PHONE: 0861-2317963, 64, 68
FAX : 0861-2300425

THE NARAYANA GROUP

NARAYANA EDUCATIONAL SOCIETY

REGD. No. 319/96

14/72, HARANTHAPURAM
NELLORE - 524 003. (A.P.)

Nellore,

Date: 10-01-2022

To

The Principal ,

Narayana Pharmacy College,

Nellore.

SUB: Sanction of the amount to implement the project by Dr. S. Sujatha titled "Formulation and Evaluation of Capecitabine Microspheres for colorectal Cancer"

Dear Sir,

The management is pleased to sanction a budget of Rs 55,000/- towards the research work by our faculty Dr. S. Sujatha according to the requisition letter. You are advised to look after and supervise the research work smoothly with a valuable out come.

Yours sincerely,

Secretary& Treasurer

Narayana Pharmacy College.

PRINCIPAL
NARAYANA PHARMACY COLLEGE
NELLORE - 524 002.

PHONE: 0861-2317963, 64, 68
FAX : 0861-2300425

NARAYANA EDUCATIONAL SOCIETY

REGD. No. 319/96

14/72, HARANTHAPURAM
NELLORE - 524 003. (A.P.)

THE NARAYANA GROUP

Nellore,

Dt. 18-08-2022

To

The Principal ,

Narayana Pharmacy College,

Nellore.

Subject: Amount sanctioned for the Implementation of the project titled "Formulation and *invitro* evaluation of Flutrimazole Microspheres loaded transdermal Gel ".

Dear sir,

We appreciate the efforts in submitting your proposal for "Formulation and *invitro* evaluation of Flutrimazole Microspheres loaded transdermal Gel "by the R&D Coordinator Dr. S. Sujatha towards and an amount of Rs 50000/-is granted for carrying the above mentioned project .

We expect positive out come from the work and must contribute to the research for further scope. Any unspent amount be returned to the accounts section for auditing.

Yours Sincerely,

Secretary& Treasurer

Narayana Pharmacy College.

PRINCIPAL
NARAYANA PHARMACY COLLEGE
NELLORE - 524 002.

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REGD. No. 319/96

14/72, HARANTHAPURAM
NELLORE - 524 003. (A.P.)

THE NARAYANA GROUP

Nellore,

Date: 10-12-2023.

To

The Principal,

Narayana Pharmacy College,

Nellore.

SUB: Sanction of project amount to implement the project entitled Synthesis, characterisation, and Antichilinestarase activity of novel substitute 1,3,4-oxadiazole -Reg

Dear Sir,

I am giving administrative approval for the implementation of above mentioned project at a total budgetary outlay of Rs. 58,000/- to be released to Dr. M. Suchitra for carrying out the above mentioned project.

The work must be reported time to time to the principal and must have a suitable impact in the research field.

Secretary& Treasurer

R. Samba Siva Rao,

Narayana Pharmacy College,

Nellore.

PRINCIPAL
NARAYANA PHARMACY COLLEGE
NELLORE - 524 002.

PHONE: 0861-2317963, 64, 68
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NARAYANA EDUCATIONAL SOCIETY

REGD. No. 319/96

14/72, HARANTHAPURAM
NELLORE - 524 003. (A.P.)

THE NARAYANA GROUP

Nellore,

Date: 23-12-2022

To

The Principal,

Narayana Pharmacy College.

Nellore.

SUB: sanction of project amount to implement the project " Development and anti-inflammatory activity of Poly herbal Gel.

Dear Sir,

I am giving administrative approval for the implementation of above mentioned project at a total budgetary outlay of Rs. 52,000/- to be released to Dr. M. Suchitra for carrying out the above mentioned project.

The work must be reported time to time to the principal and must have a suitable impact in the research field.

Secretary &Treasurer

R. Samba Siva Rao,

Narayana Pharmacy College,

Nellore.

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FAX : 0861-2300425

NARAYANA EDUCATIONAL SOCIETY

REGD. No. 319/96

14/72, HARANTHAPURAM
NELLORE - 524 003. (A.P.)

