Inhibitory Potential Of New Paenol Derivative And *Paeonia Lactiflora* Roots Extract And Against Mastitis Triggering Pathogens

Velmurugan Chinnasamy[1], Rajul Gupta[2], Pradeep Kumar Sharma[3]*

[1]Department of Pharmacology, PGP College of Pharmaceutical Science and Research Institute, Namkkal 637001, Tamil Nadu, India

[2]Naari Pharma Private Ltd, Plot no 30, Galaxy 1st main road, JP nagar – Third Phase, Bangalore 560078, Karnataka, India

[3]*Accurate College of Pharmacy, Knowledge Park-III, Greater Noida 201306, India

***Corresponding Author:**Pradeep Kumar Sharma

*Accurate College of Pharmacy, Knowledge Park-III, Greater Noida 201306, India.

E-mail: pradeepbsr2000@yahoo.com

Abstract

Facts over *Escherichia coli* and *Staphylococcus aureus* ability to tigger mastitis, and antimicrobial potential of *Paeonia lactiflora* plant motivated present study to compare the inhibitory potential of paenol derivative (PD) and *Paeonia lactiflora* root extract (PLRE) against mastitis triggering bacteria (MTB). Current study involved synthesis of PD and preparation of PLRE. The PD was characterized using ATR-IR, 1H-NMR and Mass spectrometric data. Both PD and PLRE were further investigated for their antibacterial activity against MTB namely: *Escherichia coli* and *Staphylococcus aureus*. Among two, the PD exhibited high antibacterial activity when compared with PLRE. Based on the results, present study concludes that PD possess high antimicrobial potential against MTB and recommends that PD should be further investigated to support its clinical significance.

Keywords: Mastitis, paenol, comparison, extract, and antibacterial

INTRODUCTION

Mastitis may develop due to involvement of *Staphylococcus aureus* (*S. aureus*) and *Escherichia coli* (*E. coli*)[1]. The human microbiome is known to possess 1:1 of bacteria and human cells, such that a small disturbance in this ratio may activate the mastitis triggering bacteria[2,3]. Long-term administration of conventional antibiotics against various infections may lead to mortality[4]. This problem can be handled using two therapeutic approaches, such as: use of synthetic or phytoproducts. Research suggests phenols and their derivatives to possess high antimicrobial potential[5-7], also evidence suggests that plants products and extracts act as effective antimicrobial therapy[8-13], so can be used for MTB. Phytotherapy is a traditional economical approach for the treatment of various diseases and infections[14-16]. Since it elicits numerous biological activities, so used in wide range of diseases and ailments such as antiinflammatory[17,18], in obsessive compulsive disorder[19], digestant[20], antioxidant[21-25], antiurolithaitic[26], nephtoprotective[27,28], antiarrhythmic[29], antidepressant[30], anthelmintic[31], kidney disorders[32], cardiovascular disorders[33], antihyperlipidemic[34], diabetes[35-38], immunity booster[39], periodontitis[40-42], antidiarrhoeal[43], anticancer[44-53], hepatoprotective[54-65] and other pharmacological activities[66-69]. Many research highlighted increase in biological activity of plants together when used with nanotechnology[70-85]. Facts suggest several synthetic compounds to possess strong antimicrobial activity[86-105], due to which sevral plants product have been developed[106-122] and patented because of their significant biological activities[123-137]. Earlier research described the phyto-screening[176-179], isolation and characterization of several phytochemicals[138-175]. Hence, current study was aimed to determine the inhibitory

potential of paenol derivative (PD) and *Paeonia lactiflora* root extract (PLRE) against mastitis triggering bacteria (MTB).

MATERIAL AND METHODS

Materials

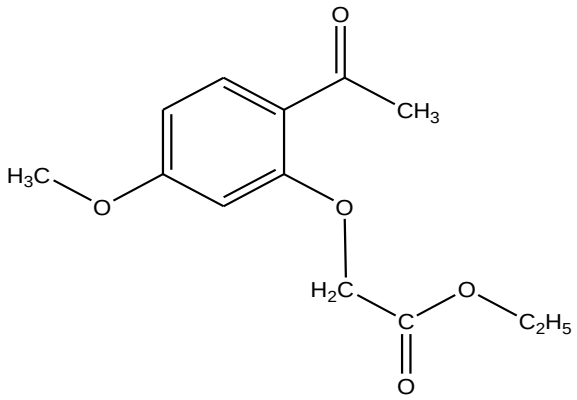
Melting points of newly synthesized compounds were determined using Thomas Hoover apparatus. IR spectra were recorded ATR-IR, Perkin Elmer, 1H-NMR on Bruker, DPX 300 and mass spectra on MASPEC (MSW/9629). Purity of synthesized compound was checked by TLC aluminium sheets – silica gel 60 F254 (0.2 mm). Plant material was collected from the local market of Sungai Petani, Malaysia. Chemicals, and solvents were procured from the SD Fine, Sigma-Aldrich, and Merck Ltd.

Preparation of Plant Extract

Preparation *Paeonia lactiflora* root extract (PLRE) was prepared as per the standard protocol[8]. Briefly, *Paeonia lactiflora* roots free of decay or mold were collected from the province of Sungai Petani, Kedah state, Malaysia and washed with fast flowing tap water, followed by air drying, mincing into small pieces; and macerated for 15 days using hydroalcoholic solvent (50:50). The mixture was filtered using double muslin cloth and a filter paper (Whatman No. 1) and the filtrate was dried to offer dark brown colour PLRE. The obtained PLRE was stored at 4°C in refrigerator for further evaluation of its antimicrobial activity against MTB.

Procedure for the synthesis of paenol derivative (PD)

The synthesis of PD was done as per the standard protocol with slight modifications[86-105]. Briefly, the hydroacetophenone was refluxed with equimolar concentration of ethylchloroacetate for 16 hours. The obtained product was extracted with ether and purified.



Response of PD and PLRE against MTB

Preparation of bacterial culture

Bacterial strains of *Staphylococcus aureus (S. aureus)* and *Escherichia coli (E. coli)* were used for the antimicrobial experiment. The prepared stock culture of microorganism was maintained at 4°C. Subcultures were prepared by transferring loopful of microorganisms' colonies from stock cultures into the nutrient broth and incubated for 24 hours at 37˚C in the incubator. The broth turbidity indicated the microbial growth[12,13].

Well Diffusion Method

The inhibitory potential of the prepared PLRE and PD against MTB was determined using well diffusion method-based zone of inhibition. The experimental protocol was followed as per the standard references with slight modifications[12-13]. Briefly, 20 µl of nutrient broth containing broth organism was poured into Muller Hinton agar plate, that was spread uniformly using L-shape rod. The wells were made on the agar medium with cork borer of 5 mm in diameter which was previously sterilized using autoclave at 121˚C for one hour. Each 50 µl of PLRE and PD were pipetted separately into the cup made on the agar plate. In the agar plate a few wells for PLRE, PD, standard and control. These plates contained the antibiotic streptomycin (standard) and tween 80 (control) solution for the purpose of comparison with the PLRE and PD. All the plates were incubated for 24 hours at 37˚C. The diameter of zone of inhibition around wells was measured in millimetres (mm) in triplicate and average values were calculated.

Preliminary Phytochemical screening of PLRE

The PLRE was subjected to preliminary phytochemical screening for the detection of various plant constituents. The prepared extract was screened for the presence of alkaloids, carbohydrates, flavonoids, glycosides, proteins, tannins, and phenols as per the procedure given in standard references[176-179].

RESULTS

Synthesis of PD

Pale yellow liquid; Yield 82%; ATR-IR: 3038, 2924, 1718, 1796 cm^{-1}; ^{1}H-NMR δ (ppm): 1.31 (3H, t, CH_3), 2.56 (3H, s, CH_3), 3.75 (3H, s, O-CH_3), 4.15 (2H, q, O-CH_2), 4.91 (2H, s, O-CH_2), 6.41-7.67 (3H, m, Ar-H); MS: m/z: 252 (M^+).

Response of PLRE and PD against MTB

In present study, the prepared PLRE and PD, were evaluated for their inhibitory potential against MTB such as *S. aureus* and *E. coli* using agar well diffusion for measurement of zone of inhibition. The results so obtained are given in table 1.

Table 1: Zone of inhibition of PLRE and PD

Compound	Microorganism	Zone of inhibition			
		Reading 1	Reading 2	Reading 3	Average Value
PLRE	*E. coli*	12	12	12	12
	S. aureus	15	15	15	15
PD	*E. coli*	22	22	22	22
	S. aureus	23	23	23	23
Streptomycin	*E. coli*	24	24	24	24
	S. aureus	25	25	25	25
Tween 80	*E. coli*	-	-	-	-
	S. aureus	-	-	-	-

Preliminary Phytochemical screening of PLRE

The PLRE was subjected to qualitative testing as per the procedure given in standard references[176-179]. The group of compounds identified in PLRE are given in table 2.

Table 2: Phytoconstituents of the PLRE

S. No.	Tests	Phytoconstituents
1	Alkaloids	+
2	Flavonoids	+
3	Glycosides	+
4	Proteins	-
5	Tannins and Phenolic compounds	+
6	Sterols	+

Where, (+) positive represent presence, and (-) negative represent absence

DISCUSSION

The preliminary phytochemical screening of prepared PLRE revealed presence of alkaloids, flavonoids, glycosides, sterols, tannins, and phenolic compounds. The IR,1H-NMR, and mass spectral data of PD was found to be in agreement with its structure. The characteristic 1H-NMR signal at 1.31 & 4.15, appearance of IR band at 1796 cm^{-1} and m/z value at 252 supported the successful synthesis of PD. These spectral values were also further confirmed based on the literary facts[180,181]. Research correlates the mechanics' of spread of diseases or ailments at molecular level and molecular therapeutics or approaches to treat them[182-214]. Evidence reports *S. aureus* and *E. coli*, to trigger microbial resistance towards conventional antibiotics raises the demand for evaluation of antimicrobials[4-7]. Facts suggests phytochemical to elicit strong antimicrobial activity attributed to their phenolic content[215-217]. Reports suggests use of *Paeonia lactiflora* in the treatment of various diseases and to possess strong antimicrobial potential. As per the literature available over different parts of *Paeonia lactiflora* plant and yet much more must be explored for this plant. Hence,

investigators of present study was planned to evaluate the in-vitro inhibition potential of *Paeonia lactiflora* root extract against MTB (*Staphylococcus aureus* and *Escherichia coli*) using well diffusion method. The PLRE was prepared using hydroalcoholic extract 50%. The prepared PLRE was investigated for anti-microbial activity (using well diffusion method) and phytochemical screening. The PLRE showed good inhibitory effect overgrowth of *S. aureus* and *E. coli.* On the other hand, the PD was prepared by esterification of paenol, and when tested against MTB (*S. aureus* and *E. coli*) exhibited high inhibitory potential study revealed that synthetic derivative (PD) possesses high potential when compared with PLRE. However, further preclinical, and clinical studies are required to further support the antimicrobial potential of PD.

