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M.Pharm [Pharmaceutical chemistry\ Analysis] Students under taking **Project work**/Field work / Internship for the Academic Year 2024-2025.

S.NO	DESCRIPTION
1	Certificate of Head of Institution
2	List of **M.Pharm [Pharmaceutical chemistry \ Analysis]** Students under taking Project work/Field work / Internship-HOI
3	List of **M.Pharm [Pharmaceutical chemistry \ Analysis]** Students under taking Project work/Field work / Internship.

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CERTIFICATE OF HEAD OF INSTITUTION

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TO WHOMSOEVER IT MAY CONCERN

Number of Students undertaking **Project work**/Field work / Internship for the Academic Year **2023-2024** is **21.**

The Students Participated in More than one activity has been counted as **ONE** only.

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This to certify that the List of **M.Pharm[Pharmaceutical Analysis \ chemistry]** Students under taking **Project work**/Field work / Internship for the Academic Year 2024-2025 are given below.

S. No	Reg.No & Name of the student	Name of the Guide	Project Work-Topic	Field work	Internship
1.	S.RAGUNATH 261321507508	MR.SURESH KANNAN	ANALYTICAL METHOD DEVELOPMENT AND VALIDATION FOR SIMULTANEOUS DETERMINATION OF DAPAGLIFLOZIN AND SITAGLIPTIN IN PURE PHARMACEUTICAL DOSAGE FORM BY RP-HPLC.	-	-
2.	MARIMUTHU. P. 261321507507	DR.P.KALAISELVI	NOVEL RP-HPLC METHOD FOR ESTIMATION OF IDOXURIDINE IN PHARMACEUTICAL DOSAGE FORM	-	-
3.	VISHNU.M.S. 261321507510	DR.P.KALAISELVI	ANALYTICAL METHOD DEVELOPMENT AND VALIDATION FOR THE ESTIMATION OF LACIDIPINE IN	-	-

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			PHARMACEUTICAL DOSAGE FORM BY RP-HPLC METHOD		
4.	SATHISH KUMAR.V. 261321507509	MR.V.SURESH KANNAN	METHOD DEVELOPMENT AND VALIDATION OF ALECTINIB DRUG BY RP HPLC BULK AND PHARMACEUTICAL DOSAGE FROM	-	-
5.	DEEPIKA.R. 261321507503	MR.R.VIJAYAMIRTHARAJ	ANALYTICAL METHOD DEVELOPMENT AND VALIDATION FOR THE SIMULATANEOUS DETERMINATION OF DAPAGLIFLOZIN AND VILDAGLIPTIN BY RP-HPLC METHOD IN TABLET DOSAGE FORM	-	-
6.	ARUN PRAKASH.S. 261321507502	DR.M.CHITRA	ANALYTICAL METHOD DEVELOPMENT AND VALIDATION FOR SIMULTANEOUS DETERMINATION OF NIRMATRELVIR AND RITONAVIR AND THEIR PHARMACEUTICAL DOSAGE FORM BY	-	-

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			RP-HPLC		
7.	S.AAKASH 261321507501	DR.B.ANBARASI	ANALYTICAL METHOD DEVELOPMENT AND VALIDATION FOR SIMULTANEOUS ESTIMATION OF BEMPEDOIC ACID AND EZETIMIBE IN PURE AND ITS PHARMACEUTICAL DOSAGE FORM BY RP-HPLC	-	-
8.	C.JAGADESWARAN 261321507506	DR.B.ANBARASI	ANALYTICAL METHOD DEVELOPMENT AND VALIDATION OF OLANZAPINE AND SAMIDORPHAN IN PURE AND PHARMACEUTICAL DOSAGE FORMS BY RP-HPLC	-	-
9.	BALAJI.N. 261930703	DR.V.SURESH KANNAN	ANALYTICAL METHOD DEVELOPMENT AND VALLIDATION OF OLANZAPINE AND FLUOXETINE IN COMBINED DOSAGE FORM BY RP-HPLC	-	-
10.	GOKULA	DR.M.CHITRA	ANALYTICAL	-	-

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	KANNAN.M. 261321507504		METHOD DEVELOPMENT AND VALIDATION FOR ESTIMATION OF IMPURITIES IN DICYCLOMINE HYDROCHLORIDE CAPSULE DOSAGE FORM BY RP-HPLC		
11.	HARSHA VARDHINEE. K. 261321507505	MR.R.VIJAY AMIRTHARAJ	ANALTICAL METHOD DEVELOPMENT AND VALIDATION FOR THE SIMULTANEOUS DETERMINATION OF METFORMIN HYDROCHLORIDE AND DAPAGLIFLOZIN BENZOATE BY RP-HPLC METHOD IN TABLET DOSAGE FORM	-	-
12.	M.ANITHA 261221507502	DR.K.SUMATHI	SYNTHESIS AND BIOLOGICAL ACTIVITY OF NEW INDOLE BASED DERIVATIVES AS POTENT ANTI-INFLAMMATORY AGENT	-	-
13.	M.MANISHA 261221507504	DR.T.VENKATACHALAM	SYNTHESIS OF CHALCONE BASED QUINOXALINE:	-	-

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			ACETYL CHOLINESTERASE INHIBTION THROUGH IN-SILICO TECHNIQUE		
14.	K.SOJARNA 261221507508	DR.T.VENKATA CHALAM	SYNTHESIS,CHRACTERIZATION AND IN-VITRO STUDIES ON 2-CHLOROQUINOLIN IN DERIVATIVES AS ANTI-ALZHEIMER DISEASE	-	-
15.	D.SUBHASHINI 261220507509	DR.K.SUMATHI	GREEN SYNTHESIS, DOCKLING STUDIES AND ANTI-DIABETIC ACTIVITY OF NOVEL AMINO FUSED TRIAZOLE SCAFFOLD	-	-
16.	P.SURYAMATHI 261220507510	DR.T.VENKATA CHALAM	SNYTHESIS, DOCKING STUDIES OF QUINOLINE AMIDE DERIVATIVE AND EVALUATION FOR THEIR TUBERCULOSIS ACTIVITY	-	-
17.	K.SANTHANA KRISHNAN 261221507507	DR.A.CHITRA	SYNTHESIS,DOCKING STUDIES AND BIOLOGICAL EVALUATION OF THIOPHENE-	-	-

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			OXADIAZOLE HYBRID DERIVATIVES		
18.	K.PAVITHRA 261221507505	DR.A.CHITRA	MICROWAVE-ASSISTED GREEN SYNTHESISI OF ZINC OXIDE NANOPARTICLES USING SEAGRASS:OPTIMISATION,CHARACTERISATION AND ANTICANCER ACITIVITY	-	-
19.	V.PRIYANKA 261220507506	DR.K.SUMATHI	ASSESSMENT OF THE ANTI-DIABETIC ACTIVITY OF SCHEFFLERA STELLATA LEAVES ETHANOLOC EXTRACT ON STREPTOZOTOCIN-INDECED DIABETES IN WISTAR RATS	-	-
20.	ARATHY P NAIR 26122507501	Dr.T. VENKATACHALAM	DESIGN, SYNTHESIS OF SOME NOVEL BENZIMIDAZOLE BASED DERIVATIVE AND EVALUATION FOR THEIR ANTI-OXIDANT ACTIVITY	-	-
21.	D.STELLA	Dr.T.VENKATA CHALAM	DESIGN, SYNTHESIS	-	-

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	MARY 261220507508		OF SOME NOVEL OXADIAZOLE BASED DERIVATIVE AND EVALUATION FOR THEIR IN VITRO ANTI-OXIDANT ACTIVITY		

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ANALYTICAL METHOD DEVELOPMENT AND VALIDATION OF OLANZAPINE AND FLUOXETINE IN COMBINED DOSAGE FORM BY RP-HPLC

A Dissertation Submitted to

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY,

CHENNAI-600032

In partial fulfillment of the requirements for the award of the Degree of

MASTER OF PHARMACY

IN

PHARMACEUTICAL ANALYSIS

Submitted by:

Mr. BALAJI.N

REGISTRATION NO: 261930703

Under the supervision & guidance of

Mr. V. SURESH KANNAN., M. Pharm.,

ASSOCIATE PROFESSOR

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CERTIFICATE

This is to certify that the words embodied in this dissertation entitle **"ANALYTICAL METHOD DEVELOPMENT AND VALIDATION OF OLANZAPINE AND FLUOXETINE IN COMBINED DOSAGE FORM BY RP-HPLC"** is the bonafide work carried out by, **Mr. BALAJI.N (Reg. No: 261930703)** under the guidance and supervision of **Mr. V. SURESH KANNAN., M. Pharm.,** Associate Professor, in the Department of Pharmaceutical Analysis.

