Number of MoUs, collaborations/linkages during the A.Y. 2020-21

VERAS®
Pharmaceuticals Pvt. Ltd.,

Memorandum of Understanding (MOU)
Between

Veras Pharmaceuticals Pvt Ltd

and

VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY

This Agreement made by this 28th August 2021, between **Veras Pharmaceuticals Pvt Ltd** located at Vizianagaram and Vignan Institute of Pharmaceutical Technology, Duvvada, Visakhapatnam.

Objective of the MOU

The objective of this Memorandum of Understanding (MOU) is:

- To promote the interaction between **Veras Pharmaceuticals Pvt Ltd** and **VIPT** is mutually beneficial area of basic research.

Proposed Mode of Collaboration

- Sponsoring student projects.
- Sponsoring R& D projects, this may be carried out wholly or partly at **VIPT** or **Veras Pharmaceuticals Pvt Ltd**

Forms of Research and Development Programs

- In their own existing facilities — The performance of research individually by each party or concurrently with both parties in mixed groups at their own facilities.

Agreements for Research Collaboration

- The nature, scope and schedule of the Research collaboration.
- The form of research collaboration.
- The sponsoring of the research fund

Signed In Duplicate

- This MOU is executed in duplicate with each copy being an official version of the Agreement
- By signing below, the parties acting by their duly authorized officers have caused this memorandum of understanding to be executed effective as of the day and year first above written and valid for two years.

VERAS PHARMACEUTICALS PVT. LTD. VIZIANAGARAM A.P.

Mr V.V.Rao
Director
Veras Pharmaceuticals Pvt Ltd
Sy no 56/ 11 to 14
Chelavuru-535005
Vizianagaram, Andhra Pradesh

28/08/21

Dr. Y. Srinivasa Rao
Principal
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside VSEZ, Duvvada,
Visakhapatnam, Andhra Pradesh 530049

PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside: VSEZ, Duvvada, Visakhapatnam-46

Survey No. 56/11 to 14, Chelavuru, Vizianagaram - 535 005 A.P.
Email: veraspharmaceuticals@gmail.com

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding (hereinafter referred to as this "MOU") is made on this 27th October 2021, and shall be effective from 1st August, 2021 ("Effective Date").

BY AND BETWEEN

DR. REDDY'S LABORATORIES LIMITED, a public Limited Company incorporated under the Companies Act, 1956, represented by Mr. Saurav Kumar, Head HR-Global Manufacturing Operations, and having its registered office at 8-2-337, Road No. 3, Banjara Hills, Hyderabad- 500 034, (hereinafter referred to as "Dr. Reddy's" which expression shall unless repugnant to the context thereof means and includes its representatives, successors in interest and permitted assigns) of the One Part.

AND

VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY, a college instituted by Lavu Educational Society approved by AICTE, PCI and affiliated to JNTU, Kakinada having its campus at Besides VSEZ , Kapujaggraju peta, Duvvada, Visakhapatnam, Andhra Pradesh 530049 , represented by its Principal Mr. Y. Srinivasa Rao (hereinafter referred to as " Vignan") "the Said Institute" which expression shall unless contrary to the meaning and context thereof mean and include its successors, representatives and permitted assigns) of the Second Part.

Both the parties are hereinafter referred to as "Party" or collectively referred to as "Parties" wherever the context so requires.

WHEREAS:

A. Dr. Reddy's is engaged in the business of manufacturing and marketing of pharmaceutical products, for which purpose it has its manufacturing units located at different locations in Andhra Pradesh and Telangana;
B. The Said Institute is engaged in conducting various educational programs/courses both full-time and part time and also is engaged in tie-ups with corporate entities for imparting educational programs/courses;
C. Dr. Reddy's is desirous of deputing its employees for imparting Induction Training Programs (**"Induction Programme"**) conducted by the said Institute for its employees;
D. The Said Institute has agreed to design and deliver an Induction Program at its location (as detailed in **Annexure I**) for training the employees of Dr. Reddy's.

NOW THEREFORE, IN CONSIDERATION OF THE MUTUAL PROMISES AND COVENANTS HEREIN CONTAINED, THE PARTIES AGREE AS FOLLOWS:

1. **Program:**

1.1 The Said Institute has agreed for undertaking the entire responsibility of conducting the Induction Training Program and Dr. Reddy's has agreed to fund the same.

Y. Srinivasa Rao
PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Besides VSEZ, Duvvada, Visakhapatnam-49

VADLAPUDI, VSP-49

Y. Srinivasa Rao

1.2 This MOU is applicable to the Programs detailed in Annexure-A conducted by the Said Institute during **1st August 2021 — 31st December 2023**. In the event that Parties intend to extend the applicability of this MOU for further period the same shall be agreed expressly by Parties in writing.

1.3 Details of the Program:

1.3.1. The said Institute has agreed to conduct the Program more fully described in Annexure-A entirely by employing its resources and faculty.

1.3.2. The Program is a full time program for the employees of Dr. Reddy's (hereinafter referred to as the enrolled candidates) during stipulated period suggested by Dr. Reddy's, for a period of 45 actual working days.

1.3.3. The Program shall consist of interactive sessions, written exams conducted by the Said Institute, on all the week days (except Sundays, public holidays and political bandhs, if any).

1.3.4. The duration of each Program shall be 45 working days, at the end of which each successful enrolled candidate shall be awarded a certificate of completion by the Said Institute in the form of a certificate titled **"Certificate** in Pharma Process Technology".

1.3.5. Each Program shall have a maximum of 50 and not less than 25 participants per batch. Participants will be encouraged to work on group participation in practicals, during the course of the Program.

1.3.6. The Program shall be conducted at the Said Institute.

1.3.7. The time, date and schedule of sessions shall be provided by the Said Institute to Dr. Reddy's.

1.3.8. Students who do not have at least 75% attendance in any course, separately for theory and practical classes, will not be allowed to appear for the end-term certification / examination.

1.3.9. Students who do not secure the marks as prescribed by the Said Institute would have one chance to re-appear for the exams, if they would like to get certified by the program.

1.3.10. The said Institute shall appoint a senior academician to supervise with experience in training and research background to supervise and plan the Induction Training Programme, preferably the person who has taken keen and active interest in initiating this programme at your Institution, with prior approval from Dr. Reddy's.

2. Program Fee

2.1 Dr. Reddy's shall pay to the Said Institute the Fees for the proposed Program for every batch per student as follows:

(i) Tuition fees @ Rs.13,500/- per student for 60 working days

(ii) Food charges in campus on working days @85/- per day + Taxes extra

2.2 The above said fees is inclusive of course material and all other training expenses during the course of the Program.

2.3 There shall be no extra cost or expenses chargeable by the Said Institute other than the above mentioned fees in 2.1 & 2.2.

2.4 Post completion of the proposed Program for every batch, Dr. Reddy's shall pay the Fees within sixty (60) days of the date of submission of the correct, un-disputed invoice with complete supporting documents, if any.

2.5 Taxes and Duties: Liabilities under taxes (including Income Tax) and duties, to be provided by the Said Institute. Further if GST is levied for the services rendered under this Agreement, the same shall be payable by Dr. Reddy's.

Y. Srinivasa Rao

PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside: VSEZ, Duvvada, Visakhapatnam-530049

Y. Srinivasa Rao

IN WITNESS WHEREOF THE PARTIES HERETO HAVE AGREED TO SIGN THE MOU ON THE DAY NAMED FIRST ABOVE.

For and on behalf of
DR. REDDY'S LABORATORIES LIMITED

In the Presence of:

Kolli Srinivas Reddy

Name: Saurav Kumar.
Designation:

Tanushree Ghosh
Legal Counsel

For and on behalf of

In the Presence of:

VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY - LAVU EDUCATIONAL SOCIETY

DocuSigned by:
Srinivasa Rao Y
1A9E4F888B04407...
Srinivasa Rao Y

Dr Y Srinivasa Rao

Y. Srinivasa Rao

Y. Srinivasa Rao

PRINCIPAL
VIGNAN INSTITUTE OF
PHARMACEUTICAL TECHNOLOGY
Beside: VSEZ, Duvvada, Visakhapatnam-49

DocuSign

Certificate Of Completion

Envelope Id: 91AE8FA4DF57486E83FF07996C28E737
Status: Sent
Subject: 1000_2021_69001 - Request for e-Signatures for an agreement.
fcorgid: 00D360000018Rn3EAE
Source Envelope:
Document Pages: 15
Signatures: 1
Certificate Pages: 5
Initials: 14
AutoNav: Enabled
EnvelopeId Stamping: Enabled
Time Zone: (UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi

Envelope Originator:
Tanushree Ghosh
8-2-337, road no 3
Banjara hills
Hyderabad, Telangana 500034
tanushreeghosh@drreddys.com
IP Address: 13.110.14.8

Record Tracking

Status: Original
11-Nov-2021 | 02:13
Holder: Tanushree Ghosh
tanushreeghosh@drreddys.com
Location: DocuSign

Signer Events	Signature	Timestamp
Srinivasa Rao Y viptvizag@gmail.com Security Level: Email, Account Authentication (None)	DocuSigned by: Srinivasa Rao Y 1A9E4F888D04407... Y. Srinivasa Rao Signature Adoption: Pre-selected Style Using IP Address: 202.62.65.60	Sent: 11-Nov-2021 | 02:19 Viewed: 11-Nov-2021 | 09:09 Signed: 11-Nov-2021 | 14:36
Electronic Record and Signature Disclosure: Accepted: 11-Nov-2021 | 09:09 ID: 19bcbc21-15b9-4f03-b20e-fb812db0590b		
Tanushree Ghosh tanushreeghosh@drreddys.com Legal Counsel Dr. Reddy's Laboratories Ltd. Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign		Sent: 11-Nov-2021 | 14:36
Kolli Srinivas Reddy srinivasreddyk@drreddys.com Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign		
Saurav Kumar. sauravk@drreddys.com Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign		

In Person Signer Events	Signature	Timestamp
Editor Delivery Events	**Status**	**Timestamp**
Agent Delivery Events	**Status**	**Timestamp**

Y. Srinivasa Rao

PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside: VSEZ, Duvvada, Visakhapatnam-49

VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
VADLAPUDI, VSP-49

Memorandum of Understanding (MOU)
Between

ZAINT HEALTH CARE PRIVATE LIMITED

and

VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY

This Agreement made by this 10th day of July, 2021, between Zaint Health Care Private Limited located in Hyderabad and Vignan Institute of Pharmaceutical Technology, Duvvada, Visakhapatnam.

Objective of the MOU

The objective of this Memorandum of Understanding (MOU) is:

- To promote the interaction between **ZAINT Health Care Private Limited** and **VIPT** which is mutually beneficial in the area of research and student training

Proposed Mode of Collaboration

- Sponsoring student projects, Internship and Industrial visits
  Sponsoring R& D projects, this may be carried out wholly or partly at **VIPT** or **ZAINT Health Care Private Limited**

Forms of Research and Development Programs

- In their own existing facilities. The performance of research individually by each party or concurrently with both parties in mixed groups at their own facilities.

Agreements for Research Collaboration

- The nature, scope and schedule of the Research collaboration.
- The form of research collaboration.
- The sponsoring of the research fund.

Signed In Duplicate

- This MOU is executed in duplicate with each copy being an official version of the Agreement
- By signing below, the parties acting by their duly authorized officers have caused this memorandum of understanding to be executed effective as of the day and year first above written. The agreement is valid for a period of one year.

