

Effect Of Prunus Domestica L On Omeprazole Induced Iron Deficiency Anaemia

C Velmurugan^{1*}, D Kumarasamy Raja², Sujith Thomas³ Akmal Ali Baig M⁴, Moideen Karuveppil³, S Ilanthalir¹, S Pathiban², M Tamil Selvan¹, V.V.S.S. Appalaraju⁵, Nagaraja Suryadevara⁶, Chandrasekaran Selvaraju⁶

- ¹ Department of Pharmacology, PGP College of Pharmaceutical Science and research institute, Namakkal, Tamil Nadu, India-637207.
- ² Department of Pharmaceutics, PGP College of Pharmaceutical Science and research institute, Namakkal, Tamil Nadu, India-637207.
- ³ Department of Pharmacology, Moulana College of Pharmacy, Perinthalmanna, Kerala-679321
- ⁴ Department of Pharmacy Practice, Sri Krishna Chaithanya College of Pharmacy, Madanapalle, Andhra Pradesh-517325.
- ⁵ Department of Medicinal Chemistry, Faculty of Pharmacy, MAHSA University, Malaysia- 42610.
- ⁶ Faculty of Medicine, Bioscience and Nursing, MAHSA University, Malaysia- 42610.

Corresponding Author:

Dr. Velmurugan C

Professor of Pharmacology PGP College of Pharmaceutical Science and Research institute Namakkal Tamil Nadu-637207 Email: velu0906@gmail.com

DOI: 10.47750/pnr.2022.13.S06.477

Abstract

Prunus domestica L, family Rosaceae, Plums are called super-food by scientists and known for cancer prevention, digestive health, brain health, blood sugar, macular prevention and weight loss. Present study was designed for anti-anemia activity by Omeprazole induced anaemic model. Study result shows extract treated animals was Significantly increase the Hb, HCT, RBC on 15 day compared to Omeprazole alone treated animals and MCH, MCHC MCV. The result concluded that Prunus Domestica L considered as an Iron Supplement in ulcer patient or the patient taking long term treatment with proton pump inhibitor. The fruit extract had higher efficacy with higher dose 400 mg/kg and efficacy is decrease with low dose. We conclude that 200 and 400mg/kg therapeutically effective for treating iron deficiency anaemia. Based on the severity of anaemic condition adjust the dose.

Keywords: Iron, Anemia, Prunus Domestica, Omeprazole, Haemoglobin.

INTRODUCTION

Anaemia is a medical condition characterized by lowered haemoglobin level. There are over 400 types of anaemia, with haemolytic anaemia being the most frequent [1-15]. More than half of the world's population experience some forms of anaemia in their life time [16-21]. The incidence of anaemia is higher in the third world than in developed countries [22-29]. Anaemia is particularly prominent in south Asia. In India, for example, up to 88% of pregnant and 74% of non-pregnant women are affected. Throughout Africa, about 50% of pregnant and 40% of non-pregnant women are anaemic. West Africa is the most affected, and southern Africa the least. In Latin America and the

Caribbean, prevalences of anaemia in pregnant and non-pregnant women are about 40% and 30% respectively [30-42]. Such prevalence has been attributed to various aggravating factors such as poor nutrition, high prevalence of blood parasites for example, plasmodium, and trypanosome and helminthes infection [43-49]. Prolonged use of non-steroidal antiinflammatory drugs as well as exposure to toxic chemicals such as phenyl hydrazine has also been implicated to cause the condition [1, 20, 50-59]. Due to the high prevalence and possibility of even further increase [60-69], there is the need to prevent it or seek for more cost effective and better treatment strategies. Plants, phytochemicals and plants products are known for their biological importance in several diseases and ailments [70-162]. Some plants have been studied for their anti-anaemic properties [2, 164-166]. Iron deficiency is the result of long-term negative iron balance. Iron stores in the form of haemosiderin and ferritin are progressively diminished and no longer meet the needs of normal iron turnover. From this critical point onward, the supply of iron to the transport protein apotransferrin is compromised. This condition results in a decrease in transferrin saturation and an increase in transferrin receptors in the circulation and on the surface of cells, including the erythron. All tissues express their need for iron in exactly the same way, i.e. by the same type of transferrin receptors on cell surfaces in proportion to actual iron need. Accordingly, a compromised supply of iron to the erythron is associated with a similarly insufficient supply of iron to all other tissues. Functionally, the lack of mobilizable iron stores will eventually cause a detectable change in classical laboratory tests, including measurement of haemoglobin, mean corpuscular haemoglobin concentration, mean corpuscular volume, total iron-binding capacity, transferrin saturation, and zinc-erythrocyte protoporphyrin [9].

MATERIALS AND METHOD

Collection and authentication of the plant material *Prunus domestica*

The plum fruit of *Prunus domestica* L. had been collected from central market, Madanapalle, Chittoor District, and Andhra Pradesh, India. Fruit was identified and authenticated by the Botanist Dr. K. Madhava Chetty, Assistant Professor, Department of botany, Sri Venkateswara University, Tirupathi.

Extract preparation

The peels of the plums were removed and they were ratted removed seed, the average yield was 2 kg. Then fruit were shade dried completely and ground into powder with mechanical grinder. The powder was passed through sieve no. 60 to get uniform powdered. The crude powder drug extracted with 80% (v/v) ethanol by maceration.

Maceration process

Maceration process involves the separation of medicinally active portions of the crude drugs. The drug material is taken in a stoppered container and immersed in the bulk of the solvents in the ratio of 1:2 (Drug & Solvent) and allowed to stand for 7 days in a room temperature with frequent shaking of every 30 min up to 6 hours on each day. The solvent was separated by filtration and concentrated under reduced pressure. The resulting semisolid mass was vacuum dried and percentage yield was calculated. [2]

The yield of dried extract of the sample, based on dry weight was calculated from the following formula:

$$\% \text{ Yield} = (W1 \times 100) / W2$$

Where, W1 is weight of the extract after solvent evaporation and W2 is weight of the dry powder material.

Table : Data showing the % yield values of fruit of *Prunus domestica* L

Plant name	Part used	Method of extraction	Solvent	Colour of extract	Nature of extract	% yield of extract in gm

Prunus domestica	Fruit	Maceration	Ethanol	Dark brown	Semisolid	50.38
------------------	-------	------------	---------	------------	-----------	-------

Acute toxicity Studies

The acute toxicity study was carried out with ethanol extract of *Prunus domestica* as per OECD 423 Guidelines. Swiss albino mice with weight ranging (25-30g) were in use for the experiment. The animals were fasted for the night, provided with water after which extracts of *Prunus domestica* was administered orally at a dose level of 5 mg/kg, p.o. If mortality was observed in animals, then the dose administered was assigned as a toxic dose. If death was observed in one animal, then the same dose was repeated again to confirm the toxic dose. If death was not observed, the method was repeated for further upper doses such as 50, 300 and 2000 mg/kg body weight. The animals were experiential for toxic symptoms such as behavioral changes, locomotion, convulsions and mortality for 14 days [181]

Omeprazole induced iron deficiency anaemia

Treatment of the animals

The rats were randomly divided into 5 groups of six in each. In this study Omeprazole was administered to all groups except normal control for 15 days at dose of 10mg/kg. The group III, IV & V were administered 100, 200 & 400 mg of Ethanol extract of fruit of *Prunus domestica* in saline along with Omeprazole 10mg/kg. On day 15 the blood sample were collected from tail vein and estimated the hematological parameters, iron content in serum and liver was estimated by Atomic absorption spectroscopy [1, 2].