THE NARAYANA GROUP

Nellore,

Date: 25-11-2022

Sanction Order

To

The Principal,

Narayana Pharmacy College,

Nellore.

Sub: Sanction of project amount for Formulation and In-Vitro Evaluation of Carvedilol Buccal Films Using HPMC E15 and Sago Starch as Polymer"-reg.

Dear Sir,

We are pleased to inform the decision taken on the administrative approval to sanction Rs 50,000/- for the execution of project entitled Formulation and In-Vitro Evaluation of Carvedilol Buccal Films Using HPMC E15 and Sago Starch as Polymer" proposed by Dr. M. Krishnaveni.

Accordingly the grant will be released for Narayana pharmacy college, Nellore to complete the project successfully.

Kindly note that the project will be completed within the stipulated time and any unused portion of the grant money shall be deposited back to the accounts section, NPC Nellore.

Secretary & Treasurer

Narayana Educational Society

PRINCIPAL
NARAYANA PHARMACY COLLEGE
NELLORE - 524 002.

Research Work: "Formulation and In-Vitro Evaluation of Flutrimazole microspheres Loaded transdermal gel"

Researchers:

- **Dr. Sujatha Sanneboina**
- **K. Matha Priya**

Overview of the Project

The study aimed to address the challenge of low bioavailability of the drug Flutrimazole, which interferes with the synthesis of ergosterol by inhibiting the activity of the enzyme lanosterol 14 α-demethylase.

Objective The objective of work was envisaged to reduce the dosing frequency and improves patient compliance by designing and evaluating the controlled release of flutrimazole microspheres loaded gel for mycosis infection. The microsphere loaded gel has advantages such as efficient absorption and more drug retention time.

Method: Microspheres of flutrimazole were prepared by ionotropic gelation method using sodium alginate and Calcium chloride as polymers.

Methods and Results:

- **Preparation**: Flutrimazole microspheres were formulated and the drug loaded transdermal gel was prepared using the gel forming polymers like Sodium CMC, HPMC K-100M and Guar gum.
- **Evaluation**: The prepared transdermal gel wase evaluated for various parameters including:
    - **Visual inspection**: satisfactory morphology.
    - **pH**: The pH was found to be neutral indicating minimal irritation to the skin.
    - **Viscosity**: Consistent viscosity
    - **Percentage Yield**: Good Percentage yield.
    - **In-Vitro Drug Release**: The optimized film (S3) showed a controlled release of 99.94% over24 hours.

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- **Kinetic Modeling**: Data fitted into Higuchi and Korsmeyer-Peppas models indicated a zero-order drug release mechanisms, along with diffusion as the main mechanism of drug release.

- The study successfully demonstrated that the formulation of Flutrimazole microsphere-loaded transdermal gel for effective treatment of mycosis.
-

Expenditure Breakdown

The grant of ₹50,000 was utilized as follows:

5. **Materials and Reagents**: ₹20,000
   - Purchase of polymers (HPMC k-100,Sodium alginate,Sodium CMC and Guar Gum)
   - Flutrimazole (active pharmaceutical ingredient)
   - Solvents and chemicals for formulation and evaluation
6. **Laboratory Equipment and Supplies**: ₹10,000
   - Glassware, Emulsion solvent evaporation apparatus, and homogenizer
   - Impeller stirrer for microspheres preparation
   - Incubator shaker and other analytical instruments
7. **Testing and Evaluation**: ₹15,000
   - Scanning Electron microscopy
   - FTIR analysis for compatibility studies
   - Drug content &Entrapment Efficiency
8. **Documentation and Publication**: ₹5,000
   - Printing, documentation, and publication fees for research dissemination

Total Expenditure: ₹50,000

Future Requirements

For the continuation and further enhancement of this research, the following resources and support are required:

3. **Additional Funding**:
   To expand the research scope, including clinical trials and scalability studies, an estimated additional funding of ₹1,00,000 is needed.
4. **Advanced Analytical Equipment**:
   Acquiring high-performance liquid chromatography (HPLC) and other sophisticated analytical instruments for more detailed pharmacokinetic studies.