Mr. Malyadri Somineni
Director
Zaint Health Care Private Limited,
Sy No: 228/E/B, Kucharam Village,
Medak District,
Hyderabad-502336, TG

10/07/21

Dr. Y. Srinivasa Rao
Principal
Vignan Institute of Pharmaceutical Technology
Beside VSEZ, Duvvada,
Visakhapatnam-530049, AP

PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside: VSEZ, Duvvada, Visakhapatnam-46

ACTIMUS BIO

Memorandum of Understanding (MOU)
Between

ACTIMUS BIOSCIENCES Private Limited

and

VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY

This Agreement made by this 24th day of June, 2021, between Actimus Biosciences Private Limited located at Siripuram, Visakhapatnam and Vignan Institute of Pharmaceutical Technology, Duvvada, Visakhapatnam.

Objective of the MOU

The objective of this Memorandum of Understanding (MOU) is:

- To promote the interaction between **ACTIMUS BIO** and **VIPT** which is mutually beneficial in the area of research and student training

Proposed Mode of Collaboration

- Sponsoring student projects, Internship and Industrial visits
  Sponsoring R& D projects, this may be carried out wholly or partly at **VIPT** or **ACTIMUS BIO**

Forms of Research and Development Programs

- In their own existing facilities. The performance of research individually by each party or concurrently with both parties in mixed groups at their own facilities.

Agreements for Research Collaboration

- The nature, scope and schedule of the Research collaboration.
- The form of research collaboration.
- The sponsoring of the research fund.

Signed In Duplicate

- This MOU is executed in duplicate with each copy being an official version of the Agreement
- By signing below, the parties acting by their duly authorized officers have caused this memorandum of understanding to be executed effective as of the day and year first above written. The agreement is valid for a period of two years.

Ramnath Reddy

Mr. A. Ramnath Reddy
Chairman and Managing Director
Actimus Biosciences Pvt Ltd
Varun Towers, 4th Floor,
Siripuram
Visakhapatnam-530003, AP

Y. Srinivasa Rao
24/06/21

Dr. Y. Srinivasa Rao
Principal
Vignan Institute of
Pharmaceutical Technology
Beside VSEZ, Duvvada,
Visakhapatnam-530049, AP

Y. Srinivasa Rao

PRINCIPAL
VIGNAN INSTITUTE OF
PHARMACEUTICAL TECHNOLOGY
Beside VSEZ, Duvvada, Visakhapatnam-49

Memorandum of Understanding (MOU)
Between

LEE PHARMA LIMITED
and
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY

This Agreement made by this 22nd June 2021, between Lee Pharma Pharma Limited, Duvvada, Visakhapatnam and Vignan Institute of Pharmaceutical Technology, Duvvada, Visakhapatnam.

Objective of the MOU

The objective of this Memorandum of Understanding (MOU) is:

- To promote the interaction between **Lee Pharma** and **VIPT** which is mutually beneficial in the area of research and student training

Proposed Mode of Collaboration

- Sponsoring student projects, Internship and Industrial visits
  Sponsoring R& D projects, this may be carried out wholly or partly at **VIPT** or **Lee Pharma**

Forms of Research and Development Programs

- In their own existing facilities. The performance of research individually by each party or concurrently with both parties in mixed groups at their own facilities.

Agreements for Research Collaboration

- The nature, scope and schedule of the Research collaboration.
- The form of research collaboration.
- The sponsoring of the research fund.

Signed In Duplicate

- This MOU is executed in duplicate with each copy being an official version of the Agreement
- By signing below, the parties acting by their duly authorized officers have caused this memorandum of understanding to be executed effective as of the day and year first above written.
- The agreement is valid for a period of two years.

T. Praveen Reddy

Mr.T.Praveen Reddy
Director-Operations
Lee Pharma Limited
Plot No: V, Phase II,
VSEZ, Duvvada,
Visakhapatnam, Andhra Pradesh
530049

Y. Srinivasa Rao 22/06/21

Dr.Y.Srinivasa Rao
Principal
Vignan Institute of
Pharmaceutical Technology
Beside VSEZ, Duvvada,
Visakhapatnam, Andhra Pradesh
530049

PRINCIPAL
VIGNAN INSTITUTE OF
PHARMACEUTICAL TECHNOLOGY
VSEZ, Duvvada, Visakhapatnam-49

JCI
Gajuwaka Gems

Memorandum of Understanding (MOU)
Between
JCI Gajuwaka Gems
and
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY

This Agreement made by this 2nd March 2021, between, **JCI Gajuwaka Gems (International NGO)** Gajuwaka, Visakhapatnam and **Vignan Institute of Pharmaceutical Technology (VIPT)**, Duvvada, Visakhapatnam..

Objective of the MOU

The objective of this Memorandum of Understanding (MOU) is:

- To provide development opportunities that empowers young people to create positive change.

Proposed Mode of Collaboration

- Training activities will be conducted to the students
- A platform for service based activities is provided for the interested students
- Students will be given platform to exhibit their ideas and mould them as entrepreneurs
- Students can be made a part of Extension Activities
- Student Members will be supported from the Institute
- Students will be trained and encouraged in various skills related to personality development, Extra- Curricular activities, Career Development, etc.

Areas of Opportunities

1. Training 2. Management 3. Group Discussion 4. Business 5. Programmes

Agreements for Collaboration

- Students have to enrol as members of **JCI Gajuwaka Gems by paying annual membership fee** to the National Head Quarters
- Students will be provided **training and other afore mentioned services** from JCI Gajuwaka Gems

Signed in Duplicate

- This MOU is executed in duplicate with each copy being an official version of the Agreement
- By signing below, the parties acting by their duly authorized officers have caused this memorandum of understanding to be executed effective as of the day and year first above written.
- The agreement is valid for a period of two years.

JFM Dr K G B Santhosh Kumari
President –JCI Gajuwaka Gems

Y. Srinivasa Rao 02/03/21

Dr. Y. Srinivasa Rao
Principal-VIPT

Y. Srinivasa Rao
PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside: VSEZ, Duvvada, Visakhapatnam-49

SANTHI BIOTECH

Block B , Sy no 56/ 11 to 14 , Chelavuru-535005,Vizianagaram Andhra Pradesh

Memorandum of Understanding (MOU)
Between

SANTHI BIOTECH

and

VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY

This Agreement made by this 25th day of Feb, 2021, between Santhi Biotech, Vizianagaram and Vignan Institute of Pharmaceutical Technology, Duvvada, Visakhapatnam.

Objective of the MOU

The objective of this Memorandum of Understanding (MOU) is:

- To promote the interaction between **Santhi Biotech** and **VIPT** which is mutually beneficial in the area of research and student training

Proposed Mode of Collaboration

- Sponsoring student projects, Internship and Industrial visits
  Sponsoring R& D projects, this may be carried out wholly or partly at **VIPT** or **Santhi Biotech**

Forms of Research and Development Programs

- In their own existing facilities. The performance of research individually by each party or concurrently with both parties in mixed groups at their own facilities.

Agreements for Research Collaboration

- The nature, scope and schedule of the Research collaboration.
- The form of research collaboration.
- The sponsoring of the research fund.

Signed In Duplicate

- This MOU is executed in duplicate with each copy being an official version of the Agreement
- By signing below, the parties acting by their duly authorized officers have caused this memorandum of understanding to be executed effective as of the day and year first above written. The agreement is valid for a period of two years.

G. Santhi

SANTHI BIOTECH VIZIANAGARAM, A.P.

Mrs.G.Santhi
Director
Santhi Biotech
Block B, Sy No 56/11 to 14
Cheluvuru
Vizianagaram-535005, AP

Y. Srinivasa Rao
25/02/21

Dr. Y. Srinivasa Rao
Principal
Vignan Institute of
Pharmaceutical Technology
Beside VSEZ, Duvvada,
Visakhapatnam-530049, AP

Y. Srinivasa Rao

PRINCIPAL
VIGNAN INSTITUTE OF
PHARMACEUTICAL TECHNOLOGY
Beside: VSEZ, Duvvada, Visakhapatnam-49

INSTITUTE OF PHARMACEUTICAL TECHNOLOGY VISAKHAPATNAM

HOMI BHABHA CANCER HOSPITAL & RESEARCH CENTRE
A CENTRE FOR TREATMENT, RESEARCH & EDUCATION IN CANCER
A Unit of Tata Cancer Hospital, Mumbai
(A Grants-in-Aid Institution, Department of Atomic Energy, Government of India)

Prof. D. Raghunadharao, MD, DM
Director

Memorandum of Understanding (MOU)
Between

HOMI BHABHA CANCER HOSPITAL AND RESEARCH CENTRE
and
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY

This Agreement made by this 17th September 2020, between, **Homi Bhabha Cancer Hospital and Research Centre (HBCH&RC)**, Aganampudi, Visakhapatnam and **Vignan Institute of Pharmaceutical Technology (VIPT)**, Duvvada, Visakhapatnam.

Objective of the MOU

The objective of this Memorandum of Understanding (MOU) is:

- To promote the interaction between **HBCH&RC** and **VIPT** which is mutually beneficial in the area of research and student training

Proposed Mode of Collaboration

- Sponsoring student projects, Internship and Industrial visits
- Sponsoring R& D projects, this may be carried out wholly or partly at **VIPT** or **HBCH&RC**

Forms of Research and Development Programs

- In their own existing facilities. The performance of research individually by each party or concurrently with both parties in mixed groups at their own facilities.

Agreements for Research Collaboration

- The nature, scope and schedule of the Research collaboration.
- The form of research collaboration.
- The sponsoring of the research fund.

Signed In Duplicate

- This MOU is executed in duplicate with each copy being an official version of the Agreement
- By signing below, the parties acting by their duly authorized officers have caused this memorandum of understanding to be executed effective as of the day and year first above written.
- The agreement is valid for a period of two years.

Prof. D.Raghunadharao
Director
HOMI BHABHA CANCER HOSPITAL
& RESEARCH CENTRE
Aganampudi,
Visakhapatnam,-530053
Andhra Pradesh

Y. Srinivasa Rao 17/09/20

Dr.Y.Srinivasa Rao
Principal
VIGNAN INSTITUTE OF
PHARMACEUTICAL TECHNOLOGY
Beside VSEZ, Duvvada,
Visakhapatnam,-530049
Andhra Pradesh

Y. Srinivasa Rao
PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside VSEZ, Duvvada, Visakhapatnam-49

COSTARICA PHARMACEUTICALS
One stop for quality
Plot No:171/C, Western Hills, Addagutta Society, Near Vijetha Degree College, Opp.JNTU, Kukatpally,Hyderabad TG 500072 www.costaricapharma.com info@costaricapharma.com

Memorandum of Understanding (MOU)
Between

COSTARICA PHARMACEUTICALS
and
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY

This Agreement made by this 4th day of September, 2020, between Costarica Pharmaceuticals located in Hyderabad and Vignan Institute of Pharmaceutical Technology, Duvvada, Visakhapatnam.

Objective of the MOU

The objective of this Memorandum of Understanding (MOU) is:

- To promote the interaction between **COSTARICA PHARMACEUTICALS** and **VIPT** which is mutually beneficial in the area of research and student training

Proposed Mode of Collaboration

- Sponsoring student projects, Internship and Industrial visits
  Sponsoring R& D projects, this may be carried out wholly or partly at **VIPT** or **COSTARICA**

Forms of Research and Development Programs

- In their own existing facilities. The performance of research individually by each party or concurrently with both parties in mixed groups at their own facilities.

Agreements for Research Collaboration

- The nature, scope and schedule of the Research collaboration.
- The form of research collaboration.
- The sponsoring of the research fund.

Signed In Duplicate

- This MOU is executed in duplicate with each copy being an official version of the Agreement
- By signing below, the parties acting by their duly authorized officers have caused this memorandum of understanding to be executed effective as of the day and year first above written. The agreement is valid for a period of two years.