- Group I** : Normal control, received 2 ml/kg of saline orally
- Group II** : Negative control, received Omeprazole (OMZ) 10 mg/kg orally.
- Group III** : Received OMZ +ethanol extract of *Prunus domestica* 100 mg/kg (EPPD) orally.
- Group IV** : Received OMZ +ethanol extract of *Prunus domestica* 200 mg/kg (EPPD) orally.
- Group V** : Received OMZ +ethanol extract of *Prunus domestica* 400 mg/kg (EPPD) orally.

Iron Analysis in liver and serum

At end of study Iron content of liver and serum of all groups of rats in experimental models was estimated by using Atomic absorption spectroscopy.

Sample collection

The samples were cleaned and dried under shade. The dried samples were then grinded and powdered in an agate pestle and mortar. Samples were labeled and stored in pre-cleaned polyethylene bottles for further analysis.

Sample Preparation (Digestion of samples)

A Multiwave 3000 micro oven system (from Anton paar, USA) with 16 position teflon vessels with capping was being used for digestion process. The digestion vessels are provided with a controlled pressure, temperature and release valve. Before use, all Teflon vessels are soaked with 10 % HNO₃. The system was initially programmed by giving gradual rise of 20 %, 40 %, and 50 % power for 5, 15 and 20 minutes respectively for the due warming up. The powder samples were used without any further treatment for sample preparation. 0.25 g of sample was weighed into the Teflon vessels followed by digestion mixture of HNO₃, & H₂O₂ in the ratio of 3:1, according to the nature of samples were being applied.

The resulting solution after microwave digestion was filtered through whatman 40 filter paper (if necessary) and diluted to 25 ml with Millipore water. A sample blank containing only acid mixture was prepared at the same time. The method of standard addition was generally adapted to calibrate the instrument before going for the observation of the samples.

Calibration of instruments

More than three working standard solution of elements to be determined are prepared, covering the concentration range as recommended by the manufacturer of the instrument for the elements to be determined. Before the analysis of samples, the instruments were calibrated with prepared working standard solution. The calibration curves were obtained for concentration vs. absorbance data statistically analyzed. Calibration of the instrument were repeated periodically during operations and blanks were carried with each set of 10 samples or aspirate any one of the prepared working standard for every 10 samples to check the instrument drift and to validate analytical procedures and performance. Reagent blank readings were taken and necessary correction was made during the calculation of concentration of various elements.

Standard Certified Reference (SRM) of National Institute of Standard and Technology (NIST) were used for day-to-day for the evaluation of methods of analysis or test and for long-term quality assurance of measurements.

Fe analysis by Flame AAS/Graphite furnace

After calibrating the instrument with prepared working standard, the digests liquid sample's solution was subjected to analysis of Fe in liver by AAS flame and Fe in Serum by Graphite furnace with specific instrumental conditions as given by instruments manufacturer. Introduce the solution into flame, record the reading, using the mean of the three reading and quantified the concentration of the metals in the given samples against the standard calibration curve obtained from Concentration vs Absorbance of the prepared known concentration on the day of the analysis.

STATISTICAL ANALYSIS

One-way analysis of variance (ANOVA) followed by Dunnett's method of multiple comparisons was employed using Graph pad InStat 5.0 software. $p < 0.05$, $p < 0.01$ & $p < 0.001$ was considered to be statistically significant.

RESULTS

Preliminary Phytochemical screening test of ethanol extract of fruit of *Prunus domestica* L

Preliminary phytochemical screening of ethanol extract was investigated. Ethanol extract showed the presence of steroids, alkaloids, saponin, proteins, Amino acid, tannins, flavonoids and minerals iron.

Table: Preliminary phytochemical screening of of *Prunus domestica* L

S.No	Constituents	Ethanol
1	Alkaloids	+
2	Steroids	+
3	Carbohydrates	+
4	Glycosides	-
5	Fixed oils & Fats	-
6	Phenolic Compounds	+

7	Proteins & amino acids	+
8	Saponins	+
9	Tannins	+
10	Gums & mucilage	+
11	Flavonoids	+
12	triterpenoids	-

Where + =present, - =absent

Acute toxicity

Table : Study period and observation parameters

Initial once observation	First 30 min and periodically 24 hr
Special attention	First 1-4 hr after drug administration
Long term observation	Up to 14 days
Direct observation parameters	Tremors, convulsions, salivation, diarrhea, lethargy, Sleep and coma.
Additional observation parameters	Skin and fur, eyes and mucous membrane, respiratory, circulatory, autonomic and central nervous systems, somatomotor activity and behavior pattern etc.

It was observed that the ethanol extract of fruit of *Prunus domestica* were not lethal to the mice and there was no mortality and morbidity even at the 2000 mg/kg doses. Hence LD50 of extracts found to be 2000 mg/kg. Therefore, 1/10th of LD50 200mg/kg consider as ED50. Based on the acute toxicity the dose of 100 (1/2 of ED50), 200 (ED50) & 400 (ED50 x 2) mg/kg of extract selected for further pharmacological evaluation.

Omeprazole induced iron deficiency anaemia

It was observed that Omeprazole alone treated group, significantly ($p < 0.01$) decreased the Hb, HCT, RBC, Fe in liver and serum on 15th day as compared to control. In extract treated group, significant increase ($p < 0.01$) in hematological and iron content in liver and serum ($p < 0.001$) was seen 15th day, as compared to Omeprazole treated group. EEPD 200 & 400 mg/kg treated groups did not show any significant change on 15th day compared to normal

control except HCT in 200mg/kg ($p < 0.05$). But on 100 mg/kg treated groups showed significant changes on hematological parameters and iron content ($p < 0.05$) when compared to normal control (as shown in table).

Table: Effect of plum fruit on Omeprazole induced iron deficiency anaemia

Groups	Hb gm/dl	HCT %	RBC $\times 10^6/\text{mm}^3$	PCV %	MCV μm^3	MCH pg/cell	MCHC g/dl
Group I	18.72 \pm 0.86 ^a	56.48 \pm 0.46 ^a	9.28 \pm 0.42 ^a	36.16 \pm 0.16 ^{**a}	60.51 \pm 0.15 ^{**a}	19.61 \pm 0.68 ^{**a}	32.19 \pm 0.68 ^{**a}
Group II	12.15 \pm 0.35 ^c	32.85 \pm 0.29 ^c	4.18 \pm 0.18 ^c	22.37 \pm 0.31 ^b	80.29 \pm 0.28 ^b	29.90 \pm 0.52 ^b	37.34 \pm 0.52 ^{**b}
Group III	16.20 \pm 0.41 ^{**b}	48.17 \pm 0.75 ^{**b}	6.24 \pm 0.28 ^{**b}	28.265 \pm 0.05 ^{*c}	80.34 \pm 0.16 ^b	26.61 \pm 0.55 ^{*c}	31.61 \pm 0.55 ^{*c}
Group IV	16.89 \pm 0.72 ^{**a}	51.46 \pm 0.52 ^{**b}	8.91 \pm 0.34 ^{**a}	37.19 \pm 0.15 ^{**a}	57.49 \pm 0.54 ^{**a}	21.47 \pm 0.17 ^{**a}	31.47 \pm 0.17 ^{*c}
Group V	17.53 \pm 0.76 ^{**a}	55.94 \pm 0.83 ^{**a}	9.36 \pm 0.30 ^{**a}	38.53 \pm 0.08 ^{**a}	58.16 \pm 0.28 ^{**a}	18.91 \pm 0.60 ^{**a}	30.91 \pm 0.60 ^{**a}

