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R E S E A R C H A R T I C L E

Design, Development and Evaluation of Multipurpose Natural Dusting Powder

Sushma K*,Bharghava Bhushan Rao P[1], P. Jyothi[2], A.M.S. Sudhakar Babu[3], K. Bala krishna[4], Tejaswini G[5], Lurdhu Mary K[6]

*[23456]*A.M.Reddy Memorial College of Pharmacy, Narasaraopet, 522412, A.P, India*
[1]V V Institute of Pharmaceutical Sciences, Gudlavalleru A.P, India.

A B S T R A C T

The aim of the present research work is to design, develop and evaluation of multipurpose natural dusting powders. To avoid the adverse effects like itching, irritation, dermatitis, bad smell etc., of the synthetic dusting powder formulations, an attempt has been made to formulate a multipurpose dusting powders by using natural elements like *Azadirachta indicia*, *Curcumal Longa* which having antimicrobial, antiseptic property. The primary objective of the current study is to design, develop and evaluation of natural multipurpose dusting powders having anti-bacterial & antiseptic property.

Keywords: *Azadirachta indicia*, *Curcumal Longa*, anti-bacterial & antiseptic

A R T I C L E I N F O

Corresponding Author
Sushma K
A M Reddy Memorial College of Pharmacy, Narasaraopet, 522412, A.P, India
MS-ID: IJMPR4510

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C O N T E N T S

1. Introduction

Dusting powders are fine medicinal (bulk) powders intended to be dusted on the skin by means of sifter-top containers. Powder bases absorb secretions and exert a drying effect, which relieves congestion and imparts a cooling sensation and should be pass through a 100-200 mesh sieve to ensure that they are grit free and will not further mechanically irritate traumatized areas.

1) Medical: Medical dusting powders are used mainly for superficial skin conditions, whereas surgical dusting powder is used in body cavities and also on major wounds as a result of burns and umbilical cords of infants.

2) Surgical:

Surgical dusting powders must be sterilized before their use, whereas medical dusting powders must be free from pathogenic microorganisms.

2. Materials and Methods

Collection of plant materials:

Curcumalonga(Turmeric) was collected from local market**,** Narasaraopet ***Azadirachtaindica***(Neem) was collected from medicinal garden ofA.M.ReddyMemorial College Of Pharmacy.

Authentication of plant materials:

All collected plant materials were authenticated from Department of Botany, **Acharya Nagarjuna University**, Nagarjunanagar, Guntur.

Extraction of plant materials:

Azadirachtaindica:

Air dried powder (100 g) of the leaves was mixed with 500 mL of methanol and were kept at room temperature for 36 hours. The mixture was then filtered through Whatman No.1 filter paper and the filtrate was evaporated to dryness by leaving it inside the oven at constant temperature of 600C for 3 to 4 days. The residues obtained were stored at 40C until testing. Four different concentrations, 50,100,150 and 200 (mg/ml) in 20% dimethyl sulfoxide (DMSO) were prepared[10].

Product of Neem Extract:

Methanolic extracts of the 100g dried neem leaves obtained was 4.18g (4.18%). For quality control, the neem extract was cultured on nutrient agar (NA) to determine its purity. After overnight incubation, no growth of any colonies of bacteria was observed.[22]

Curcumalonga:

Collected Rhizomes of *curcuma longa and* were dried, powdered alcoholic in equal qualities(30ml alcohol+30 ml water) using Soxhlet apparatus at 55-85 °C for 8-10 hr in order to extract the polar and non-polar compounds.. For each solvent extraction, the powdered pack material was air dried and then used. The solvents of the respective extracts were reduced under room temperature and stored at 4 °C for further use

Product of turmeric Extract:

Hydroalcholic extracts of the 100g dried turmeric rhizomes obtained was 3.7g (3.7%). For quality control, the turmeric extract was cultured on nutrient agar (NA) to determine its purity. After overnight incubation, no growth of any colonies of bacteria was observed[18]

Preliminary phytochemical investigation of extract:

Qualitative chemical tests were conducted for ethanolic and water extracts of *Curcuma longa and Azadirachtaindica* .To identify the various phytoconstituents.The various tests and reagents used are given below and observations are recorded and tabulated.

Formulation of natural dusting powder:

Formulaion of dusting powder was given in table

Procedure: The preparation of natural dusting powder aided by triturition method using aqueous and alcoholic extracts of neem and turmeric individually and in combination as main component

Inrediants Quantity taken Purpose

- Talc (52%w/w)
- Lubricant.
- Zinc oxide (5%w/w) Astringent.
- Calcium carbonate (30%w/w)Abrasive.
- Zinc stearate (3% w/w) Humeactant.

Perfume (q.s) Smelling

Were mixed with the Neem and Turmeric extracts with gradual addition until a homogeneous powder was obtained. The prepared powder was evaluated for physical properties.