A. Venkata Ramesh

Mr. A. Venkata Ramesh
Proprietor
Costarica Pharmaceuticals,
Plot No: 171/C, Opp. JNTU,
Kukatpally
Hyderabad-500072, Telangana

Y. Srinivasa Rao 04/09/20

Dr. Y. Srinivasa Rao
Principal
Vignan Institute of Pharmaceutical Technology
Beside VSEZ, Duvvada,
Visakhapatnam-530049, AP

Y. Srinivasa Rao

PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside: VSEZ, Duvvada, Visakhapatnam-49

PHARMACON SOCIETY FOR PHARMACY PRACTICE

Committed to Excellence in Pharmaceutical Care

VIGNAN

INSTITUTE OF PHARMACEUTICAL TECHNOLOGY

(Approved By AICTE, PCI New Delhi & Affiliated to JNTUK - Kakinada)

An ISO 9001:2015, ISO 14001:2015 & OHSAS 18001:2007 Certified Institution

Agreement of collaboration

Pharmacon Society for Pharmcy Practice (PSPP)

is proud to collaborate with

Vignan Institute of Pharmaceutical Technology, Vizag

Objectives of collaboration:

1. Augmenting the students learning with experts from industry.
2. Connect the students to Advisors, Coordinators and Mentors of PSPP from India, USA, Canada, Australia, Middle East, Ireland, UK, South Africa and Sweden.
3. Do interactive sessions and career awareness programs for students free of cost.
4. Offer guidance in doing Clerkship and Academic project effectively.
5. Offer guidance in implementation of Clinical Pharmacy Services during Internship.
6. Offer modules in Clinical Pharmacy, Clinical Research, Pharmacovigilance, Medical Writing, Clinical Data Management, Antimicrobial Stewardship, Medical Affairs and Research Methodologies for interested students at least possible cost.
7. Take up collaborative research projects.
8. Mentor Students in crafting successful career.

Collaboration will be valid for a period of 1 year from the date of confirmation i.e., 03-09-2020. It can be extended after a year with mutual agreement.

Dr. Karthik Rakam, Pharm. D
President
Pharmacon Society for Pharmacy Practice

Dr. Y. Srinivasa Rao
Principal
Vignan Institute of Pharmaceutical Technology

03/09/20

Pharmacon Society for Pharmacy Practice (PSPP) is a society registered under Telangana Societies registration act 2001 with registration number 1586 of 2017.

Vignan Institute of Pharmaceutical Technology (VIPT) is one of the constituent colleges of Vignan Institutions well known for quality education with GLOBAL STANDARDS AND INDIAN VALUES. VIPT was established in 2006 with a view to provide job oriented professional courses in Pharmacy. VIPT offers B.Pharm., M.Pharm., Pharm.D. programmes.

PRINCIPAL OF VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY Beside: VSEZ, Duvvada, Visakhapatnam-49

Enanti Labs Pvt. Ltd.

An **ISO 9001:2015** and **ISO 14001:2015** Certified company.
Works : Plot No. 60 D, JN Pharmacity, Parawada (Mdl), Visakhapatnam - 531 019
Tel: 08924-236080, 236084

Memorandum of Understanding (MOU)

Between

VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
and
ENANTI LABS PVT.LTD

This Agreement made on 24th August 2020, between Enanti Labs Pvt.Ltd located at Visakhapatnam, and Vignan Institute of Pharmaceutical Technology, Duvvada, Visakhapatnam.

Objective of the MOU

The objective of this Memorandum of Understanding (MOU) is:

To promote the interaction between **Enanti Labs Pvt.Ltd** and **VIPT** is mutually beneficial area of basic research.

Proposed Mode of Collaboration

- Sponsoring student projects.

  Sponsoring R& D projects, this may be carried out wholly or partly at **VIPT** or **Enanti Labs Pvt.Ltd**

Forms of Research and Development Programs

- In their own existing facilities — The performance of research individually by each party or concurrently with both parties in mixed groups at their own facilities.

Agreements for Research Collaboration

- The nature, scope and schedule of the Research collaboration.
- The form of research collaboration.
- The sponsoring of the research fund

Signed In Duplicate

- This MOU is executed in duplicate with each copy being an official version of the Agreement
- By signing below, the parties acting by their duly authorized officers have caused this memorandum of understanding to be executed effective as of the day and year first above written.

Y. Srinivasa Rao

Dr. Y.Srinivasa Rao
Principal
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside VSEZ, Duvvada,
Visakhapatnam, Andhra Pradesh 530046

M Chandra Sekhara Reddi

Dr. M.Chandra Sekhara Reddi
Director
ENANTI LABS PVT LTD
Plot No.60D,
JN Pharmacity, Thanam(Vill)
Visakhapatnam, Andhra Pradesh 531019

Y. Srinivasa Rao

PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside VSEZ, Duvvada, Visakhapatnam-45

ISO 9001 : 2015

Synpure Labs India Pvt. Ltd.
An ISO 9001:2015 Certified Company

Memorandum of Understanding (MOU)
Between

Synpure Labs India Pvt. Ltd.,

and

Vignan Institute of Pharmaceutical Technology

This Agreement made by this 24th August 2020, between Synpure Labs India Pvt.Ltd. located at Pydibhimavaram (V), Srikakulam dist. and Vignan Institute of Pharmaceutical Technology, Duvvada, Visakhapatnam.

Objective of the MOU

The objective of this Memorandum of Understanding (MOU) is:

To promote the interaction between Synpure Labs India Pvt. Ltd. and **VIPT** is mutually beneficial area of basic research.

Proposed Mode of Collaboration

- Assisting student projects.
- Assisting R& D projects, this may be carried out wholly or partly at **VIPT** or Synpure Labs India Pvt.Ltd.
- On-the -job training, Skill Development & Internships for Students.

Forms of Research and Development Programs

- In their own existing facilities — The performance of research individually by each party or concurrently with both parties in mixed groups at their own facilities.

Agreements for Research Collaboration

- The nature, scope and schedule of the Research collaboration.
- The form of research collaboration.

Signed In Duplicate

- This MOU is executed in duplicate with each copy being an official version of the Agreement.
- By signing below, the parties acting by their duly authorized officers have caused this memorandum of understanding to be executed effective as of the day and year first above written with Validity of 5 Years.

24/08/20

Mr. U.B.Narayana
General Manager,
Synpure Labs India Pvt.Ltd.,
Plot no:45, IDA, Pydhihimavaram,,
Ranasthalam mandal, Srikakulam (Dist.)
Andhra Pradesh 532409

Dr. Y. Srinivasa Rao
Principal
Vignan Institute of
Pharmaceutical Technology
Beside VSEZ, Duvvada,
Visakhapatnam, A.P. 530046

PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside VSEZ, Duvvada, Visakhapatnam

VEDAS PHARMA

Memorandum of Understanding (MoU)
between

VEDAS PHARMA
and
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY

This Agreement made by this 20th August 2020, between Vedas Pharma, Vizianagaram, and Vignan Institute of Pharmaceutical Technology, Duvvada, Visakhapatnam.

Objective of the MoU

The objective of this Memorandum of Understanding (MoU) is:

- To promote the interaction between **Vedas Pharma** and **VIPT** which is mutually beneficial in the area of research and student training

Proposed Mode of Collaboration

- Sponsoring student projects, Internship and Industrial visits
- Sponsoring R& D projects, this may be carried out wholly or partly at **VIPT** or **Vedas Pharma**

Forms of Research and Development Programs

- In their own existing facilities. The performance of research individually by each party or concurrently with both parties in mixed groups at their own facilities.

Agreements for Research Collaboration

- The nature, scope and schedule of the Research collaboration.
- The form of research collaboration.
- The sponsoring of the research fund.

Signed in Duplicate

- This MoU is executed in duplicate with each copy being an official version of the Agreement
- By signing below, the parties acting by their duly authorized officers have caused this memorandum of understanding to be executed effective as of the day and year first above written. The agreement is valid for a period of two years.

V S Prasad

Mr.V.Srikar Prasad
Director
Vedas Pharma
Survey No: 56/11,
Cheluvuru
Vizianagaram, Andhra Pradesh 535005

VEDAS PHARMA * ORE (POST) A.P. *

Y. Srinivasa Rao
20/08/20

Dr.Y.Srinivasa Rao
Principal
Vignan Institute of Pharmaceutical Technology
Beside VSEZ, Duvvada,
Visakhapatnam, Andhra Pradesh 530049

VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY * VADLAPUDI, VSKP-49 *

Y. Srinivasa Rao

PRINCIPAL
VIGNAN INSTITUTE OF
PHARMACEUTICAL TECHNOLOGY
Beside: VSEZ, Duvvada, Visakhapatnam-49

Memorandum of Understanding (MOU)
Between

APOGEN REMEDIES PVT.LTD

and

VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY

This Agreement made by this 20th August 2020, between **Apogen Remedies Pvt.Ltd** Located at Hyderabad, Telangana, and Vignan Institute of Pharmaceutical Technology, Duvvada, Visakhapatnam.

Objective of the MOU

The objective of this Memorandum of Understanding (MOU) is:

To promote the interaction between **APOGEN REMEDIES PVT.LTD** and **VIPT** is mutually beneficial area of basic research.

Proposed Mode of Collaboration

- Sponsoring student projects.

  Sponsoring R& D projects, this may be carried out wholly or partly at **VIPT** or **APOGEN REMEDIES PVT.LTD**

Forms of Research and Development Programs

- In their own existing facilities — The performance of research individually by each party or concurrently with both parties in mixed groups at their own facilities.

Agreements for Research Collaboration

- The nature, scope and schedule of the Research collaboration.
- The form of research collaboration.
- The sponsoring of the research fund

Signed In Duplicate

- This MOU is executed in duplicate with each copy being an official version of the Agreement
- By signing below, the parties acting by their duly authorized officers have caused this memorandum of understanding to be executed effective as of the day and year first above written with validity of 5 Years.

Dr.K. Bhanu Prasad
Director
APOGEN REMEDIES PVT.LTD
12-7/133/G/2,
Anjaneya Nagar, Moosapet
Hyderabad, Telangana 500018

Dr. Y. Srinivasa Rao
Principal
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
beside VSEZ, Duvvada,
Visakhapatnam, Andhra Pradesh 530046

PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside: VSEZ, Duvvada, Visakhapatnam-49

IJPSR (2021), Volume 12, Issue 4 **(Research Article)**

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 29 December 2019; received in revised form, 26 February 2021; accepted, 18 March 2021; published 01 April 2021

ANTI-DIABETIC EFFECT OF LEAF AND STEM EXTRACT OF *MACROTYLOMA UNIFLORUM* (LAM.) VERDC IN ALLOXAN INDUCED DIABETIC RATS

Galanki Vasantha *[1], A. Venkatesham [2] and C. H. Dayakar [3]

Vignan Institute of Pharmaceutical Technology [1], Visakhapatnam - 530049, Andhra Pradesh, India.
Department of Pharmacology and clinical pharmacy [2], SVS Group of institutions, School of Pharmacy, Bheemaram, Warangal - 506015, Telangana, India.
Department of Pharmacognosy [3], Dhanvanthari Institute of Pharmaceutical Sciences, Sujathanagar, Khammam - 507101, Telangana, India.

Keywords:

Macrotyloma uniflorum, Diabetes, Alloxan, Antioxidant activity

Correspondence to Author:
Galanki Vasantha

Assistant Professor,
Vignan Institute of Pharmaceutical Technology, Visakhapatnam - 530049, Andhra Pradesh, India.