This is forwarded to The Tamil Nadu Dr. M.G.R Medical University, Chennai, for the partial fulfillment of requirements for the Degree of Master of Pharmacy in Pharmaceutical Analysis, 2023 – 2024.

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DATE: ..11/6/24.....

EVALUATED ON: ..11/06/24....

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DECLARATION

I hereby declare that this dissertation entitled "**ANALYTICAL METHOD DEVELOPMENT AND VALIDATION OF OLANZAPINE AND FLUOXETINE IN COMBINED DOSAGE FORM BY RP-HPLC**" has been carried out by me under the guidance and supervision of **Mr. V. SURESH KANNAN., M. Pharm.,** Associate Professor, Department of Pharmaceutical Analysis, JKKMMRF'S – Annai JKK Sampoorani Ammal College of pharmacy, Komarapalayam, in a partial fulfillment of requirements for the Degree of Master of Pharmacy in Pharmaceutical Analysis.

I further declare that this work is original and has not been submitted in part or full for the award of any other degree or diploma of any other university.

Mr. BALAJI.N

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Place: Komarapalayam

Date: 04/05/24

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SUMMARY AND CONCLUSION

The scope and objective of the present work is to develop and validate a new simple HPLC method for development and validation of Olanzapine and Fluoxetine in combined dosage form. From the reported literature, there were few methods established for the determination of Olanzapine and Fluoxetine in individual and in combination with other drug.

It was concluded that there were only few methods reported for the simultaneous estimation of the above selected multi component dosage form, which promote to pursue the present work. Chromatogram was run through Column C18(240 × 4.6mm)5µ injection of 10µl . Mobile phase containing methanol: water Buffer taken in the ratio 60:40 was pumped through column at a flow rate of 1.0 ml/min. Buffer used in this method was 0.1 ml triethylamine.

Temperature was maintained at 32°C. Optimized wavelength selected was 238nm. Retention time of Olanzapine and Fluoxetine were found to be 2.3min and 6.387 min. %RSD of the Olanzapine and Fluoxetine were and found to be 1.65 and 1.74 respectively. %Recovery was obtained is satisfied which is between 98% to 102 % for Olanzapine and Fluoxetine respectively.

LOD, LOQ values obtained is satisfied. Retention times were decreased and that run time was decreased, so the method developed was simple and economical that can be adopted in regular Quality control test in Industries.

Hence, the chromatographic method developed for the Olanzapine and Fluoxetine said to be rapid, simple, specific, sensitive, precise, accurate and reliable that can be effectively applied for routine analysis in research institutions, quality control department in industries, approved testing laboratories, bio-pharmaceutics and bio-equivalence studies and in clinical pharmacokinetic studies

As a result of this, the current method—which is Rapid, Specific, Precise, Accurate, and Linear can be applied to routine drug analysis of these formulations in tablet form.

ANALYTICAL METHOD DEVELOPMENT AND VALIDATION FOR THE SIMULTANEOUS DETERMINATION OF METFORMIN HYDROCHLORIDE AND DAPAGLIFLOZIN BENZOATE BY RP-HPLC METHOD IN TABLET DOSAGE FORM

A Dissertation Submitted to

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MASTER OF PHARMACY

IN

PHARMACEUTICAL ANALYSIS

Submitted by:

HARSHA VARDHINEE K

REGISTRATION NO: 261321507505

Under the supervision & guidance of

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CERTIFICATE

This is to certify that the words embodied in this dissertation entitle **"ANALYTICAL METHOD DEVELOPMENT AND VALIDATION FOR THE SIMULTANEOUS ESTIMATION OF METFORMIN HYDROCHLORIDE AND DAPAGLIFLOZIN BENZOATE BY RP-HPLC IN TABLET DOSAGE FORM"** is the bonafide work carried out by, **Ms.K.HARSHA VARDHINEE., (Reg. No: 261321507505)** under the guidance and supervision of **Mr. R.VIJAYAMIRTHARAJ., M.Pharm.,** Professor and Head of the Department of Pharmaceutical Analysis.

This is forwarded to The Tamil Nadu Dr. M.G.R Medical University, Chennai, for the partial fulfillment of requirements for the Degree of Master of Pharmacy in Pharmaceutical Analysis, April – 2024.

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DECLARATION

I hereby declare that this dissertation entitled **"ANALYTICAL METHOD DEVELOPMENT AND VALIDATION FOR THE SIMULTANEOUS ESTIMATION OF METFORMIN HYDROCHLORIDE AND DAPAGLIFLOZIN BENZOATE BY RP-HPLC IN TABLET DOSAGE FORM"** has been carried out by me under the guidance and supervision of **Mr.R. VIJAYAMIRTHARAJ., M. PHARM.,** Professor and Head of the Department of Pharmaceutical Analysis, JKKMMRF'S – Annai JKK Sampoorani Ammal College of pharmacy, Komarapalayam, in a partial fulfillment of requirements for the Degree of Master of Pharmacy in Pharmaceutical Analysis.

I further declare that this work is original and has not been submitted in part or full for the award of any other degree or diploma of any other university.

K. Harsha Vardhinee

Ms. K.HARSHA VARDHINEE

Reg. No. 261321507505

Place: Komarapalayam

Date: 11/6/2024

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CONCLUSION

It was concluded that were only few methods reported for the simultaneous estimation of the above selected multicomponent dosage form, which promote to pursue the present work. The scope and objective of the present work is to develop and validate a new simple RP-HPLC method for simultaneous estimation of Metformin Hydrochloride and Dapagliflozin benzoate in combined dosage form.

In simultaneous RP-HPLC method development, A wavelength of 249 nm was selected for the study. It was found that a system comprising of Buffer: ACN: Methanol in the ratio of 30:5:65 which gave good resolution and peak characteristics. The column used was Phenomenex C 18 column (150x4.6mm,) particle size 5µm with flow rate of 1.2 ml/min with pH adjusted to 3.5 using UV detection at 249 nm. For quantitative estimation, 249 nm was selected as suitable wavelength and the individual peaks of Metformin Hydrochloride and Dapagliflozin benzoate was identified by retention time 2.078 minutes and 3.238 minutes respectively.

From the above experimental data and results, the developed RP-HPLC method has having the following advantages: IStandard and sample preparation requires less time, No tedious extraction was involved was involved in the analysis of formulation, Suitable for the analysis of raw materials, applicable to dissolution studies and can be used for the content uniformity studies.

RP-HPLC method was found to be simple, precise, specific and accurate. The developed method was validated for various parameters as per ICH guidelines like system suitability, accuracy, precision, linearity , specificity, limit of detection , limit of quantitation, ruggedness, robustness.

