

## Details of the Collaborative Activity

2018-19

**Name of the Collaborating Institute:** P.A. College of Engineering, Mangalore

**Name of Collaborating Department from YDU:** Yenepoya Research Center

### Activities:

**Research Internship:** Undergraduate students from Dept of Biotechnology from P.A. College of Engineering, Mangalore undertaken research internship training program at YRC

1. Fathima Kazreena,
  - Havva Farisha
  - Mariyam
  - Khadeejath S Begum
  - Abdullah A
  - Mohammed Zanhali GK
  - Muhammed Sabad
  - Abhishek SK

### Research Facility Utilization:

Undergraduate students from PA College of Engineering, utilized the Probe Sonicator facility and other facilities available at YRC for the research project.

### Joint Research Publication:

1. Priya ESP, Nayak RP, Saldanha P. Raj CGD, Shashidhara KS. Anti-inflammatory and toxicity studies of substituted hydrazine pyrazolone derivatives. *International Journal of Pharmaceutical Research*. 2021; 13(1): 198.
2. Priya ESP, Nayak RP, Saldanha P, BJ Mohan, Prabhu A. Neuroprotective Activity of Pyrazolone Derivatives Against Paraquat-induced Oxidative Stress and Locomotor Impairment in *Drosophila*. *International Journal of Current Research and Review*, 2020; 12(23), p.68.

ATTESTED

Dr. Gangadhara Somayaji K.S.

Yenepoya (Deemed to be University)  
University Road, Deralakatte  
Mangalore- 575 018, Karnataka



# P.A. COLLEGE OF ENGINEERING

Approved by AICTE | Affiliated to VTU | Recognized by Govt. of Karnataka | ISO 9001-2008

PAET/PACE/PRN/2017-18

14.06.20118  
Date

To,

The Director,  
Yenepoya Research Centre,  
Mangalore.

Sir,

**Sub: Internship training for Biotechnology Students- Reg.**

As a part of B.E. degree course in Biotechnology, the following 9 students of VI semester desires to do their internship at your esteemed college as part of their studies. So we request you to permit the students to undergo visit in the month of August and extend all possible help.

- |                          |   |            |
|--------------------------|---|------------|
| 1. Mariyam               | - | 4PA15BT009 |
| 2. Havva Farisha         | - | 4PA15BT006 |
| 3. Fathima Kazreena      | - | 4PA15BT005 |
| 4. Kadheejath Shahanoor  | - | 4PA15BT007 |
| 5. Abdullah Aamer        | - | 4PA15BT001 |
| 6. Muhammed Zanzhal G.K. | - | 4PA15BT011 |
| 7. Muhammed Sabad Sabad  | - | 4PA15BT010 |
| 8. Abhishek S.K.         | - | 4PA15BT002 |
| X9. Anjali K. V.         | - | 4PA15BT003 |

Thanking you,

Yours faithfully,

  
PRINCIPAL

P.A. COLLEGE OF ENGINEERING

MANGALORE - 574 153

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TESTED

Dr.Gangadhara Somayaji K.S.  
Registrar  
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Mangalore- 575 018, Karnataka



YENEPOYA  
(DEEMED TO BE UNIVERSITY)

Recognised under Sec 3(A) of the UGC Act 1956  
Accredited by NAAC with 'A' Grade

## YENEPOYA RESEARCH CENTRE

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University Road, Deralakatte

Mangalore - 575018.

Email : research@yenepoya.edu.in

dydirectoryrc@yenepoya.edu.in

Ph +91 8242204668/69/70, Ext. 2035

05.12.2018

### CERTIFICATE

This is to certify that, Ms. Fathima Kazreena, Bachelor of Engineering in Biotechnology, Dept. of Biotechnology, P.A College of Engineering, Mangalore, has successfully completed her internship as a Research Intern in Yenepoya Research Centre, Yenepoya (Deemed to be University) under the guidance of Dr. Keshav Prasad, Deputy Director and Professor, CSBMM, Yenepoya Research Centre & Dr. Pratigya Subba, Assistant Professor, CSBMM, Yenepoya Research Centre, Yenepoya (Deemed to be University) Deralakatte, Mangalore from 6<sup>th</sup> Aug 2018 to 15<sup>th</sup> Sep 2018 in the field of "Proteomic Analysis".

