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PHYTOCHEMICAL PROFILING AND GC-MS ANALYSIS OF *ARTEMISIA NILAGIRICA* AN *IN SILICO* INVESTIGATION AGAINST COLORECTAL CANCER

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ABSTRACT

Artemisia nilagirica (C.B. Clarke) Pamp is a valuable medicinal plant belonging to the Asteraceae family. This study aimed to identify the bioactive compounds in the hydroalcoholic extract derived from its leaves, utilizing Gas Chromatography-Mass Spectrometry (GC-MS) analysis. Phytochemicals, which are naturally occurring compounds in plants, have biological activities that help prevent diseases by scavenging and chelating free radicals. The GC-MS analysis detected 50 different bioactive compounds in the hydroalcoholic leaf extract. Among these, the compounds with the highest efficiency include 2-Propenoic acid, 3-(2-hydroxyphenyl)-(E), Mome Inositol, 3-(2-Hydroxyphenyl) Acrylic Acid, and Androst-4-Ene-3,17-dione. These phytocompounds were subjected to molecular docking analysis with colorectal cancer receptors in an *in silico* study. Notably 2-Propenoic acid and 3-(2-hydroxyphenyl)-(E) exhibited a high binding energy of -3.75, indicating their potential as major bioactive molecules in *A. nilagirica.* Therefore, the isolation and purification of compounds with therapeutic potential from *A. nilagirica* could provide valuable resources for combating various diseases in both plants and humans.

KEYWORDS: *Artemisia nilagirica,* Gas Chromatography-Mass Spectrometry, phytocompounds, auto docking.

INTRODUCTION

Artemisia nilagirica, which belongs to family Asteraceae, belonging to family Rutaceae are well distributed in the eastern region of India. Previously the leaf extract of *A. nilagirica* has been reported with an antibacterial activity. The leaves of this plant are also used against cold and cough by the local tribal population in east India. There are about 45,000 species of plants in India are reported to have medicinal properties, which concentrated spots in the region of Eastern Himalayas, western Ghats and Andaman and Nicobar Island. The officially documented plants with medicinal potential are few bat traditional practitioners use more than 6000 plants.

Plants have been widely recognized an important source of novel therapeutic compounds since ancient times for the treatment of various diseases and were reported in traditional medicine system such as the Siddha and Ayurveda (Syal Kumar,2017). Essential oils of *Artemisia* spp. have been widely used for a variety of medicinal purposes for many years. *Artemisia nilagirica* (Clarke) pamp commonly called Indian wormwood, is widely found in the hilly areas of India. *A. nilagirica* has been reported to exhibit insecticidal activities (Banerj *et al*., 1990). The plant grow throughout the hilly regions of India. If is a tall aromatic shrub. This medicinal herb is erect, hairly, aften half-woody. The stems are leafy and branched. Leaves are alternate, large, ovate and lobbed, Deeply pinnatisect with small stipule-like lobes at the base, pubescent above, ash- grey or white- tomentose beneath, upper most leaves are smaller, 3- fid or entire, lanceolate, the flowers are small and stand in long narrow clusters at the top top of the stem, subgloboseheads, inspicate or erect or horizontal panicledracemes. They are brownish yellow in colour. Leaves and flowering tops are bitter, astringent and aromatic. The frait are minute, bracts ovate or oblong. The percentage of oil constituents and the yield of oil vary with the distribution of the plant and also depend on the growth phases extracts with carbohydrates exclusively present in hydroalcoholic extracts. Around 59 compounds were identified from essential oil of *A. nilagirica* which showed an inhibitory activity on Phytophthoracapsici, causing “foot rot” in pepper (Shafi *et al*., 2004). Various species of Artemisia have been characterized for their biological activities.