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ANALYTICAL METHOD DEVELOPMENT AND VALIDATION FOR THE ESTIMATION OF LACIDIPINE IN PHARMACEUTICAL DOSAGE FORM BY RP-HPLC METHOD

A Dissertation Submitted to

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In partial fulfillment of the requirements for the award of the Degree of

MASTER OF PHARMACY

IN

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7. SUMMARY AND CONCLUSION

SUMMARY

A new method was established of Lacidipnie by RP-HPLC methods. The chromatographic conditions were successfully developed for the separation of Lacidipnie by using Inertsil ODS C18 column (4.6×250mm)5µ, flow rate was 1ml/min, mobile phase ratio was (70:30 v/v) ACN : KH2PO4 ph 3, detection wavelength was 225nm. The instrument used for HPLC, WATERS HPLC Auto Sampler, Separation module 2695, photo diode array detector 996, Empower-software version-2. The retention times were found to be 2.798 mins. The % purity of Lacidipnie was found to be 99.87%. The system suitability parameters for Lacidipnie such as theoretical plates and tailing factor were found to be 4260, 1.2, the resolution was found to be 7.67. The analytical method was validated according to ICH guidelines (ICH, Q2 (R1)). The linearity study of Lacidipnie was found in concentration range of 50µg-250µg and correlation coefficient (r^2) was found to be 0.999 and 0.999, % recovery was found to be 98.56% , %RSD for repeatability was 1.2, % RSD for intermediate precision was 1.9. The precision study was precision, robustness and repeatabilty. LOD value was 3.72 and 0.0242 and LOQ value was 7.40 respectively. Hence the suggested RP-HPLC can be used for routine analysis of Lacidipnie in API and Pharmaceutical dosage form.

- As per ICH guidelines, accuracy was to be 100%.
- As per ICH guidelines, precision was found to be 99%.
- As per ICH guidelines,linearity was found to be 0.99
- As per ICH guidelines, limit of detection was found to be 3.72.

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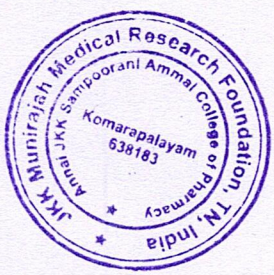
Hence it is concluded that the assay method is found to be valid in terms of reliability, precision, accuracy and specificity and hence it is suitable for routine analysis as well as for stability analysis.

CONCLUSION

The study is focused to develop and validate RP - HPLC methods for estimation of Lacidipine in tablet dosage form. For routine analytical purpose it is desirable to establish methods capable of analyzing huge number of samples in a short time period with good robustness, accuracy and precision without any prior separation steps. HPLC method generates large amount of quality data, which serve as highly powerful and convenient analytical tool. The method shows good reproducibility and good recovery. From the specificity studies, it was found that the developed methods were specific for Lacidipine.



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NOVEL RP- HPLC METHOD FOR ESTIMATION OF IDOXURIDINE IN PHARAMCUTICAL DOSAGE FORM

A Dissertation Submitted to

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7. SUMMARY AND CONCLUSION

SUMMARY

A RP-HPLC method for Idoxuridine was developed and validated in tablet dosage form as per ICH guide lines. The results of this validation are as summarized in the report. The results are found to be complying with the acceptance criteria for each of the parameter.

Waters Alliance RP-HPLC (Empower software with PDA detector) with Hypersil ACE C18 (250 x 4.6 mm, 5 µ) column, Injection volume of 10 µl is injected and eluted with the Mobile phase (OPA and Methanol in the ratio of 60:40) which was pumped at a flow rate of 1.0 ml at 270 nm. The peak of Idoxuridine was found well separated at 6 min.

As per ICH guidelines, system suitability was found to be 0.2%.

- As per ICH guidelines, accuracy was to be 100%.
- As per ICH guidelines, precision was found to be 99%.
- As per ICH guidelines,linearity was found to be 1.000.
- As per ICH guidelines, limit of detection was found to be 2.673.
- As per ICH guidelines,solution stability was found to be 0.2.
- As per ICH guidelines, specificity was found to be 2.696

Hence it is concluded that the assay method is found to be valid in terms of reliability, precision, accuracy and specificity and hence it is suitable for routine analysis as well as for stability analysis.

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ANALYTICAL METHOD DEVELOPMENT AND VALIDATION FOR ESTIMATION OF IMPURITIES IN DICYCLOMINE HYDROCHLORIDE CAPSULE DOSAGE FORM BY RP-HPLC

A Dissertation Submitted to

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I hereby declare that this dissertation entitled "**ANALYTICAL METHOD DEVELOPMENT AND VALIDATION FOR ESTIMATION OF IMPURITIES IN DICYCLOMINE HYDROCHLORIDE CAPSULE DOSAGE FORM BY RP-HPLC**" has been carried out by me under the guidance and supervision of **Dr. M. CHITRA., M. PHARM., Ph.D.,** Associate Professor, Department of Pharmaceutical Analysis, JKKMMRF'S – Annai JKK Sampoorani Ammal College of pharmacy, Komarapalayam, in a partial fulfillment of requirements for the Degree of Master of Pharmacy in Pharmaceutical Analysis.

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SUMMARY AND CONCLUSION

A RP-HPLC method for Dicyclomine Hcl capsule was developed and Validated in capsule dosage form as pre ICH Guide lines, A Linear ,Accurate, precise methods was developed for the determination of impurities in Dicyclomine Hydrochloride in capsule dosage form. Retention time of Dicyclomine Hcl capsule were found to be 10mins for Unknown impurities and known impurity at 12.5min. The linearity results for Dicyclomine Hcl correlation coefficients (R^2) was 0.999 and Y-intercept at 100% concentration was 1.3 for unknown impurities and linearity results for Dicyclomine Hcl Related compound-A correlation coefficients (R^2) was 1.000 and Y-intercept at 100% concentration was -3.58 for known impurity, demonstrating excellent linearity in the relationship between concentration and peak area. So the method developed was simple and economical that can be adopted in regular Quality control test in Industries. The developed method was validated for various parameters as per ICH guidelines like system suitability, linearity, system precision, method precision and accuracy.

The analytical method validation of Dicyclomine Hcl capsule by RP-HPLC method was found to be satisfactory and could be used for the routine pharmaceutical analysis.

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ANALYTICAL METHOD DEVELOPMENT AND VALIDATION OF OLANZAPINE AND SAMIDORPHAN IN PURE AND PHARMACEUTICAL DOSAGE FORMS BY RP-HPLC

A Dissertation Submitted to

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DECLARATION

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During this period we found his to be hard working and committed and we wish his all the best in his future endeavours.

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8. SUMMARY AND CONCLUSION

A RP-HPLC method for Olanzapine and Samidorphan was developed and Validated in Pure and tablet dosage form as pre ICH Guide lines

UV visible Detector and Column C18(100 ×4.6 mm, 5µ) injection of 10µl is injected and eluted with the mobile phase of Acetonitrile : Mono basic potassium phosphate in the ratio 50:50which was pumped at a flow rate of 1.0ml at 220nm. The peak of Olanzapine and Samidorphan was found well separated within 6min. The developed method was validated for various parameters as per ICH guidelines like system suitability, linearity, system precision, intermediate precision, recovery, robustness, LOD& LOQand Forced degradadion.

The analytical method validation of Olanzapine and Samidorphan by RP-HPLC method was found to be satisfactory and could be used for the routine pharmaceutical analysis of Olanzapine and Samidorphan.

FUTURE SCOPE

In the above mentioned RP-HPLCmethod for estimation of Olanzapine and Samidorphan in combined tablet dosage form, and the run time was found to be within 6 minutes, retention time of Olanzapine and Samidorphan is 2.2 & 3.2 minutes. Hence the present method is Rapid, Specific, Precise, Accurate, Linear can be used for routine analysis of these drugs from tablet formulation.

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ANALYTICAL METHOD DEVELOPMENT AND VALIDATION FOR SIMULTANEOUS ESTIMATION OF BEMPEDOIC ACID AND EZETIMIBE IN PURE AND ITS PHARMACEUTICAL DOSAGE FORM BY RP-HPLC

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8. CONCLUSION

A RP - HPLC method for Bempedoic acid and Ezetimibe was developed and validated in tablet dosage form as per ICH guidelines. The results are found to be complying with the acceptance criteria for each of the parameter.