*Rinkla P.D.*  
5/12/2018  
Deputy Director  
Yenepoya Research Centre  
Yenepoya (Deemed to be University)  
Deralakatte, Mangaluru-575018

ATTESTED

Dr. Gangadhara Somayaji K.S.  
Registrar  
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University Road, Deralakatte  
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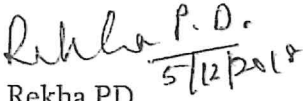
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Ph +91 8242204668/69/70, Ext. 2035

05.12.2018

### CERTIFICATE

This is to certify that, Ms. Havva Farisha, Bachelor of Engineering in Biotechnology, Dept. of Biotechnology, P.A College of Engineering, Mangalore, has successfully completed her internship as a Research Intern in Yenepoya Research Centre, Yenepoya (Deemed to be University) under the guidance of Dr. Keshav Prasad, Deputy Director and Professor, CSBMM, Yenepoya Research Centre & Mr. Arun Patil, Assistant Professor, CSBMM, Yenepoya Research Centre, Yenepoya (Deemed to be University) Deralakatte, Mangalore from 6<sup>th</sup> Aug 2018 to 15<sup>th</sup> Sep 2018 in the field of "Proteogenomic Analysis".

  
Dr. Rekha PD  
Deputy Director  
Yenepoya Research Centre  
Yenepoya (Deemed to be University)  
Deralakatte, Mangaluru-575018

ATTESTED 

Dr. Gangadhara Somayaji K.S.  
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05.12.2018

### CERTIFICATE

This is to certify that, Ms. Mariyam, Bachelor of Engineering in Biotechnology, Dept. of Biotechnology, P.A College of Engineering, Mangalore, has successfully completed her internship as a Research Intern in Yenepoya Research Centre, Yenepoya (Deemed to be University) under the guidance of Dr. Keshav Prasad, Deputy Director and Professor, CSBMM, Yenepoya Research Centre & Dr. Pratigya Subba, Assistant Professor, CSBMM, Yenepoya Research Centre, Yenepoya (Deemed to be University) Deralakatte, Mangalore from 6<sup>th</sup> Aug 2018 to 15<sup>th</sup> Sep 2018 in the field of "Proteomic Analysis".

*Rekha P.D.*  
*5/12/2018*

Dr. Rekha PD

Deputy Director  
Yenepoya Research Centre  
Yenepoya (Deemed to be University)  
Deralakatte, Mangaluru-575018

*GS* ATTESTED

Dr. Gangadhara Somayaji K.S.  
Registrar  
Yenepoya (Deemed to be University)  
University Road, Deralakatte  
Mangalore-575018, Karnataka



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05.12.2018

### CERTIFICATE

This is to certify that, Ms. Kadheejath Shahanoor Begum KK, Bachelor of Engineering in Biotechnology, Dept. of Biotechnology, P.A College of Engineering, Mangalore, has successfully completed her internship in Yenepoya Research Centre, Yenepoya (Deemed to be University) under the guidance of Dr. Keshav Prasad, Deputy Director and Professor, CSBMM, Yenepoya Research Centre & Mr. Arun Patil, Assistant Professor, CSBMM, Yenepoya Research Centre, Yenepoya (Deemed to be University) Deralakatte, Mangalore from 6<sup>th</sup> Aug 2018 to 15<sup>th</sup> Sep 2018 in the field of "Proteogenomic Analysis".