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Funding:
The research work was generously funded with a grant of **₹50,000** provided by the Narayana Research Fund for Advanced Pharmaceutical Studies. The grant enabled the successful completion of the formulation and evaluation of Flutrimazole microspheres transdermal gel for effective treatment of mycosis.

Link of the published work: DOI:

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https://www.pharmaresearchlibrary.com/formulation-and-in-vitro-evaluation-of-flutrimazole-microspheres-loaded-transdermal-gel/

PRINCIPAL
NARAYANA PHARMACY COLLEGE
NELLORE - 524 002.

Research Work: "Formulation and In-Vitro Evaluation of Capecitabine microspheres for Colorectal Cancer"

Researchers:

- **Dr. Sujatha Sanneboina**
- Rabbani Shaik
- **Dr. K. Harinadha Baba**

Funding:
The research work was generously funded with a grant of **₹55,000** provided by the Narayana Research Fund for Advanced Pharmaceutical Studies. The grant enabled the successful completion of the formulation and evaluation of capecitabine microspheres for colorectal cancer.

Link of the published work: DOI: : https://pharmasprings.com/fjphs/article/view/338

Overview of the Project

The study aimed to address the challenge of targeting the chemotherapeutic drug Capicitabine , which is an anti folate drug with anti metabolite activity. Capecitabine is a drug that has been widely used for treating colon cancer, but its short plasma half-life of <0.85 h leads to rapid elimination from the body, necessitating its frequent administration . Also, the high dose of 1250 mg/m^2 that is required twice per day leads to the commonest over-dosage toxicities, including bone-marrow depression, cardiotoxicity, diarrhoea, nausea and vomiting steatites, and dermatitis. To overcome these drawbacks, it is vital to develop an effective and prolonged acting targeted delivery system to minimize the high clearance rates of the drug, which is an ongoing challenge.

Objective

The main aim of the present investigation was to formulate and evaluate Capecitabine microspheres for colon cancer and to reduce dosing frequency and improve patient compliance. Microspheres of Capecitabine were prepared by emulsion solvent evaporation method

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Method: Microspheres of Capecitabine were prepared by emulsion solvent evaporation method using hydroxy propyl methyl cellulose and ethyl cellulose as polymers.

Methods and Results:

- **Preparation**: Capecitabine microspheres were formulated using emulsion solvent evaporation method with Ethyl cellulose and HPMC K-100 as primary polymers.
- **Evaluation**: The microspheres were evaluated for various parameters including:
    - **Scanning Electron microscopy**: satisfactory morphology.
    - **Size Analysis**: The microsphere resulted with suitable particle size.
    - **Drug Content & Entrapment Efficiency**: Consistent drug distribution and entrapment.
    - **Percentage Yield**: Good Percentage yield.
    - **In-Vitro Residence Time**: More than 12 hours, ensuring prolonged drug release.
    - **In-Vitro Drug Release**: The optimized formulation showed a controlled release of 99.94% over24 hours.
    - **Kinetic Modeling**: Data fitted into Higuchi and Korsmeyer-Peppas models indicated a zero-order drug release mechanisms, along with diffusion and erosion.
- The study successfully demonstrated that the formulation of capecitabine-loaded microspheres using ethyl cellulose and HPMC k-100 for effective colon targeting.
-

Expenditure Breakdown

The grant of ₹55,000 was utilized as follows:

9. **Materials and Reagents**: ₹20,000
    - Purchase of polymers (Ethyl Cellulose, HPMC K-100)
    - Capecitabine (active pharmaceutical ingredient)
    - Solvents and chemicals for formulation and evaluation
10. **Laboratory Equipment and Supplies**: ₹15,000
    - Glassware, Emulsion solvent evaporation apparatus, and homogenizer
    - Impeller stirrer for microspheres preparation
    - Incubator shaker and other analytical instruments
11. **Testing and Evaluation**: ₹15,000
    - Scanning Electron microscopy
    - FTIR analysis for compatibility studies
    - Drug content &Entrapment Efficiency
12. **Documentation and Publication**: ₹5,000
    - Printing, documentation, and publication fees for research dissemination

Total Expenditure: ₹55,000

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Future Requirements

For the continuation and further enhancement of this research, the following resources and support are required:

5. **Additional Funding**:
   To expand the research scope, including clinical trials and scalability studies, an estimated additional funding of ₹1,00,000 is needed.
6. **Advanced Analytical Equipment**:
   Acquiring high-performance liquid chromatography (HPLC) and other sophisticated analytical instruments for more detailed pharmacokinetic studies.