CONCLUSION

The results of the present study over inhibitory potential of PD and PLRE against MTB, it is here by concluded that synthetic derivative PD possess high antimicrobial potential against MTB especially *S. aureus* and *E. coli*. Present study recommends that highly potent PD should be further evaluated based on the preclinical and clinical data.

CONFLICTS OF INTEREST

The authors have no conflicts of interest regarding this investigation.

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REFERENCES

1. Jensen K, Günther J, Talbot R, Petzl W, Zerbe H, Schuberth HJ, Seyfert HM, Glass EJ. Escherichia coli- and Staphylococcus aureus-induced mastitis differentially modulate transcriptional responses in neighbouring uninfected bovine mammary gland quarters. BMC Genomics. 2013 Jan 16;14:36.
2. Fuloria S, Subramaniyan V, Sekar M, Wu YS, Chakravarthi S, Nordin RB, Sharma PK, Meenakshi DU, Mendiratta A & Fuloria NK. Introduction to Microbiome. In: Gupta G, Oliver BG, Dua, K, Singh A, MacLoughlin R. (eds) Microbiome in Inflammatory Lung Diseases. Springer, Singapore, 2022.
3. Mishra S, Sharma D, Srivastava SP, Raj K, Malviya R, Fuloria NK. Tele-medicine: The Immediate and Long-Term Functionality Contributing to Treatment and Patient Guidance. In: Choudhury T, Katal A, Um JS, Rana A, Al-Akaidi M (eds) Telemedicine: The Computer Transformation of Healthcare. 2022. TELe-Health. Springer, Cham.
4. Pahwa S, Fuloria NK, Kumar N, Singh V, Fuloria S. Diversified beauty of Saccharomyces boulardii. Pharmaceutical reviews. 2007;5(6).
5. Rohane SH, Chauhan AJ, Fuloria NK, Fuloria S. Synthesis and invitro antimycobacterial potential of novel hydrazones of eugenol. Arabian Journal of Chemistry. 2020; 13(2): 4495.
6. Fuloria S, Fuloria NK, Balaji K, Karupiah S, Sathasivam K, Jain A, Sridevi U, Himaja M. Synthesis and discerning of the antimicrobial potential of new azomethines derived from chloroxylenol. Indian Journal of Heterocyclic Chemistry. 2016;26(1-2):95.
7. Fuloria NK, Fuloria S, Balaji K, Karupiah S, Sathasivam K, Jain A, Sridevi U, Himaja M. Synthesis and evaluation of antimicrobial potential of novel oxadiazoles derived from tolyloxy moiety. Indian Journal of Heterocyclic Chemistry. 2016;26(3-4):101-5.
8. Ze PS, Yu CX, Jo LS, Subramaniyan V, Sharma PK, Meenakshi DU, Chinnasamy V, Palanisamy SM, Kishore N, Rajasekaran S, Adinarayana S, Yadav DK, Parihar L, Kushwaha SP, Muthuramu T, Fuloria S, Fuloria NK. In-vitro antimicrobial activity of Cymbopogon citratus Stem extracts. Journal of Cardiovascular Disease

Research. 2021; 12(5): 1121-1132.

9. Subramaniyan V, Fuloria S, Chakravarthi S, Aaleem AA, Jafarullah SM, Fuloria NK. Dental Infections and Antimicrobials. Journal of Drug and Alcohol Research. 2021;10(4):1-5.
10. Barkatullah R, Abdur IM, Khan H, Bashir K, Fuloria S, Fuloria NK, Mabkhot YN, Naz H, Algarni H. Antimicrobial, cytotoxic and phytotoxic activities of Skimmia laureola. Zeitschrift Fur Arznei- & Gewurzpflanzen. 2020; 25 (2), 88-91.
11. Jaju S, Pahwa S, Fuloria N. Phytochemical and antimicrobial activity of stem and leaves of Desmodium gangeticum linn. Hamdard Medicus. 2009;52(4):131-5.
12. Sharma PK, Fuloria S, Alam S, Sri MV, Singh A, Sharma VK, Kumar N, Subramaniyan V, Fuloria NK. Chemical composition and antimicrobial activity of oleoresin of Capsicum annuum fruits. Mindanao Journal of Science and Technology. 2021;19(1): 29-43.
13. Shivkanya J, Shilpa P, Sangita K, Neeraj F. Pharmacognostical studies and antibacterial activity of the leaves of Murraya koenigii. Pharmacognosy Journal. 2009; 1(3), 211-214.
14. Fuloria NK, Fuloria S, Kathiresan S, Sundram KM, Balaji K. Principles and Practices of traditional, complementary and alternative medicine. Nirali Prakashan, India, 2017.
15. Fuloria NK, Fuloria S, Kumar S, Singh A. Fundamentals of Pharmaco-economics. Nirali Prakashan, India, 2017.
16. Gauniya A, Fuloria S, Tripathi P, Fuloria N, Pahwa S, Basu SP. Role of aromatic plants in national economy. Pharmaceutical reviews. 2008;6(1).
17. Subramaniyan V, Paramasivam VE. Potential anti-inflammatory activity of Plumbago zeylanica. Asian J Pharm Clin Res. 2017;10(10):372-5.
18. Vetriselvan S, Subasini U, Velmurugan C, Muthuramu T, Revathy J. Anti-inflammatory activity of Cucumis sativus seed in carrageenan and xylene induced edema model using albino wistar rats. Int. J. Biopharm. 2013;4(1):34-7.
19. Sekar M, Jeyabalan D, Bala L, Subramanian K, Jabaris SL, Wong LS, Subramaniyan V, Chidambaram K, Gan SH, Izzati NN, Begum MY. Neuropharmacological evaluation of Morinda citrifolia Linn fruits extract in animal models of obsessive-compulsive disorder. Frontiers in Pharmacology. 2022.
20. Malik MK, Kumar V, Sharma PP, Singh J, Fuloria S, Subrimanyan V, Fuloria NK, Kumar P. Improvement in Digestion Resistibility of Mandua Starch (Eleusine coracana) after Cross-Linking with Epichlorohydrin. ACS omega. 2022;7(31):27334-46.
21. Velu V, Banerjee S, Radhakrishnan V, Gupta G, Chellappan DK, Fuloria NK, Fuloria S, Mehta M, Dua K, Malipeddi H. Identification of Phytoconstituents of Tragia Involucrata leaf Extracts and Evaluate their Correlation with Anti-inflammatory & Antioxidant Properties. Anti-Inflammatory & Anti-Allergy Agents in Medicinal Chemistry (Formerly Current Medicinal Chemistry-Anti-Inflammatory and Anti-Allergy Agents). 2021 Sep 1;20(3):308-15.
22. Vetriselvan S, Shankar J, Gayathiri S, Ishwin S, Devi CH, Yaashini A, Sheerenjet G. Comparative evaluation of in vitro antibacterial and antioxidant activity using standard drug and polyherbal formulation. Int J Phytopharm. 2012;3:112-6.
23. Kayarohanam S, Subramaniyan V, Janakiraman AK, Kumar SJ. Antioxidant, antidiabetic, and antihyperlipidemic activities of dolichandrone atrovirens in albino Wistar rats. Research Journal of Pharmacy and Technology. 2019;12(7) :3511-6.
24. Venkateshan S, Subramaniyan V, Chinnasamy V, Chandiran S. Anti-

oxidant and anti-hyperlipidemic activity of Hemidesmus indicus in rats fed with high-fat diet. Avicenna journal of phytomedicine. 2016;6(5):516.