WATERS HPLC (Empower software with UV/Visible detector) with WATERS (C_{18}, 250 x 4.6 mm, 5µm) Packed Column, Injection volume of 10 µL is injected and eluted with the Mobile phase [Buffer (dipotassium hydrogen orthophosphate (Dihydrate)) and Methanol, in the ratio of 60:40] Which was pumped at a flow rate of 1.0 mL at 242 nm. The peak of Bempedoic acid and Ezetimibe was found well separated at 3.090 min, 4.268 min. The developed method was validated for various parameters as per ICH guidelines like System suitability, Accuracy (recovery), Precision (repeatability), Specificity (interference), Robustness, Ruggedness, Limit of Detection, Limit of Quantitation, Linearity and Range.

The analytical method validation of Bempedoic acid and Ezetimibe by RP-HPLC method was found to be satisfactory and could be used for the routine pharmaceutical analysis of Bempedoic acid and Ezetimibe.

FUTURE SCOPE

In the above-mentioned RP-HPLC method for estimation of Bempedoic acid and Ezetimibe in combined tablet dosage form and the run time was found to be within 7 minutes, retention time of Bempedoic acid and Ezetimibe was 3.090 and 4.268 minutes. Hence it is concluded that the assay method is found to be valid in terms of reliability, accuracy, precision and specificity. Hence it is suitable for routine analysis as well as for stability analysis.

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ANALYTICAL METHOD DEVELOPMENT AND VALIDATION FOR SIMULTANEOUS DETERMINATION OF DAPAGLIFLOZIN AND SITAGLIPTIN IN PURE PHARMACEUTICAL DOSAGE FORM BY RP-HPLC

A Dissertation Submitted to

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In partial fulfillment of the requirements for the award of the Degree of

MASTER OF PHARMACY

IN

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CONCLUSION

A RP - HPLC method for Dapagliflozin and Sitagliptin were developed and validated in tablet dosage form as per ICH guidelines. The results are found to be complying with the acceptance criteria for each of the parameter.

RP HPLC - SHIMADZU LC2010 CHT with Flowrosil(C_{18}, 250 x 4.6 mm, 5µm) Packed Column, Injection volume of 10 µL is injected and eluted with the Mobile phase (Buffer (0.02 Ammonium dihydrogen phosphate): Acetonitrile (50:50). Which was pumped at a flow rate of 1.0 mL at 220 nm. The peak of Dapagliflozin and Sitagliptin was found well separated at. The developed method 3.033 and 13.408 was validated for various parameters as per ICH guidelines like system suitability, accuracy (recovery), precision (repeatability), specificity (interference), robustness, limit of detection, limit of quantitation, linearity and range.

Hence it is concluded that the assay method is found to be valid in terms of reliability, accuracy, precision and specificity. Hence it is suitable for routine analysis as well as for stability analysis.

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ANALYTICAL METHOD DEVELOPMENT AND VALIDATION FOR SIMULTANEOUS DETERMINATION OF NIRMATRELVIR AND RITONAVIR AND THEIR PHARMACEUTICAL DOSAGE FORM BY RP-HPLC

A Dissertation Submitted to

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In partial fulfillment of the requirements for the award of the Degree of

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CONCLUSION

A RP - HPLC method for Nirmatrelvir and Ritonavir were developed and validated in tablet dosage form as per ICH guidelines. The results are found to be complying with the acceptance criteria for each of the parameter.

WATERS HPLC (Empower software with UV/Visible detector) with WATERS (C_{18}, 250 x 4.6 mm, 5µm) Packed Column, Injection volume of 10 µL is injected and eluted with the Mobile phase (Buffer and Methanol, in the ratio of 50:50) Which was pumped at a flow rate of 1.0 mL at 235 nm. The peak of Nirmatrelvir and Ritonavir was found well separated at 4.061 mins and 5.817 mins. The developed method was validated for various parameters as per ICH guidelines like system suitability, accuracy (recovery), precision (repeatability), specificity (interference), robustness, ruggedness, limit of detection, limit of quantitation, linearity and range.

Hence it is concluded that the assay method is found to be valid in terms of reliability, accuracy, precision and specificity. Hence it is suitable for routine analysis as well as for stability analysis.

FUTURE SCOPE

In the above-mentioned RP-HPLC method for estimation of Nirmatrelvir and Ritonavir in combined tablet dosage form, and the run time was found to be within 10 minutes, retention time of Nirmatrelvir and Ritonavir is 4.0 and 5.8 minutes. Hence the present method is rapid, specific, precise, accurate, linearity can be used for routine analysis of this drugs from tablet formation.

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METHOD DEVELOPMENT AND VALIDATION OF ALECTINIB DRUG BY RP HPLC BULK AND PHARMACEUTICAL DOSAGE FROM.

A Dissertation Submitted to

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10. CONCLUSION

A simple, novel, precise and economical RP-HPLC method was developed for the determination of Alectinib in Bulk and Pharmaceutical dosage form. From the literature survey for analytical method it was observed that, few methods have been developed for the estimation of Alectinib.

Different mobile phases were tried, to select the ideal mobile phase. Among that Acetonitrile : water (80:20 v/v) pH-3.0 adjusted with 0.1% orthophosphoric acid and it was found to be ideal, since it gave good resolution and peak shapes with perfect symmetry. The flow rate was found to be optimized at 0.8mL/min. detection was carried out at 265mn by PDA detection.

The linearity in 10-50µg/mL for Alectinib, the correlation coefficient was 0.999 respectively. From the results of validation parameters it is evident that the proposed method is accurate, precise, selective, specific and robust.

Compared to the literature survey, Our result has been concluded for the determination of Alectinib was rapid and more reliable. It has been reported by the standard chromatograms andspectrums. Our studies have been proven that this method is suitable for the quantification and validation of Alectinib by RP-HPLC. This method has the ability to detect the Alectinib content within the retention time of 5mins. All parameters such as precision, accuracy, linearity, robustness, LOD, LOQ and system suitability is validated under ICH guidelines and the result shows that the method is reliable and acceptable.

The developed RP-HPLC has the following advantages are

- The developed method was found to be simple, sensitive and cost effective.
- The developed method could estimate Alectinib in Bulk and pharmaceutical dosage form within a short run time.
- The main advantages of the proposed methods are its suitable and routine determination of these drugs.

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ANALYTICAL METHOD DEVELOPMENT AND VALIDATION FOR THE SIMULTANEOUS DETERMINATION OF DAPAGLIFLOZIN AND VILDAGLIPTIN BY RP-HPLC METHOD IN TABLET DOSAGE FORM

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RESULT AND DISCUSSION

A simple Reverse Phase High Performance Liquid Chromatographic method has been developed and validated for the simultaneous analysis of Dapagliflozin and Vildagliptin in combined dosage form.

In RP-HPLC method, optimizations of different chromatographic parameters like selection of chromatographic method, detection wavelength, selection of mobile phase, mobile phase ratio, etc., were done.

A wavelength of 247 nm was selected for the study. It was found that a system comprising of 10 mM potassium dihydrogen orthophosphate: methanol in the ratio of 35: 65%v/v which gave good resolution and peak characteristics. The column used was Hibar, C18 column 250mm X 4.0mm, particle size 5µm with flow rate of 1.0 ml/min with pH adjusted to 4.0 using UV detection at 247 nm.

For quantitative estimation, 247 nm was selected as suitable wavelength and the individual peaks of Dapagliflozin and Vildagliptin was identified by retention time 3 minutes and 4.6 minutes respectively.

The method was validated as per ICH guidelines. Calibration curves were plotted with concentration versus peak area.

From the linearity studies, specified concentration levels were determined.Dapagliflozin was found to be linear in the concentration range of 25 to250 µg/ml. Vildagliptin was found to be linear in the concentration range of 1 to 10 µg/ml.

The LOD values for Dapagliflozin and Vildagliptin were found to be 5 and10 ng/ml, and their LOQ values were found to be 10 and 70 ng/ml respectively.

Stability studies were carried and the drug solutions were found to be stable for 5 hours and 24 hours at room temperature and refrigerated conditions, respectively.

Recovery studies were carried out at 80%, 100% and 120% levels. Good recovery values show that the method is free from interferences.