Funding:
The research work was generously funded with a grant of **₹55,000** provided by the management of Narayana Educational society for Advanced Pharmaceutical Research. The grant enabled the successful completion of the formulation and evaluation of Capecitabine microspheres for colorectal Cancer using ethyl cellulose and HPMC K-100 as polymers.

Link of the published work: DOI: https://pharmasprings.com/fjphs/article/view/338

PRINCIPAL
NARAYANA PHARMACY COLLEGE
NELLORE - 524 002.

Research Work: "Formulation and In-Vitro Evaluation of Carvedilol Buccal Films Using HPMC E15 and Sago Starch as Polymer"

Researchers:

- **Krishnaveni Manubolu**
- **Mohammad Amisha Sulthana**
- **Dr. K. Harinadha Baba**

Funding:
The research work was generously funded with a grant of **₹50,000** provided by the Narayana Research Fund for Advanced Pharmaceutical Studies. The grant enabled the successful completion of the formulation and evaluation of carvedilol buccal films using HPMC E15 and Sago starch as polymers.

Link of the published work: DOI: http://dx.doi.org/10.22376/Ijpbs.2024.15.2.p14-30

Project Overview

The study aimed to address the challenge of low oral bioavailability of **Carvedilol**, a drug with α1-, β1-, and β2-adrenergic blocker activity. Due to the drug's significant first-pass metabolism (resulting in only 25-35% bioavailability), the research focused on developing buccal mucoadhesive films to improve bioavailability and provide controlled drug release.

Objective:
The primary goal was to formulate carvedilol buccal films using semi-synthetic polymer **HPMC E15** and natural polymer **Sago starch** to bypass hepatic metabolism, reduce dosing frequency, and enhance patient compliance.

Methods and Results:

- **Preparation**: Carvedilol buccal films were formulated using solvent casting methods with HPMC E15 and Sago starch as primary polymers.
- **Evaluation**: The films were evaluated for various parameters including:
  - **Thickness and Weight Uniformity**: Both were within satisfactory limits.
  - **Folding Endurance**: The films showed excellent endurance with over 300 folds.
  - **Surface pH**: Films exhibited neutral pH (6.4-7), ensuring minimal irritation to the buccal mucosa.
  - **Drug Content Uniformity**: Consistent drug distribution across the films.
  - **Swelling Index**: Higher swelling was observed in HPMC E15 films compared to Sago starch films.
  - **In-Vitro Residence Time**: More than 7 hours, ensuring prolonged drug release.
  - **Permeation Studies**: Conducted using goat buccal mucosa, the films demonstrated 95.04% permeation in 8 hours.

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- **In-Vitro Drug Release**: The optimized film (S3) showed a controlled release of 98.96% over 8 hours.
- **Kinetic Modeling**: Data fitted into Higuchi and Korsmeyer-Peppas models indicated a combination of zero-order and first-order release mechanisms, along with diffusion-based drug release.

The study successfully demonstrated that the formulation of carvedilol-loaded buccal films using HPMC E15 and Sago starch provides controlled drug release and effectively overcomes the first-pass metabolism of Carvedilol.

Expenditure Breakdown

The grant of ₹50,000 was utilized as follows:

1. **Materials and Reagents**: ₹20,000
   - Purchase of polymers (HPMC E15, Sago starch)
   - Carvedilol (active pharmaceutical ingredient)
   - Solvents and chemicals for formulation and evaluation
2. **Laboratory Equipment and Supplies**: ₹15,000
   - Glassware, solvent casting apparatus, and tools for film preparation
   - Franz diffusion cell for permeation studies
   - pH meters and other analytical instruments
3. **Testing and Evaluation**: ₹10,000
   - In-vitro and ex-vivo studies, including dissolution testing
   - FTIR analysis for compatibility studies
   - Kinetic modeling software for release profile analysis
4. **Documentation and Publication**: ₹5,000
   - Printing, documentation, and publication fees for research dissemination

Total Expenditure: ₹50,000

Future Requirements

For the continuation and further enhancement of this research, the following resources and support are required:

1. **Additional Funding**:
   To expand the research scope, including clinical trials and scalability studies, an estimated additional funding of ₹1,00,000 is needed.
2. **Advanced Analytical Equipment**:
   Acquiring high-performance liquid chromatography (HPLC) and other sophisticated analytical instruments for more detailed pharmacokinetic studies.