25. Nivetha V, Subramaniyan V, Manikandan G, Divya Bharathi M, Krishna Prasanth T, Manjula K. In vitro antidiabetic and antioxidant activities of the methanolic extract of Alpinia purpurata root. Journal of Pharmacognosy and Phytochemistry. 2019;8(3):1060-4.
26. Velu V, Fuloria N, Fuloria S, Panda J, Panda BP, Malipeddi H. In Vitro and In Vivo Anti-Urolithiatic Activity of Terpenoid-Rich Ethyl Acetate Extract of Rhizomes of Curcuma Zedoaria. Studies on Ethno medicine. 2018;12(1,2): 31-39.
27. Subramaniyan V, Shaik S, Bag A, Manavalan G, Chandiran S. Potential action of Rumex vesicarius (L.) against potassium dichromate and gentamicin induced nephrotoxicity in experimental rats. Pak J Pharm Sci. 2018 Mar 1;31(2):509-16.
28. Subramaniyan V, Shaik S, Bag A, Manavalan G, Chandiran S. Potential action of Rumex vesicarius (L.) against potassium dichromate and gentamicin induced nephrotoxicity in experimental rats. Pakistan Journal of Pharmaceutical Sciences. 2018.31(2): 509-516.
29. Chinnasamy V, Subramaniyan V, Chandiran S, Kayarohanam S, Kanniyan DC, Velaga VS, Muhammad S. Antiarthritic Activity of Achyranthes Aspera on Formaldehyde-Induced Arthritis in Rats. Open Access Maced J Med Sci. 2019; 7 (17): 2709-2714.
30. Velmurugan C, Muthuramu T, Venkatesh S, Vetriselvan S. Anti-depressant activity of ethanolic extract of bark of Ougeinia oojeinensis (Roxb.) in mice. International Journal of Biological and Pharmaceutical Research. 2013;4(5):382-5.
31. Jaju SB, Fuloria NK, Bhargav KL. Anthelmintic activity of Ferula foetida Regel. Antiseptic. 2010;107(2):97.
32. Lum PT, Sekar M, Gan SH, Jeyabalan S, Bonam SR, Rani N, Mahdzir KMK, Seowa LJ, Wu YS, Subramaniyan V, Fuloria NK, Fuloria S. Therapeutic potential of mangiferin against kidney disorders and its mechanism of action: A review. Saudi Journal of Biological Sciences. 2022; 29(3): 1530.
33. Zuraini NZA, Sekar M, Wu YS, Gan SH, Bonam SR, Rani NNIM, Begum MY, Lum PT, Subramaniyan V, Fuloria NK, Fuloria S. Promising Nutritional Fruits against Cardiovascular Diseases: An Overview of Experimental Evidence and Understanding Their Mechanisms of Action. Vascular Health and Risk Management. 2021; 17: 739-769.
34. Vetriselvan S, Suganya V, Muthuramu T. Antihyperlipidemic activity of hydroalcoholic extract of Hybanthus enneaspermus. Asian Journal of Phytomedicine and Clinical Research. 2013;1(1).
35. Zahoor I, Singh S, Behl T, Sharma N, Naved T, Subramaniyan V, Fuloria S, Fuloria NK, Bhatia S, Al-Harrasi A, Aleya L. Emergence of microneedles as a potential therapeutics in diabetes mellitus. Environmental Science and Pollution Research. 2021:1-21.
36. Sharma P, Bajaj S, Fuloria S, Porwal O, Subramaniyan V, ozdemir M, Meenakshi DU, Kishore N, Fuloria NK. Ethnomedicinal And Pharmacological Uses Of Curcuma Caesia. NVEO – Natural Volatiles & Essential Oils Journal. 2021; 8(1), 14902-14910.
37. Jaju SB, Indurwade NH, Sakarkar DM, Ali M, Fuloria NK. Antidiabetic and Antiinflammatory Studies of Alpinia galanga Rhizome. Asian Journal of Chemistry. 2011; 23(3):1230.
38. Gothwal SK, Goyal K, Barjatya HC, Bhakar BL, Dahiya R, Singh Y, Saini TK, Agrawal M, Subramaniyan V, Gupta G. Estimating the correlation between TYG and CIMT in non-diabetic adult patients. Obesity Medicine. 2022 Oct 1;35:100460.
39. Fuloria S, Mehta J, Talukdar MP, Sekar M, Gan SH, Subramaniyan V, Rani NN,

Begum MY, Chidambaram K, Nordin R, Maziz MN. Synbiotic Effects of Fermented Rice on Human Health and Wellness: A Natural Beverage That Boosts Immunity. Frontiers in Microbiology. 2022;13.

40. Porwal O, Nee JLJ, Fuloria S, ozdemir M, kala D, Answer ET, Fuloria NK. Response Of Hydroalcoholic Extract Of Plumeriaalba Leaves Against Periodontal Disease Triggering Microbiota. NVEO – Natural Volatiles & Essential Oils Journal. 2021; 8(1), 13047-13063.
41. La Jun Ting N, Fuloria S, Subramaniyan V, Sharma PK, Unnikrishnan Meenakshi D, Chinnasamy V, Palanisamy SM, Fuloria NK. Response Of Various Extracts Of Manilkarazapota (L) Seeds Against Periodontitis Triggering Microbiota. NVEO – Natural Volatiles & Essential Oils Journal. 2021; 8(1): 13047-13063.
42. Selvaraj S Naing NN, Arfah NW, Djearamane S, Wong LS, Subramaniyan V, Fuloria NK, Sekar M, Fuloria S, Abreu MHNG de Abreu. Epidemiological Factors of Periodontal Disease AQ2 AQ1 Among South Indian Adults. Journal of Multidisciplinary Healthcare. 2022; 15: 1547-1557.
43. Subramaniyan V, Fuloria NK, Fuloria S, Hazarika I. Drug Treatment of Diarrhea. In: Textbook of Pharmacology, page 493-496, Thieme Publications, India, 2021.
44. Safi SZ, Saeed L, Shah H, Latif Z, Ali A, Imran M, Muhammad N, Emran TB, Subramaniyan V, Ismail IS. Mechanisms of β-adrenergic receptors agonists in mediating pro and anti-apoptotic pathways in hyperglycemic Müller cells. Molecular Biology Reports. 2022;49(10):9473-80.
45. Subramaniyan V, Fuloria S, Gupta G, Kumar DH, Sekar M, Sathasivam K, Sudhakar K, Alharbi KS, Afzal O, Kazmi I, Al-Abbasi FA, Altamimi ASA, Fuloria NK. A review on epidermal growth factor receptor's role in breast and non-small cell lung cancer. Chemico-Biological Interactions. 2022; 351: 109735.
46. Hamid UZ, Sim MS, Guad RM, Subramaniyan V, Sekar M, Fuloria NK, Fuloria S, Choy KW, Fareez IM, Bonam SR, Wu YS. Molecular Regulatory Roles of Long Non-coding RNA HOTTIP: An Overview in Gastrointestinal Cancers. Current molecular medicine. 2022;22(6):478-90.
47. Morais SR, Chitra K, Jeyabalan S, Wong LS, Sekar M, Chidambaram K, Gan SH, Begum MY, Rani NN, Subramaniyan V, Fuloria S. Anticancer potential of Spirastrella pachyspira (marine sponge) against SK-BR-3 human breast cancer cell line and in silico analysis of its bioactive molecule sphingosine. Frontiers in Marine Science. 2022 Sep 15;9:950880.
48. Yap KM, Sekar M, Seow LJ, Gan SH, Bonam SR, Mat Rani NNI, Lum PT, Subramaniyan V, Wu YS, Fuloria NK, Fuloria S. Mangifera indica (Mango): A Promising Medicinal Plant for Breast Cancer Therapy and Understanding Its Potential Mechanisms of Action. Breast Cancer: Targets and Therapy. 201; 13:471-503.
49. Yap KM, Sekar M, Fuloria S, Wu YS, Gan SH, Rani NNIM, Subramaniyan V, Kokare C, Lum PT, Begum MY, Mani S, Meenakshi DU, Sathasivam K, Fuloria NK. Drug Delivery of Natural Products Through Nanocarriers for Effective Breast Cancer Therapy: A Comprehensive Review of Literature. International Journal of Nanomedicine. 2021; 16: 7891-7941.
50. Ramli S, Sim MS, Guad RM, Gopinath SC, Subramaniyan V, Fuloria S, Fuloria NK, Choy KW, Rana S, Wu YS. Long noncoding RNA UCA1 in gastrointestinal cancers: molecular regulatory roles and patterns, mechanisms, and interactions. Journal of oncology. 2021;2021.
51. Fuloria S, Subramaniyan V, Karupiah, S, Kumari U, Sathasivam K, Meenakshi

DU, Wu YS, Sekar M, Chitranshi N, Malviya R, Sudhakar K, Bajaj S, Fuloria NK. Comprehensive Review of Methodology to Detect Reactive Oxygen Species (ROS) in Mammalian Species and Establish Its Relationship with Antioxidants and Cancer. Antioxidants. 2021; 10: 128.

52. Haider MR, Ahmad K, Siddiqui N, Ali Z, Akhtar MJ, Fuloria N, Fuloria S, Ravichandran M, Yar MS. Novel 9-(2-(1-arylethylidene) hydrazinyl) acridine derivatives: Target Topoisomerase 1 and growth inhibition of HeLa cancer cells. Bioorganic chemistry. 2019;88:102962.
53. Kumar N, Singh H, Gupta AK, Singh A, Fuloria N.. Comparative study of the toxicity profile in patients receiving cisplatin- paclitaxel vs carboplatin paclitaxel in ovarian cancer. World Journal of Pharmaceutical Research 2019; 8, 3, 1063-1070.
54. Vakiloddin S, Fuloria N, Fuloria S, Dhanaraj SA, Balaji K, Karupiah S. Evidences of hepatoprotective and antioxidant effect of Citrullus colocynthis fruits in paracetamol induced hepatotoxicity. Pakistan Journal of Pharmaceutical sciences. 2015; 28(3): 951-7.
55. Vetriselvan S, Middha A. Potential action of Andrographis paniculata against chronic ethanol consumption induced liver toxicity in experimental rats. Eur. J. Med. Plants. 2016;12:1-9.
56. Gayathiri S, Vetriselvan S, Shankar Jothi IS, Hemah Devi SK, Yaashini A. Hepatoprotective activity of aqueous extract of Hippophae rhamnoides L. in carbon tetrachloride induced hepatotoxicity in albino wistar rats. International journal of biological & pharmaceutical research. 2012;3(4):531-7.
57. Subramaniyan V, Jegasothy R. Update on ethanol induced oxidative stress in liver toxicity and the effects of pregnancy. Indian Journal of Public Health. 2019;10(8).
58. Wahab NW, Guad RM, Subramaniyan V, Fareez IM, Choy KW, Bonam SR, Selvaraju C, Sim MS, Gopinath SC, Wu YS. Human exfoliated deciduous teeth stem cells: features and therapeutic effects on neurogenerative and hepatobiliary-pancreatic diseases. Current stem cell research & therapy. 2021 Jul 1;16(5):563-76.
59. Subramaniyan V, Middha A. Chronic ethanol consumption induced hepatotoxicity and protective effect of Boswellia serrata. National Journal of Physiology, Pharmacy and Pharmacology. 1970;6(2):170.
60. Singh I, Vetriselvan S, Shankar J, Gayathiri S, Hemah C, Shereenjeet G, Yaashini A. Hepatoprotective activity of aqueous extract of curcuma longa in ethanol induced hepatotoxicity in albino wistar rats. Int J Phytopharmacol. 2012;3(3):226-33.
61. Chellappann DK, Subramaniyan V, Rajamanickam GV, Muthappan M, Gnanasekaran D. Hepatoprotective effects of aqueous extract of Andrographis paniculata against ccl4 induced hepatotoxicity in albino Wistar rats. Asian Journal of Pharmaceutical and Clinical Research. 2011;4(3):93-4.
62. Vetriselvan S, Subasini U, Rajamanickam C, Thirumurugu S. Hepatoprotective activity of Andrographis paniculata in ethanol induced hepatotoxicity in albino wistar rats. IJCP. 2011;1:1-4.
63. Vetriselvan S, Victor R, Parimala D, Arun G. Comparative evaluation of hepatoprotective activity of andrographis paniculata and Silymarin in ethanol induced hepatotoxicity in albino wistar rats. Der Pharmacia Lettre. 2010;2(6):52-9.
64. Subramaniyan V, Middha A. Chronic ethanol consumption–induced hepato-toxicity and protective effect of Boswellia serrata. National Journal of Physiology, Pharmacy and Pharmacology. 2016; 6(2): 170.
65. Kaur S, Vetriselvan S, Hemah C, Gayathiri S, Yaashini A, Singh I,

Shankar J. Hepatoprotective activity of aqueous extract of Picrorhiza kurroa in carbon tetrachloride (ccl4) induced hepatotoxicity in albino wistar rats. Int J Pharm Ther. 2012;3(2):207-14.