Antimicrobial evaluation:

Principle:

The inhibition of microbial growth under standardized conditions may be utilized for demonstrating the therapeutic efficacy of antibiotics. The microbiological assay is based upon a comparison of the inhibition of growth of micro organisms by measured concentrations of the antibiotics to be examined with that produced by known concentrations of a standard preparation of the antibiotic having known activity.[29]

Media used for antibiotic assay:

Here we are using nutrient agar medium to test the micro organisms inoculums are made from the ingredients. Dissolve the ingredients in sufficient water to produce 1000 ml. Then the medium was sterilized by autoclave at 121^{o}c for 20 minis, so that after sterilization the pH was adjusted[4]

Preparation of standard Solution:

Here marketed synthetic dusting powder (chlorohexidine) is used as standard solution.

Test microorganisms:

For the evaluation of antimicrobial activity of dusting powder. We use the test microorganisms like *E.coli* (gram negative) and *Staphylococcus aureus*(gram positive). These organisms are collected from the Andhra University (AU), Visakhapatnam. Maintain the cultures on slants of the medium under the incubation conditions and transfer weekly to fresh slants.[29]

Preparation of inoculums:

For the inoculums preparation one loop full of test organism was taken from 24 hrs fresh culture into 5ml of sterile water. The suspension shows 0.6to0.8 optical density at 530nm. We determine the dilution factor which gave 25%light transmission at 530 nm[30].

Cup plate method:

Agar well diffusion: Method was performed for the determination of antimicrobial activity. After sterilization of nutrient medium and Petri dishes transfer into laminar air flow unit for aseptic transfer. 0.25µl of each bacterial inoculum was added to 25ml of nutrient medium and pour into Petri dishes after solidification cups were made by using borer (5mm). 50µl of test formulations I, II, III&IV combination of formulations I, II, III&IV synthetic dusting powder (Chlorohexidine were added to each cup. Then the plates were incubated at 37^{o}c for 24hrs in the incubator.[31] After incubation, the diameter of clear zone of inhibition produced around the well was measured in mm compared to the standard (synthetic-chlorohexidine)

3. Results and Discussion

Preliminary phytochemical investigation of extracts:

Phytochemical screening of *curcumalonga* and *Azadirachtaindica* extracts was carried out for the presence of Alkaloids, Flavanoids, Tannins, Phenolic compounds, Saponins, Carbohydrates, Glycosides, Proteins, Terpenoids. Results were noted as shown in Table.

Table 1: Phytochemical investigation of extracts

S.NO	Phytochemical test	Extract of *Azadiractaindica*	Extract of *curcuma indica*
1	Alkaloids	+	+
2	Flavonoids	+	+
3	Phenolic compounds & Tannins	+	+
4	Steroids	_	+
5	Carbohydrates	+	_
6	Saponins	+	+
7	Glycosides	+	+
8	Proteins &Aminoacids	_	_
9	Terpenoids	+	+
10	Fatty acids	_	+

Note: (-)Absent,(+)indicates presence**.**

Table 2: Preparation of Formulation I

S.NO	Ingredients	Quantity
1	Aqueous extract of Neem	5gm
2	Talc	52gm
3	Zinc oxide	5gm
4	Calicum carbonate	30gm
5	Zinc stearate	4gm
6	Perfume	q.s

Table 3: Preparation of Formulation II

S.NO	Ingredients	Quantity
1	Ethanolic extract of Neem	5gm
2	Talc	52gm
3	Zinc oxide	5gm
4	Calicum carbonate	30gm
5	Zinc stearate	4gm
6	Perfume	q.s

Table 4: Preparation of Formulation III

S.NO	Ingredients	Quantity
1	Turmeric	5gm
2	Talc	52gm
3	Zinc oxide	5gm
4	Calicumcarbonate	30gm
5	Zinc stearate	4gm
6	Perfume	q.s

Table 5: Preparation of Formulation IV

SNO	Ingredients	Quantity
1	Ethanolic extract ofNeem&tuemeric	5gm
2	Talc	52gm
3	Zinc oxide	5gm
4	Calicumcarbonate	30gm
5	Zincstearate	4gm
6	Perfume	q.s

Table 6: zone of inhibition of Formulations I&II

S.NO	Standard and test samples	*Escherichia coli*	*Staphylococcus aureus*
1	Formulation I	9.6 mm	9.8mm
2	Formulation II	11mm	11.6mm