Values are in mean \pm SEM; (n=6), Significance levels: * = highly significant differences at $p < 0.05$, ** = highly significant differences at $p < 0.01$, ^{ns} = non significant when treated group compared to Group II. Mean bearing same superscript does not differ significantly & mean bearing different superscript differ significantly. ^c = highly significant differences at $p < 0.05$, ^b = significant differences at $p < 0.01$, ^a = non significant

Table: Estimated iron content of liver and serum by AAS & Graphite furnace in Omeprazole induced iron deficiency anaemia

Groups	LIVER $\mu\text{g}/\text{gm}$ of tissue	SERUM $\mu\text{g}/\text{dl}$
Group I	836.66 \pm 0.05 ^a	468 \pm 0.53 ^a
Group II	226.99 \pm 0.10 ^c	128 \pm 0.90 ^c
Group III	695.39 \pm 0.13 ^{**b}	339 \pm 0.48 ^{**b}
Group IV	784.68 \pm 0.10 ^{**a}	414 \pm 0.72 ^{**a}
Group V	808.85 \pm 0.20 ^{**a}	482 \pm 0.57 ^{**a}

Values are in mean \pm SEM; (n=6), Significance levels: *** = highly significant differences at $p < 0.001$, ^{ns} = non significant when treated group compared to Group II. Mean bearing same superscript does not differ significantly & mean bearing different superscript differ significantly compared to normal control. ^c = highly significant differences at $p < 0.001$, ^b = significant differences at $p < 0.05$, ^a = non significant

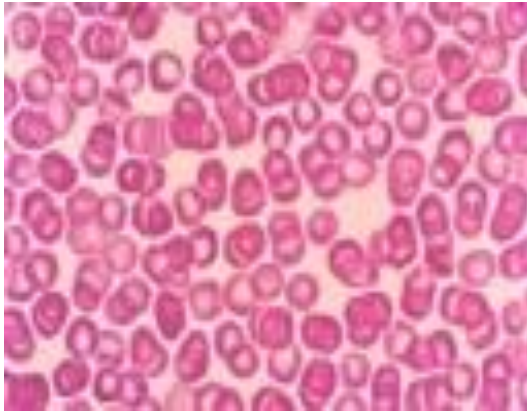
Blood smear of RBC in omeprazole induced anaemia

MCV defines the size of the red blood cells and is expressed as femtoliters (10^{-15} ; fl) or as cubic microns (μm^3). The normal values for MCV are 87 ± 7 fl. MCH quantifies the amount of hemoglobin per red blood cell. The normal values for MCH are 29 ± 2 picograms (pg) per cell.

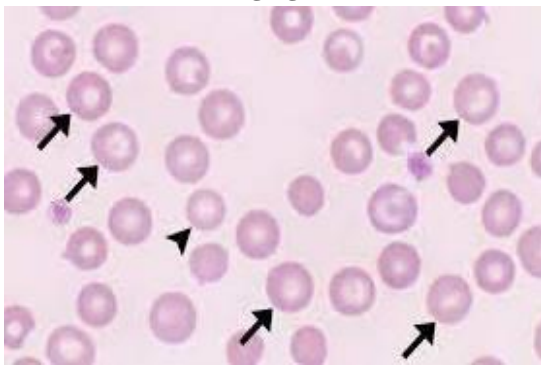
MCHC indicates the amount of hemoglobin per unit volume. In contrast to MCH, MCHC correlates the hemoglobin content with the volume of the cell. It is expressed as g/dl of red blood cells or as a percentage value. The normal values for MCHC are 34 ± 2 g/dl.

RBC stained blood smear of rat of normal control, showing normal appearance of erythrocytes. omeprazole treated rats showing Macrocyte hypochromic erythrocytes with abnormal blood smear. The extract treated group showing overall better picture of blood smear with Hyperchromic (HC) erythrocytes in 200 & 400 mg/kg doses with almost normal shape but in 100mg/kg reveal few Macrocytic RBC.

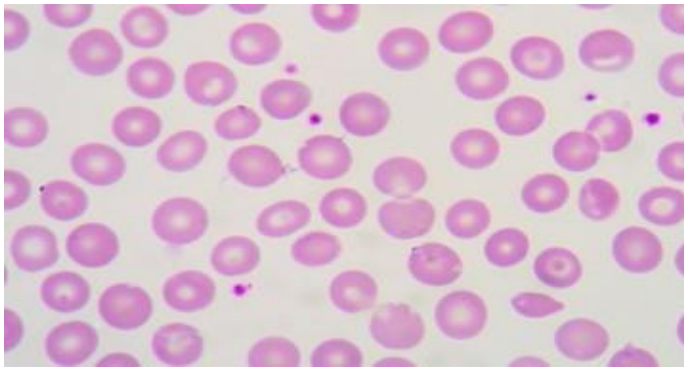
Normal Control



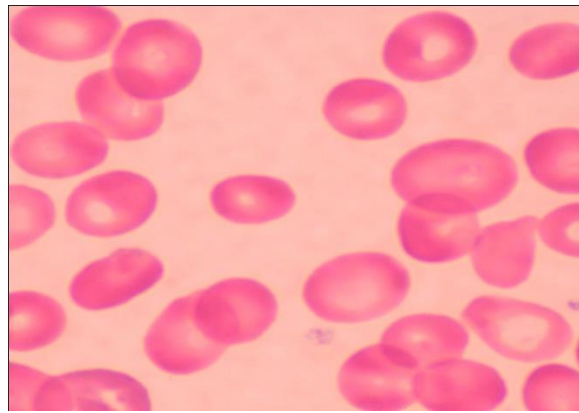
EEPD100 mg/kg



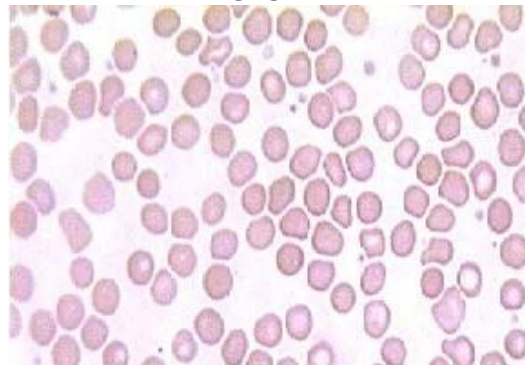
EEPD400 mg/kg



Negative control



EEPD200 mg/kg



DISCUSSION

This study aimed to evaluate the effect of EEPD on the anaemia induced by Omeprazole in albino rats. Omeprazole is an acid-reducer that is used to treat acid reflux and stomach ulcers. Omeprazole works by preventing acid pumping cells found on the stomach wall from producing acid. Gastric acid plays an important role in the absorption of iron. Dietary iron can be divided into 2 types with respect to absorption: the heme type, derived from animal blood and muscle, which is well absorbed and comprises about 10% - 30% of the normal Western diet, and the more common non heme type, derived from plants (fruits, vegetables, grains, nuts), which requires an acidic gastric environment for absorption [1, 126-169]. However, plants are known for their wide range of biological activities [170-188]. Although the heme component is absorbed independent of gastric pH, the non heme part requires an acidic pH for absorption [171]. At physiologic pH and in the presence of oxygen, iron exists predominantly in the