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3. **Collaborations**:
   Collaboration with clinical research organizations (CROs) for advanced ex-vivo and in-vivo testing, particularly for human trials.
4. **Green Chemistry Initiatives**:
   Implementing sustainable and eco-friendly practices in the preparation of buccal films, which would require investment in green chemistry technologies.

Conclusion

The research on **"Formulation and In-Vitro Evaluation of Carvedilol Buccal Films"** has successfully laid the groundwork for innovative drug delivery systems aimed at improving patient outcomes. The promising results of this study highlight the potential for further exploration in buccal film technology, with the hope of advancing pharmaceutical care for patients requiring carvedilol therapy.

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Research Work: "To develop and evaluate the in-vitro antioxidant and anti-inflammatory activity of polyherbal Gel"

Researchers:

Suchitra M*, Harinadha Baba K, Yamini R, Sri Harshitha P, Surekha G, Pavani T, Sakshi Jain

Funding:
The research work was generously funded with a grant of **₹52,000** provided by the Narayana Research Fund for Advanced Pharmaceutical Studies. The grant enabled the successful completion of the Formulation and Evaluation Of *Invitro antioxidant* and *anti-inflamatory* Activity Of Polyherbal Gel

Link of the published work: DOI : https://doi.org/10.26452/fjphs.v3i3.496

Project Overview

This project aims to formulate a polyherbal gel and evaluate its in-vitro antioxidant and anti-inflammatory activities. The formulation will combine selected herbal extracts known for their therapeutic properties. This study will help determine the potential of the polyherbal gel as a natural therapeutic agent for conditions associated with oxidative stress and inflammation.

Objective:
The objectives include:
1.Formulation of Polyherbal Gel: Develop a gel containing a blend of herbal extracts with potential antioxidant and anti-inflammatory properties.
2.Antioxidant Activity Evaluation: Use *in-vitro* assays to measure the gel's ability to neutralize free radicals and prevent oxidative damage.
3.Anti-inflammatory Activity Evaluation: Conduct in-vitro tests (e.g., inhibition of protein denaturation, membrane stabilization assays) to assess the gel's efficacy in reducing inflammation.
4.Data Analysis: Compare the results with standard antioxidants and anti-inflammatory agents to validate the efficacy of the polyherbal gel.

Methods and Results:

1. Formulation of Polyherbal Gel

- **Ingredients and Preparation:**
  - Select herbs with known antioxidant and anti-inflammatory properties (e.g., Curcuma longa (Turmeric), Aloe barbadensis (Aloe Vera), Azadirachta indica (Neem), and Ocimum sanctum (Tulsi)).

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- Prepare herbal extracts using a suitable solvent (e.g., ethanol or methanol) through maceration or Soxhlet extraction.
- Incorporate the extracts into a gel base using carbopol 940, glycerin, triethanolamine, and distilled water.
- Homogenize the mixture to form a uniform gel.

2. In-Vitro Antioxidant Activity Evaluation

1 ml of sample (1 mg/ml) was mixed with 3 ml of methanol, 0.2 ml of 10% aluminium chloride, 0.2 ml of 1 M potassium acetate and 5.6 ml of distilled water and remains at room temperature for 30 min. The absorbance of the reaction mixture was measured at 420nm with UV-Visible spectrophotometer.

$$\text{Inhibition\%} = \left(\frac{\text{Control absorbance} - \text{Sample absorbance}}{\text{Control Absorbance}}\right) \times 100$$

. In-Vitro Anti-inflammatory Activity Evaluation

- **Protein Denaturation Inhibition Assay:**
  - Mix 1 ml of the gel with 1 ml of egg albumin and incubate at 37°C for 15 minutes.
  - Heat the mixture at 70°C for 5 minutes.
  - Measure absorbance at 660 nm.
  - Calculate % inhibition using the formula provided above.
- **Human Red Blood Cell (HRBC) Membrane Stabilization Method:**
  - Mix 1 ml of the gel with 1 ml of HRBC suspension.
  - Incubate at 37°C for 30 minutes, followed by centrifugation.
  - Measure absorbance of the supernatant at 560 nm.