*Rekha P.D.*  
*5/12/2018*

Dr. Rekha PD  
Deputy Director  
Yenepoya Research Centre  
Yenepoya (Deemed to be University)  
Deralakatte, Mangaluru-575018

ATTESTED

*[Signature]*  
Dr. Gangadhara Somayaji K.S.  
Registrar  
Yenepoya (Deemed to be University)  
University Road, Deralakatte  
Mangalore- 575 018, Karnataka

## Research Article

# Anti-Inflammatory And Toxicity Studies Of Substituted Hydrazine Pyrazolone Derivatives

SINDHU PRIYA E S<sup>1,2</sup>, ROOPA P NAYAK<sup>3\*</sup>, PREMA SALDANHA<sup>4</sup>, DARSHAN RAJ C G<sup>5</sup>, SHASHIDHARA KS<sup>6</sup>

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<sup>2</sup>Yenepoya Research Centre, Yenepoya (Deemed to be University), University Road, Deralakatte, Mangalore-575018

<sup>3</sup>Professor and Head, Dept. of Pharmacology, Yenepoya Medical College, Yenepoya (Deemed to be University), University Road, Deralakatte, Mangalore-575018

<sup>4</sup> Professor and Head, Dept. of Pathology, Yenepoya Medical College, Yenepoya (Deemed to be University), University Road, Deralakatte, Mangalore-575018

<sup>5</sup>Assistant Professor and Head, Research Department of Chemistry, P A College of Engineering, Nadupadavu, Mangalore-572109

<sup>6</sup> Dept. of Genetics and Plant Breeding, College of Agriculture, Hassan-573225, University of Agricultural Sciences (Bangalore), India.

\*Corresponding Author

Email: roopapnayak@yenepoya.edu.in

Received: 06.08.20, Revised: 04.09.20, Accepted: 07.10.20

## ABSTRACT

**Objectives:** Substituted hydrazine pyrazolone derivatives were evaluated for the anti-inflammatory effect, acute toxicity, and genotoxicity in this study.

**Materials and methods:** The pyrazolone derivatives (C1-C4) were screened for in vitro albumin denaturation assay, in vitro Cyclo Oxygenase inhibition studies and in silico molecular docking studies. Compounds C3 and C4 were selected for in vivo anti-inflammatory activity assessment by carrageenan-induced paw edema model in albino rats. Compounds C3 and C4 were screened for acute toxicity studies by assessing the liver and renal function tests. Genotoxicity of C3 and C4 was determined through DNA fragmentation assay.

**Results and Discussion:** Among the tested compounds, C3 and C4 were effective against the denaturation of egg albumin. Compounds C3 and C4 were found to be potent molecules towards significant inhibition of COX-2 but insignificant towards COX-1 inhibition. Carrageenan-induced paw edema test revealed C3 as a more potent compound than the standard drug. The result of in silico molecular docking studies of compounds with COX-1 and COX-2 enzymes correlates with the in vivo and in vitro anti-inflammatory studies. Compounds C3 and C4 were found to be nontoxic at tested dose which was evidenced by acute toxicity and DNA fragmentation studies.

**Conclusion:** Among the tested compounds C3 has emerged as an effective non-steroidal anti-inflammatory scaffold. The potency of a compound might be attributed due to trifluoromethyl substitution.

**Keywords:** Pyrazolone, anti-inflammatory activity, COX inhibition, molecular docking

## INTRODUCTION

Inflammation is a multistage process and comprehensive body defense response to noxious stimuli and connected with certain physiological, biochemical and cellular modifications. Inflammation is significantly observed in lung diseases such as asthma, chronic obstructive pulmonary disorder and other diseases including allergic rhinitis, rheumatoid arthritis, osteoarthritis, inflammatory bowel diseases and psoriasis. Over the last few years despite intensive global research, cures for pain and inflammation

with no toxicity have still not been found [1]. Nonsteroidal anti-inflammatory drugs (NSAIDs) are commonly used to treat pain and inflammation [2]. NSAIDs exhibit their drug action by inhibiting cyclooxygenase (COX) enzymes, which catalyzes the conversion of arachidonic acid to prostaglandins, prostacyclins, and thromboxanes [3]. Enzyme COX exists as COX-1 and COX-2 isoforms. They are assumed to play an energetic role in producing pathological and physiological prostaglandins respectively [4]. Currently used NSAIDs employ their anti-





between

Department of Dental Materials, Yenepoya Dental college (Y.D.C.), Yenepoya  
(Deemed to be) University, Deralakatte, Mangaluru, Karnataka, 575018

and

Department of Mechanical Engineering, P.A. College of Engineering (P.A.C.E.),  
under Visvesvaraya Technological University, Konaje, Mangaluru, Karnataka,  
574153.