highly insoluble ferric Fe(III) form and therefore is poorly bioavailable [185]. Ingested ferrous ions are readily oxidized to ferric ions by dissolved oxygen [186]. Stomach acid is important in releasing iron from ligands in food and in solubilizing ferric iron by converting it to ferrous form [68, 153]. It has been speculated that inhibition of gastric acid secretion may lead to reduction in iron and vitamin B12 absorption. The development of iron malabsorption has been shown in a variety of hypo- or achlorhydric conditions. After oral administration of PPI, the onset of the antisecretory effect of omeprazole occurs within 1 h, with the maximum effect occurring within 2 h [20, 172]. The inhibitory effect of omeprazole on acid secretion increases with repeated once-daily dosing, reaching a plateau after 4 days. Study showed a significant rise in serum iron concentration of $164 \pm 32\%$ $\mu\text{g/dL}$ above baseline 2 h after oral ingestion, plateauing afterwards. These studies suggested that a 5-day course of PPI treatment would be sufficient length of treatment and 3 h of serum iron-level monitoring would be sufficient to detect serum changes in iron levels following the ingestion of iron preparation. Lack of enough stomach acid caused by chronic use of Omeprazole can affect the absorption of nutrients such as iron from foods. Patients taking Omeprazole for chronic stomach disorders may require iron injections to prevent iron deficiency anemia. The orally administered extract shows anti-anaemic activity and ethanol extract at 200 & 400 mg/kg doses more effectively counteract Omeprazole induced anemia. The study revealed that the extract does not affect the Omeprazole effect induced model in rats. Further study needed for isolate the specific constituent and elucidate the mechanism.

CONCLUSION

In conclusion the ethanol extract of *Prunus Domestica* fruit reversed anaemia induced by Omeprazole. The vitamin and mineral constituents of the fruit appear most likely as the active ingredients responsible for the haematinic effect of plum fruit. The increases in the hematological indices exhibited by *Prunus Domestica* extract might be connected with the Phyto-constituents, vitamin and mineral contents of the fruit of *Prunus Domestica*. These constituents are might have hemopoietic factors that have direct influence on the production of hemoglobin in blood. Further studies to map for excellence of phytoconstituents like flavonoid, vitamins and minerals in ethanol extract and elucidate the exact machinery of effect and pharmaceutical formulation studies to make use in anaemic condition.

References

1. Khatib MA, Rahim O, Kania R, Molloy P. Iron deficiency anemia: induced by long-term ingestion of omeprazole. *Dig Dis Sci* 2002;47:2596-2597.
2. Lim JH, Subramanian V, Xiaojun K, bin Abu Bakar MH, Wei TZ, Alshatawi MJ, Low WL, Ambihabathy K, Azzani M. Influence of Medication Error among Medical and Non-medical Students in a Malaysian University. *Journal of Young Pharmacists*. 2019 Oct 1;11(4):399.
3. Fuloria S, Wei LT, Karupiah S, Subramanian V, Gellknight C, Wu YS, Kayarohanam S, Fuloria NK. Development and Validation of UV-visible method to determine gallic acid in hydroalcoholic extract of *Erythrina fusca* leaves. *International Journal of Research in Pharmaceutical Sciences*. 2020;11(4):6319-26.
4. Fuloria S, Hong O, Kim C, Ting B, Karupiah S, Paliwal N, Kumari U, Sathasivam K, Vetriselvan S, Fuloria N. Synthesis of Silver Nanoparticles of Corn Silk Agrowaste and Their Bioactivities. 2020. *Asian J. Chem*. 32. 1497-1504.
5. Wahab NWA, Guad RM, Subramanian V, Fareez IM, Choy KW, Bonam SR, Selvaraju C, Sim MS, Gopinath SCB, Wu YS. Human Exfoliated Deciduous Teeth Stem Cells: Features and Therapeutic Effects on Neurogenerative and Hepatobiliary-pancreatic Diseases. *Curr Stem Cell Res Ther*. 2021;16(5) 563-576. doi:10.2174/1574888x15999200918105623. PMID: 32957893.
6. Shivkanya F, 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.
7. Velmurugan C, Subramanian V, Ilanthir S, Fuloria S, Sekar M, Fuloria NK. Evaluation Of Anti-Diabetic And Wound Healing Potential Of Ethiopia Plant 'Ruta Graveolens' In Diabetic Induced Rat. *NVEO-Natural Volatiles & Essential Oils Journal*. 2021:5629-40.
8. Guad RM, Wu YS, Aung YN, Sekaran SD, Wilke AB, Low WY, Sim MS, Carandang RR, Jeffree MS, Taherdoost H, Sunggip C. 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.
9. Fuloria N, Fuloria S, Subramanian V, Almalki W, Al-abbasi F, Kazmi I, Rajput S, Gupta G. A European pharmacotherapeutic agent Roflumilast exploring integrated preclinical and clinical evidences for SARS CoV-2 mediated inflammation to organ damage. *Authorea Preprints*. 2021.

10. La Jun Ting N, Fuloria S, Subramaniyan V, Sharma PK, Unnikrishnan Meenakshi D, Chinnasamy V, Palanisamy SM, Fuloria NK. Response Of Various Extracts Of Manilkara zapota (L) Seeds Against Periodontitis Triggering Microbiota. NVEO-Natural Volatiles & Essential Oils. 2021:13047-63.
11. Ee JW, Velaga A, Guad RM, Subramaniyan V, Fuloria NK, Choy KW, Fuloria S, Wu YS. Deciphering Synsepalum dulcificum as an Arising Phytotherapy Agent: Background, Phytochemical and Pharmacological Properties with Associated Molecular Mechanisms. Sains Malaysiana. 2022; 51(1):199. <https://doi.org/10.17576/jsm-2022-5101-16>
12. Fuloria S, Subramaniyan V, Sekar M, Wu YS, Chakravarthi S, Nordin RB, Sharma PK, Meenakshi DU, Mendiratta A, Fuloria NK. Introduction to Microbiome. In Microbiome in Inflammatory Lung Diseases 2022 (pp. 13-28). Springer, Singapore.
13. 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. <https://doi.org/10.3389/fphar.2022.993927>
14. Jha S, Malviya R, Fuloria S, Sundram S, Subramaniyan V, Sekar M, Sharma PK, Chakravarthi S, Wu YS, Mishra N, Meenakshi DU, Bhalla V, Djearmane S, Fuloria NK. Characterization of Microwave-Controlled Polyacrylamide Graft Copolymer of Tamarind Seed Polysaccharide. *Polymers*. 2022; 14(5), 1037.
15. 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.
16. Selvaraj S, Prasad S, Fuloria S, Subramaniyan V, Sekar M, Ahmed AM, Bouallegue B, Hari Kumar D, Sharma VK, Maziz MN, Sathasivam KV. COVID-19 Biomedical Plastics Wastes—Challenges and Strategies for Curbing the Environmental Disaster. *Sustainability*. 2022;14(11):6466.
17. Morais, S. R., K. C., Jeyabalan, S., Wong, L. S., Sekar, M., Chidambaram, K., Gan, S. H., Begum, M. Y., Izzati Mat Rani, N. N., Subramaniyan, V., Fuloria, S., Fuloria, N. K., Safi, S. Z., Sathasivam, K. V., Selvaraj, S., & Sharma, V. K. (2022). 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*, 9, [950880]. <https://doi.org/10.3389/fmars.2022.950880>
18. 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. *Deep Learning for Targeted Treatments: Transformation in Healthcare*. 2022:1-38.
19. 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.
20. Gothwal SK, Goyal K, Barjatya HC, B.L. Bhakar, Rajiv Dahiya, Yogendra Singh, Tarun Kumar Saini, Mohit Agrawal, Vetriselvan Subramaniyan, Gaurav Gupta. Estimating the correlation between TYG and CIMT in non-diabetic adult patients. *Obesity Medicine*,35, 2022, 100460.
21. Agbor AG, Odetola AA (2001). Haematological studies of *Parguetina nigrescens* on haemorrhagic anaemic rats. *Afr. J. Med. Sci.* 30: 105 - 109.
22. 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 Oct 31;13:4516.
23. Subramaniyan V, Chun NK, bt Shahrudin PN, Qi LP, Ahamed MM, Priya RR, Zahir RM, Santhi VK, Seng WY, Kumarasamy V, Fuloria NK. A Cross-sectional Study on Awareness of Dyslexia Disorder among University Students. *Open Access Macedonian Journal of Medical Sciences*. 2020;8(E):251-5.
24. Selvaraj S, Naing NN, Arfah NW, Djearmane 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. <https://doi.org/10.2147/JMDH.S374480>
25. 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.
26. 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 Vaniferin: Potential Resveratrol-Derived Molecules for New Drug Discovery, Development and Therapy. *Molecules*. 2022;27(16):5072.
27. Huq MZ, Abdullah JY, Wong LS, Jamayet NB, Alam MK, Rashid QF, Husein A, Ahmad WM, Eusufzai SZ, Prasad 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.
28. Singh S, Sharma N, Sachdeva M, Behl T, Zahoor I, Fuloria NK, Sekar M, Fuloria S, Subramaniyan V, Alsabayiel 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.
29. Lum PT, Sekar M, Gan SH, Bonam SR, Shaikh MF. Protective Effect of Natural Products against Huntington’s Disease: An Overview of Scientific Evidence and Understanding Their Mechanism of Action. *ACS Chemical Neuroscience* 2021;12:391-418.
30. Fuloria NK, Raheja RK, 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.