Results

Antioxidant Activity:

- **Hydrogen Peroxide Assay:**
  - The polyherbal gel showed 78% inhibition at a concentration of 100 µg/ml, indicating strong antioxidant activity. The IC50 value (concentration at which 50% inhibition occurs) was found to be 52 µg/ml.

Anti-inflammatory Activity:

All samples were at various concentrations (between 20 and 100 g). offered signi□icant defence against protein denaturation. Comparing PHF-3 to different formulations and individual ethanolic extracts, the highest % inhibition was found at 100g/ml. It has sizable activity comparable to that of diclofenac sodium standard.

Expenditure Breakdown

The grant of ₹52,000 was utilized as follows:

1. **Materials and Reagents**: ₹20,000
   - Herbal Extracts or Raw Herbs: ₹5,000
   - Gel Base Materials (e.g., Carbopol, glycerine, triethanolamine): ₹8,000
   - Chemicals for Assays: ₹7,000

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- Solvents and chemicals for formulation and evaluation

2. **Laboratory Equipment and Consumables** - ₹12,000
    - Glassware and Disposable Items (e.g., test tubes, pipettes, cuvettes)
    - Equipment Usage Charges (e.g., UV-Visible spectrophotometer, centrifuge)
    - Miscellaneous Laboratory Consumables
3. **Analytical Services** - ₹10,000
    - *In-Vitro* Assay Services
    - Data Analysis and Software Usage Fees
4. **Documentation and Publication**: ₹10,000
    - Printing, documentation, and publication fees for research dissemination

Total Expenditure: ₹52,000

Future Requirements

□ Optimization of Formulation:

- Refinement of Gel Composition: Further optimization of the polyherbal gel's formulation to enhance its efficacy, stability, texture, and shelf life.
- Stability Studies: Conduct accelerated and long-term stability studies to determine the gel's shelf life and ensure consistent performance over time.

□ Advanced In-Vitro Testing:

- Additional Antioxidant and Anti-inflammatory Assays: Perform more diverse in-vitro tests such as lipid peroxidation inhibition, superoxide anion scavenging, and cyclooxygenase (COX) inhibition assays to confirm and expand the scope of antioxidant and anti-inflammatory activities.
- Cytotoxicity Testing: Assess the safety of the gel by conducting cytotoxicity tests on relevant cell lines (e.g., fibroblasts, keratinocytes) to ensure the gel is non-toxic and safe for topical use.

□ In-Vivo Studies:

- Animal Testing: Plan and conduct in-vivo studies to evaluate the gel's efficacy in a biological system. This would involve testing on appropriate animal models to observe its antioxidant and anti-inflammatory effects.
- Dermal Irritation and Sensitization Studies: Conduct skin irritation and sensitization studies on animal models to evaluate the safety of the gel for topical application.

Additional Funding: Seek grants, investments, or partnerships to support further research, development, and commercialization efforts.

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Resource Planning: Ensure adequate allocation of resources, including personnel, laboratory facilities, and raw materials, for future phases.

Conclusion

The study successfully developed a polyherbal gel with significant *in-vitro* antioxidant and anti-inflammatory properties. The gel demonstrated high free radical scavenging activity in Hydrogen Peroxide assay and potent anti-inflammatory effects through protein denaturation inhibition and HRBC membrane stabilization. These findings indicate that the polyherbal gel could be a promising candidate for treating oxidative stress and inflammatory conditions. Future work should focus on optimizing the formulation, conducting in-vivo studies, and ensuring regulatory compliance to validate its safety and efficacy further. Overall, the polyherbal gel shows strong potential as a safe, natural alternative for topical antioxidant and anti-inflammatory applications.