System suitability parameters like plate number (N), tailing factor (Tf), capacity factor (k`), resolution (Rs) and relative standard deviation of peak area for repetitive injections were studied and it was found that the values were within the limits.

DESIGN, SYNTHESIS OF SOME NOVEL BENZIMIDAZOLE BASED DERIVATIVE AND EVALUATION OF THEIR ANTIOXIDANT ACTIVITY

Dissertation submitted to

THE TAMILNADU Dr.M.G.R MEDICAL UNIVERSITY,

CHENNAI-32

In partial fulfillment of the requirementsfor the award of the degree of

MASTER OF PHARMACY

IN PHARMACEUTICAL CHEMISTRY

Submitted by

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Under the guidance of

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6. RESULTS AND DISCUSSION

6.1. Synthesis

A series of novel class of design and synthesize a novel class of oxadiazole based derivatives were synthesized by the reaction between benzoic acid and semi carbazide in presence of cyclization agent it will give 5-phenyl-1,3,4-oxadiazol-2-amine. Further this compound treated with various aromatic aldehyde in presence of NaOH to give corresponding title compound. and the synthesized compounds are characterization by using IR, ^{1}H NMR, ^{13}C NMR, and mass spectroscopy. All the compounds and intermediates were purified by successive recrystallization from ethanol. The purity of synthesized compounds was confirmed by Melting Point and which were checked in open capillary tube and are uncorrected and TLC using Ethyl Acetate: Petroleum Ether (50:50) as solvent system. The IR spectrum of the final synthesized compounds showed absorption bands around 3300–3156 cm^{-1} for amide NH, while the distinguishing broad absorption peaks C=O for CONH were observed in the range 1720–1690 cm^{-1}, 3350–3157 cm^{-1} for NH. 1489–1464 cm^{-1} for CH2, 1379–1344 cm^{-1} for CH_3, and 800–700 cm^{-1} for C=C. These compounds also exhibited appropriate peaks at corresponding δ ppm in their ^{1}H NMR spectra and corresponding molecular ion peaks in LC–MS spectra which were in conformity with the assigned structures. The structures of synthesized compounds were confirmed by **FT-IR, ^{1}H-NMR** and **^{13}C-NMR** the result was correlated with the expected structure. All the synthesized compounds were subjected for short-term in vitro anti-oxidant study

6.1.1. Characterization of synthesized compounds

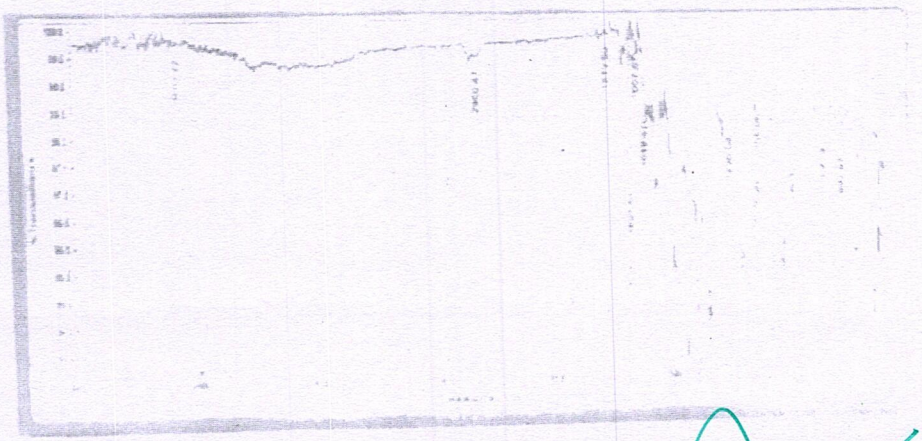

Figure 6. IR spectra for compound R1

7.CONCLUSION

Among the widespread heterocyclic compounds, oxygen heterocycles occupy a distinct position because of their wide natural abundance and broad biological as well as pharmaceutical significance. In these particular classes of O-heterocycles, 'chromone and benzimidazole' heterocyclic scaffolds represent a privileged structural motif well-distributed in natural products with a broad spectrum of potent biological activities. They have been used since ancient times in traditional medicine l and are well-known by their diversity of pharmacological properties, such as antiallergic, anti-inflammatory, antidiabetic, antitumor, and antimicrobial [8].

The rigid chromone and benzimidazole fragment has been classified as a privileged structure in drug discovery, due to its use in a wide variety of pharmacologically active compounds such as anticancer, anti-HIV, antibacterial and anti-inflammatory agents [12]. Presence of chromone based structure in a molecule is often associated with its capacity to prevent diseases. Few naturally occurring chromone exhibit antimicrobial, antitumor, antiviral and mutagenic, antiproliferative and central nervous system (CNS) activities [14]. Numerous synthetic derivatives of naturally occurring benzimidazole have found use in pharmaceuticals, particularly as antifungal and antimicrobial agents [12]. Several chromone and benzimidazole derivatives have also been reported to act as kinase inhibitors, to bind to benzodiazepine receptors and as efficient agents in the treatment of cystic fibrosis [17]. A key feature is that the lipophilic nature of the oxadiazole derivatives helps to cross the cell membrane easily. Based on above statement, the present study is based on theantioxidant activity of oxadiazole derivatives were evaluated against DPPH method comparing with standard drugs. The substitution on chromone and benzimidazole may alter the biological activity of chromone and benzimidazole derivatives.

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5. RESULTS AND DISCUSSION

5.1. Synthesis

A series of novel class of design and synthesize a novel class of oxadiazole based derivatives were synthesized by the reaction between benzoic acid and semi carbazide in presence of cyclization agent it will give 5-phenyl-1,3,4-oxadiazol-2-amine. Further this compound treated with various aromatic aldehyde in presence of NaOH to give corresponding title compound. and the synthesized compounds are characterization by using IR, ^{1}H NMR, ^{13}C NMR, and mass spectroscopy. All the compounds and intermediates were purified by successive recrystallization from ethanol. The purity of synthesized compounds was confirmed by Melting Point and which were checked in open capillary tube and are uncorrected and TLC using Ethyl Acetate: Petroleum Ether (50:50) as solvent system. The IR spectrum of the final synthesized compounds showed absorption bands around 3300–3156 cm^{-1} for amide NH, while the distinguishing broad absorption peaks C=O for CONH were observed in the range 1720–1690 cm^{-1}, 3350–3157 cm^{-1} for NH, 1489–1464 cm^{-1} for CH2, 1379–1344 cm^{-1} for CH_3, and 800–700 cm^{-1} for C=C. These compounds also exhibited appropriate peaks at corresponding δ ppm in their ^{1}H NMR spectra and corresponding molecular ion peaks in LC–MS spectra which were in conformity with the assigned structures. The structures of synthesized compounds were confirmed by **FT-IR, ^{1}H-NMR** and **^{13}C-NMR** the result was correlated with the expected structure. All the synthesized compounds were subjected for short-term in vitro anti-oxidant study.

5.2. Molecular docking studies

Based on literature studies of oxadiazole derivatives, the 10 compounds were designed for our study and these compounds were subjected to molecular docking studies. Molecular docking was carried out through discovery studio to predict the interactions model of the protein to its inhibitors. The molecular docking was performed to elucidate the binding mode competence of tyrosinase (PDB ID:3NM8) and oxadiazole analogues. The designed molecules were docked along with the native ligand and a reference standard, donepezil. The docking energy of our designed compounds ranged from 7 to 11 kcal/mol indicated good binding affinities to the target receptor, and the results are depicted in **Table 1**. Among the docked compounds,

6. CONCLUSION

Among the widespread heterocyclic compounds, oxygen heterocycles occupy a distinct position because of their wide natural abundance and broad biological as well as pharmaceutical significance. In these particular classes of O-heterocycles, 'oxadiazole' heterocyclic scaffolds represent a privileged structural motif well-distributed in natural products with a broad spectrum of potent biological activities. They have been used since ancient times in traditional medicine1and are well-known by their diversity of pharmacological properties, such as antiallergic, anti-inflammatory, antidiabetic, antitumor, and antimicrobial [8].