E-mail: vasanthagrace10@gmail.com

ABSTRACT: Diabetes mellitus (DM) is a metabolic disorder in the endocrine system resulting from a defect in insulin secretion, insulin action or both of them. Adverse side effects of chemical drugs for the treatment of diabetes persuaded the use of medical plants. *Macrotyloma uniflorum* is a traditionally used plant for the treatment of diabetes is packed with powerful plant constituents with polyphenols, flavonoids, and proteins. They are one of the richest antioxidant sources, which lower blood sugar and bear other beneficial health effects. The purpose of this study is to evaluate the effect of ethanolic extract of *Macrotyloma uniflorum* leaves and stem (EMULS) on Alloxan-induced diabetic rats. In this study 36 Male Sprague Dawley rats, the body weight of 150-200 g was divided into 5 groups. Diabetes was induced by intraperitoneal injection of 150 mg/kg Alloxan. The *Macrotyloma uniflorum* treatment duration was 30 days in which two doses of extract (200 mg/kg & 400 mg/kg) were orally administered to diabetic rats. Blood glucose levels were estimated with glucometer before treatment, 2 h and 1-4 weeks after administration of extracts. Treatment with extracts of the *Macrotyloma uniflorum* resulted in a significant reduction in blood glucose. Extract of this plant is useful in controlling the blood glucose level. *Macrotyloma uniflorum* appears to aid in diabetes control and diminution of the complications of the disease.

INTRODUCTION: Diabetes mellitus (DM) is a metabolic disorder resulting from a defect in insulin secretion, insulin action, or both [1, 3]. Insulin deficiency in turn, leads to chronic hyperglycemia with disturbances of carbohydrate, fat, and protein metabolism [1, 2].

As the disease progresses, tissue or vascular damage ensures leading to severe diabetic complications such as retinopathy, neuropathy, nephropathy, cardiovascular complications, and ulceration. Thus, diabetes covers a wide range of heterogeneous diseases [2].

Hyperglycemia is an important factor in the development and progression of the complications of diabetes mellitus. In diabetic rats, the utilization of impaired carbohydrates leads to accelerated lipolysis resulted in hyperlipidemia. Despite the presence of known Anti-diabetic medicines in the pharmaceutical market, diabetes and the related

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.12(4).2428-37

This article can be accessed online on www.ijpsr.com

DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.12(4).2428-37

IJPSR (2021), Volume 12, Issue 4 (Research Article)

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 29 December 2019; received in revised form, 26 February 2021; accepted, 18 March 2021; published 01 April 2021

ANTI-DIABETIC EFFECT OF LEAF AND STEM EXTRACT OF *MACROTYLOMA UNIFLORUM* (LAM.) VERDC IN ALLOXAN INDUCED DIABETIC RATS

Galanki Vasantha [*1], A. Venkatesham [2] and C. H. Dayakar [3]

Vignan Institute of Pharmaceutical Technology [1], Visakhapatnam - 530049, Andhra Pradesh, India.
Department of Pharmacology and clinical pharmacy [2], SVS Group of institutions, School of Pharmacy, Bheemaram, Warangal - 506015, Telangana, India.
Department of Pharmacognosy [3], Dhanvanthari Institute of Pharmaceutical Sciences, Sujathanagar, Khammam - 507101, Telangana, India.

Keywords:

Macrotyloma uniflorum, Diabetes, Alloxan, Antioxidant activity

Correspondence to Author:
Galanki Vasantha

Assistant Professor,
Vignan Institute of Pharmaceutical Technology, Visakhapatnam - 530049, Andhra Pradesh, India.

E-mail: vasanthagrace10@gmail.com

ABSTRACT: Diabetes mellitus (DM) is a metabolic disorder in the endocrine system resulting from a defect in insulin secretion, insulin action or both of them. Adverse side effects of chemical drugs for the treatment of diabetes persuaded the use of medical plants. *Macrotyloma uniflorum* is a traditionally used plant for the treatment of diabetes is packed with powerful plant constituents with polyphenols, flavonoids, and proteins. They are one of the richest antioxidant sources, which lower blood sugar and bear other beneficial health effects. The purpose of this study is to evaluate the effect of ethanolic extract of *Macrotyloma uniflorum* leaves and stem (EMULS) on Alloxan-induced diabetic rats. In this study 36 Male Sprague Dawley rats, the body weight of 150-200 g was divided into 5 groups. Diabetes was induced by intraperitoneal injection of 150 mg/kg Alloxan. The *Macrotyloma uniflorum* treatment duration was 30 days in which two doses of extract (200 mg/kg & 400 mg/kg) were orally administered to diabetic rats. Blood glucose levels were estimated with glucometer before treatment, 2 h and 1-4 weeks after administration of extracts. Treatment with extracts of the *Macrotyloma uniflorum* resulted in a significant reduction in blood glucose. Extract of this plant is useful in controlling the blood glucose level. *Macrotyloma uniflorum* appears to aid in diabetes control and diminution of the complications of the disease.

INTRODUCTION: Diabetes mellitus (DM) is a metabolic disorder resulting from a defect in insulin secretion, insulin action, or both [1, 3]. Insulin deficiency in turn, leads to chronic hyperglycemia with disturbances of carbohydrate, fat, and protein metabolism [1, 2].

As the disease progresses, tissue or vascular damage ensures leading to severe diabetic complications such as retinopathy, neuropathy, nephropathy, cardiovascular complications, and ulceration. Thus, diabetes covers a wide range of heterogeneous diseases [2].

Hyperglycemia is an important factor in the development and progression of the complications of diabetes mellitus. In diabetic rats, the utilization of impaired carbohydrates leads to accelerated lipolysis resulted in hyperlipidemia. Despite the presence of known Anti-diabetic medicines in the pharmaceutical market, diabetes and the related

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.12(4).2428-37

This article can be accessed online on www.ijpsr.com

DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.12(4).2428-37

ejpmr, 2021,8(5), 369-377

SJIF Impact Factor 6.22

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

COMPREHENSIVE QSAR ANALYSIS AND COMPUTER ASSISTED MECHANISM STUDY OF CINNAMIC ACIDS AS POTENT ANTITUBERCULAR AGENTS

Jainendra Kumar B.[a], Suresh K.[b], Umarani W. A.[c], Sony Priya K.[c], Purna Nagasree K.[d] and Murali Krishna Kumar M.[c]*

[a]School of Pharmacy, Anurag Group of Institutions, Hyderabad, Telangana – 500088, India.
[b]Department of Microbiology, Gitam Institute of Science, Gitam (deemed to be university), Visakhapatnam – 530045.
[c]Pharmaceutical Chemistry Research Labs, AU College of Pharmaceutical Sciences, Andhra University, Visakhapatnam- Andhra Pradesh – 530003, India.
[d]Vignan Institute of Pharmaceutical Technology, Duvvada, Visakhapatnam, Andhra Pradesh – 530046, India.

***Corresponding Author: Dr. Murali Krishna Kumar M.**
Pharmaceutical Chemistry Research Labs, AU College of Pharmaceutical Sciences, Andhra University, Visakhapatnam- Andhra Pradesh – 530003, India.

Article Received on 02/03/2021 **Article Revised on 21/03/2021** **Article Accepted on 11/04/2021**

ABSTRACT

Cinnamic acids are one of the oldest class of natural products known to mankind. Along with varied bioactivities, these compounds are also known to possess antimicrobial activity. As these compounds possess αβ unsaturated carboxylic acid system similar to intermediates formed in fatty acid biosynthesis, it is hypothesized to interfere with enzymes involved in fatty acid biosynthesis. But there is no report of cinnamic acids interfering with the enzyme complex involved in human fatty acid biosynthesis (FAS-I), probably due to steric hindrance offered by the phenyl unit. But in case of *Mycobacterium tuberculosis*, very long chain fatty acids (mycolic acids) are biosynthesized by enzymes of FAS-II pathway. These enzymes are dissociated and relatively liberal in allowing larger substrates to participate in enzyme activity. Hence, we made an attempt to prepare and screen cinnamic acids for anti TB activity using MABA method and cell viability assays. Further we did a thorough docking simulation study on enzymes involve in FAS-II pathway with cinnamic acids. We found surprisingly high potency for the synthesized cinnamic acids (MIC 1.6 µg/mL). We also found the docking scores completely in agreement with our hypothesis of FAS-II enzyme inhibition as main mechanism of action. The bioactivity and SAR are discussed in detail.

KEYWORDS: Cinnamic acids, FAS-II inhibition, anti TB, *Mycobacterium tuberculosis.*

INTRODUCTION

Cell wall disruption remained in the forefront of antimicrobial drug discovery. More than 50% of antibiotics including betalactams, used clinically acts via inhibiting cell wall biosynthesis. *Mycobacterium tuberculosis*, the causative organism for tuberculosis, is a bacillus shielded by a unique thick lipid-rich cell wall.[1] The cellular envelope (Figure 1) is composed of peptidoglycan (PG), arabinogalactan (AG), and mycolic acids (MAs, long fatty acids i.e. C60-C90) and a lipopolysaccharide, lipoarabinomannan (LAM).[2,3]

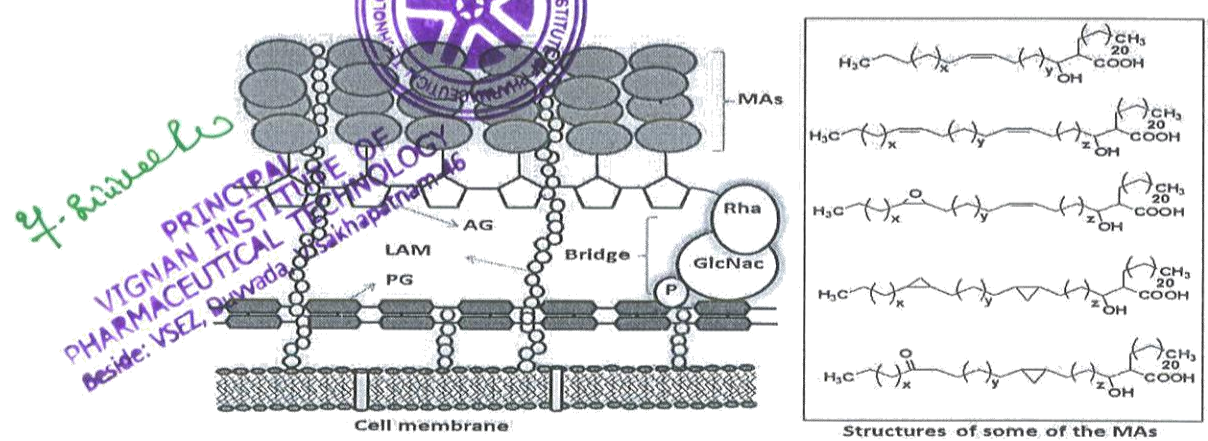

Figure 1: Cell envelope of *M. tuberculosis* with structural components.

ejpmr, 2021,8(5), 369-377

SJIF Impact Factor 6.22

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

COMPREHENSIVE QSAR ANALYSIS AND COMPUTER ASSISTED MECHANISM STUDY OF CINNAMIC ACIDS AS POTENT ANTITUBERCULAR AGENTS

Jainendra Kumar B.[a], Suresh K.[b], Umarani W. A.[c], Sony Priya K.[c], Purna Nagasree K.[d] and Murali Krishna Kumar M.[c]*

[a]School of Pharmacy, Anurag Group of Institutions, Hyderabad, Telangana – 500088, India.
[b]Department of Microbiology, Gitam Institute of Science, Gitam (deemed to be university), Visakhapatnam – 530045.
[c]Pharmaceutical Chemistry Research Labs, AU College of Pharmaceutical Sciences, Andhra University, Visakhapatnam- Andhra Pradesh – 530003, India.
[d]Vignan Institute of Pharmaceutical Technology, Duvvada, Visakhapatnam, Andhra Pradesh – 530046, India.

***Corresponding Author: Dr. Murali Krishna Kumar M.**
Pharmaceutical Chemistry Research Labs, AU College of Pharmaceutical Sciences, Andhra University, Visakhapatnam- Andhra Pradesh – 530003, India.