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Research Work: Synthesis, Characterization And Anti-Cholinesterase Activity Of Novel Substitute 1, 3, 4-Oxadiazole

Researchers:

Suchitra M*, P. Deepika, SK. Arshiya, G. Navya Sree, K. Joshna, M.Swarupa

Funding:
The research work was generously funded with a grant of **₹58,000** provided by the Nàrayana Research Fund for Advanced Pharmaceutical Studies. The grant enabled the successful completion of the Synthesis, Characterization And Anti-Cholinesterase Activity Of Novel Substitute 1, 3, 4-Oxadiazole

Link of the published work: DOI :

Project Overview

This project aims to synthesize novel substituted 1,3,4-oxadiazole derivatives and evaluate their potential as anti-cholinesterase agents. The compounds will be synthesized using cyclization reactions involving hydrazides and carboxylic acids, then characterized through NMR, IR, MS to confirm their structures. The anti-cholinesterase activity will be assessed using in-vitro assays like Ellman's method to determine IC50 values against acetylcholinesterase (AChE enzyme).

Objective:

- To design and synthesize a series of novel substituted 1,3,4-oxadiazole derivatives
- Literature survey on oxadiazoles containing compounds.
- Scheme for preparation and synthesis of oxadiazoles.
- To purify the compounds by appropriate solvent techniques.
- To characterize the compounds by spectral analysis like a) IR spectroscopy b) NMR c) Ms
- To evaluate the synthesized derivative compounds for *in -silico* anti-cholinesterase studies.
- To evaluate the synthesized derivative compounds for *in -vitro* anti-cholinesterase studies.
- Compare the values of biological activities of synthesized compounds with standard and control.

Methods and Results:
Synthesis and Characterization of 2-Amino-5- substituted phenyl-1,3,4-oxadiazole.
Step-1:

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A mixture of aldehyde (0.03 mole) and semi carbazide hydrochloride (0.05 mole) was dissolved in a suitable solvent such as ethanol(20 ml),to maintain the pH of this mixture a buffer solution such as sodium acetate was added to maintain the pH. This whole mixture was refluxed for 3 hours at 100°c.Solvent was distilled off and the obtained residue was used for further reaction. The obtained residue further known as Schiff base.

Step-2:

The mixture of above residue (0.01 mole) and sodium carbonate(0.01 mole) was dissolved in water (2 ml).Iodine (0.01 mole) and potassium iodide (0.01 mole)was refluxed for 2 hours at 100°c.The reaction mixture was then concentrated ,allowed to cool, the solid product obtained was filtered ,washed with water and re-crystallized using methanol.

***Insilico* studies:**

The main objective of this part of the work is to perform a docking analysis of synthesized 5-amino 1,3,4-oxadiazole derivatives on AChE receptors using auto dock model to develop probable correlation between the *invitro* and *invivo* Alzheimer's activity results and binding affinities of the 5-amino 1,3,4-oxadiazole derivatives with receptor. The protein receptors AChE is attractive targets in the Alzheimer's disease.

To demonstrate the shared mechanism of derivatives of 5-amino 1,3,4-oxadiazole derivatives with most active sites of AChE receptors, we have preferred a computer aided experimental method that is molecular docking. The 2D structures of all the compounds were generated by drawing in Chem sketch (www.acdlabs.com) and energy minimized 3D structures were generated by using Gaussian 09,[1]with small basic set small hf/3-21g*.[2]The crystallographic 3D structure of AChE, target receptors were regained from RSC PDB *(www.rscb.org)* PDB ID: UNK 900 for AChE. Such energy minimized compounds and receptors AChE, were used for docking.

***Invitro* studies (Estimation of cholinesterase inhibitory activity):**

The most common assay is based on Ellman's method using an alternative substrate acetylthiocholine and 5,5'-dithio-bis-2-nitrobenzoic acid (DTNB). The reaction results in production of 5-thio-2-nitrobenzoate that has yellow color due to the shift of electrons to the sulfur atom.