It is considered to produce most medicinally important secondary metabolites (Ambasta SP., 1986). Several interesting studies using *Artemisia* spp. showed a series of antimicrobial and

antioxidant activities (Juteau 2002). The qualitative determination of various secondary metabolites like flavonoids, terpenoids, saponins and polysaccharides of Artemisia spp. were detected by HPLC, GC-MS and NMR (Xie., 2008). Few considerable secondary metabolites were successfully isolated and used in food industry as an alternative to synthetic antimicrobials (Pattison 2004). The determination of potential antimicrobial activity of *Artemisia nilagirica* extracts could be more informative for the future use in controlling phytopathogens and also in clinical treatment as natural antimicrobial agents.

The organisms like *Escherichia, Enterobacter, Klebsiella, Proteus, Shigella* and *Staphylococcus* species are implicated to cause severe infections in human, as they are found in multiple environmental habitats (Emori.,1993). *Erwinia* spp., *Clavibacter michiganense*, *Pseudomonas syringae* and *Xanthomonas campestris* were reported to be severe phytopathogens, causing damage in carrot, potato, tomato, leafy greens, onion, green pepper, squash and other cucurbits. Furthermore, these phytopathogens cause disease in any plant tissue it invades (Setubal JC., 2005). *A. nilagirica* var. *nilagirica* is a valuable medicinal plant, widely used in the Indian traditional medicine for the treatment of depression, diabetics, epilepsy, insomnia and stress (Walter *et al*., 2003). In west the of the plants and herbs as a source of medicine is growing, with approximately 40% of the population are reported to use it for the treatment of many diseases.

It is also used as antihelmintic, antiseptic, antispasmodic, cholagogue, digestive, expectorant, purgative and stimulant. The bioactive compounds isolated from A. nilagirica such as flavonoids, sesquiterpene lactones have been reported to have antimicrobial, cytotoxic, and insecticidal properties (Naik *et al*., 2014). The genus consists of small herbs and shrubs, found in northern temperate regions and comprises of about 500 species from South Asia, North America and European countries (Abad,. 2012). Species of the genus are called by the common names mugwort, wormwood and sagebrush. Due to presence of terpenoids and sesquiterpene lactones, most of the species possess strong aromas and bitter tastes, which discourage herbivory, and may have had a selective advantage (Bora, 2011). These species have wide and varied applications in plant and human disease control and in the pharmaceutical industry. There are several species of *Artemisia* that have been investigated as antimicrobial, antioxidant, cytotoxic, insecticidal, repellent and anticonvulsant agents (Tan, 1998). Although a review on the genus Artemisia was published by Abad *et al*. 2012.

Bioactive compounds are known for their antitoxin resistance and as a reliable source of antimicrobial treatments, and are widely used as anti-infective supplements and adjuncts in combination with other compounds. However, the properties of natural-based mixtures need to be carefully investigated to determine their pharmacological effects on biological systems (Ushimaru *et al*., 2007). Approximately 80% of the medicines of the world depend on plant-based bioactive components for curing various diseases. . However, the most of these plant resources have not yet undergone chemical, pharmacological, and toxicological studies to investigate their bioactive compounds (Farug *et al*., 2014). Many important secondary metabolites and essential oils were reported from Artemisia sp. Essential oils of *Artemisia* spp. have been frequently used for a the treatment of various diseases for many years. *Artemisia nilagirica* (Clarke) pamp (Indian worm wood) is widely found in the hilly areas of India (Banerji *et al*., 1990). The present study was phytochemical characterization and GC-MS analysis of *nilagirica* hydroalcoholic extract and AutoDock docking of phytocompound of *Artemisia nilagirica* with colorectral cancer receptor.

MATERIALS AND METHODS

Collection of plant materials

The *Artemisia nilagirica* were collected from Wayanad, Kerala India. The plant material was identified and authenticated at the Rapinat herbarium and center for molecular systematics by Dr. John Britto and a specimen (SS+SW.001) was retained in our laboratory for future reference.

Preparation of extract by direct method

The leaves of *Artemisia nilagirica* were collected and washed thoroughly in running tap water to remove soil particles and other debris. The leaves were shade dried separately and ground to a fine powder using electric blender. The powdered materials were stored in an air tight polythene container for further investigation. The powdered leaf material was immersed in hydroalcoholic solution and the extract was separated and filtered by Whatman No.1 paper and dried by rotary evaporator.