3	Formulation III	9mm	9.5mm
4	Formulation IV	13.5mm	13.8mm
5	Synthetic dusting powder(chlorohexidine)	14mm	14.2mm

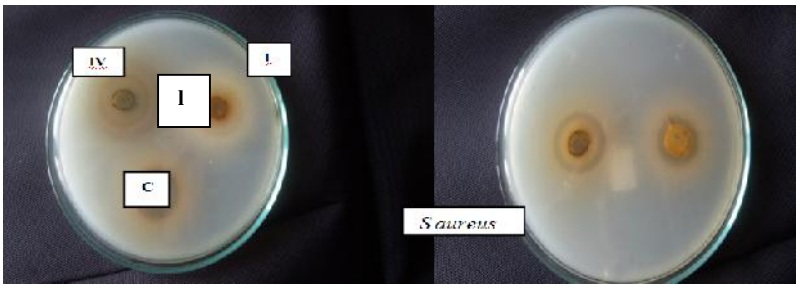

Figure 1: plates showing zone of inhibition for *S aureus*

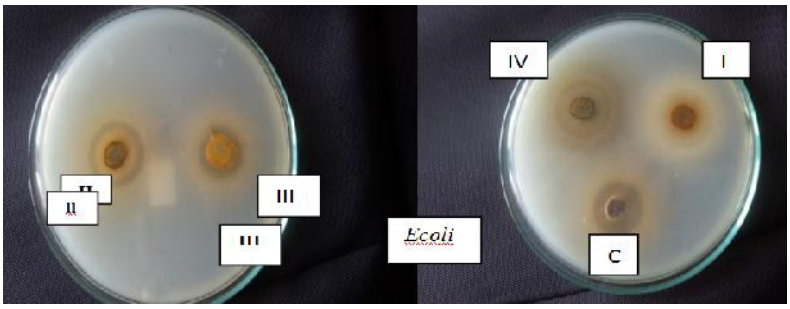

Figure 2: plates showing zone of inhibition for *Ecoli*

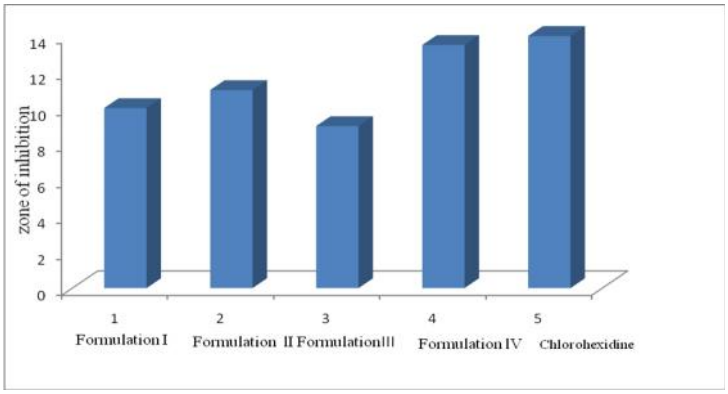

Figure.3: Antimicrobial activity of formulations on *S aures*

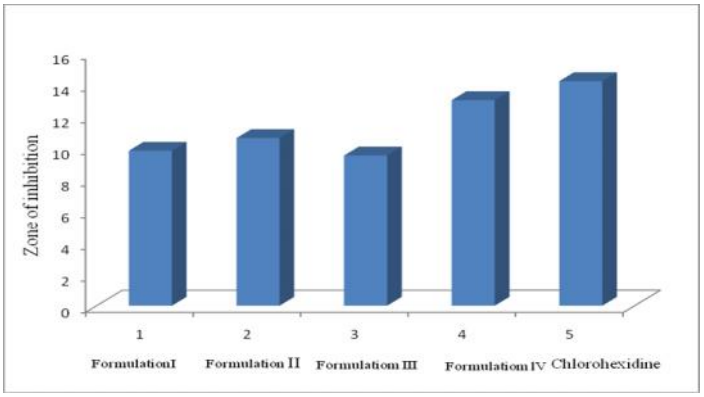

Figure.4: Antimicrobial activity of formulations on *Ecoli*

Discussion:

Anti-microbial activity of the each plant extract has been tested against the skin pathogen, *Staphylococcus aureus* ,*Eschirechia coli.* The results suggested that herbal extracts with combination of *Azadirachtaindica andcurcuma longa* of a giving higher activity than the standard dusting powder

chlorohexidine. Different plant extracts may show synergistic effect enhancing their anti-bacterial activity. *Azadirachtaindica & curcum longa* stop the growth of *Staphylococcus aureus*, *Escherichia coli.* When these extracts combined to formulate the herbal dusting powder. It enhances antibacterial activity. These results were also compared to the commercially available synthetic dusting powder. The results suggested that herbal dusting powder has exhibited almost equal antimicrobial activity compared to synthetic dusting powder. Dusting powder was also made using talc as base and plants extracts were added as herbal ingredients (Formulation I,II,III&IV). Thus Herbal dusting powder was prepared with only plant extracts showed maximum antibacterial activity .The plant extracts which obtained naturally was used because it has no side effects like skin rashes and other skin relative problems.

4. Conclusion

This present study based on natural anti bacterial& antiseptic agents combination is carried out using combination of Turmeric and Neem extracts(both alcoholic& aqueous). Chlorohexidine has major side effect like burning, itching, skinrash, reddness. These side effect can be over can by using natural formultion. This present study helped in developing the full-fledged user friendly multipurpose dusting powder with good physical stability, carrying convenience, application convenience and flexibility meant for every one for every day use.

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