66. Subramaniyan V. Therapeutic Importance of Caster Seed Oil. Nuts and Seeds in Health and Disease Prevention (Second Edition), Academic Press, 2020: 485-495.
67. Subramaniyan V, Kayarohanam S, Kumarasamy V. Impact of herbal drugs and its clinical application. Int J Pharm Res. 2019.
68. Kaur R, Sood A, Kanotra M, Arora S, Subramaniyan V, Bhatia S, Al-Harrasi A, Aleya L, Behl T. Pertinence of nutriments for a stalwart body. Environmental Science and Pollution Research. 202;28(39):54531-50.
69. Ee JW, Velaga A, Guad RM, SubramaniyanV, Fuloria NK, Choy KW, Fuloria S, Wu YS. Deciphering Synsepalum dulcificum as an arising phytotherapy agent: Background, phytochemical, and pharmacological properties with associated molecular mechanism. Sains Malaysiana. 2022; 51(1): 199-208.
70. Singh S, Sharma N, Sachdeva M, Behl T, Zahoor I, Fuloria NK, Sekar M, Fuloria S, Subramaniyan V, Alsubayiel AM, Dailah HG. Focusing the pivotal role of nanotechnology in Huntington's disease: an insight into the recent advancements. Environmental Science and Pollution Research. 2022:1-9.
71. Tan EP, Djearamane S, Wong LS, Rajamani R, Tanislaus Antony AC, Subbaih SK, Janakiraman AK, Aminuzzaman M, Subramaniyan V, Sekar M, Selvaraj S. An In Vitro Study of the Antifungal Efficacy of Zinc Oxide Nanoparticles against Saccharomyces cerevisiae. Coatings. 2022;12(12):1988.
72. Ting BYS, Fuloria NK, Subrimanyan V, Bajaj S, Chinni SV, Reddy LV, Sathasivam KV, Karupiah S, Malviya R, Meenakshi DU, Paliwal N, Priya K, Fuloria S. Biosynthesis and Response of Zinc Oxide Nanoparticles against Periimplantitis Triggering Pathogens. Materials. 2022; 15(9):3170.
73. Malviya R, Fuloria S, Verma S, Subramaniyan V, Sathasivam KV, Kumarasamy V, Kumar DH, Vellasamy S, Meenakshi DU, Yadav S, Sharma A. Commercial utilities and future perspective of nanomedicines. PeerJ. 2021 ;9:e12392.
74. Sudhakar K, Fuloria S, Subramaniyan V, Sathasivam KV, Azad AK, Swain SS, Sekar M, Karupiah S, Porwal O, Sahoo A, Meenakshi DU. Ultraflexible Liposome Nanocargo as a Dermal and Transdermal Drug Delivery System. Nanomaterials. 2021;11(10):2557.
75. Sharma N, Zahoor I, Sachdeva M, Subramaniyan V, Fuloria S, Fuloria NK, Naved T, Bhatia S, Al-Harrasi A, Aleya L, Bungau S. Deciphering the role of nanoparticles for management of bacterial meningitis: an update on recent studies. Environmental Science and Pollution Research. 2021;28(43):60459-76.
76. Malviya R, Raj S, Fuloria S, Subramaniyan V, Sathasivam K, Kumari U, Unnikrishnan Meenakshi D, Porwal O, Hari Kumar D, Singh A, Chakravarthi S, Kumar Fuloria N. Evaluation of Antitumor Efficacy of Chitosan-Tamarind Gum Polysaccharide Polyelectrolyte Complex Stabilized Nanoparticles of Simvastatin. International Journal of Nanomedicine. 2021; 16: 2533-2553.
77. Jha R, Singh A, Sharma PK, Porwal O, Fuloria NK. Graphene-based nanomaterial system: A boon in the era of smart nanocarriers. Journal of Pharmaceutical Investigation. 2021;51(3):245-80.
78. Chinni SV, Gopinath SCB, Anbu P, Fuloria N, Fuloria S, Mariappan P, Krusnamurthy K, Reddy LV, Ramachawolran G, Sreeramanan S, Sumitha S. Characterization and antibacterial response of silver nanoparticles biosynthesized using

Coccinia indica leaves ethanolic extract. Crystals. 2021; 11(2): 97.

79. Fuloria S, Subramaniyan V, Karupiah S, Kumari U, Sathasivam K, Meenakshi DU, Wu YS, Guad RM, Udupa K, Fuloria NK. A Comprehensive Review on Source, Types, Effects, Nano-technology, Detection, and Therapeutic Management of Reactive Carbonyl Species Associated with Various Chronic Diseases. Antioxidants. 202; 9: 1075.
80. Fuloria S, Ru CS, Paliwal N, Karupiah S, Sathasivam K, Singh S, Gupta K, Fuloria NK. Response of biogenic zinc oxide nanoparticles against periimplantitis triggering non-periodontal pathogen. International Journal of Research in Pharmaceutical Sciences. 2020;11(3):3889-96.
81. Fuloria NK, Ko MY, Rui CS, Hang CZ, Karupiah S, Paliwal N, Kumari U, Gupta K, Sathasivam K, Fuloria S. Green synthesis and evaluation of dimocarpus longan leaves extract based chitosan nanoparticles against periodontitis triggering bacteria. Asian Journal of Chemistry. 2020; 32(7);1660-1666.
82. Jha R, Singh A, Sharma PK, Fuloria NK. Smart carbon nanotubes for drug delivery system: A comprehensive study. Journal of Drug Delivery Science and Technology. 2020;58:101811.
83. Hang CZ, Fuloria NK, Hong OJ, Kim CB, Ting BY, Ru CS, Ko MY, Fuloria S. Biosynthesis of DLLAE blended silver nanoparticles and their response against periodontitis triggering bacteria. International Journal of Research in Pharmaceutical Sciences. 2020; 11(2): 1849-56.
84. Fuloria NK, Fuloria S, Chia KY, Karupiah S, Sathasivam K. Response of green synthesized drug blended silver nanoparticles against periodontal disease triggering pathogenic microbiota. Journal of Applied Biology and Biotechnology. 2019 Jul 4;7(4):4-6.
85. Fuloria S, Fuloria NK, Yi CJ, Khei TM, Joe TA, Wei LT, Karupiah S, Paliwal N, Sathasivam K. Green Synthesis of Silver Nanoparticles Blended with Citrus Hystrix Fruit Juice Extract and their Response to Periodontitis Triggering Microbiota. Bulletin of Environment, Pharmacology and Life Sciences. 2019;8(7):112-23.
86. Fuloria NK, Singh V, Shaharyar M, Ali M. Antimicrobial evaluation of imines and thiazolidinones derived from 3-phenyl propanehydrazide. Acta Poloniae Pharmaceutica-Drug Research. 2009; 66:141-6.
87. Fuloria NK, Fuloria S, Balaji K, Sundram KM. Evidences of Antitubercular Potential of Novel Thiazolidinone Derivatives Bearing Chloroxylenol Moiety. Malaysian Journal of Pharmacy. 2015; 2 (1): 67.
88. Fuloria SH, Fuloria NK, Sundram K, Kathiresan S, Saurabh S, Khushboo G, Ajay J, Ugrappa S, Malipeddi H, Shiva S. Synthesis and discerning of antibiotic potential of PCMX based novel azetidinones. Acta Poloniae Pharmaceutica. 2017;76:1711-5.
89. Fuloria NK, Fuloria SH, Sathasivam KA, Karupiah S, Balaji KA, Jin LW, Jade OD, Jing IC. Synthesis and discerning of antimicrobial potential of novel oxadiazole derivatives of chloroxylenol moiety. Acta Poloniae Pharmaceutica. 2017;74(4):1125.
90. Chigurupati S, Fuloria NK, Fuloria S, Karupiah S, Veerasamy R, Nemala AR, Yi LJ, xiang Ilan A, Shah SA. Synthesis and antibacterial profile of novel azomethine derivatives of β-phenylacrolein moiety. Tropical Journal of Pharmaceutical Research. 2016;15 (4):821-6.
91. Fuloria NK, Balaji K, Karupiah S, Sathasivam K, Jain A, Sridevi U, Himaja M. Synthesis, characterization and antimicrobial evaluation of 2-phenylpropanoic acid derived new oxadiazoles. Indian Journal of Heterocyclic Chemistry. 2016;1:2-37.
92. Fuloria NK, Fuloria S, Gupta R. Synthesis and antimicrobial profile of newer Schiff bases and thiazolidinone