31. Rohilla S, Singh M, Priya S, Almalki WH, Haniffa SM, Subramaniyan V, Fuloria S, Fuloria NK, Sekar M, Singh SK, Jha NK. Exploring the Mechanical Perspective of a New Anti-Tumor Agent: Melatonin. *Journal of Environmental Pathology, Toxicology and Oncology*. 2023; 42(1), 1-16.
32. Ze P, Yu CX, Jo LS, Subramaniyan V, Sharma PK, Meenakshi D, Chinnasamy V, Palanisamy S, Kishore N, Rajasekaran S, Adinarayana S. In-vitro antimicrobial activity of *Cymbopogon citratus* Stem extracts. *Journal of Cardiovascular Disease Research*. 2021;12(5):1121.
33. 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*. 2021;28(39):54531-50.
34. 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.
35. Kumar S, Behl T, Sehgal A, Chigurupati S, Singh S, Mani V, Aldubayan M, Alhowail A, Kaur S, Bhatia S, Al-Harrasi A, Subramaniyan V, Fuloria S, Fuloria NK, Sekar M, Abdel Daim MM. Exploring the focal role of LRRK2 kinase in Parkinson's disease. *Environ Sci Pollut Res Int*. 2022;29(22):32368-32382. doi: 10.1007/s11356-022-19082-5. Epub 2022. PMID: 35147886.
36. 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.
37. 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.
38. 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).
39. Subramaniyan V. *Therapeutic Importance of Caster Seed Oil. Nuts and Seeds in Health and Disease Prevention (Second Edition)*, Academic Press, 2020: 485-495.
40. 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.
41. 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. Tiliarin: A Potential Natural Lead Molecule for New Drug Design and Development for the Treatment of Cardiovascular Disorders. *Molecules*. 2022; 27(3): 673.
42. 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.
43. Kathiresan VS, Haris MRHM, Fuloria S, Fuloria NK. Chemical modification of banana trunk fibers for the production of green composites. *Polymers*. 2021; 12(12): 1943.
44. 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.
45. Akhlaq M, Azad AK, Fuloria S, Meenakshi DU, Raza S, Safdar M, Nawaz A, Subramaniyan V, Sekar M, Sathasivam KV, Wu YS. Fabrication of Tizanidine Loaded Patches Using Flaxseed Oil and Coriander Oil as a Penetration Enhancer for Transdermal Delivery. *Polymers*. 2021;13(23):4217.
46. 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.
47. Mustafa NH, Sekar M, Fuloria S, Begum MY, Gan SH, Rani NN, Ravi S, Chidambaram K, Subramaniyan V, Sathasivam KV, Jeyabalan S. Chemistry, Biosynthesis and Pharmacology of Sarsasapogenin: A Potential Natural Steroid Molecule for New Drug Design, Development and Therapy. *Molecules*. 2022;27(6):2032.
48. Subramaniyan V, Chakravarthi S, Seng WY, Kayarohanam S, Fuloria NK, Fuloria S. Impact of COVID-19 in public health: Prevalence and preventive approaches. *Pak J Pharm Sci*. 2020;33(4):1739-45.
49. 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.
50. 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.
51. 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*. 2002; 27(8): 2572.
52. Gnanaraj C, Sekar M, Fuloria S, Swain SS, Gan SH, Chidambaram K, Rani NNIM, Balan T, Stephenie S, Lum PT, Jeyabalan S, Begum MY, Chandramohan V, Thangavelu L, Subramaniyan V, Fuloria NK. 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.

53. 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.
54. Guad RM, Wu YS, Aung YN, Sekaran SD, Wilke AB, Low WY, Sim MS, Carandang RR, Jeffree MS, Taherdoost H, Sunggip C. 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.
55. 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 Phytoconstituents from *Swertia alata*. *Plants*. 2021;10(6):1109.
56. Kumar SP, Fuloria S; Ali M, Amit S; 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.
57. Sharma P, Bajaj S, Fuloria S, Porwal O, Subramaniyan V. Ethnomedicinal and pharmacological uses of *Curcuma caesia*. *NVEO-Natural Volatiles & Essential Oils Journal, NVEO*. 2021:14902-10.
58. 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.
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. 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.
61. Malviya R, Jha S, Fuloria NK, Subramaniyan V, Chakravarthi S, Sathasivam K, Kumari U, Meenakshi DU, Porwal O, Sharma A, Kumar DH. Determination of temperature-dependent coefficients of viscosity and surface tension of tamarind seeds (*Tamarindus indica* L.) polymer. *Polymers*. 2021;13(4):610.
62. 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.
63. 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.
64. 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.
65. Subramaniyan V, Paramasivam VE. Potential anti-inflammatory activity of *Plumbago zeylanica*. *Asian J Pharm Clin Res*. 2017;10(10):372-5.
66. Subramaniyan V, Saminathan K, Kumarasamy V. Impact of herbal drugs and its clinical application. *Int J Pharm Res*. 2019.
67. Narayanan DK, Kayarohanam SA, Fuloria SH, Fuloria NK, Janakiraman AK, Djearmane SI, Wu YS, Chakravarthi SR, Subramaniyan VE. Covid-19 vaccine candidates under clinical evaluation-a review. *Int J Pharm Res*. 2021;13(1):4588-98.
68. 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.
69. Fuloria S, Yusri MA, Sekar M, Gan SH, Rani NN, Lum PT, Ravi S, Subramaniyan V, Azad AK, Jeyabalan S, Wu YS. Genistein: A Potential Natural Lead Molecule for New Drug Design and Development for Treating Memory Impairment. *Molecules*. 2022;27(1):265.
70. Ting BY, Fuloria NK, Subramaniyan 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.
71. 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; 7(4): 46. <https://doi.org/10.7324/JABB.2019.70408>
72. Fuloria S, Fuloria NK, Sundram KM, Sathasivam K, Singh S, Gupta K, Jain A, Sridevi U, Himaja M, Shanker S. Synthesis & discerning of antibiotic potential of PCMX based novel azetidines. *Acta Poloniae Pharmaceutica: Drug Research*, 2017; 76(6), 171-1715.
73. Sa'ad MA, Kavitha R, Fuloria S, Fuloria NK, Ravichandran M, Lalitha P. Synthesis, Characterization and Biological Evaluation of Novel Benzimidazole Derivatives: Newer Antibiotics for Periimplantitis Treatment. *Antibiotics*. 2022; 11(2):207. <https://doi.org/10.3390/antibiotics11020207>
74. Fuloria NK, Fuloria S, K Sathasivam, S. Karupiah. Synthesis and discerning of antimicrobial potential of novel oxadiazole derivatives of chloroxylene moiety. *Acta Poloniae Pharmaceutica: Drug Research*. 2017; 74 (6), 1125-30.
75. 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.
76. 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 periimplantitis triggering bacteria. *Asian Journal of Chemistry*. 2020; 32:1660. <https://doi.org/10.14233/ajchem.2020.22649>
77. Rohane SH, Chauhan AJ, Fuloria NK, Fuloria S. Synthesis and in vitro antimycobacterial potential of novel hydrazones of eugenol.

