke treatment me ek effective drug hai. Aaj bhi yeh severe aur resistant malaria cases me important role play karta hai.

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