derivatives. International Scholarly and Scientific Research & Innovation. 2014; 8:12.
93. Gupta R, Fuloria NK, Fuloria S. Synthesis and antimicrobial activity evaluation of some schiff bases derived from 2-aminothiazole derivatives. Indonesian Journal of Pharmacy. 2013:193-7.
94. Gupta R, Fuloria NK, Fuloria S. Synthesis and antimicrobial profile of some newer 2-amino-thiazole derivatives. Turkish Journal of Pharmaceutical Sciences. 2013;10(3).
95. Varshney MM, Husain A, Percha V, Fuloria N. Synthesis, characterization and biological evaluations of some 5-(substituted amino alkyl)-2-{(1, 3-benzothiazole-2-yl)}-thiazolidine-4 one Mannich bases as potent antibacterial agents. Journal of Applied Pharmaceutical Science. 2013;3(4):135-8.
96. Gupta R, Fuloria NK, Fuloria S. Synthesis & antimicrobial profile of some new heterocycles bearing thiazole moiety. Southern Brazilian Journal of Chemistry. 2012;20:20-61.
97. Chauhan V, Fuloria NK, Fuloria S. Synthesis, characterization and comparative screening of some newer 2-phenyl indole and 5-chloro-2-phenyl indole derivatives. Southern Brazilian Journal of Chemistry. 2012;20(20):69-76.
98. Fuloria NK, Singh V, Shaharyar M, Ali M. Synthesis and Antimicrobial Evaluation of Some New Oxadiazoles Derived from Phenylpropionohydrazides. Molecules. 2009; 14(5): 1898-1903.
99. Fuloria NK, Singh V, Yar MS, Ali M. Synthesis, characterization and antimicrobial evaluation of novel imines and thiazolidinones. Acta Poloniae Pharmaceutica-Drug Research. 2009;66(2):141-6.
100. Fuloria NK, Singh V, Shaharyar M, Ali M. Synthesis and antimicrobial studies of novel imines and oxadiazoles. Southern Brazilian Journal of Chemistry. 2008;16:11-22.
101. Fuloria NK, Singh V, Shaharyar M, Ali M. Synthesis, characterization and biological studies of new schiff bases and azetidinones derived from propionic acid derivatives. Asian Journal of Chemistry. 2008;20(8):6457.
102. Fuloria NK, Singh V, Shaharyar M, Ali M. Synthesis, characterization and biological studies of novel imines and azetidinones derivatives of haloaryloxy moiety. Asian Journal of Chemistry. 2008;20(6):4891.
103. Sa'ad MA, Kavitha R, Fuloria S, Fuloria NK, Ravichandran M, Lalitha P. Synthesis, Characterization and Biological Evaluation of Novel Benzamidine Derivatives: Newer Antibiotics for Periodontitis Treatment. Antibiotics. 2022; 11(2):207.
104. Naaz F, Ahmad F, Lone BA, Pokharel YR, Fuloria NK, Fuloria S, Ravichandran M, Pattabhiraman L, Shafi S, Yar MS. Design and synthesis of newer 1, 3, 4-oxadiazole and 1, 2, 4-triazole based Topsentin analogues as anti-proliferative agent targeting tubulin. Bioorganic chemistry. 2020;95:103519.
105. Dahiya R, Rampersad S, Ramnanan singh TG, Kaur K, Kaur R, Mourya R, Chennupati SV, Fairman R, Jalsa NK, Sharma A, Fuloria S. Synthesis and Bioactivity of a Cyclopolypeptide from Caribbean Marine Sponge. Iranian Journal of Pharmaceutical Research: IJPR. 2020; 19(3):156.
106. Malik M, Bhatt P, Kumar T, Singh J, Kumar V, Faruk A, Fuloria S, Fuloria N, Subramaniyan V, Kumar S. Significance of chemically derivatized starch as drug carrier in developing novel drug delivery devices. The Natural Products Journal. 2022;12.
107. Muthu M, Vetriselvan S, Narra Kishore Yadav RM, Senthil Kumar C, Mohamed Raffick M, Vignesh M, Selvakumar K, Joysa Ruby J, Parkavi V. Preparation and evaluation of alginate/chitosan particulate system for rifampicin release. International Journal of Pharmacy & Therapeutics. 2012;3(2):215-20.

108. Raffick MM, Mohamed JM, Vetriselvan S, Vignesh M, Selvakumar K, Parkavi V, Ruby JJ. Preparation and evaluationof in-vitro release kinetics of novel bilayer metoprolol succinate as sustained release and amlodipine besylate as immediat release tablets. International Journal of Biological & Pharmaceutical Research. 2012; 3(2): 285-297.
109. Mundhe A, Fuloria NK, Pande S, Biyani K. BCS based biowaivers and their current regulatory issues. Indo American Journal of Pharmaceutical Research 2013; 3(6): 4617-4629.
110. Akhlaq M, Azad AK, Fuloria S, Meenakshi DU, Raza S, Safdar M, Nawaz A, Subramaniyan V, Sekar M, Sathasivam KV, Wu YS, Miret MM, Fuloria NK. Fabrication of tizanidine loaded patches using flaxseed oil and coriander oil as a penetration enhancer for transdermal delivery. Polymers. 2021; 13(23): 4217.
111. Fuloria NK, Thosare S, Fuloria S, Balaji K, Dhanaraj SA. Design and evaluation of gastric floating Matrix tablets of an anti-hypertensive drug Perindropil erbumine. World Journal of Pharmacy and Pharmaceutical Sciences 2013; 2 (5), 3532-3537.
112. Dhole A, Neerajkumar F. An Overview on Cleaning Validation of API Manufacturing Plants. Journal of Current Pharma Research. 2013;4(1): 1097.
113. Malviya R, Sundram S, Fuloria S, Subramaniyan V, Sathasivam KV, Azad AK, Sekar M, Kumar DH, Chakravarthi S, Porwal O, Meenakshi DU, Fuloria NK. Evaluation and Characterization of Tamarind Gum Polysaccharide: The biopolymer. Polymers. 2021; 13(18): 3023.
114. Sharma VK, Sharma PP, Mazumder B, Bhatnagar A, Subramaniyan V, Fuloria S, Fuloria NK. Mucoadhesive microspheres of glutaraldehyde crosslinked mucilage of Isabgol husk for sustained release of gliclazide. Journal of Biomaterials Science, Polymer Edition. 2021;32(11):1420-49.
115. Malviya R, Jha S, Fuloria NK, Subramaniyan V, Chakravarthi S, Sathasivam K, Kumari U, Meenakshi DU, Porwal O, Sharma A, Kumar DH, Fuloria S. Determination of temperature-dependent coefficients of viscosity and surface tension of tamarind seeds (Tamarindus indica L.) Polymer. Polymers. 2021; 13(5): 610.
116. Fuloria S, Subramaniyan V, Dahiya R, Dahiya S, Sudhakar K, Kumari U, Sathasivam, K, Meenakshi DU, Wu YS, Sekar M, Malviya R, Singh A, Fuloria NK. Mesenchymal stem cell-derived extracellular vesicles: Regenerative potential and challenges. Biology. 2021; 10(3): 172.
117. Kathiresan VS, MRHM Haris, S Fuloria, NK Fuloria. Chemical modification of banana trunk fibers for the production of green composites. Polymers. 2021; 12(12): 1943.
118. Sathasivam KV, Fuloria NK, Fuloria S, Darshenee PJ, Xavier R, Marimuthu K, Sundram K. Kinetic, equilibrium and thermodynamic studies on removal of Cu (II) and Pb (II) by activated carbon prepared from macro-algae (Kappaphycus alvarezii). Asian Journal of Chemistry. 2019;31(6):1343.
119. Sathasivam K, Fuloria NK, Fuloria S, Karupiah S. Removal of Methylene Blue from Aqueous Solution Using Arto-carpus Integer Agrowaste: Equilibrium, Kinetic and Thermodynamic Studies. Bulletin of Environment, Pharmacology and Life Sciences. 2019; 8(3).
120. Sharma VK, Fuloria NK, Dhanaraj SA, Fuloria S, Vyas G. Optimization of formulation of micro-granules of acetylsalicylic acid using aqueous system. World Journal of Pharmacy and Pharmaceutical Sciences. 2014; 3 (3), 2042-2062.
121. Mundhe AV. Cocrystalization: an alternative approach for solid modification. Journal of Drug Delivery and Therapeutics. 2013;3(4):166-72.
122. Fuloria NK, Fuloria S, Dhanaraj SA. Principles and practices of industrial management. Studium Press LLC, USA,

2015.