Article Received on 02/03/2021 **Article Revised on 21/03/2021** **Article Accepted on 11/04/2021**

ABSTRACT

Cinnamic acids are one of the oldest class of natural products known to mankind. Along with varied bioactivities, these compounds are also known to possess antimicrobial activity. As these compounds possess αβ unsaturated carboxylic acid system similar to intermediates formed in fatty acid biosynthesis, it is hypothesized to interfere with enzymes involved in fatty acid biosynthesis. But there is no report of cinnamic acids interfering with the enzyme complex involved in human fatty acid biosynthesis (FAS-I), probably due to steric hindrance offered by the phenyl unit. But in case of *Mycobacterium tuberculosis*, very long chain fatty acids (mycolic acids) are biosynthesized by enzymes of FAS-II pathway. These enzymes are dissociated and relatively liberal in allowing larger substrates to participate in enzyme activity. Hence, we made an attempt to prepare and screen cinnamic acids for anti TB activity using MABA method and cell viability assays. Further we did a thorough docking simulation study on enzymes involve in FAS-II pathway with cinnamic acids. We found surprisingly high potency for the synthesized cinnamic acids (MIC 1.6 µg/mL). We also found the docking scores completely in agreement with our hypothesis of FAS-II enzyme inhibition as main mechanism of action. The bioactivity and SAR are discussed in detail.

KEYWORDS: Cinnamic acids, FAS-II inhibition, anti TB, *Mycobacterium tuberculosis.*

INTRODUCTION

Cell wall disruption remained in the forefront of antimicrobial drug discovery. More than 50% of antibiotics including betalactams, used clinically acts via inhibiting cell wall biosynthesis. *Mycobacterium tuberculosis*, the causative organism for tuberculosis, is a bacillus shielded by a unique thick lipid-rich cell wall.[1] The cellular envelope (Figure 1) is composed of peptidoglycan (PG), arabinogalactan (AG), and mycolic acids (MAs, long fatty acids i.e. C60-C90) and a lipopolysaccharide, lipoarabinomannan (LAM).[2,3]

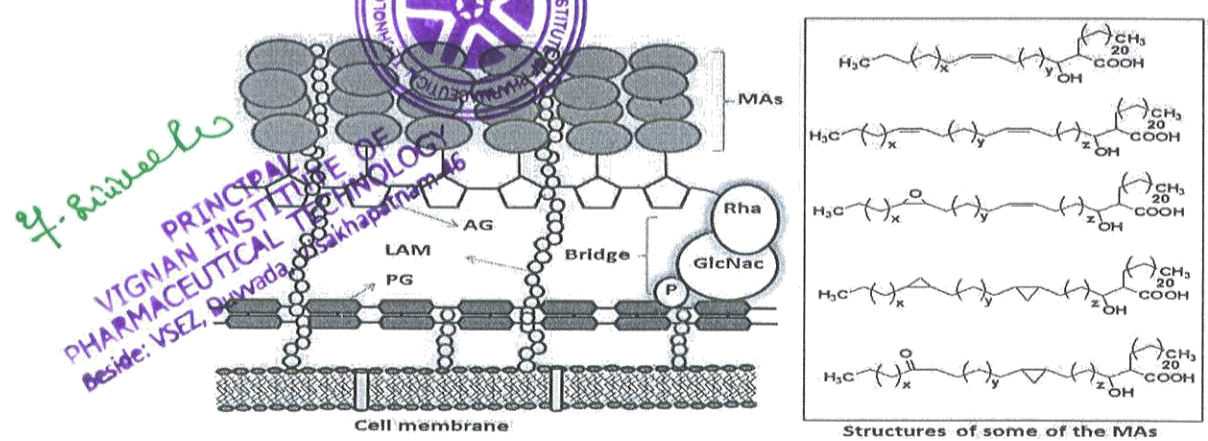

Figure 1: Cell envelope of *M. tuberculosis* with structural components.

AMERICAN JOURNAL OF PHARMTECH RESEARCH
Journal home page: http://www.ajptr.com/

A Review On Pharmacological Effects of Tulsi (*Ocimum Sanctum).*

V. Jhansi Lakshmi*[1], Louchana Priya. A[1], Santhosh Kumar Ranajit[2]
1.Department of Pharmacology, Vignan Institute of Pharmaceutical Technology, Duvvada, Visakhapatnam, Andhra Pradesh, India
2. School of pharmacy, Centurion University of Technology and Management, Odisha.

ABSTRACT

This article provides an overview on the pharmacological effects, uses of various plant parts, Phytochemical constituents of Tulsi. In India, Tulsi is a plant of religious, cultural and medicinal importance from time unknown. It is also known as holy basil belongs to family Lamiaceae. Each part of the plant that is stem, leaves, roots and the whole plant, flowers is known for its medicinal properties. Tulsi has been found to protect organs and tissues against chemical stress from industrial pollutants and heavy metals, and physical stress from prolonged physical exertion, ischemia, physical restraint and exposure to cold and excessive noise. Tulsi has also been shown to counter metabolic stress through normalization of blood glucose, blood pressure and lipid levels, and psychological stress through positive effects on memory and cognitive function and through its anxiolytic and anti-depressant properties. Tulsi its wide pharmacological uses made it a most sought-after plant for scholars and researchers. In this review article we focus mainly on Cultivation, botanical description, taxonomy, medicinal uses, chemical constituents, pharmacological activities of Tulsi like anti-diabetic, hepatoprotective, analgesic activity, anti-inflammatory were discussed in detail. Various species of genus occimum were also mentioned, with their phytochemical constituents and pharmacological activities. This review article contains cumulative information from various research articles.

Keywords: *Occimum sanctum*, Tulsi, anti-diabetic, anti -inflammatory, analgesic activity.

PRINCIPAL VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY Visakhapatnam-46

*Corresponding Author Email: louchanaallabani@gmail.com
Received 28 February 2021; Accepted 29 March 2021

Please cite this article as: Lakshmi VJ *et al.*, A Review On Pharmacological Effects of Tulsi (Ocimum Sanctum).. American Journal of PharmTech Research 2021.

RB1: RB transcriptional corepressor 1; H2AX: H2A.X variant histone; 14-3-3σ: 14-3-3 Phospho-serine/phospho-threonine binding proteins; CDC2: Cell division control protein 2 homologue; $P21^{CIP1}$: Cyclin-dependent kinase inhibitor 1; P16 INK4A: A protein encoded by the gene *CDKN2A* (Cyclin-dependent kinase inhibitor 2A); SA-β-gal: Senescence-associated beta-galactosidase; *SERPINE1*: Serpin family E member 1; *PAI-1*: Plasminogen activator inhibitor-1; TRIM: Tripartite motif-containing protein superfamily; SASP: Senescence-associated secretory phenotype; TNF-α: Tumour necrosis factor alpha; SSBs: Single-strand breaks; DSBs: Double-stranded breaks; NER: Nucleotide-excision repair; BER: Base-excision repair; NHEJ: Non-homologous end-joining; HRR: Homologous recombination repair; SSA: Single-strand annealing; CPDs: Cyclobutane pyrimidine dimers; 6-4PPs: (6-4) Pyrimidine-pyrimidone photoproducts; POLII: RNA polymerase II; GG: Global-genome; RRM2B: Ribonucleotide Reductase Regulatory *TP53* Inducible Subunit M2B; RR: Ribonucleotide Reductase; PCNA: Proliferating Cell Nuclear Antigen; POLH: DNA polymerase eta; XPV: Xeroderma pigmentosum variant; TLS: Translesion synthesis polymerases; XP: Xeroderma pigmentosum; CS: Cockayne syndrome; CASPASES: Cysteine-aspartic proteases; FAS: FS-7-associated surface antigen; TNFSF10: TNF superfamily member 10; TRAIL: TNF-related apoptosis-inducing ligand; DR: Death receptors; TNFRSF10A: Tumour necrosis factor (TNF)-receptor superfamily member 10a; TNFRSF10B: Tumour necrosis factor (TNF)-receptor superfamily member 10b; TNFRSF1A: TNF receptor superfamily member 1A; MOMP: Mitochondrial outer membrane permeabilization; *BAK*1: *BCL2* antagonist/killer 1; *PMAIP1*: Phorbol-12-myristate-13-acetate-induced protein 1; *BBC3*: *BCL-2*-binding component 3; *BCL2L1*: *BCL2* like 1; *AEN*: Apoptosis-enhancing nuclease; *CERS5*: Ceramide Synthase 5; *CERS6*: Ceramide Synthase 6; *TRIAP1*: *TP53* Regulated Inhibitor of Apoptosis 1; *DRAM1*: DNA damage-regulated autophagy modulator 1; *ULK1*: UNC-51-like autophagy-activating kinase 1; *TSC2*: Tuberous Sclerosis Complex subunit 2; *PTEN*: Phosphatase and tensin homologue; *PRKAA2*: Protein kinase AMP-activated catalytic subunit alpha 2; mTOR: Mechanistic target of rapamycin kinase; *BNIP3*: *BCL2* Interacting Protein 3; *DAPK-1*: Death-associated protein kinase 1; MAP 1 LC3A: Microtubule-associated protein 1A/1B-light chain 3 alpha; MAP1 B: Microtubule-associated protein 1B; SLC2A1: Solute carrier family 2 member 1; GLUT1: Glucose transporter type 1; SLC2A4: Solute carrier family 2 member 4; GLUT4: Glucose transporter type 4; SLC2A3: Solute carrier family 2 member 3; GLUT3: Glucose transporter type 3; NF-κB: Nuclear factor kappa-light-chain-enhancer of activated B cells; TIGAR: *TP53*-inducible glycolysis and apoptosis regulator; PFK1: Phosphofructokinase 1; PGM: Phosphoglycerate mutase; miR-34a: MicroRNA-34a; *RRAD*: Ras-related glycolysis inhibitor and calcium channel regulator; *PDK2*: Pyruvate dehydrogenase kinase 2; *PDH*: Pyruvate dehydrogenase; *PRKN*: Parkin RBR E3 ubiquitin-protein ligase; *PDH*1A: Pyruvate dehydrogenase E1 subunit alpha 1; GLS2: Glutaminase 2; MCAT: Malonyl-CoA-acyl carrier protein transacylase; SCO2: Synthesis of cytochrome c oxidase 2; ETC: Electron transport chain; *AIFM1*: Apoptosis-inducing factor mitochondria associated 1; MIEAP: Mitochondria-eating protein; PPP: Pentose phosphate pathway; AKT1: AKT serine/threonine kinase 1; G6PD: Glucose-6-phosphate dehydrogenase; *PANK1*: Pantothenate kinase-1; *G6PC*: Glucose-6-phosphatase catalytic subunit; *PCK1*: Phosphoenolpyruvate carboxykinase-1; GK: Glycerol kinase; *SIRT6*: Sirtuin 6; FOXO1: Forkhead box protein O1; FAO: Fatty acid oxidation; *CROT*: Carnitine O-Octanoyltransferase; *CPTA1*: Carnitine palmitoyltransferase 1A; *CPT1C*: Carnitine palmitoyltransferase 1C; *LPIN1*: Lipin1; FAS: Fatty acid synthesis; SREBP: Sterol regulatory element-binding proteins; SCD1: Stearoyl-CoA-desaturase 1; MUFAs: Mono-unsaturated fatty acids; *SLC7A3*: Solute carrier family 7 member 3; PHGDH: Phosphoglycerate dehydrogenase; *ATF4*: Activating transcription factor 4

Acknowledgements
We thank Dr. Y. Srinivasa Rao and Mr. Vinod Kumar Mugada for their continuous support and help to carry out the article review process.