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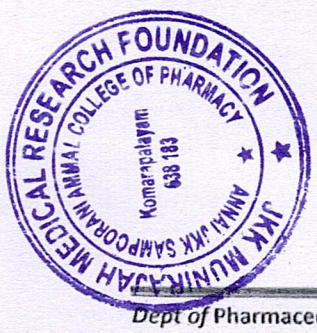

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SYNTHESIS, CHRACTERIZATION AND IN- VITRO STUDIES ON 2-CHLOROQUINOLIN IN DERIVATIVES AS ANTI- ALZHEIMER DISEASE

Dissertation submitted to

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In partial fulfillment of the requirements

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MASTER OF PHARMACY

IN

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Submitted by

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6.SUMMARY AND CONCLUSION

The structure of the newly synthesized compounds was validated by physical, chemical, and spectroscopic data. In molecular docking studies, the studied drugs demonstrated a similar mechanism of protein binding to the active region of the acetyl cholinesterase protein (PDB ID:1F8U). According on the predicted docking energies, the interaction with cholinesteraseenzyme is shows promising binding energy. All substances were tested for viability in vitro against Human SH-SY5Y neuroblastoma cell lines. Compounds S9 and S11 were shown to be the most effective against the evaluated cell lines. Work is being done to advance the search for new cholinesterase inhibitors. In order to establish a SAR for rational study, more derivatives and in-depth, detailed investigations on in vivo activity may be undertaken. The current study suggests that more research is needed forquinoline derivatives developed as a potent lead for Alzheimer's disease.

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SYNTHESIS AND BIOLOGICAL ACTIVITY OF NEW INDOLE BASED DERIVATIVES AS POTENT ANTI-INFLAMMATORY AGENT

Dissertation submitted to

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In partial fulfillment of the requirements

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6. SUMMARY AND CONCLUSION

The physicochemical and spectroscopic data confirmed the structural integrity of the newly synthesized compounds. The investigated molecules displayed a similar manner to protein binding to the active site of cyclooxygenase in molecular docking studies. The calculated docking energies indicated that its interaction with cyclooxygenase is favourable, but only to a limited extent. The molecular discreptor value was studied by molinsipration software and all the parameters were within a limit. All the synthesized compounds were screened for their *in vitro* anti-inflammatory activity activity. Compounds A10 and A7 are emerged to be the most active compounds against in tested enzyme and these compounds also posses a significant docking score for the studied enzyme. The study thus serves as an attempt to progress toward the discovery of novel lead molecule for the treatment of inflammation. In future the additional derivatives may be prepared and further extended in-depth investigations into *in-vivo* activity would be implemented to establish a SAR (Structural activity relationship) for rational study.

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SYNTHESIS OF CHALCONE BASED QUINOXALINE: *ACETYLCHOLINESTERASE* INHIBITION THROUGH *IN-SILICO* TECHNIQUE

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This is to certify that the dissertation work entitled " **SYNTHESIS OF CHALCONE BASED QUINOXALINE: *ACETYLCHOLINESTERASE* INHIBITION THROUGH *IN-SILICO* TECHNIQUE"** is the bonafide work carried out by, **Ms.M.MANISHA., REG.NO:261221507504,** under the guidance and supervision of **Dr. T.VENKATACHALAM, M.Pharm., Ph.D.,** Professor and Head, in the Department of Pharmaceutical chemistry .

This is forwarded to The Tamil Nadu Dr.M.G.R Medical University, Chennai, for the partial fulfillment of requirements for the Degree of Master of Pharmacy in Pharmaceutical chemistry (2023-2024).

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5. RESULTS AND DISCUSSION

5.1.2D - QSAR

5.2.Model Information and Interpretation

The resultant QSAR model for *acetylcholinesterase* inhibitors shows that five descriptors are involved in predicting the activity. With the criteria of all above mentioned, Model 1 is chosen for discussion. Experimental, predicted activities, leverage values of the model 2 and their residues are shown in **Table 2**.

Model 1 = -12.6584 + 94.513 (AATSC3e) + 3.6902 (MATS6m) + 0.9277 (BCUTp-1l) - 0.0906 (C1SP3) + 2.2487 (IC1).

R2: 0.9201 R2adj: 0.9086 R2-R2adj: 0.0114 LOF: 0.0774

Kxx: 0.3731 Delta K: 0.0529 RMSE tr: 0.2103 MAE tr: 0.1566

RSS tr: 1.8132 CCC tr: 0.9584 s: 0.2276 F: 80.5572

In this model 1, 1compoundswere taken as training set and 5 compounds as the test set. The correlation coefficient value (r2 value) of the model was 0.9201 which is merely equal to one. This manifests to be the best fit of the model. R2adj determines the convenience for the addition of a new descriptor to the model. The difference between the R2-R2adj must be lower to satisfy. The R2-R2adj value is 0.0114 which is lower and satisfied. The absence of overfitting of the model is confirmed by the low value of Friedman's lack of fit (LOF). The LOF value in model 1 was 0.0774 and it is lower. The delta K value was positive (Delta K = 0.0529) which shows a good correlation between the biological activity and the descriptors. The quality of the model was confirmed by obtaining mean absolute error (MAE) and standard deviation (s) of estimate. The model shows MAE and s value as 0.1566 and 0.2276 respectively. This shows the good quality of the model. Therefore, AATSC3e, MATS6m, BCUTp-1, C1SP3, and IC1 are the descriptors shown best fit of the model. AATSC3e, MATS6m, BCUTp-1, IC1 showed a positive contribution, and C1SP3 showed a negative contribution in the generated model 1. Model 1 is analyzed for outliers by residual calculation. The compounds with higher values of residuals are considered as the outliers. To improve the quality of the model, residual compounds 1, 14, 18, are excluded and executed for further model prediction.

6. CONCLUSION

The structure of the newly synthesized compounds was validated by physical, chemical, and spectroscopic data. In molecular docking studies, the studied drugs demonstrated a similar mechanism of protein binding to the active region of the acetyl cholinesterase protein (PDB ID:4EY6). According on the predicted docking energies, the interaction with *cholinesterase* enzyme is shows promising binding energy. All substances were tested for viability in vitro against Human SH-SY5Y neuroblastoma cell lines. Compounds M2 and M4 were shown to be the most effective against the evaluated cell lines. Work is being done to advance the search for new *cholinesterase* inhibitors. In order to establish a SAR for rational study, more derivatives and in-depth, detailed investigations on *in vivo* activity may be undertaken. The current study suggests that more research is needed for chalcone merged quinoxaline derivatives developed as a potent lead for Alzheimer's disease.

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SYNTHESIS, DOCKING STUDIES AND BIOLOGICAL EVALUATION OF THIOPHENE-OXADIAZOLE HYBRID DERIVATIVES

Dissertation submitted to

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CHENNAI-32.

In partial fulfillment of the requirements for the award of the degree of

MASTER OF PHARMACY

IN

PHARMACEUTICAL CHEMISTRY

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5. RESULT AND DISCUSSION

5.1. Results of Molecular docking

The molecular docking studies for the designed compounds were carried out through PyRx molecular docking software to determine the free energy binding towards targeted enzymes. The docking pose for the ligand enzyme interaction was visualized with discovery studio. The binding free energy for all the ligands was tabulated in table. From the results it clearly shows that, all the compounds have promising interaction with targeted enzyme topoisomerase I. The interaction is mainly due to the presence of lipophilic factor of aromatic heterocyclic ring. From the docking results, compound T11 (9 kcal/mol) shows highest binding affinity toward topoisomerase I enzyme compared to standard drug doxorubicin. This compound produced two conventional hydrogen bonds between carbonyl oxygen and nitrogen of oxadiazole moiety with residues of Pro 358 and Lys 262 respectively. The following amino acids such as Pro 230, Try 231, Giu 232, Phe 259, Tyr 308, Pro 357, Gly 359, Leu 360, Arg 362, are interact with ligand through hydrophobic bond. These interactions due to the aromatic character of ligands. The remaining of the entire studied compound shows good to moderate binding affinities to the selected enzymes. These amino acids have been repeatedly implicated during ligand interaction with the Topoisomerase I enzyme and also play important role in the inhibition of the ligand-binding domain of topoisomerase I inhibitors. These non-covalent interactions, van der Waals, columbic interaction, π–π interaction, and hydrogen interaction, are shown in **Figure 3 to 12**. The table 1 shows the binding energy of studied compounds. Based on the docking score the following derivatives like T2, T3, T4, T9, T10, T11, T12, T15, T16, and T17 are selected for the conventional synthesis and it was further evaluated for the cytotoxicity studies against the MCF-7 cells.