Results

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A series of novel 1,3,4-oxadiazole derivatives were successfully synthesized using cyclization reactions involving hydrazides and carboxylic acids under reflux conditions. The yields of the synthesized compounds ranged from 65% to 85%, indicating an efficient synthesis process.

The chemical structures of the synthesized compounds were confirmed using various spectroscopic techniques.

Nuclear Magnetic Resonance (NMR): Proton (1H) and Carbon (13C) NMR spectra confirmed the presence of expected functional groups and aromatic ring protons.

Infrared Spectroscopy (IR): Characteristic absorption bands corresponding to oxadiazole, aromatic rings, and substituents were observed.

Mass Spectrometry (MS): Molecular ion peaks were consistent with the calculated molecular weights of the synthesized compounds.

Anti-Cholinesterase Inhibitory Activity:

In-vitro assays demonstrated that several of the synthesized 1,3,4-oxadiazole derivatives exhibited significant inhibition of acetylcholinesterase (AChE). Compounds with electron-donating groups showed higher inhibitory activity, suggesting a favourable interaction with the enzyme's active site.

Docking Studies proved that good binding capacity of molecules. SAR analysis revealed that substitutions on the aromatic ring, particularly with electron-donating groups like methoxy and hydroxyl, enhanced anti-cholinesterase activity. Bulky substituents at specific positions decreased activity, indicating steric hindrance may impact enzyme binding.

Conclusion:

These findings highlight the potential of novel 1,3,4-oxadiazole derivatives as promising candidates for anti-cholinesterase acti

Expenditure Breakdown

The grant of ₹58,000 was utilized as follows:

- **Materials and Reagents**:

Starting Materials and Reagents: Essential chemicals for synthesis (solvents, reagents, and precursors) : 18,000 INR

- **Instrumentation and Equipment**:

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Characterization Tools: Use of NMR, Mass Spectrometry, IR, or UV-Vis for structural analysis : 20,000 INR

Biological Activity Assessment:

In-vitro Testing: Expenses for enzymes, substrates, buffers, and consumables for anti-cholinesterase activity testing : 10,000 INR

Publication:

Documentation and Publication: 10,000 INR

Total Expenditure: ₹58,000

Future Requirements

1. Additional Materials and Reagents:
   - New Chemical Reagents and Solvents: For research progresses, additional reagents or different solvents may be required to synthesize new derivatives or optimize existing synthesis routes.
2. Advanced Instrumentation and Equipment Access:
   - Access to Specialized Equipment: Future research may require advanced equipment such as:
     - High-Performance Liquid Chromatography (HPLC) or Gas Chromatography-Mass Spectrometry (GC-MS) for purity assessment.
3. Expansion of Biological Testing:
   - In-vivo Testing: Research progresses from in-vitro to in-vivo studies, require funding for animal models, ethical approvals, housing, and care.
   - Additional Enzyme Assays: Expanding the range of enzymes tested (e.g., other cholinesterase forms or different biological targets) may be needed to confirm the activity or broaden the scope of the study.
   - High-Throughput Screening: Consider investing in or accessing automated high-throughput screening systems to test a large number of compounds efficiently.
4. Enhanced Data Analysis Tools:
   - Software for Molecular Modelling: Investment in computational chemistry software like Gaussian or Schrödinger for molecular docking studies or QSAR (Quantitative Structure-Activity Relationship) analysis.
   - Data Management and Analysis Tools: Use of advanced data analysis tools or platforms to manage large datasets, perform statistical analysis, and visualize complex results.
6. Collaboration and Networking:
   - Collaborative Projects: Partnering with other research groups, institutions, or industry to access additional expertise, equipment, or funding.
7. Additional Funding
8. Contingency Planning

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Conclusion

The new synthesized compounds of 3-(5-amino-1,3, 4-oxadiazol-2- yl) derivatives 1a,2b,3c,4d &5d were screened for anti-cholinesterase inhibitor activity by using Elman's method of dose 5 mg/kg and 10 mg/kg. The compounds which shown reduction of Ache levels of 1A,1B,1C,1D,1E. All most all the compounds have shown potent ACHE inhibitory activity among that 5e has shown good activity when comparison with donepezil.

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