The Memorandum of Understanding is entered into on this day of 17<sup>th</sup> October 2018 and executed between Department of Dental Materials, Yenepoya Dental College (Y.D.C.) Yenepoya (Deemed to be) University, Deralakatte, Mangaluru, 575018 and Department of Mechanical Engineering, P.A. College of Engineering (P.A.C.E), under Visvesvaraya Technological University, Konaje, Mangaluru, 574153.

The objective of this Memorandum of Understanding is mutual Cooperation between the Department of Dental Materials, Yenepoya Deemed to be University, Deralakatte, Mangaluru, 575018. and Department of Mechanical Engineering, P.A. College of Engineering (P.A.C.E), under Visvesvaraya Technological University, Konaje, Mangaluru, 574153.

1. To collaborate in research activities between P.A.C.E Dept. of Mechanical Engineering and Dental Materials Dept., Y.D.C. to utilize the equipment available in both the departments as shown below:

**Equipment available at Dept. of Mechanical Engineering in P.A.C.E.:**

- ❖ Ultrasonicator
- ❖ Electro-spinning machine
- ❖ Universal testing machine
- ❖ Torsion testing machine
- ❖ Rockwell hardness and Brinell hardness testing machine
- ❖ Impact testing machine
- ❖ Muffle furnace
- ❖ Metallurgical microscope
- ❖ Fatigue testing machine

**Equipment available at Dept. Dental Materials in YDC:**

- ❖ Universal testing machine. (20kN load capacity 2kN and 20kN load cell): The fixture available for testing compression, tension, shear, bending (3 points and 4 points), wire grip and Brinell hardness grip with 5mm and 2mm indenter.
- ❖ Vickers and Knoop hardness tester.
- ❖ pH meter.
- ❖ Electronic balance.
- ❖ Magnetic stirrer.
- ❖ Vernier calipers, screw gauge etc.

ATTESTED

Dr. Gangadhara Somayaji K S  
Registrar  
Yenepoya (Deemed to be University)  
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Mangalore 575 018, Karnataka.

2. The material testing equipment in the department can be utilized for research at a subsidized rate.
3. Further, whatever research happens, the publications should include the authors from both departments, acknowledging the facilities and equipment, utilized for the work.



**Duration:**

This Memorandum of understanding will remain for three years from the date of execution and is subjected to renewal for a further period as may be decided by mutual discussion and consent. The MOU can be terminated by either of the party with one month notice. On termination of the contract by the concerned parties, all rights on the technologies developed both the parties will have equal rights.

Any changes or additions to this Memorandum of Understanding have set their hands on the day, month and year first above written.

*B.T. N. [Signature]*  
On behalf of Dept. of Dental Materials.  
Head of the  
Dept. of DENTAL MATERIALS  
YENEPOYA DENTAL COLLEGE  
YENEPOYA UNIVERSITY  
Deralakatte, Mangalore-575018

*[Signature]*  
On behalf of Dept. of Mechanical Engineering  
Department of Mechanical Engineering  
P.A. College of Engineering  
MANGALORE

*[Signature]*  
DEAN / PRINCIPAL  
Yenepoya Dental College  
Yenepoya Deemed to be University  
Yenepoya Dental College, Deralakatte  
Mangaluru-575018

*[Signature]*  
Dean (Research) / Director (Academics)  
P.A. College of Engineering, Mangaluru.

*[Signature]*  
Registrar  
Yenepoya (Deemed to be University)  
University Road, Deralakatte  
Mangalore 575 018

*[Signature]*  
Principal  
Yenepoya (Deemed to be) University Mangaluru, P.A. College of Engineering, Mangaluru.

Notary Stamps not available in  
Karnataka State from 01 / 04 / 2020  
Hence not affixed  
*[Signature]*  
Notary, Mangalore

Sworn and Signed Before me, this  
..... day of ..... 20.....  
at Mangalore, D.K. Dist.,



Errors / Corrections Etc. *[Signature]*

*[Signature]*  
NOTARY  
Dakshina Kannada Dist

Dr. Gangadhara Somayaji K S  
Registrar  
Yenepoya (Deemed to be University)  
University Road, Deralakatte  
Mangalore