- Arabian Journal of Chemistry. 2020;13(2):4495-504.
78. Sekar M, Muhammad Zulhilmi A. Formulation, Evaluation and Antimicrobial Properties of Polyherbal Toothpaste. *International Journal of Current Pharmaceutical Research* 2016;8:105-107.
 79. Sekar M, Nandakogulnair S, Danial Amani M, Shaiful MH, Shazni M, Kang Wei M, Istiazzul M, Mohd Syafiq A. Comparative Evaluation of Antimicrobial Properties of Red and Yellow Watermelon Seeds. *International Journal of Current Pharmaceutical Research* 2014;6:35-37.
 80. Sekar M, Nor Safwan Hadi NA, Puteri Nurul Fatimah DB, Zakiah Syahirah MH, Ezza Izzaty MN, Nalina K, Mohd Syafiq A. Comparative Evaluation of Antimicrobial Properties of Citrus Varieties Available in Malaysia Market. *International Journal of Current Pharmaceutical Research* 2013;5:32-5.
 81. 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. https://doi.org/10.4103/pm.pm_250_20
 82. Sekar M, Hazlin Nadira MH, Fatin Shahirah AF, Syafina Syafawati MS, Nurul Noorain MZ, Muhammad Nafiz N, Mohd Syafiq A. Antibacterial Activity of the Methanolic Extract of *Hibiscus sabdariffa* Leaves and Fruits. *British Microbiology Research Journal* 2015;10:1-6.
 83. 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. <https://doi.org/10.52711/0974-360X.2022.00205>
 84. 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*. 2021; 20, 1. <https://doi.org/10.2174/1871523020666210126144506>
 85. 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 *Curcuma zedoaria*. *Studies on Ethno-Medicine*. 2018; 12(1,2): 31. <https://doi.org/10.1080/09735070.2017.1409687>
 86. Ravindran M, Alifah I, Nur Afini F, Nur Ain N, Nur A, Sekar M. Formulation and Evaluation of Natural Antioxidant Cream Comprising Methanolic Peel Extract of *Dimocarpus longan*. *International Journal of Pharmaceutical and Clinical Research* 2016;8:1305-1309.
 87. Sekar M, Nurashikin AR. Formulation, Evaluation and Antibacterial Properties of Herbal Ointment Containing Methanolic Extract of *Clinacanthus nutans* Leaves. *International Journal of Pharmaceutical and Clinical Research* 2016;8:1170-1174.
 88. Sekar M, Nur Fatin Z, Nuraina A, Nur Afiqah AA, Abdin Shakirin MN, Hafizati Izuani M, Nurul Syuhada S, Mohd Syafiq A. Comparative Antioxidant Properties of Methanolic Extract of Red and White Dragon Fruits. *International Journal of Current Pharmaceutical Research* 2016;8:56-58.
 89. Sekar M, Fathin Azara MB, Afikaah Shaan A, Suryani Hayati MS, Rumaisak A, Nur Iryani AR, Mohd Syafiq A. Comparative Evaluation of Antioxidant Properties of Methanolic Extract of Red and Green Custard Apple Fruits. *British Biotechnology Journal* 2015;9:1-6.
 90. 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
 91. 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(03), 72.
 92. Fuloria S, Subramanyan 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.
 93. Jaju S, Pahwa S, Fuloria N. Pharmacognostical Studies & antibacterial activity of leaves of *Murraya Koenigii*. *Pharmacognosy Journal*. 2009; 1(3), 211.
 94. Nurul Azima M, Shazalyana A, Nurin Fatini G, Puteri Zarith Sofea Y, Hikmah MI, Masitah I, Sekar M. Synergistic Antibacterial Activity of Mangiferin with Antibiotics against *Staphylococcus aureus*. *Drug Invention Today* 2019;12:14-17.
 95. Jaju S, Indurwade NH, Sakarkar DM, Ali M, Fuloria N. Antidiabetic & antiinflammatory studies of *Alpinia galangal* rhizome. *Asian Journal of Chemistry*. 2011; 23(3): 1230.
 96. Jaju SB, Indurwade NH, Sakarkar DM, Fuloria NK, Ali M. Galangoflavonoid isolated from *Alpinia galanga* rhizome. *Tropical Journal of Pharmaceutical Research*. 2009; 8(6): 545.
 97. Jaju SB, Indurwade NH, Sakarkar DM, Fuloria NK, Ali M. Isolation of β -sitosterodiglucoside and β -sitosteryl arabinoside from rhizomes *Alpinia galangal*. *Asian Journal of Chemistry*. 2009; 21(3): 2350.
 98. Jaju SB, Indurwade NH, Sakarkar DM, Fuloria NK, Ali M. Linolein-2-Stearin Phosphate and Linolenic Acid β -D-Glucoside: The Newer Isolates of *Alpinia galanga* Rhizomes. *Asian Journal of Chemistry*. 2009; 21(5): 3892.
 99. 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.
 100. Bajaj S, Fuloria S, Subramanyan 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.
 101. Balaji K, Ni LH, Rajindran B, Sikarwar MS, Fuloria NK, Fuloria S. Determination of Total Phenolic, Flavonoid Content and Antioxidant Activity of *Terminalia Chebula* (Fruit). *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 2015; 6(2): 413.
 102. 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.
103. Dahiya S, Dahiya R, Fuloria NK, Mourya R, Dahiya S, Fuloria S, Kumar S, Shrivastava J, Saharan S, Chennupati SV, Patel JK. Natural bridged bicyclic macromolecules from *Celosia argentea* and *Amanita phalloides*. *Mini-Reviews in Medicinal chemistry*. 2022.
 104. Dahiya R, Dahiya S, Fuloria NK, Jankie S, Agarwal A, Davis V, Sahadeo V, Radhay V, Ramsuhag 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.
 105. 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; 354(4):2000446.
 106. 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.
 107. 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.
 108. Vakiloddin S, Fuloria N, Fuloria S, Dhanaraj SA, Balaji K, Karupiah S. Evidence of hepatoprotective and antioxidant effect of *Citrullus colocynthis* fruits in paracetamol induced hepatotoxicity. *Pakistan Journal of Pharmaceutical sciences*. 2015; 28(3): 951.
 109. Muhamad Fadzil NS, Sekar M, Gan SH, Bonam SR, Wu YS, Vaijanathappa J, Ravi S, Lum PT, Dhadde SB. Chemistry, Pharmacology and Therapeutic Potential of Swertiamarin - A Promising Natural Lead for New Drug Discovery and Development. *Drug Design, Development and Therapy* 2021;15:2721-2746.
 110. Azman S, Sekar M, Bonam SR, Gan SH, Wahidin S, Lum PT, Dhadde SB. Traditional Medicinal Plants Conferring Protection Against Ovalbumin-Induced Asthma in Experimental Animals: A Review. *Journal of Asthma and Allergy* 2021;14:641-662.
 111. Balasubramaniam G, Sekar M, Badami S. In-vitro Antioxidant and Cytotoxic Properties of *Strobilanthes kunthianus*. *Research Journal of Pharmacy and Technology* 2021;14(5):2522-2528.
 112. Rani NNIM, Hussein ZM, Mustapa F, Yi CX, Azhari H, Sekar M, Mohd Amin MCI. Exploring the Possible Targeting Strategies of Liposomes against Methicillin-Resistant *Staphylococcus aureus* (MRSA). *European Journal of Pharmaceutics and Biopharmaceutics* 2021;165:84-105.
 113. Lum PT, Sekar M, Gan SH, Pandey V, Bonam SR. Protective Effect of Mangiferin on Memory Impairment: A systematic review. *Saudi Journal of Biological Sciences* 2021;28(1):917-927.
 114. Balasubramaniam G, Sekar M, Badami S. Analgesic and Anti-inflammatory Activities of *Strobilanthes kunthianus* in Experimental Animal Models. *Research Journal of Pharmacy and Technology* 2020;13(12):5844-5850.
 115. Nur Mursyida S, Sekar M, Gan SH, Lum PT, Vaijanathappa J, Ravi S. Resveratrol: Latest Scientific Evidences of its Chemical, Biological Activities and Therapeutic Potentials. *Pharmacognosy Journal* 2020;12(6s):1779-1791.
 116. Nurul Iman NF, Sekar M, Gan SH, Lum PT, Vaijanathappa J, Ravi S. Lutein: A Comprehensive Review on its Chemical, Biological Activities and Therapeutic Potentials. *Pharmacognosy Journal* 2020;12(6s):1769-1778.
 117. Balasubramaniam G, Sekar M, Ravi S, Badami S. Isolation and Structural Characterization of Phytoconstituents from *Strobilanthes kunthianus*. *Pharmacognosy Journal* 2020;12(6s):1605-1611.
 118. Siti Nurul Najihah O, Lum PT, Gan SH, Shankar M, Sekar M. Protective Effect of Natural Products against Chemotherapy-Induced Cardiotoxicity: A Review. *Pharmacognosy Journal* 2020;12(5):1180-1189.
 119. Siti Nurul Najihah O, Lum PT, Nurul Azima M, Puteri Zarith Sofea Y, Nurin Fatini G, Hikmah MI, Shazalyana A, Masitah I, Aina Akmal MN, Sekar M. Molecules of Interest – Embelin – A Review. *Research Journal of Pharmacy and Technology* 2020;13(7):3485-3493.
 120. Balasubramaniam G, Sekar M, Badami S. Pharmacognostical, Physicochemical and Phytochemical Evaluation of *Strobilanthes kunthianus* (Acanthaceae). *Pharmacognosy Journal* 2020;12(4):731-741.
 121. Nurul Azima M, Shazalyana A, Nurin Fatini G, Puteri Zarith Sofea Y, Hikmah MI, Masitah I, Sekar M. Combinatory Effect of Embelin with Antibiotics against *Staphylococcus aureus*. *Drug Invention Today* 2019;12:18-20.
 122. Sekar M, Noor Jasmin SA. Formulation, Evaluation and Antibacterial Properties of Novel Polyherbal Toothpaste for Oral Care. *International Journal of Pharmaceutical and Clinical Research* 2016;8:1155-1158.
 123. Sekar M, Badami S, Ravi S, Thippeswamy BS, Veerapur VP. Synthesis and Evaluation of Analgesic and Anti-Inflammatory Activities of Most Active Free Radical Scavenging Derivatives of Mangiferin. *British Journal of Applied Science & Technology* 2014;4:4959-4973.
 124. Sekar M, Badami S, Ravi S, Thippeswamy BS, Veerapur VP. Synthesis and Evaluation of Analgesic and Anti-Inflammatory Activities of Most Active Antioxidant Derivatives of Embelin. *British Journal of Pharmaceutical Research* 2014;4:2182-2199.
 125. Mahendran S, Badami S, Ravi S, Thippeswamy BS, Veerapur VP. Antioxidant, Analgesic and Anti-Inflammatory Studies of Novel Ninyhydrin Adduct of Embelin. *Pharmaceutical Chemistry Journal* 2011;45:547-51.
 126. Azman S, Sekar M, Wahidin S, Gan SH, Vaijanathappa J, Bonam SR, Alvala M, Lum PT, Thakur V, Beladiya VJ, Mehta AA. Embelin Alleviates Severe Airway Inflammation in OVA-LPS-Induced Rat Model of Allergic Asthma. *Journal of Asthma and Allergy* 2021;14:1511-1525.
 127. 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.
 128. 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.