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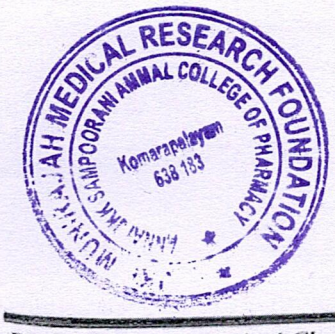
6. SUMMARY AND CONCLUSION

The physicochemical and spectroscopic data confirmed the structural integrity of the newly synthesized compounds. The investigated molecules displayed a similar manner to protein binding to the active site of Topoisomerase I protein (PDB ID: 1A35) in molecular docking studies. The calculated docking energies indicated that its interaction with Topoisomerase I is favourable, but only to a limited extent. The ADME properties of the compounds are also assessed by SWISS ADME online tool and all the compounds are within the limit. All the synthesized compounds were screened for their *in vitro* viability test against MCF-7 cancer cell line. Compound **T11** emerged to be the most active compounds against in tested cell line. The study thus serves as an attempt to progress toward the discovery of novel lead molecule for cancer treatment. In future the additional derivatives may be prepared and further extended in-depth investigations into *in-vivo* activity would be implemented to establish a SAR (Structural activity relationship) for rational study.



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SYNTHESIS,DOCKING STUDIES OF QUINOLINE AMIDE DERIVATIVE AND EVALUATION FOR THEIR TUBERCULOSIS ACTIVITY.

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5. RESULT AND DISCUSSION

5.1. Molecular docking

The molecular docking studies for the designed compounds **(figure 6)** were carried out through PyRx molecular docking software to determine the free energy binding towards targeted enzymes. The docking pose for the ligand enzyme interaction was visualized with discovery studio. The binding free energy for all the ligands was tabulated in table. From the results it clearly shows that, all the compounds have promising interaction with targeted enzyme Mycobacterium tuberculosis ligase. The interaction is mainly due to the presence of lipophilic factor of aromatic heterocyclic ring. From the docking results, compound P4(8.9 kcal/mol) shows highest binding affinity toward Mycobacterium tuberculosis ligase enzyme compared to standard drug indomethacin. The compound A7 shows 2 hydrogen bond interactions with amino acid such as Arg 488 and Arg 590. The following amino acids such as Gly 490, Asn 491, Thr 501, Gly 503, Asp 533, Thr 591, Asn 722 are interact with ligand through hydrophobic bond. These interactions due to the aromatic character of ligands. The remaining the entire studied compound shows good to moderate binding affinities to the selected enzymes. These amino acids have been repeatedly implicated during ligand interaction with the Mycobacterium tuberculosis ligase enzyme and also play important role in the inhibition of the ligand-binding domain of Mycobacterium tuberculosis ligase inhibitors. These non-covalent interactions, van der Waals, columbic interaction, π–π interaction, and hydrogen interaction, are shown in **Figure 7 to 17**. The table 1 shows the binding energy of studied compounds. Based on the docking score the following derivatives like P2, P3, P4, P5, P8, P9, P10, P11, P15 and P19 are selected for the conventional synthesis and it was further evaluated for the in-vitro anti-TB activity.

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6. SUMMARY AND CONCLUSION

The synthesis of titled compounds was achieved by following synthetic routes as shown in the scheme. The synthesis of title compounds was achieved in good yield by simple techniques. It was chemically stable and available in good yield. The sharp melting point and unique spot-on TLC indicated that title compounds were obtained in pure form. The synthesized Compounds were purified by successive recrystallization from the appropriate solvents. These compounds also exhibited appropriate peaks at corresponding δ ppm in their ^{1}H-NMR spectra and corresponding molecular ion peaks in LC-MS spectra which conformed with the assigned structures. The interpretation of IR, ^{1}H NMR, and LC-MS spectra confirmed the structure of the title compounds.All the designed compounds were subjected to molecular docking studies using PyRx software. All the studied compounds show the significant docking score and which is compared with standard drug Isoniazid. All the synthesized compounds were subjected to in vitro anti-tubercular activity by LPR assay. It could be concluded from the present investigation that the quinoline derivative possess the most potent anticancer molecules.

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5 RESULT AND DISCUSSION

5.1 Molecular docking

The molecular docking studies for the designed compounds were carried out through PyRx molecular docking software to determine the free energy binding towards targeted enzymes. The docking pose for the ligand enzyme interaction was visualized with discovery studio. The binding free energy for all the ligands was tabulated in table. From the results it clearly shows that, all the compounds have promising interaction with targeted enzyme topoisomerase II. The interaction is mainly due to the presence of lipophilic factor of aromatic heterocyclic ring. From the docking results, compound T9 (9.7 kcal/mol) shows highest binding affinity toward topoisomerase II enzyme compared to standard drug gliclazide. This compound produced five conventional hydrogen bonds between carbonyl oxygen, acid oxygen from hydroxyl group and nitrogen of triazole moiety with residues of Arg 133, Glu 249, Pro 647, Gln 648 and Try 731 respectively. The remaining the entire studied compound shows good to moderate binding affinities to the selected enzymes. These amino acids have been repeatedly implicated during ligand interaction with the Topoisomerase II enzyme and also play important role in the inhibition of the ligand-binding domain of topoisomerase II inhibitors. These non-covalent interactions, van der Waals, columbic interaction, π–π interaction, and hydrogen interaction, are shown in **Figure 3 to 12**. The table 1 shows the binding energy of studied compounds. Based on the docking score the following derivatives like T1, T2, T3, T4, T8, T9, T11, T14, T15, T16, and T17 are selected for the conventional synthesis and it was further evaluated for the in vitro anti-diabetic activity using corresponding cell line.

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6 SUMMARY AND CONCLUSION

The physicochemical and spectroscopic data confirmed the structural integrity of the newly synthesized compounds. The investigated molecules displayed a similar manner to protein binding to the active site of DPP-IV protein (PDB ID: 6OER) in molecular docking studies. The calculated docking energies indicated that its interaction with DPP-IV is favourable, but only to a limited extent. The ADME properties of the compounds are also assessed by SWISS ADME online tool and all the compounds are within the limit. All the synthesized compounds were screened for their *in vitro* anti-diabetic activity. Compounds **T9** emerged to be the most active compounds against in tested enzyme. The study thus serves as an attempt to progress toward the discovery of novel lead molecule for diabetic treatment. In future the additional derivatives may be prepared and further extended in-depth investigations into *in-vivo* activity would be implemented to establish a SAR (Structural activity relationship) for rational study.

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MICROWAVE-ASSISTED GREEN SYNTHESIS OF ZINC OXIDE NANOPARTICLES USING SEAGRASS: OPTIMISATION, CHARACTERISATION AND ANTICANCER ACTIVITY

Dissertation submitted to

THE TAMILNAD Dr.M.G.R MEDICAL UNIVERSITY,

CHENNAI-32.