Authors' contributions
W.F. contributed towards the concept of the article. A.M.A.S. designed the framework of the article and contributed towards drawing the figures. Supervision—A.M.A.S. W.F. was a major contributor for the literature research and writing of the manuscript. Critical reviews—all authors read and approved the final manuscript.

Funding
None

Availability of data and materials
This article is a review article and does not need any data and materials.

Ethics approval and consent to participate
This is a review article; thus, it does not involve studies with human beings as participants performed by any of the authors.

Consent for publication
All authors provided the consent to publish the review article.

Competing interests
All the authors declared that there are no competing interests (none).

Author details
[1]Department of Pharmacy Practice, Faculty of Pharmacy, Vignan Institute of Pharmaceutical Technology, Visakhapatnam, India. [2]Patient Experience Management, Forum Business Research, Visakhapatnam, India.

Received: 5 June 2020 Accepted: 11 August 2020
Published online: 16 November 2020

References

1. Levine A, Oren M. The first 30 years of P53: growing ever more complex. Nature Reviews Cancer [Internet]. (2009) [cited 11 may 2020]; 9(10):749-758Available from https://doi.org/https://doi.org/10.1038/nrc2723
2. Bouaoun L, Sonkin D, Ardin M, Hollstein M, Byrnes G, Zavadil J et al (2016) [cited 11 may 2020]; 37(9):865-876Available from https://doi.org/https://doi.org/10.1002/humu.23035
3. Vousden K, Prives C. Blinded by the light: the growing complexity of P53. Cell [Internet]. (2009) 137(3):413-431Available from https://doi.org/https://doi.org/10.1016/j.cell.2009.04.037
4. Riley T, Sontag E, Chen P, Levine A. Transcriptional control of human P53-regulated genes. Nature Reviews Molecular Cell Biology [Internet]. (2008) [cited 11 may 2020]; 9(5):402-412Available from https://doi.org/https://doi.org/10.1038/nrm2395
5. Levine A. P53, the cellular gatekeeper for growth and division. Cell [Internet]. (1997) [cited 11 may 2020]; 88(3):323-331Available from https://doi.org/https://doi.org/10.1016/s0092-8674(00)81871-1
6. Census FM, evaluation of P53 target genes. Oncogene [Internet]. (2017) [cited 11 may 2020]; 36(28):3943-3956Available from https://doi.org/https://doi.org/10.1038/onc.2016.502
7. Lane D, Madhumalar A, Lee A, Tay B, Verma C, Brenner S et al (2011) [cited 11 may 2020]; 10(24):4272-4279Available from https://doi.org/https://doi.org/10.4161/cc.10.24.18567
8. Belyi V, Ak P, Markert E, Wang H, Hu W, Puzio-Kuter A et al (2009) [cited 11 may 2020]; 2(6):a001198-a001198Available from https://doi.org/https://doi.org/10.1101/cshperspect.a001198
9. Jain A, Barton M. P53: emerging roles in stem cells, development and beyond. Development [Internet]. (2018) [cited 23 July 2020];145(8): dev158360Available from https://doi.org/https://doi.org/10.1242/dev.158360
10. Lin J, Chen J, Elenbaas B, Levine A. Several hydrophobic amino acids in the P53 amino-terminal domain are required for transcriptional activation, binding to MDM-2, and the adenovirus 5 E1B 55-kD protein. Genes & Development [Internet]. (1994) [cited 11 may 2020]; 8(10):1235-1246Available from https://doi.org/https://doi.org/10.1101/gad.8.10.1235
11. Chen X, Farmer G, Zhu H, Prywes R, Prives C. Cooperative DNA binding of P53 with TFIID (TBP): a possible mechanism for transcriptional activation. Genes & Development [Internet]. 1993 [cited 11 may 2020]; 7(10):1837-1849. Available from: https://doi.org/https://doi.org/10.1101/gad.7.10.1837
12. Thut C, Chen J, Klemm R, Tjian R. P53 transcriptional activation mediated by coactivators TAFII40 and TAFII60. Science [Internet]. (1995) 267(5194):100-104Available from https://doi.org/https://doi.org/10.1126/science.7809597
13. Walker K, Levine A. Identification of a novel P53 functional domain that is necessary for efficient growth suppression. Proceedings of the National Academy of Sciences [Internet]. (1996) [cited 11 may 2020];93(26):15335-15340Available from https://doi.org/https://doi.org/10.1073/pnas.93.26.15335
14. Bargonetti J, Manfredi J, Chen X, Marshak D, Prives C. A proteolytic fragment from the central region of P53 has marked sequence-specific DNA-binding activity when generated from wild-type but not from oncogenic mutant

Feroz and Sheikh *Egyptian Journal of Medical Human Genetics* (2020) 21:49
https://doi.org/10.1186/s43042-020-00089-x

Egyptian Journal of Medical Human Genetics

REVIEW Open Access

Exploring the multiple roles of guardian of the genome: P53

Wasim Feroz[1*] and Arwah Mohammad Ali Sheikh[2]

Abstract

Background: Cells have evolved balanced mechanisms to protect themselves by initiating a specific response to a variety of stress. The *TP53* gene, encoding P53 protein, is one of the many widely studied genes in human cells owing to its multifaceted functions and complex dynamics. The tumour-suppressing activity of P53 plays a principal role in the cellular response to stress. The majority of the human cancer cells exhibit the inactivation of the P53 pathway. In this review, we discuss the recent advancements in P53 research with particular focus on the role of P53 in DNA damage responses, apoptosis, autophagy, and cellular metabolism. We also discussed important P53-reactivation strategies that can play a crucial role in cancer therapy and the role of P53 in various diseases.

Main body: We used electronic databases like PubMed and Google Scholar for literature search. In response to a variety of cellular stress such as genotoxic stress, ischemic stress, oncogenic expression, P53 acts as a sensor, and suppresses tumour development by promoting cell death or permanent inhibition of cell proliferation. It controls several genes that play a role in the arrest of the cell cycle, cellular senescence, DNA repair system, and apoptosis. P53 plays a crucial role in supporting DNA repair by arresting the cell cycle to purchase time for the repair system to restore genome stability. Apoptosis is essential for maintaining tissue homeostasis and tumour suppression. P53 can induce apoptosis in a genetically unstable cell by interacting with many pro-apoptotic and anti-apoptotic factors.

Furthermore, P53 can activate autophagy, which also plays a role in tumour suppression. P53 also regulates many metabolic pathways of glucose, lipid, and amino acid metabolism. Thus under mild metabolic stress, P53 contributes to the cell's ability to adapt to and survive the stress.

Conclusion: These multiple levels of regulation enable P53 to perform diversified roles in many cell responses. Understanding the complete function of P53 is still a work in progress because of the inherent complexity involved in between P53 and its target proteins. Further research is required to unravel the mystery of this Guardian of the genome *"TP53"*.

Keywords: *TP53*, Tumour suppressor protein P53, Apoptosis, DNA repair, Cellular senescence

* Correspondence: wasimferoz5@gmail.com
[1]Department of Pharmacy Practice, Faculty of Pharmacy, Vignan Institute of Pharmaceutical Technology, Visakhapatnam, India
Full list of author information is available at the end of the article

IJPSR (2021), Volume 12, Issue 6 (Research Article)

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 22 June 2020; received in revised form, 15 October 2020; accepted, 04 May 2021; published 01 June 2021

A SIMPLE, SENSITIVE AND FAST SINGLE STEP EXTRACTION METHOD FOR DETERMINATION OF EMPAGLIFLOZIN IN HUMAN PLASMA USING LC-MS/MS

Amit Raval [1], Cheepurupalli Prasad [2], Rajaram Shivaji Rao Patil [3] and Atmakuri Chaitanya Krishna [*1]

College of Pharmacy [1], Pacific Academy of Higher Education and Research University, Pratap Hills, Pratap Nagar Ext., Airport Road, Udaipur - 313024, Rajasthan, India.
Vignan Institute of Pharmaceutical Technology [2], Besides Visakhapatnam Special Economic Zone, Kapujaggraju Peta, Duvvada, Visakhapatnam - 530049, Andhra Pradesh, India.
Omacon Analytical Solutions LLP [3], 119-120, 1st Floor, Building 5, Swastik Regalia, Ghodbunder Rd, Waghbil, Thane West - 400615, Maharashtra, India.

Keywords:

Liquid chromatography-mass spectrometry, Empagliflozin, Bio-analytical method, Human Plasma

Correspondence to Author:
Atmakuri Chaitanya Krishna

Research Scholar,
College of Pharmacy, Pacific Academy of Higher Education and Research University, Pratap Hills, Pratap Nagar Ext., Airport Road, Udaipur - 313024, Rajasthan, India.

E-mail: kriss.iway@gmail.com

ABSTRACT: A simple, sensitive, and fast single-step extraction method for estimating empagliflozin in human plasma using LC-MS/MS was developed and validated for pharmacokinetics evaluations. Plasma samples were basified before solid-phase extraction on SOLA (30 mg / 1 mL cartridges). Separations were carried out on a normal reverse phase C18 column (Hypersil BDS 100 × 4.6, 5µ mm column) for 3.5 minutes at a flow rate of 0.6 mL/min. Ten µL of the SPE eluent is directly injected onto LC-MS/MS to quantify the analyte from 1.563-800.000 ng/mL using a single SRM transition (m/z: 449.140→371.100) in negative ion mode. During method validation, selectivity, matrix effect, recovery, carry-over effect, stability studies, inter-day, and intra-day precision and accuracy experiments were conducted per USFDA guidelines. Method validation data has successfully met the acceptance criteria making it suitable for use in routine bio-analytical laboratories. The scope of this assay can be extended to cover the requirement of preclinical, toxicology, and PK/PD studies.

INTRODUCTION: Empagliflozin is indicated as an adjunct to diet and exercise to improve glycemic control, assist in weight loss and reduce blood pressure in adult patients with type 2 diabetes. Empagliflozin inhibits the sodium-glucose co-transporter 2 which is responsible for the reabsorption of glucose from the glomerular filtrate in the kidneys resulting in glucuretic effect [1-5]. Based on the pharmacokinetic study data, the analytical method required for analysis of empagliflozin in human plasma must be sensitive to detect concentrations as low as 1.5 ng/mL. Moreover, the linear response relationship till the upper limit of quantification determines the applicability of the analytical method for multiple doses of the drug and makes the method preferable.

Few liquid chromatography-tandem mass spectrometry (LC-MS/MS) [6-13] and diode array detectors (DAD/PDA) [14, 15] based bio-analytical methods were reportedly using ultra-performance liquid chromatography (UPLC) systems for estimation of empagliflozin in human plasma. In this method, we present a simple, sensitive, high-throughput, and robust method for the determination of empagliflozin in human plasma using the HPLC-MS/MS method in negative ion mode. The current study employs a simple and single-step extraction procedure with sample volumes as low as 200 µL, and the solid phase eluent is directly injected onto LC-MS/MS.