123. Malviya R, Fuloria NK, Fuloria S, Subramaniyan V, Meenakshi DU, Nandkumar S. (2021). Polyacrylamide Grafted Tamarind Seed Gum Formulation and Method for Preparation Thereof. Australian patent, Patent No. 2021100876. Australia.
124. Malviya R, Fuloria NK, Fuloria S, Subramaniyan V, Meenakshi DU, Vneteddu VG, Dahiya R, Dahiya S, Narra K, Ganesan P. (2021). Nanoparticle formulation and method for preparation thereof. Australian patent, Patent No. 2021101624. Australia.
125. Malviya R, Fuloria NK, Fuloria S, Subramaniyan V, MD Unnikrishnan, DT Patel, VV Gangadhar, K Narra, A Sanjana, M Ajay. (2021) Carboxy-methylated polymer-based drug nanosuspension formulation and method of preparation thereof. Australian patent, Patent No. 2021102565. Australia.
126. Malviya R, Mishra PR, Mishra R, Fuloria NK, Sundaram S, Fuloria S, Subramaniyan V, Meenakshi DU, Bajaj S, Mendiratta A, Islam, M, Tiwari R, Dhamija K (2021). An air-cooling device with smart antimicrobial features. Application no. 2021/4650. South Africa.
127. Malviya R, Sundram S, Awasthi R, Mishra S, Jindal S, Srivastava SP, Raj K, Kumar V, Singh B, Balusam B, Dhanaraj RK, Fuloria, NK (2021). Acacia Chundra Gum Stabilized Highly Faced Nanoparticles for Controlled Drug Delivery. Application No. 2021103637. Australia.
128. Azad AK, Srikumar C, Fuloria NK, Fuloria S, Poovi G, Malviya R, Meenakshi DU, Mendiratta A, Patel TD, Seng WY, Sharma PK, Subramaniyan V, Sundram S, Uddin H, Vanteddu VG, Yadav DZK (2021). Composition of a transdermal film for protiene and peptide-based therapeutic drug delivery in a non-invasive way. Application no. DE202021105304U1. Germany.
129. Malviya R, Sharma PK, Md. AA, Sundra S, Kishore N, Vanteddu VG, Verma S, Fuloria NK, Fuloria S, Verma S, Singh PK, Sharma PK, Awasthi R, Subramaniyan V, Kaur A, Khatoon R (2021). Chronotherapeutic dosage form for the effective treatment of disease. Application No. 2021107459. Australia.
130. Malviya R, Fuloria NK, Fuloria S, Subramaniyan V, Wu YS, Chakravarthi S (2021). Glass separator for nanoparticles. Indian patent, Application No. 337830-001. Indian Patent Trademark Office, Delhi, India.
131. Malviya R, Fuloria NK, Fuloria S, Subramanian V, Meenakshi DU, Sundram S, Kishore N, Dipakbhai TP, Vanteddu VG, Khan SA, Kurra P (2021). Neem (Azadirachita indica) Gum Based in Situ Gelling System for Targeted Delivery of Simvastatin into Stomach. Application No. 2021103679. Australia.
132. Malviya R, Fuloria NK, Fuloria S, Subramaniyan V, Dahiya R, Chakravarthi S, Karikalan B, Hari KD, Kumarasamy V, Palanisamy SM (2021). An air-cooling device with smart antimicrobial features and its working mechanism. Application No. 2021103679. Australia.
133. Malviya R, Sundram S, Fuloria NK, Fuloria S, MP Singh, Subramaniyan V, Tiwari N, Unnikrishnan MD, Srivastava SP, Chauhan V, Mishra S (2021). Method and Process to Develop Herbal Shampoo against Pediculus Humanus Capitis De Geer (Head Louse). Application No. 2021104305. Australia.
134. Alavala RRK, Awasthi R, Azad AK, Babu RN, B RR, Dhiman N, Fuloria NK, Fuloria S, Malviya R, Meenakshi DU, Mohammad J, Rao GSNK, Sekar M, Singh A, Srivastava SP, Subramaniyan V, Sundram S, Tiwari N, Yagnik SK (2022). Eine Vorrichtung zur Herstellung von modifiziertem Babul-Gummi aus Acacia Nilotica. Patent no. G11839DE. Germany.
135. Malviya R, Sundram S, Alam MA, Mishra PS, Mishra R, Fuloria NK,

Fuloria S, Subramaniyam V, Gupta SK, Chaudhary S, Sharma PK, Natesan G, Sekar M, Verma S, Chauhan A, Dubey A, Varshney S (2022). A formulation and a method to develop transdermal film for the delivery model protein drug through non-invasive route. Application no. 2022/00715. South Africa.

136. Varshney S, Bharti M, Sundram S, Malviya R, Fuloria NK. The Role of Bioinformatics Tools and Technologies in Clinical Trials. In: Bioinformatics Tools and Big Data Analytics for Patient Care (pp. 1-16). Chapman and Hall/CRC, 2022.
137. Meenakshi DU, Nandakumar S, Francis AP, Sweety P, Fuloria S, Fuloria NK, Subramaniyan V, Khan SA. Deep Learning and Site-Specific Drug Delivery: The Future and Intelligent Decision Support for Pharmaceutical Manufacturing Science. Malviya R, Ghinea G, Dhanaraj RK, Balusamy B, Sundram S. In: Deep Learning for Targeted Treatments: Transformation in Healthcare. 16:1-38, 2022.
138. Rohilla Suman, Singh M, Priya S, Almalki WH, Haniffa SM, Subramaniyan V, Fuloria S, Fuloria NK, Sekar M, Singh SK, Jha NK, Chellappan DK, Negi P, Dua K, Gupta G. Exploring the mechanistic perspective of a new anti-tumor agent: Melatonin. Journal of Environmental Pathology, Toxicology and Oncology. 2023.
139. Selvaraj LK, Jeyabalan S, Wong LS, Sekar M, Logeshwari B, Umamaheswari S, Premkumar S, Sekar RT, Begum MY, Gan SH, Izzati Mat Rani NN. Baicalein prevents stress-induced anxiety behaviors in zebrafish model. Frontiers in Pharmacology. 2022;13:4516.
140. Fuloria NK, Raheja RA, Shah KH, Oza MJ, Kulkarni YA, Subramaniyan V, Sekar M, Fuloria S. Biological activities of meroterpenoids isolated from different sources. Frontiers in Pharmacology. 2022;13.
141. Kaur I, Behl T, Sehgal A, Singh S, Sharma N, Subramanian V, Fuloria S, Fuloria NK, Sekar M, Dailah HG, Alsubayiel AM. A motley of possible therapies of the COVID-19: reminiscing the origin of the pandemic. Environmental Science and Pollution Research. 2022:1-9.
142. Fuloria S, Sekar M, Khattulanuar FS, Gan SH, Rani NN, Ravi S, Subramaniyan V, Jeyabalan S, Begum MY, Chidambaram K, Sathasivam KV. Chemistry, Biosynthesis and Pharmacology of Viniferin: Potential Resveratrol-Derived Molecules for New Drug Discovery, Development and Therapy. Molecules. 2022;27(16):5072.
143. Mehta J, Utkarsh K, Fuloria S, Singh T, Sekar M, Salaria D, Rolta R, Begum MY, Gan SH, Rani NNIM, Chidambaram K, Subramaniyan V, Sathasivam KV, Lum PT, Uthirapathy S, Fadare OA, Awofisayo O, Fuloria NK. Antibacterial Potential of Bacopa monnieri (L.) Wettst. and Its Bioactive Molecules against Uropathogens—An In Silico Study to Identify Potential Lead Molecule(s) for the Development of New Drugs to Treat Urinary Tract Infections. Molecules. 2022; 27(15):4971.
144. Gnanaraj C, Sekar M, Fuloria S, Swain SS, Gan SH, Chidambaram K, Rani NN, Balan T, Stephenie S, Lum PT, Jeyabalan S. In Silico Molecular Docking Analysis of Karanjin against Alzheimer's and Parkinson's Diseases as a Potential Natural Lead Molecule for New Drug Design, Development and Therapy. Molecules. 2022;27(9):2834.
145. Thayumanavan G, Jeyabalan S, Fuloria S, Sekar M, Ravi M, Selvaraj LK, Bala L, Chidambaram K, Gan SH, Rani NNIM, Begum MY, Subramaniyan V, Sathasivam KV, Meenakshi DU, Fuloria NK. Silibinin and Naringenin against Bisphenol A-Induced Neurotoxicity in Zebrafish Model—Potential Flavonoid Molecules for New Drug Design, Development, and Therapy for Neurological Disorders. Molecules. 2022; 27(8): 2572.
146. Mustafa NH, Sekar M, Fuloria S, Begum MY, Gan SH, Rani NNIM, Ravi S,

Chidambaram K, Subramaniyan V, Sathasivam KV, Jeyabalan S, Uthirapathy S, Ponnusankar S, Lum PT, Bhalla V, Fuloria NK. Chemistry, Biosynthesis and Pharmacology of Sarsasapogenin: A Potential Natural Steroid Molecule for New Drug Design, Development and Therapy. Molecules. 2022; 27(6): 2032.

147. Fuloria S, Mehta J, Chandel A, Sekar M, Rani NNIM, Subramaniyan V, Nordin RB, Djearamane S, Wu YS, Sathasivam KV, Meenakshi DU, Chakravarthi S, Lum PT, Azad AK, Fuloria NK. A Comprehensive Review on the Therapeutic Potential of Curcuma Longa in Relation to its Major Active Constituent Curcumin. Frontiers In Pharmacology. 2022; 13.
148. Gupta G, Almalki WH, Kazmi I, Fuloria NK, Fuloria S, Subramaniyan V, Sekar M, Singh SK, Chellappan DK, Dua K. Current update on the protective effect of naringin in inflammatory lung diseases. EXCLI journal. 2022;21:573-9.
149. Nasir NN, Sekar M, Fuloria S, Gan SH, Rani NNIM, Ravi S, Begum MY, Chidambaram K, Sathasivam KV, Jeyabalan S, Dhiravidamani A, Thangavelu L, Lum PT, Subramaniyan V, Wu YS, Azad AK, Fuloria NK. Kirenol: A Potential Natural Lead Molecule for a New Drug Design, Development, and Therapy for Inflammation. Molecules. 2022; 27(3): 734.
150. Khattulanuar FS, Sekar M, Fuloria S, Gan SH, Rani NNIM, Ravi S, Chidambaram K, Begum Y, Azad AK, Jeyabalan S, Dhiravidamani A, Thangavelu L, Lum PT, Subramaniyan V, Wu YS, Sathasivam K, Fuloria NK. Tilianin: A Potential Natural Lead Molecule for New Drug Design and Development for the Treatment of Cardiovascular Disorders. Molecules; 27(3): 673.
151. Dahiya S, Dahiya R, Fuloria NK, Mourya R, Dahiya S, Fuloria S, Kumar S, Shrivastava J, Saharan R, Chennupati SV, Patel JK. Natural Bridged Bicyclic Peptide Macrobiomolecules from Celosia argentea and Amanita phalloides. Mini Reviews in Medicinal Chemistry. 2022;22(13):1772-88.
152. Mohd Zaid NA, Sekar M, Bonam SR, Gan SH, Lum PT, Begum MY, Mat Rani NNI, Vaijanathappa J, Wu YS, Subramaniyan V, Fuloria NK, Fuloria S. Promising Natural Products in New Drug Design, Development, and Therapy for Skin Disorders: An Overview of Scientific Evidence and Understanding Their Mechanism of Action. Drug Design, Development and Therapy. 2022; 16: 23-66.
153. Fuloria S, Yusri MAA, Sekar M, Gan SH, Rani NNIM, Lum PT, Ravi S, Subramaniyan V, Azad AK, Jeyabalan S, Wu YS, Meenakshi DU, Sathasivam KV, Fuloria NK. Genistein: A Potential Natural Lead Molecule for New Drug Design and Development for Treating Memory Impairment. Molecules. 2022; 27(1): 265.
154. Watroly MN, Sekar M, Fuloria S, Gan SH, Jeyabalan S, Wu YS, Subramaniyan V, Sathasivam K, Ravi S, Rani NNIM, Lum PT, Vaijanathappa J, Meenakshi DU, Mani S, Fuloria NK. Chemistry, Biosynthesis, Physicochemical and Biological Properties of Rubiadin: A Promising Natural Anthraquinone for New Drug Discovery and Development. Drug Design, Development and Therapy. 2021; 15: 4527-4549.
155. Sahoo A, Fuloria S, Swain SS, Panda SK, Sekar S, Subramaniyan V, Panda M, Jena AK, Sathasivam K, Fuloria NK. Potential of Marine Terpenoids Against SARS-CoV-2: An In silico Drug Development Approach. Biomedicines. 2021; 9(11): 1505.
156. Khan TA, Azad AK, Fuloria F, Nawaz A, Subramaniyan V, Akhlaq M, Sathasivam KV, Sekar M, Porwal O, Meenakshi DM, Malviya R, Mallandrich M, Mendiratta A, Fuloria NK. Chitosan coated 5-fluorouracil incorporated emulsions as a transdermal drug delivery matrix. Polymers. 2021; 13(19): 3345.
157. Yap KM, Sekar M, Wu YS, Gan SH, Rani NNIM, Seow LL, Subramaniyan