Phytochemical extraction (Soxhlet apparatus)

Fresh leaves of *Artemisia nilagirica* were thoroughly cleaned with distilled water and then dried in the shade for 2 to 3 days. The dried leaves were ground into a powder, and 10 grams of the plant powder were used for extraction using a Soxhlet apparatus at boiling temperature. A hydroalcoholic solvent system was employed for the extraction process. The crude extract

obtained weighed 1.32 grams. The extracts of *Artemisia nilagirica* were then subjected to qualitative phytochemical characterization to identify various classes of active chemical constituents, following standard prescribed methods. The results of the tests were categorized as weak (+), moderate (++), strong (+++), or absent (-).

DPPH

To make DPPH first we have to prepare a stock. A rapid, simple and inexpensive method to measure to anti-oxide capacity of food involves the use of the free radical, 2, 2-Diphenyl -1-picylnydiazyl (DPPH) which is widely used to test the ability of components to act as free radical scavengers.

Procedure

To prepare 0.1mM of DPPH solution in methanol and add 1000 µl of this solution to 3 ml of the solution of plant extract in methanol. The mixtures have to be shaken vigorously and allowed to stand at room temperature for 30 minutes. Then the absorbance has to be measured at 517 nm using a UV-VIS spectrophotometer. (Ascorbic acid can be used as the reference). Lower absorbance values of reaction mixture indicate higher free radical scavenging activity. The capability of scavenging the DPPH radical can be calculated by using the following formula. DPPH scavenging effect (% inhibition) = [(absorbance of control- absorbance of reaction mixture)/absorbance of control] X 100.

Phytochemical analysis

Detection of resins

To 0.5 ml of plant extract, 3 ml of cuso4 solution is added. Shaken for about 1-2 min formation of green colour precipitate indicates the presence of resins.

Detection of Carboxylic acid

To 1ml plant extract, 2 ml of sodium bicarbonate solution is added. Colour changes occur indicates the presence of carboxylic acid.

Detection of Tannins

To 2ml of plant extract, 2-3ml of 10% HCL is added and boiled for 5-6 min. Formation of red colour indicates the presence of tannins.

Detection of Steroids

To 0.5 ml extract, 5ml of chloroform is added and equal amount of conc. H2so4 was added. In the upper layer formation of red colour and in the lower layer, yellow with green colour is formation indicates the presence of steroids.

Detection of Flavanoids

To 0.5 ml extract, 4ml of 1% ammonia was added and to this 1ml of conc. H2so4 was added. The formation of yellow colour indicates the presence of flavonoids.

Detection of Carbohydrates

To 0.5ml of extract, 0.5ml of Benedict reagent was added ad boiled for 2 min. Colour changes and ppt is formed. It indicates the presence of carbohydrate.

Detection of Glycosides

Preparation of hydrosalyte

To 50mg of extract, 2ml of conc. HCL was added and kept in a water bath for 1 hour and then filtered. The filtrate is hydrated.

Born-Trageru's Test

Taken 2ml of hydrolysate, 3ml of chloroform was added, shaken vigorously, then the chloroform layer gets separated. Then 10% ammonia solution was added. The formation of pink colour indicates the presence of glycosides.

Saponification test

To 1 or 2ml of normal sodium hydroxide, 2ml of extract is added and boiled for 2 minutes. Formation of soap or fat indicates the positive test for saponification.

Detection of Proteins (Bradford Method)

To 500µl of plant extract, 5ml of the Bradford reagent was added, incubated at dark for 10 to 15 min. Taken the OD at 575nm.

Detection of Phenol (Ferric Chloride Test)

To 50 mg of extract, 5ml of distilled water was added and a few drops of 5% ferric chloride solution were added. The formation of dark green colour indicates the presence of phenol.