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.12(6).3457-63

This article can be accessed online on www.ijpsr.com

DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.12(6).3457-63

ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Published by JK Welfare & Pharmascope Foundation Journal Home Page: www.pharmascope.org/ijrps

Green Synthesis of Polyherbal Silver Nanoparticles from *Rosa Gallia officinalis, Citrus sinensis* and *Solanum tuberosum* Extract for antioxidant Potency

Brito Raj S[1], Boukary Obedoulaye[1], Sucharitha P[2], Saritha M[3], Shaheedha S M[4], Srikanth P[5], Bhaskar Reddy K*[1]

[1]Department of Pharmaceutics, Centre for Pharmaceutical Nanotechnology, Sri Venkateswara College of Pharmacy, RVS Nagar, Chittoor - 517127, Andhra Pradesh, India
[2]Department of Pharmaceutics, Seven Hills College of Pharmacy, Tirupati – 517561, Andhra Pradesh, India
[3]Department of Pharmaceutics, Vignan Institute of Pharmaceutical Technology, Kapujaggraju Peta Duvvada,Visakhaptnam -530049, Andhra Pradesh, India
[4]Department of Pharmacognosy, Crescent School of Pharmacy, B.S.Abdur Rahman Crescent Institute of Science and Technology, Vandalur, Chennai - 600048, Tamil Nadu, India
[5]Department of Pharmaceutics, Vaagdevi Pharmacy College, Warangal - 506005, Telangana, India

Article History:

Received on: 02 Jul 2020
Revised on: 02 Aug 2020
Accepted on: 03 Aug 2020

Keywords:

Polyherbal,
Silver Nanoparticles,
DPPH Scavenging,
Total Phenolic Content,
Antioxidant Activity

ABSTRACT

Skin ageing is due to the combination of natural, largely genetically programmed and environmentally modulated changes which occur in the body system due to free radical damage. Silver Nanoparticle (AgNPs), were prepared by chemical reduction using green synthesis and they were evaluated for particle size in nanometer, zeta potential in millivolt, surface morphology by scanning electron microscopy (SEM) and percent entrapment efficiency. The polyphenols were quantified by chromatographic techniques and the antioxidant activity measured spectrophotometrically by DPPH (2,2 Diphenyl 1 picrylhydrazyl) assay. According to this study AgNPs showed a least particle size of 145.4±2.4nm, maximum zeta potential of -39.1±2.4 mV with desired polydispersity index of 0.358±0.02, the amount of polyphenols loaded in AgNPs was found to be 87.23±2.54%. Maximum phenolic content was found in F1 as 65.21 ± 3.721 mg equivalent GAE/g of extract. On comparing the IC_{50} values, F1 and F5 exhibited the lowest and highest values respectively. Therefore, F1 possesses higher DPPH radical scavenging potential.

*Corresponding Author

Name: Bhaskar Reddy K
Phone: +91 9176688999
Email: bhaskurra@gmail.com

ISSN: 0975-7538

DOI: https://doi.org/10.26452/ijrps.v11i4.3800

Production and Hosted by
Pharmascope.org

PRINCIPAL VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY Beside: VSEZ, Duvvada, Visakhapatnam

INTRODUCTION

Skin ageing process can be prematurely caused by various factors which include free radicals damaging the cells, exposure to the sun (photo-ageing) and pollution, environmental factors (smoking and drinking), diet and stress, and loss of subcutaneous support (Zhang and Duan, 2018; Tobin, 2017). It can be the result of a combination of natural, largely genetically programmed and environmentally modulated changes which occur in the body. Skin ageing is a predominantly natural change that cannot be completely reversed; however, it is possible to reduce the wrinkles and brown spots (Bau-

ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Published by JK Welfare & Pharmascope Foundation Journal Home Page: www.pharmascope.org/ijrps

Green Synthesis of Polyherbal Silver Nanoparticles from *Rosa Gallia officinalis, Citrus sinensis* and *Solanum tuberosum* Extract for antioxidant Potency

Brito Raj S[1], Boukary Obedoulaye[1], Sucharitha P[2], Saritha M[3], Shaheedha S M[4], Srikanth P[5], Bhaskar Reddy K*[1]

[1]Department of Pharmaceutics, Centre for Pharmaceutical Nanotechnology, Sri Venkateswara College of Pharmacy, RVS Nagar, Chittoor - 517127, Andhra Pradesh, India
[2]Department of Pharmaceutics, Seven Hills College of Pharmacy, Tirupati – 517561, Andhra Pradesh, India
[3]Department of Pharmaceutics, Vignan Institute of Pharmaceutical Technology, Kapujaggraju Peta Duvvada,Visakhaptnam -530049, Andhra Pradesh, India
[4]Department of Pharmacognosy, Crescent School of Pharmacy, B.S.Abdur Rahman Crescent Institute of Science and Technology, Vandalur, Chennai - 600048, Tamil Nadu, India
[5]Department of Pharmaceutics, Vaagdevi Pharmacy College, Warangal - 506005, Telangana, India

Article History:

Received on: 02 Jul 2020
Revised on: 02 Aug 2020
Accepted on: 03 Aug 2020

Keywords:

Polyherbal,
Silver Nanoparticles,
DPPH Scavenging,
Total Phenolic Content,
Antioxidant Activity

ABSTRACT

Skin ageing is due to the combination of natural, largely genetically programmed and environmentally modulated changes which occur in the body system due to free radical damage. Silver Nanoparticle (AgNPs), were prepared by chemical reduction using green synthesis and they were evaluated for particle size in nanometer, zeta potential in millivolt, surface morphology by scanning electron microscopy (SEM) and percent entrapment efficiency. The polyphenols were quantified by chromatographic techniques and the antioxidant activity measured spectrophotometrically by DPPH (2,2 Diphenyl 1 picrylhydrazyl) assay. According to this study AgNPs showed a least particle size of 145.4±2.4nm, maximum zeta potential of -39.1±2.4 mV with desired polydispersity index of 0.358±0.02, the amount of polyphenols loaded in AgNPs was found to be 87.23±2.54%. Maximum phenolic content was found in F1 as 65.21 ± 3.721 mg equivalent GAE/g of extract. On comparing the IC_{50} values, F1 and F5 exhibited the lowest and highest values respectively. Therefore, F1 possesses higher DPPH radical scavenging potential.

*Corresponding Author

Name: Bhaskar Reddy K
Phone: +91 9176688999
Email: bhaskurra@gmail.com

ISSN: 0975-7538

DOI: https://doi.org/10.26452/ijrps.v11i4.3800

Production and Hosted by
Pharmascope.org

PRINCIPAL VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY Beside: VSEZ, Duvvada, Visakhapatnam

INTRODUCTION

Skin ageing process can be prematurely caused by various factors which include free radicals damaging the cells, exposure to the sun (photo-ageing) and pollution, environmental factors (smoking and drinking), diet and stress, and loss of subcutaneous support (Zhang and Duan, 2018; Tobin, 2017). It can be the result of a combination of natural, largely genetically programmed and environmentally modulated changes which occur in the body. Skin ageing is a predominantly natural change that cannot be completely reversed; however, it is possible to reduce the wrinkles and brown spots (Bau-

ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Published by JK Welfare & Pharmascope Foundation Journal Home Page: www.pharmascope.org/ijrps

Green Synthesis of Polyherbal Silver Nanoparticles from *Rosa Gallia officinalis, Citrus sinensis* and *Solanum tuberosum* Extract for antioxidant Potency

Brito Raj S[1], Boukary Obedoulaye[1], Sucharitha P[2], Saritha M[3], Shaheedha S M[4], Srikanth P[5], Bhaskar Reddy K*[1]

[1]Department of Pharmaceutics, Centre for Pharmaceutical Nanotechnology, Sri Venkateswara College of Pharmacy, RVS Nagar, Chittoor - 517127, Andhra Pradesh, India
[2]Department of Pharmaceutics, Seven Hills College of Pharmacy, Tirupati – 517561, Andhra Pradesh, India
[3]Department of Pharmaceutics, Vignan Institute of Pharmaceutical Technology, Kapujaggraju Peta Duvvada,Visakhaptnam -530049, Andhra Pradesh, India
[4]Department of Pharmacognosy, Crescent School of Pharmacy, B.S.Abdur Rahman Crescent Institute of Science and Technology, Vandalur, Chennai - 600048, Tamil Nadu, India
[5]Department of Pharmaceutics, Vaagdevi Pharmacy College, Warangal - 506005, Telangana, India

Article History:

Received on: 02 Jul 2020
Revised on: 02 Aug 2020
Accepted on: 03 Aug 2020

Keywords:

Polyherbal,
Silver Nanoparticles,
DPPH Scavenging,
Total Phenolic Content,
Antioxidant Activity

ABSTRACT

Skin ageing is due to the combination of natural, largely genetically programmed and environmentally modulated changes which occur in the body system due to free radical damage. Silver Nanoparticle (AgNPs), were prepared by chemical reduction using green synthesis and they were evaluated for particle size in nanometer, zeta potential in millivolt, surface morphology by scanning electron microscopy (SEM) and percent entrapment efficiency. The polyphenols were quantified by chromatographic techniques and the antioxidant activity measured spectrophotometrically by DPPH (2,2 Diphenyl 1 picrylhydrazyl) assay. According to this study AgNPs showed a least particle size of 145.4±2.4nm, maximum zeta potential of -39.1±2.4 mV with desired polydispersity index of 0.358±0.02, the amount of polyphenols loaded in AgNPs was found to be 87.23±2.54%. Maximum phenolic content was found in F1 as 65.21 ± 3.721 mg equivalent GAE/g of extract. On comparing the IC_{50} values, F1 and F5 exhibited the lowest and highest values respectively. Therefore, F1 possesses higher DPPH radical scavenging potential.

*Corresponding Author

Name: Bhaskar Reddy K
Phone: +91 9176688999
Email: bhaskurra@gmail.com

ISSN: 0975-7538

DOI: https://doi.org/10.26452/ijrps.v11i4.3800

Production and Hosted by
Pharmascope.org

PRINCIPAL VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY Beside: VSEZ, Duvvada, Visakhapatnam

INTRODUCTION

Skin ageing process can be prematurely caused by various factors which include free radicals damaging the cells, exposure to the sun (photo-ageing) and pollution, environmental factors (smoking and drinking), diet and stress, and loss of subcutaneous support (Zhang and Duan, 2018; Tobin, 2017). It can be the result of a combination of natural, largely genetically programmed and environmentally modulated changes which occur in the body. Skin ageing is a predominantly natural change that cannot be completely reversed; however, it is possible to reduce the wrinkles and brown spots (Bau-

ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Published by JK Welfare & Pharmascope Foundation Journal Home Page: www.pharmascope.org/ijrps

Green Synthesis of Polyherbal Silver Nanoparticles from *Rosa Gallia officinalis, Citrus sinensis* and *Solanum tuberosum* Extract for antioxidant Potency

Brito Raj S[1], Boukary Obedoulaye[1], Sucharitha P[2], Saritha M[3], Shaheedha S M[4], Srikanth P[5], Bhaskar Reddy K*[1]

[1]Department of Pharmaceutics, Centre for Pharmaceutical Nanotechnology, Sri Venkateswara College of Pharmacy, RVS Nagar, Chittoor - 517127, Andhra Pradesh, India
[2]Department of Pharmaceutics, Seven Hills College of Pharmacy, Tirupati – 517561, Andhra Pradesh, India
[3]Department of Pharmaceutics, Vignan Institute of Pharmaceutical Technology, Kapujaggraju Peta Duvvada,Visakhaptnam -530049, Andhra Pradesh, India
[4]Department of Pharmacognosy, Crescent School of Pharmacy, B.S.Abdur Rahman Crescent Institute of Science and Technology, Vandalur, Chennai - 600048, Tamil Nadu, India
[5]Department of Pharmaceutics, Vaagdevi Pharmacy College, Warangal - 506005, Telangana, India

Article History:

Received on: 02 Jul 2020
Revised on: 02 Aug 2020
Accepted on: 03 Aug 2020

Keywords:

Polyherbal,
Silver Nanoparticles,
DPPH Scavenging,
Total Phenolic Content,
Antioxidant Activity

ABSTRACT

Skin ageing is due to the combination of natural, largely genetically programmed and environmentally modulated changes which occur in the body system due to free radical damage. Silver Nanoparticle (AgNPs), were prepared by chemical reduction using green synthesis and they were evaluated for particle size in nanometer, zeta potential in millivolt, surface morphology by scanning electron microscopy (SEM) and percent entrapment efficiency. The polyphenols were quantified by chromatographic techniques and the antioxidant activity measured spectrophotometrically by DPPH (2,2 Diphenyl 1 picrylhydrazyl) assay. According to this study AgNPs showed a least particle size of 145.4±2.4nm, maximum zeta potential of -39.1±2.4 mV with desired polydispersity index of 0.358±0.02, the amount of polyphenols loaded in AgNPs was found to be 87.23±2.54%. Maximum phenolic content was found in F1 as 65.21 ± 3.721 mg equivalent GAE/g of extract. On comparing the IC_{50} values, F1 and F5 exhibited the lowest and highest values respectively. Therefore, F1 possesses higher DPPH radical scavenging potential.