V, Fuloria NK, Fuloria S, Lum PT. Hesperidin and its Aglycone Hesperedin in Breast Cancer Therapy: A Review of Recent Developments and Future Prospects. Saudi Journal of Biological Sciences 2021; 28: 6730.
158. Bajaj S, Fuloria S, Subramaniyan V, Meenakshi DU, Wakode S, Kaur A, Bansal H, Manchanda S, Kumar S, Fuloria NK. Chemical characterization and anti-inflammatory activity of phyto-constituents from Swertia alata. Plants. 2021; 10(6): 1109.
159. Dahiya R, Dahiya S, Fuloria NK, Jankie S, Agarwal A, Davis V, Sahadeo V, Radhay V, Ramsubhag Y, Mullings W, Langford Z, Bedassie Z, Fuloria S. Natural Thiazoline-Based Cyclodepsipeptides from Marine Cyanobacteria: Chemistry, Bioefficiency and Clinical Aspects. Current Medicinal Chemistry. 2021; 28(38):7887-7909.
160. Malviya R, Tyagi A, Fuloria S, Subramaniyan V, Sathasivam K, Sundram S, Karupiah S, Chakravarthi S, Meenakshi DU, Gupta N, Sekar M. Fabrication and Characterization of Chitosan—Tamarind Seed Polysaccharide Composite Film for Transdermal Delivery of Protein/Peptide. Polymers. 2021;13(9):1531..
161. Sharma PK, Fuloria S, Ali M, Singh A, Kushwaha SP, Sharma VK, Subramaniyan V, Fuloria NK. Isolation of new phytometabolites from Alpinia galanga willd rhizomes. Pakistan Journal of Pharmaceutical Sciences. 2021 ;34(4):1397-1401 (2021).
162. Dahiya R, Dahiya S, Shrivastava J, Fuloria NK, Gautam H, Mourya R, Fuloria S. Natural cyclic polypeptides as vital phytochemical constituents from seeds of selected medicinal plants. Archiv der Pharmazie. 2021 Apr;354(4):2000446.
163. Fuloria NK, Fuloria S, Sharma VK, Ali M, Singh A, Sharma PK. Isolation of new diterpene from methanolic extract of Capsicum annuum Linn. Fruits. Pharmacognosy Magazine. 2020; 16(72):730.
164. Fuloria S, Wei LT, Karupiah S, Subramaniyan V, Gellknight C, Wu YS, Kayarohanam S, Fuloria NK. Development and Validation of UV-visible method to determine gallic acid in hydroalcoholic extract of Erythrinafusca leaves. International Journal of Research in Pharmaceutical Sciences. 2020;11(4):6319-26.
165. Dahiya R, Dahiya S, Fuloria NK, Kumar S, Mourya R, Chennupati SV, Jankie S, Gautam H, Singh S, Karan SK, Maharaj S, Fuloria S, Shrivastava J, Agarwal A, Singh S, Kishor A, Jadon G, Sharma A. Natural Bioactive Thiazole-Based Peptides from Marine Resources: Structural and Pharmacological Aspects. Marine Drugs. 2020; 18(6):329.
166. Bajaj S, Wakode S, Kaur A, Fuloria S, Fuloria N. Anti-inflammatory and ulcerogenic activity of newer phytoisolates of Swertia alata CB Clarke. Natural Product Research. 2021;35(23):5055-65.
167. Fuloria NK, Fuloria S. Isolation of β-sitosterol diarabinoside from rhizomes of Alpinia galanga. International Journal of Pharmacological and Pharmaceutical Sciences. 2012;6(12):676-8.
168. Jaju SB, Indurwade NH, Sakarkar DM, Fuloria NK, Ali MD, Basu SP. Isolation of β-sitosterol diglucosyl caprate from Alpinia galanga. Pharmacognosy research. 2010 Jul;2(4):264.
169. Jaju SB, Indurwade NH, Sakarkar DM, Fuloria NK, Ali MD, Das S, Basu SP. Galangoflavonoid isolated from rhizome of Alpinia galanga (L) Sw (Zingiberaceae). Tropical Journal of Pharmaceutical Research. 2009;8(6), 545-550.
170. Jaju S, Indurwade N, Sakarkar D, Fuloria N, Al M. Isolation of galangogalloside from rhizomes of Alpinia galanga. International Journal of Green Pharmacy (IJGP). 2009;3(2), 144-147.
171. SB Jaju, NH Indurwade, DM Sakarkar, M Ali, NK Fuloria. Isolation of β-

sitosterodiglucoside and β-sitosteryl arabinoside from rhizomes Alpinia galangal. Asian Journal of Chemistry. 2009;21(3), 2350-2356.
172. Jaju SB, Indurwade NH, Sakarkar DM, Fuloria NK, Ali M, Basu SP. Galangoisoflavonoid isolated from rhizomes of Alpinia galanga. Pharmacognosy Magazine. 2009 Jul 1;5(19):209.
173. Jaju SB, Indurwade NH, Sakarkar DM, Ali M, Fuloria NK, Duragkarº NJ. Linolein-2-Stearin Phosphate and Linolenic Acid β-D-Glucoside: The Newer Isolates of Alpinia galanga Rhizomes. Asian Journal of Chemistry. 2009 May 30;21(5):3892.
174. Jaju SB, Indurwade NH, Sakakar DM, Fuloria NK, Ali MD, Basu SP. Linoleic acid isolated from rhizomes of Alpinia galanga. Nigerian Journal of Natural Products and Medicine. 2009;13:76-81.
175. Subramaniyan V. Hemidesmus indicus and Usage for Arthritic Conditions. Bioactive Food as Dietary Interventions for Arthritis and Related Inflammatory Diseases (Second Edition), Academic Press, 2019; 507-521.
176. Jiea CK, Fuloria S, Subrimanyan V, Sathasivam K, Meenakshi DU, Kumar V, Chakravarthi S, Kumari U, Sekar M, Wu YS, Fuloria NK. Phytochemical screening and antioxidant activity of Cananga odorata extract. Research Journal of Pharmacy and Technology. 2022; 15(3): 1230-34.
177. Subasini U, Thenmozhi S, Sathyamurthy D, Vetriselvan S, Victor Rajamanickam G, Dubey GP. Pharmacognostic and phytochemical investigations of Dioscorea bulbifera L. International Journal of Pharmacy & Life Sciences. 2013 May 1;4(5).
178. Ee J, Velaga A, Mac Guad RH, Subramaniyan V, Kumar N. Deciphering Synsepalum dulcificum as an Arising Phytotherapy Agent: Background, Phytochemical and Pharmacological Properties with Associated Molecular Mechanisms. Sains Malaysiana. 2022;51(1):199-208.
179. Vetriselvan S, Felix A, Magendran R, Ponnaiyakannan S, Prabakaran T, Jothi S, Davan R. The phytochemical screening and the anti-ulcer activity of methanolic extract of Ixora coccinea Linn leaf. J Pharm Res. 2012;5(6):3074-7.
180. Fuloria NK, Fuloria S. Structural Elucidation of Small Organic Molecules by 1D, 2D and Multi-Dimensional-Solution NMR spectroscopy. Journal of Anal and Bioanal techniques2013; 11: 1-8.
181. Fuloria NK, Fuloria S. Spectroscopy: Fundamentals and Data Interpretation. Studium Press; 2013.
182. Singh Y, Fuloria NK, Fuloria S, Subramaniyan V, Almalki WH, Gupta G, Shaikh MA, Singh M, Al-Abbasi FA, Kazmi I. Disruption of the biological activity of protease-activated receptors2/4 in adults rather than children in SARS CoV-2 virus-mediated mortality in COVID-19 infection. Drug Development Research. 2021;82 (8):1075-8.
183. Anuj G, Fuloria NK. Short review on Quality by design: A new Era of Pharmaceutical drug development. International Journal of Drug Development and Research. 2012;4 (3):19-26.
184. Ugrappa S, Jain A, Fuloria NK, Fuloria S. Acanthomatous ameloblastoma in anterior mandibular region of a young patient: A rare case report. Annals of African medicine. 2017;16(2):85.
185. Fuloria NK, Fuloria S, Vakiloddin S. Phase zero trials: a novel approach in drug development process. Renal Failure. 2013;35(7):1044-53.
186. Singh S, Gupta K, Garg KN, Fuloria NK, Fuloria S, Jain T. Dental management of the cardiovascular compromised patient: a clinical approach. Journal of Young Pharmacists. 2017;9(4):453.
187. Makkar S, Jain A, Ugrappa S, Fuloria NK, Fuloria S. Obstructive sleep apnea: Diagnose the dental way. Annals of Tropical Medicine & Public Health. 2017;10(4).