129. 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.
130. 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.
131. 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.
132. Senthil CK, Mohan S. Fabrication, characterization and evaluation of hepatoprotective activity drug loaded flavono nanoparticle delivery system. *The Journal of Phytopharmacology*. 2015; 4(2): 90-96.
133. Gadhve D, Rasal N, Sonawane R, Sekar M, Kokare C. Nose-to-brain Delivery of Teriflunomide-loaded Lipid-based Carbopol-gellan Gum Nanogel for Glioma: Pharmacological and In vitro Cytotoxicity Studies. *International Journal of Biological Macromolecules* 2021;167:906-920.
134. Siti Nurul Najiha O, Sekar M. In-vitro Antioxidant and Cytotoxic Activities of Silver Nanoparticles of Embelin Isolated from *Embelia ribes*. *Research Journal of Pharmacy and Technology* 2019;12:4080-4084.
135. Siti Nurul Najiha O, Sekar M. In-vitro Antioxidant and Cytotoxic Activities of Silver Nanoparticles of Mangiferin Isolated from *Mangifera indica*. *Journal of Global Pharma Technology* 2019;11:10-15.
136. 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.
137. 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.
138. 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.
139. 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.
140. 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.
141. 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.
142. Fuloria NK, Singh V, Shaharyar M, Ali M. Synthesis and antimicrobial evaluation of newer oxadiazoles derived from phenylpropiono hydrazides. *Molecules*. 2009;14(5), 1898-1903.
143. 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).
144. Fuloria NK, Fuloria S, Vakiloddin S. Phase zero trials: a novel approach in drug development process. *Renal Failure*. 2013;35(7):1044-53.
145. Dahiya R, Rampersad S, Ramnanansingh TG, Kaur K, Kaur R, Mourya R, Chennupati SV, Fairman R, Jalsa NK, Sharma A, Fuloria S, Fuloria NK. Synthesis and Bioactivity of a Cyclopolypeptide from Caribbean Marine Sponge. *Iranian Journal of Pharmaceutical Research: IJPR*. 2020;19(3):156.
146. 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):95-9.
147. 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, 37.42.
148. 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.
149. Fuloria NK, Balaji K, Karupiah S, Sathasivam K, Jain A, Sridevi U, Himaja M, Shanker S. Synthesis and evaluation of antimicrobial potential of novel oxadiazoles derived from tolyloxy moiety. *Indian Journal of Heterocyclic Chemistry*. 2016; 26 (03-04), 101-105.
150. 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 Toposentin analogues as anti-proliferative agent targeting tubulin. *Bioorganic chemistry*. 2020;95:103519.
151. Malviya R, Fuloria NK, Fuloria S, Subramaniyan V, Meenakshi DU, Nandkumar S. (2021). Polyacrylamide Grafted Tamarind Seed Gum Formulation and Method for Preparation Thereof. 2021. Australia patent number 2021100876. Application number 2021100876.
152. Malviya R, Fuloria NK, Fuloria S, Subramaniyan V, Meenakshi DU, Vanteddu VG, Dahiya R, Dahiya S, Narra K, Ganesan P. (2021). Nanoparticle formulation and method for preparation thereof. Australia patent number 2021101624. Application number 2021101624.
153. 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. Australia patent number 2021102565. Application number 2021102565.
154. 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. Australia patent number 2021103637. Application number 2021103637.