*Corresponding Author

Name: Bhaskar Reddy K
Phone: +91 9176688999
Email: bhaskurra@gmail.com

ISSN: 0975-7538

DOI: https://doi.org/10.26452/ijrps.v11i4.3800

Production and Hosted by
Pharmascope.org

PRINCIPAL VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY Beside: VSEZ, Duvvada, Visakhapatnam

INTRODUCTION

Skin ageing process can be prematurely caused by various factors which include free radicals damaging the cells, exposure to the sun (photo-ageing) and pollution, environmental factors (smoking and drinking), diet and stress, and loss of subcutaneous support (Zhang and Duan, 2018; Tobin, 2017). It can be the result of a combination of natural, largely genetically programmed and environmentally modulated changes which occur in the body. Skin ageing is a predominantly natural change that cannot be completely reversed; however, it is possible to reduce the wrinkles and brown spots (Bau-

KIMS-ICON HOSPITAL

CERTIFICATE OF INTERNSHIP

This is to certify that Ms. KAKADA SMRUTHI, Regd. No. 15AC1T0009 is a bonafide student of Vignan Institute of Pharmaceutical Technology, Duvvada, Visakhapatnam. She has successfully completed the internship at KIMS ICON Hospital (A Unit of Icon Krishi Institute of Medical Sciences Private Limited), Visakhapatnam in the following departments as prescribed under regulation 16 and Appendix C of Pharm D Regulations 2008.

Department	Date		Total Duration (in months)
	From	To	
General medicine	02/11/2020	02/05/2021	Six (2 months COVID duties)
Orthopaedics	03/05/2021	02/07/2021	Two
Gynaecology	03/07/2021	02/09/2021	Two
General Surgery	03/09/2021	01/11/2021	Two

Mr. G. RAM PRASAD
Quality manager
KIMS ICON Hospital
Sheelanagar, Visakhapatnam

Mr. G. SUKESH REDDY
Chief Operating Officer
KIMS ICON Hospital
Sheelanagar, Visakhapatnam

PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside: VSEZ, Duvvada, Visakhapatnam-49

PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside: VSEZ, Duvvada, Visakhapatnam-46

Icon Krishi Institute of Medical Sciences Private Limited
#32-11-02, Sheela Nagar, BHPV Post, Visakhapatnam - 530 012
Andhra Pradesh, India.
0891-7100100 kimshospitals.com
CIN : U85110AP2018PTC108133

Regd. Office : Apollo Hospitals Enterprise Limited, No. 19, Bishop Gardens, Raja Annamalaipuram, Chennai-600 028.
Corporate Indentity Number (CIN) : L85110TN1979PLC008035

CERTIFICATE OF INTERNSHIP

This is to certify that **Mr. ABDUL RASHEED, Regd. No. 15AC1T0001** is a student of Pharm D at Vignan Institute of Pharmaceutical Technology. He has successfully completed the Internship program at **Apollo Hospitals**, Health City, Arilova, Visakhapatnam from 2nd November 2020 to 2nd November 2021 in the following departments as prescribed under regulation 16 and Appendix C of Pharm D Regulations 2008.

Department	Date		Total Duration (In Months)
	From	To	
General Medicine	02.11.2020	01.05.2021	Six
Paediatrics	02.05.2021	01.07.2021	Two
Orthopaedics	02.07.2021	01.09.2021	Two
General Surgery	02.09.2021	02.11.2021	Two

Head of the Institution
Vignan Institute of
Pharmaceutical Technology
Duvvada, Visakhapatnam

PRINCIPAL
VIGNAN INSTITUTE OF
PHARMACEUTICAL TECHNOLOGY
Duvvada, Visakhapatnam

Head HR
Apollo Hospitals
Health City, Arilova,
Visakhapatnam

PRINCIPAL
VIGNAN INSTITUTE OF
PHARMACEUTICAL TECHNOLOGY
Duvvada, Visakhapatnam-530 049

Clinical Pharmacologist
Apollo Hospitals
Health City, Arilova,
Visakhapatnam

NABH
Certificate No : H-201[illegible]-0133

PINNACLE HOSPITAL
CARE TO CURE

Date: 02/11/2021

CERTIFICATE OF INTERNSHIP

This is to Certify that Mrs.YELETI SUSMITHA Regd no . 15AC1T0030 is a bonafide student at this VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY(VIPT) college.She has Succesfully comleted the Internship from November 2020 to November 2021 in the Following departments as Prescribed under regulation 16 and Appendix C of Pharm D Regulations 2008.

Department	Date		Total Duration (In Months)
	From	To	
General Medicine	02/11/2020	2/05/2021	Six
Paediatrics	03/05/2021	02/07/2021	Two
Orthopaedics	03/07/2021	02/09/2021	Two
General Surgery	03/09/2021	02/11/2021	Two

Dr Krihna Naik

Resident Medical Officer

PRINCIPAL
VIGNAN INSTITUTE OF
PHARMACEUTICAL TECHNOLOGY
Beside: VSEZ, Duvvada, Visakhapatnam-46

For Pinnacle Hospitals India Pvt Ltd,

PINNACLE HOSPITAL
Plot No.10, 11 & 12, APIIC Health City, Chinagadili
Visakhapatnam, Andhra Pradesh - 530 040
Ph : 0891 6769999, 6769955, 2520099
www.pinnaclehospitals.com, info@pinnaclehospital.com

PINNACLE CLINIC
Balaji's Mangalagiri Chambers, No. 2C, D.No.9-14-6
Beside Tycoon Restaurant, VIP Road
Siripuram, Visakhapatnam - 530 003
Ph : 0891 6769966. Mob. : 8978881660

PADMAJA HOSPITAL

Old Gajuwaka Jn., Visakhapatnam - 530 026.

☎ : 0891-2515648, 2762975, 2768686, Cell : 81067 59521

CERTIFICATE OF INTERNSHIP

This is to certify that **BHAGAVATHI KUSUM CHANDU, Regd. No. 15AC1T0005** is a bonafide student at this college. He has successfully completed the Internship from November 2020 to October 2021 in the following departments as prescribed under regulation 16 and Appendix C of Pharm D Regulations 2008.

Department	Date		Total Duration (In Months)
	From	To	
General Medicine	02.11.2020	01.05.2021	Six
Paediatrics	02.05.2021	01.07.2021	Two
Orthopaedics	02.07.2021	01.09.2021	Two
General Surgery	02.09.2021	01.11.2021	Two

Head of the Institution
Vignan Institute of Pharmaceutical Technology
Duvvada, Visakhapatnam

PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Near VSEZ Duvvada, Visakhapatnam-49

PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside VSEZ, Duvvada, Visakhapatnam

Director/Superintendent
Dr. G. Simhachalam
MS (Gen. AIIMS)
Padmaja Hospital,
Old Gajuwaka, Visakhapatnam-26

Dr. G. SIMHACHALAM
M.S. (Gen. AIIMS)
Regd. No. 16464
PADMAJA HOSPITAL
Old Gajuwaka Jn.
Visakhapatnam-530 026

Dr. BENERJE'S
MEDIKON HOSPITAL

CERTIFICATE OF INTERNSHIP

This is to certify that **Miss. NAIDANA MANASA** Regd No. **15AC1T0017** is bonafide student of **VIGNAN INSTITUTE OF PHARMACUTICAL TECHNOLOGY**. She has successfully completed the Internship at **Dr. BENERJE'S MEDIKON HOSPITAL**, Anakapalle in following departments as prescribed under regulation 16 and Appendix C of Pharm D Regulation 2008.

Department	Date		Total Duration (In Months)
	From	To	
General Medicine	14-01-2021	30-06-2021	5 Months 17 Days
General Surgery	01-07-2021	31-08-2021	2 Months
Orthopaedics	01-09-2021	30-10-2021	2 Months

PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside: VSEZ, Duvvada, Visakhapatnam-46

Dr. NARESH SURISETTY
M.B.B.S.M.D.
Anesthesia & Critical
Regd.No. 65757

Regd.No. 19491
M.V. BENERJE M.S.,
Surgeon
Anakapalle-531001

**Address: 9-20-1,RTC Complex Road,
Anakapalle, Visakhapatnam Dist., A.P.
Pin code: 531001 Cell: 8500786389.**

AINU
Asian Institute of Nephrology & Urology
Centre for Advanced Kidney Care

CERTIFICATE OF INTERNSHIP

This is to certify that **Ms. Karagani Sumathi** bearing Reg No. 15ACIT0012, a bonafide student at **Vignan Institute of Pharmaceutical Technology** has successfully completed the Internship from **Nov 2020 to Oct 2021** in the following department as prescribed under Regulation 16 and Appendix C of Pharma D Regulation 2008.

Department	Date from	Date to	Total Duration
General Medicine	02.11.2020	02.05.2021	Six Months
General Surgery	03.05.2021	02.07.2021	Two Months
Orthopaedics	03.07.2021	01.09.2021	Two Months
Paediatrics	02.09.2021	01.11.2021	Two Months

Y. Srinivasulu

Head of the Institution
Vignan Institute of Pharmaceutical Technology
Duvvada , Visakhapatnam

PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Duvvada, Visakhapatnam-49

PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Visakhapatnam

G. Ravindra Varma

Dr. G. Ravindra Varma
DNB., M.Ch., MS (Surgery)
Director / Medical Superintendent
AINU Hospitals, Visakhapatnam

DR. G. RAVINDRA VARMA
M.S., M.Ch (Urology) Mumbai
DNB (Genito-Urinary Surgery)
Fellow Urology (Singapore)
Regd No. : 39814
Senior Consultant Urologist, Andrologist & Transplant Surgeon
Asian Institute of Nephrology & Urology (Vizag) Pvt. Ltd

Door No. 47 11-12, 1st Lane Dwarakanagar, Near Diamond Park, Visakhapatnam-530016, Andhra Pradesh
Ph : 0891-6763333, 2536333 www.ainuindia.com

A PLUS HOSPITALS
Caring for your life.

CERTIFICATE OF INTERNSHIP

This is to certify that **SARAGADAM BHUVANESWARI,** bearing **Regd. No. 15AC1T0024** is a bonafide student of Vignan Institute of Pharmaceutical Technology. She has successfully completed the Internship from November 2020 to October 2021 in the following departments as prescribed under regulation 16 and Appendix C of Pharm D Regulations 2008.

Department	Date		Total Duration (In Months)
	From	To	
General Medicine	02-11-2020	01-05-2021	Six
Orthopaedics	02-05-2021	01-07-2021	Two
Paediatrics	02-07-2021	01-09-2021	Two
General Surgery	02-09-2021	01-11-2021	Two

APLUSS HOSPITALS
(A Unit of Omme Venkata Padmavathi Healthcare Pvt. Ltd.)

Dr. K.S.K. CHAITANYA VARMA
M.B.B.S., MD Internal Medicine
(Regd. No. 90581)

Head of the Institution
Vignan Institute of Pharmaceutical Technology
Duvvada, Visakhapatnam

Director/Superintendent
Apluss Hospitals
Kurmannapalem

PRINCIPAL
VIGNAN INSTITUTE OF PHARMACEUTICAL TECHNOLOGY
Beside: VSEZ, Duvvada, Visakhapatnam-46

APLUSS HOSPITALS KURMANNAPALEM