188. Singh Y, Fuloria NK, Fuloria S, Subramaniyan V, Meenakshi DU, Chakravarthi S, Kumari U, Joshi N, Gupta G. N-terminal domain of SARS CoV-2 spike protein mutation associated reduction in effectivity of neutralizing antibody with vaccinated individuals. Journal of Medical Virology. 2021;93(10):5726.
189. Alharbi KS, Fuloria NK, Fuloria S, Rahman SB, Al-Malki WH, Shaikh MA, Thangavelu L, Singh SK, Allam VS, Jha NK, Chellappan DK. Nuclear factor-kappa B and its role in inflammatory lung disease. Chemico-Biological Interactions. 2021; 345: 109568.
190. Subramaniyan V, Chakravarthi S, Jegasothy R, Seng WY, Fuloria NK, Fuloria S, Hazarika I, Das A. Alcohol-associated liver disease: A review on its pathophysiology, diagnosis and drug therapy. Toxicology Reports 2021; 8: 376-385.
191. Sa'ad MA, Ramasamy K, Fuloria NK, Fuloria S, Ravichandran M, Lalitha P. Pathogenesis of Porphyromonas gingivalis: Genes, Mechanism and Potential Role of Gingipains Inhibitors. Malaysian Journal of Microbiology. 2021;17.
192. Narayanan DK, Kayarohanam SA, Fuloria SH, Fuloria NK, Janakiraman AK, Djearamane SI, Wu YS, Chakravarthi SR, Subramaniyan VE. Covid-19 vaccine candidates under clinical evaluation-a review. International Journal of Pharmaceutical Research. 202;13(1):4588-98.
193. Fuloria S, Jain A, Singh S, Hazarika I, Salile S, Fuloria NK. Regenerative potential of stem cells derived from human exfoliated deciduous (SHED) teeth during engineering of human body tissues. Current Stem Cell Research & Therapy. 2021;16(5):507-17.
194. Ugrappa S, Jain A, Bhargava A, Fuloria NK, Fuloria S. A search in the surge of treatment for COVID-19 patients: A narrative literature review. International Journal of Research in Pharmaceutical Sciences. 2020; 11 (SPL)(1), 822-831.
195. Vetriselvan S, Chun NK, Kumarasamy V, Shahrudin PNH, Singh D, Sivanadam G, Qi LP, Ahamed MMM, Priya RRR, Zahir RM, Santhi VK, Seng WY, Fuloria N K, Fuloria S. A Cross-sectional Study on Awareness of Dyslexia Disorder among University Students. Open Access Macedonian Journal of Medical Science. 2020; 10, 8(E): 251-255.
196. Vetriselvan S, Srikumar C, Wu YS, Saminathan K, Neeraj KF, Shivkanya F. Impact of COVID-19 in public health: Prevalence and preventive approaches. Pakistan Journal of Pharmaceutical Sciences. 2020; 33 (4): 1739-1745.
197. Fuloria S, Fuloria NK, Hong OJ, Kim CB, Ting BY, Karupiah S, Paliwal N, Kumari U, Sathasivam K. K. Synthesis of SNPs of corn silk agrowaste and their bioactivities. Asian Journal of Chemistry. 2020;32(6):1497-504.
198. Fuloria S, Subramaniyan V, Gupta G, Sekar M, Meenakshi D, Sathasivam K, Sudhakar K, Alharbi KS, Almutairi SS, Almalki WH, Fuloria NK. Detection of Circulating Tumor Cells and Epithelial Progenitor Cells: A Comprehensive Study. Journal of Environmental Pathology, Toxicology and Oncology. 2022.
199. Kumarasamy V, Anbazhagan D, Subramaniyan V, Vellasamy S. Blastocystis sp., parasite associated with gastrointestinal disorders: An overview of its pathogenesis, immune modulation and therapeutic strategies. Current Pharmaceutical Design. 2018; 24(27): 3172-3175.
200. Maheshwaran K, Alexpandian PS, Anton A, Subramaniyan V, Satheesh KS. Smart Garbage Monitoring System using IOT. International Journal of Engineering Research & Technology. 2018,; 6(3).
201. Hang LJ, Subramaniyan V, Xiaojun K, bin Abu Bakar MH, Wei TZ, Alshtaiwi MJ, Ling LW, Ambihabathy K, Azzani M. Influence of Medication Error among Medical and Non-medical Students in a Malaysian University. Journal of Young Pharmacists. 2019;11(4):399.

202. Singh Y, Fuloria NK, Fuloria S, Subramaniyan V, Almalki WH, Al-abbasi FA, Kazmi I, Rajput SS, Joshi N, Gupta G. A European pharmacotherapeutic agent roflumilast exploring integrated preclinical and clinical evidence for SARS CoV-2 mediated inflammation to organ damage. British Journal of Clinical Pharmacology. 2022; 88(8): 3562-3565.
203. Sharma A, Sundram S, Malviya R, Verma S, Fuloria NK, Fuloria S, Sekar M, Mishra N, Meenakshi DU. Patient Care and Treatment Strategies for Skin Diseases in Sub Saharan Africa: Role of Traditional and Western Medicines. Infectious Disorders Drug Targets. 2022.
204. Huqh MZ, Abdullah JY, Wong LS, Jamayet NB, Alam MK, Rashid QF, Husein A, Ahmad WM, Eusufzai SZ, Prasadh S, Subramaniyan V. Clinical Applications of Artificial Intelligence and Machine Learning in Children with Cleft Lip and Palate—A Systematic Review. International Journal of Environmental Research and Public Health. 2022;19(17):10860.
205. Narayanan DK, Djearamane S, Fuloria S, Kayarohanam S, Subramaniyan V, Sekar M, Fuloria NK. A Review on DNA Vaccines in Pre-Clinical Trials Against SARS-CoV-2. Journal of Experimental Biology and Agricultural Sciences. 2022:487-93.
206. Selvaraj S, Prasadh S, Fuloria S, Subramaniyan V, Sekar M, Ahmed AM, Bouallegue B, Hari Kumar D, Sharma VK, Maziz MNH, Sathasivam KV, Meenakshi DU, Fuloria NK. COVID-19 Biomedical Plastics Wastes—Challenges and Strategies for Curbing the Environmental Disaster. Sustainability. 2022; 14(11): 6466.
207. Tune BX, Sim MS, Poh CL, Guad RM, Woon CK, Hazarika I, Das A, Gopinath SC, Rajan M, Sekar M, Subramaniyan V. Matrix Metalloproteinases in Chemoresistance: Regulatory Roles, Molecular Interactions, and Potential Inhibitors. Journal of Oncology. 2022;2022.
208. Pandey KP, Singh CL, Verma S, Singh A, Jha R, Porwal O, Fuloria N and Sharma PK. Development and Validation of Stability Indicating High Performance Liquid Chromatography Method for Related Substances of Imatinib Mesylate. Indian Journal of Pharmaceutical Sciences. 2022; 84(2): 465-476.
209. Fuloria S, Subramaniyan V, Meenakshi DU, Sekar M, Chakravarthi S, Kumar DH, Kumari U, Vanteddu VG, Patel TD, Narra K, Sharma PK. Etiopathophysiological role of the renin–angiotensin–aldosterone system in age-related muscular weakening: RAAS-independent beneficial role of ACE2 in muscle weakness. Journal of Biochemical and Molecular Toxicology. 2022:e23030.
210. Jha S, Malviya R, Fuloria S, Sundram S, Subramaniyan V, Sekar M, Sharma PK, Chakravarthi S, Wu YS, Mishra N, Meenakshi DU, Bhalla V, Djearamane S, Fuloria NK. Characterization of Microwave-Controlled Polyacrylamide Graft Copolymer of Tamarind Seed Polysaccharide. Polymers. 2022; 14(5): 1037.
211. Kumar S, Behl T, Sehgal A, Chigurupati S, Singh S, Mani V, Aldubayan M, Alhowail A, Kaur S, Bhatia S, Al-Harrasi A. Exploring the focal role of LRRK2 kinase in Parkinson's disease. Environmental Science and Pollution Research. 2022:1-5.
212. Anwar ET, Gupta N, Porwal O, Sharma A, Malviya R, Singh A, Fuloria NK. Skin Diseases and their Treatment Strategies in Sub-Saharan African Regions. Infectious Disorders - Drug Targets. 2022. doi: 10.2174/1871526521666210927120334
213. Subramaniyan V, Fuloria S, Darnal HK, Meenakshi DU, Sekar M, Nordin RB, Chakravarthi S, Sathasivam KV, Khan SA, Wu YS, Kumari U. COVID-19-associated mucormycosis and

treatments. Asian Pacific Journal of Tropical Medicine. 2021;14(9):401.

214. Guad RM, Wu YS, Aung YN, Sekaran SD, Wilke ABB, Low WY, Sim MS, Carandang RR, Jeffree MS, Taherdoost H, Sunggip C, Lin CLS, Murugaiah C, Subramaniyan V, Azizan N. Different Domains of Dengue Research in Malaysia: A Systematic Review and Meta-Analysis of Questionnaire-Based Studies. International Journal of Environmental Research and Public Health. 2021; 18(9):4474.
215. Fuloria S, Ying CY, Xuan KY, Jun CT, Karupiah S, Kumari U, Fuloria NK. Determination of total phenolic content and antimicrobial potential of different extracts of Citrus hystrix DC leaves. Bulletin of Environment, Pharmacology and Life Sciences. 2020;9(8):112-6.
216. Singh A, Verma S, Jarari NMHA, Singh AP, Fuloria NK, Fuloria S. Effect of Piperine on Pharmacokinetics of Rifampicin and Isoniazid: Development and Validation HPLC Method. Journal of Applied Pharmaceutical Science. 2018; 8(3), 72-81.
217. Khan H, Khan MA, Rauf A, Haleemi A, Fuloria S, Fuloria NK. Inhibition on Urease and Thermal Induced Protein Denaturation of commonly used Antiulcer Herbal Products. Study based on in-vitro assays. Pharmacognosy Journal. 2015;7(3).