In partial fulfillment of the requirements

the award of the degree of

MASTER OF PHARMACY

IN

PHARMACEUTICAL CHEMISTRY

Submitted by

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This is certify that the dissertation work entitled **"MICROWAVE – ASSISTED GREEN SYNTHESIS OF ZINC OXIDE NANOPARTICLES USING SEA GRASS: OPTIMIZATION, CHARACTERISATION AND ANTICANCER ACTIVITY"** is the bonafide work carried out by, **Ms.K.PAVITHRA .,Reg no:261221507505** under the guidance and supervision of **Dr.A.CHITRA, M.pharm., Ph.D.,** Associate Professor, in the Department of Pharmaceutical Chemistry .

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DECLARATION

I Hereby declared that this dissertation entitled **"Microwave –Assisted Green Synthesis Of Zinc Oxide Nanoparticles Using Sea Grass: Optimization, Characterisation And Anticancer Activity"** is a bonafide work carried out by me under the guidance and supervision of **Dr.A.Chitra, M.Pharm., Ph.D.,** Associate Professor, in the Department of Pharmaceutical Chemistry JKKMMRF'S ANNAI JKK SAMPOORANI COLLEGE OF PHARMACY B. KOMARAPALAYAM submitted to Tamil Nadu Dr.M.G.R. Medical University, Chennai , In partial fulfillment of the requirements for the award of the degree Master of Pharmacy in Pharmaceutical Chemistry during the academic year (2023-2024).

I further declare that this work is original and has not been submitted to this dissertation previously for the award of any degree

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RESULTS AND DISCUSSIONS

3.3.1 Biosynthesis of ZnO Nanoparticles

ZnO nanoparticles were biosynthesized with the help of leaf extract of Enhalus Acoroids using 0.05M zinc acetate as the zinc precursor salt. After addition of the extract and ammonia to 0.05M zinc acetate solution, pale yellow to brownish colored precipitate was observed which suggested that ZnO nanoparticles have been synthesized. The pale yellow to brownish color of the precipitate was due to coating with biomolecules from the extracts which was similar to that observed in many other reports [38, 39]. The biomolecules present in EA leaf (EAL) extract acted as reducing and stabilizing agents in bio-reduction of Zn2+ ions thereby forming ZnO nanoparticles. The so formed ZnO nanoparticles were further divided into two parts, one of which was calcinated whereas the other was air dried. White colored ZnO nanoparticles were obtained after calcination. Characterization of biosynthesized ZnO nanoparticles before and after calcination was further carried out using UV–vis spectrometry, photoluminescence studies,field emission scanning electron microscopy (FESEM), X-ray diffraction (XRD), attenuated total reflectance infrared spectroscopy (ATR-IR), gas chromatography-mass spectrometry (GC-MS), high resolution-mass spectrometry (HR-MS), and nuclear magnetic resonance (NMR) analysis.

3.3.2 Characterization of ZnO Nanoparticles

3.3.2.1 UV-visible spectroscopic analysis

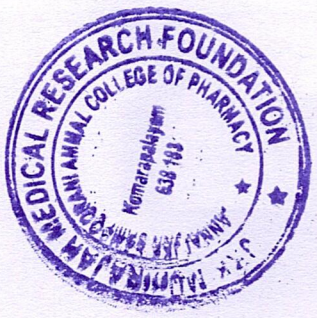
UV-visible spectra were recorded within the interval of 300–1100 nm for ZnO nanoparticles before calcination (line 1), after calcination (line 2) and PDL extract (line 3) as represented in Figure 3.1. ZnO nanoparticles showed absorption maxima at 418 nm and 402 nm respectively before and after calcination with 3.038 eV and 3.159 eV respectively as the corresponding band gap energies. Calculations of band gap energy have been done based upon the following equation 3.1:

$$Eg = hc/\lambda = 1240/\lambda \quad (3.1)$$

where h is Planck's constant which equals 4.136×10−15 eV.s, c is the velocity of light which equals 2.998×108 m/s and λ is the cut off wavelength. Thus hc=1239.97 ×10−9 eV.m (1 nm / 10−9 m) = 1239.97 eV.nm; Round off i.e.≈ 1240 eV.nm.

CONCLUSION

Biosynthesis of zinc oxide nanoparticles was successfully carried out using Enhalus Acoroids leaf extract followed by estimation of antimicrobial activities against different bacteria (E. coli, S. aureus, P. aeruginosa, B. subtilis) and fungi (Penicillium sp., F. oxysporum, A. flavus, R. solani) along with cytoxocity studies against HCT-116 cancer cells. These ZnO nanoparticles showed non-bacterial and non-antifungal nature against all four bacteria and fungi before and after calcination. Also, uncalcinated and calcinated ZnO nanoparticles were biocompatible against HCT-116 cancer cells. The non-antibacterial and non-antifungal properties of these ZnO nanoparticles can be considered as a pre-requisite for its biocompatibility due to its inert nature which can be further used for drug delivery applications. Thus, ZnO nanoparticles can serve as a biocompatible carrier system in drug delivery applications due to its inert nature.



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ASSESSMENT OF THE ANTI-DIABETIC ACTIVICTY OF *SCHEFFLERA STELLATA* LEAVES ETHANOLIC EXTRACT ON STREPTOZOTOCIN-INDUCED DIABETES IN WISTAR RATS

Dissertation submitted to

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CERTIFICATE

This is to certify that the dissertation work entitled " **ASSESSMENT OF THE ANTI-DIABETIC ACTIVICTY OF *SCHEFFLERA STELLATA* LEAVES ETHANOLIC EXTRACT ON STREPTOZOTOCIN-INDUCED DIABETES IN WISTAR RATS**" is the bonafide work carried out by, **Mrs.V.PRIYANKA.,Reg. No: 26122507506** under the guidance and supervision of **Dr. K. SUMATHI, M.Pharm., Ph.D.,** Associate Professor, in the Department of Pharmaceutical Chemistry.

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DECLARATION

I hereby declared that this dissertation entitled " **ASSESSMENT OF THE ANTI-DIABETIC ACTIVICTY OF *SCHEFFLERA STELLATA* LEAVES ETHANOLIC EXTRACT ON STREPTOZOTOCIN-INDUCED DIABETES IN WISTAR RATS** "is a bonafide work carried out by me under the guidance and supervision of **Dr. K. SUMATHI, M.Pharm, Ph.D.,** Associate Professor, Department of Pharmaceutical Chemistry, JKKMMRF'S- Annai JKK Sampoorani Ammal College of Pharmacy, Komarapalayam submitted to The Tamilnadu Dr. M.G.R Medical University-Chennai in partial fulfillment and requirement of university rules and regulation for the award of Degree Master of Pharmacy in Pharmaceutical Chemistry during the academic year 2023-2024.

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6. Result & Discussion

6.1 Preliminary Phytochemical analysis of Ethanolic extract of *Schefflera stellata (Geartn.)*(EESS)

The result of preliminary phytochemical analysis of Ethanolic extract of *Schefflera stellata (Geartn.)* (EESS) showed presence of various phytochemical constituents such as, flavonoids, alkaloids, tannins, proteins, steroids and phenol with absence of saponins and anthroquinones.

The results were shown in **(Table-1)**

Table- 1. Phytochemical screening of EESS

The Phytochemical studies of the sample TEST	Sample
TANNINS	+
SAPONINS	-
FLAVONOIDS	+
ALKALOIDS	+
PROTEINS	+
STEROIDS	+
ANTHROQUINONES	-
PHENOL	+

(+) Present ; (-) Absent

8. CONCLUSION

The anti-diabetic activity of Whole pant of *Schefflera stellata* Willd is evidenced byblood glucose level, estimation of lipid profile activity of *Schefflera stellata* and the evidentreduction in SGOT, SGPT in liver and creatinine in serum also proves that the *Schefflera stellata* reduced the Pancreas, liver damage which is common in diabetes.

Thus, it may be concluded that *Schefflera stellata* produced significant antidiabetic activity in streptozotocin induced diabetic rats. The efficacy of the *Schefflera stellata* was comparable to that of Glibenclamide. Further work was necessary to elucidate the mechanism of action involved in the anti-diabetic activity of *Schefflera stellata* with special references to phytochemicals.

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