155. 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, Subramanian V, Kaur A, Khatoon R (2021). Chronotherapeutic dosage form for the effective treatment of disease. Australia patent number 2021107459. Application number 2021107459.
156. 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. Australia patent number 2021103679. Application number 2021103679.
157. Azad AK, Srikumar C, Fuloria NK, Fuloria S, Poovi G, Malviya R, Meenakshi DU, Mendiratta A, Patel TD, Seng WY, Sharma PK, Subramanian V, Sundram S, Uddin H, Vanteddu VG, Yadav DZK (2021). Composition of a transdermal film for protein and peptide-based therapeutic drug delivery in a non-invasive way. Germany patent number DE202021105304U1. Application number DE202021105304U1.
158. Malviya R, Sundram S, Fuloria NK, Fuloria S, MP Singh, Subramanian V, Tiwari N, Unnikrishnan MD, Srivastava SP, Chauhan V, Mishra S. Method and Process to Develop Herbal Shampoo against *Pediculus Humanus Capitis De Geer* (Head Louse). Australia patent number 2021104305. Application number 2021104305.
159. Malviya R, Mishra PR, Mishra R, Fuloria NK, Sundaram S, Fuloria S, Subramanian V, Meenakshi DU, Bajaj S, Mendiratta A, Islam, M, Tiwari R, Dhamija K (2021). An air-cooling device with smart antimicrobial features. South Africa patent number 2021/4650. Application number 2021/4650.
160. Fuloria NK, Fuloria S. Structural elucidation of small organic molecules by 1D, 2D and multi dimensional-solution NMR spectroscopy. *J. Anal. Bioanal. Tech.* 2013;4.
161. Kumar N, Fuloria F. *Spectroscopy: Fundamentals and Data Interpretation.* Studium Press; 2013.
162. Gupta R, Fuloria NK, Fuloria S. Synthesis & antimicrobial profile of some new heterocycles bearing thiazole moiety. *Southern Brazilian Journal of Chemistry*, 20(20), 61, 2012.
163. 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, Subramanian 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.
164. Hamid UZ, Sim MS, Guad RM, Subramanian 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.
165. Watroly MN, Sekar M, Fuloria S, Gan SH, Jeyabalan S, Wu YS, Subramanian V, Sathasivam KV, Ravi S, Rani NN, Lum PT. 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.
166. Yap KM, Sekar M, Wu YS, Gan SH, Rani NN, Seow LJ, Subramanian V, Fuloria NK, Fuloria S, Lum PT. Hesperidin and its aglycone hesperetin in breast cancer therapy: A review of recent developments and future prospects. *Saudi Journal of Biological Sciences.* 2021;28(12):6730-47.
167. Sharma PK, Fuloria S, Alam S, Sri MV, Singh A, Sharma VK, Kumar N, Subramanian V, Fuloria NK. Chemical composition and antimicrobial activity of oleoresin of *Capsicum annum* fruits. *Mindanao Journal of Science and Technology.* 2021;19(1).
168. Singh Y, Fuloria NK, Fuloria S, Subramanian 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.
169. Malviya R, Sundram S, Fuloria S, Subramanian V, Sathasivam KV, Azad AK, Sekar M, Kumar DH, Chakravarthi S, Porwal O, Meenakshi DU. Evaluation and Characterization of Tamarind Gum Polysaccharide: The Biopolymer. *Polymers.* 2021;13(18):3023.
170. Sahoo A, Fuloria S, Swain SS, Panda SK, Sekar M, Subramanian V, Panda M, Jena AK, Sathasivam KV, Fuloria NK. Potential of marine terpenoids against SARS-CoV-2: An in silico drug development approach. *Biomedicine.* 2021;9(11):1505.
171. Subramanian 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;31(2):509-16.
172. Chellappann DK. 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.
173. Fuloria S, Subramanian V, Karupiah S, Kumari U, Sathasivam K, Meenakshi DU, Wu YS, Guad RM, Udupa K, Fuloria NK. A comprehensive review on source, types, effects, nanotechnology, detection, and therapeutic management of reactive carbonyl species associated with various chronic diseases. *Antioxidants.* 2020;9(11):1075.
174. Fuloria S, Subramanian V, Dahiya R, Dahiya S, Sudhakar K, Kumari U, Sathasivam K, Meenakshi DU, Wu YS, Sekar M, Malviya R. Mesenchymal stem cell-derived extracellular vesicles: regenerative potential and challenges. *Biology.* 2021;10(3):172.
175. Khan TA, Azad AK, Fuloria S, Nawaz A, Subramanian V, Akhlaq M, Safdar M, Sathasivam KV, Sekar M, Porwal O, Meenakshi DU. Chitosan-Coated 5-Fluorouracil Incorporated Emulsions as Transdermal Drug Delivery Matrices. *Polymers.* 2021;13(19):3345.
176. Yap KM, Sekar M, Fuloria S, Wu YS, Gan SH, Rani NN, Subramanian V, Kokare C, Lum PT, Begum MY, Mani S. Drug delivery of natural products through nanocarriers for effective breast cancer therapy: A comprehensive review of literature. *International Journal of Nanomedicine.* 2021;16:7891.
177. Ramli S, Sim MS, Guad RM, Gopinath SC, Subramanian 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.

178. Zaid NA, Sekar M, Bonam SR, Gan SH, Lum PT, Begum MY, Rani NN, Vajjanathappa J, Wu YS, Subramaniyan V, Fuloria NK. 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.
179. Chinnasamy V, Subramaniyan V, Chandiran S, Kayarohanam S, Kannian 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.
180. 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;8:376-85.
181. Zuraini NZ, Sekar M, Wu YS, Gan SH, Bonam SR, Rani NN, 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.
182. Yap KM, Sekar M, Seow LJ, Gan SH, Bonam SR, Rani NN, 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*. 2021;13:471.
183. Fuloria S, Subramaniyan V, Karupiah S, Kumari U, Sathasivam K, Meenakshi DU, Wu YS, Sekar M, Chitranshi N, Malviya R, Sudhakar K. Comprehensive review of methodology to detect reactive oxygen species (ROS) in mammalian species and establish its relationship with antioxidants and cancer. *Antioxidants*. 2021;10(1):128.
184. Fuloria S, Mehta J, Chandel A, Sekar M, Rani NN, Begum MY, Subramaniyan V, Chidambaram K, Thangavelu L, Nordin R, Wu YS. A comprehensive review on the therapeutic potential of *Curcuma longa* Linn. in relation to its major active constituent curcumin. *Frontiers in Pharmacology*. 2022;13.
185. 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.
186. Malviya R, Raj S, Fuloria S, Subramaniyan V, Sathasivam K, Kumari U, Meenakshi DU, Porwal O, Kumar DH, Singh A, Chakravarthi S. Evaluation of antitumor efficacy of chitosan-tamarind gum polysaccharide polyelectrolyte complex stabilized nanoparticles of simvastatin. *International journal of nanomedicine*. 2021;16:2533.
187. 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.
188. 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):3172-5.