Biuret Test

To 2ml of extract, 1 drop of 2% cuso4 solution. Add 1 ml of 95% ethanol, then add 2 to 3 sodium hydroxide pellets.Formation of pink colour indicates the test is positive.

Saponin Test

To 50 mg of plant extract, 20 ml of distilled water was added and shaken vigorously for 15 min, formation of 2 cm layer of foam indicates the presence of saponins.

Gum Test

The 100 mg of plant extract was dissolved in 2 ml of distilled water. 2ml of absolute alcohol with constant stirring. White colour cloudy precipitate indicates gums & mucilage's.

Detection of flavanoglycoside

The 50 mg of plant extract was dissolved in 5ml ethanol. Added few drops of magnesium sulphate & few drops of conc.HCL. The formation of pink colour indicates the presence of flavanoglycoside.

GCMS analysis

The GC-MS analysis was carried out for *Artemisia nilagirica* alcoholic extract using a Clarus 500 Perkin- Elmer Gas Chromatograph equipped and coupled to a mass detector Turbo mass ver 5. 2.0 – Perking Elmer Turbomas 5.2 spectrometer with an Elite-(5%Phenyl 95% dimethyl polysiloxane), 30 m, 250 µm capillary columns. The oven temperature was raised up to 250°C, Injection port temperature was ensured as 280°C and Helium flow rate as 1 ml/min. The ionization voltage was 70 eV. The samples were injected in split mode as 1:10. The mass Spectral scans range was set at 40-450 (MHz). Transfer line and source temperature: 200ºC, 250ºC, Sample injected 1 mL.

Thin Layer Chromatography

TLC ready-made plates were preferred and cut. A thin mark of 0.5 cm was made from the bottom of the plate to load the sample spots. Then the sample solutions were loaded on the spots marked on the line at equal distances. The mobile phase was poured into the beaker to a level of a few centimeters above the beaker's bottom. Now the three different plates prepared with corresponding sample spots were placed in TLC chamber so that the side of the plate with the sample line would face the mobile phase. After that, the plates were removed such that the sample spots were raised well above the level in mobile phase (ie., 0.5 cm beneath

from the top) and those were being allowed to dry. From the spot curves seen in the three plates, Rf values were calculated by the formula.

Rf value = Distance travelled by the solute / Distance travelled by the solvent.

PDB- Protein Data Bank

The Protein Data Bank (PDB) archive is the single worldwide repository of information about the 3D structures of large biological molecules, including proteins and nucleic acids. These are the molecules of life that are found in all organisms, including bacteria, yeast, plants, flies, other animals, and humans. Understanding the shape of a molecule deduce a structure's role in human health and disease, and in drug development. The structures in the archive range from tiny proteins and bits of DNA to complex molecular machines like the ribosome. These data show that most structures are determined by X-ray diffraction, but about 10% of structures are determined by protein NMR. When using X-ray diffraction, approximations of the coordinates of the atoms of the protein are obtained, whereas estimations of the distances between pairs of atoms of the protein are found through NMR experiments. Therefore, the final confirmation of the protein is obtained, in the latter case, by solving a distance geometry problem. A few proteins are determined by cryo-electron microscopy**.**

Software used for Docking

Auto-Dock

AutoDock is a suite of automated docking tools. It is designed to predict how small molecules, such as substrates or drug candidates, bind to a receptor of known 3D structure. In Auto- docking the docking results are more accurate and reliable. It can optionally model flexibility in the target macromolecule. It enables Auto Dock's use in evaluating protein-protein interactions.

Parts of Auto Dock

The Auto Dock Tools window has several parts

At the top are menus that access the general methods available in PMV. These include tools for reading and writing coordinates and images, for modifying coordinates, for selection, and for visualization. A row of buttons at the top allows quick access to the most popular tools of PMV Below the buttons, there are a series of menus that access the AutoDock-specific tools of Auto Dock Tools. The 3-D molecular viewer is at center right the Dashboard, located to

the left of the viewer, allows quick selection, visualization, and coloring of molecules currently displayed in the viewer.

Procedure

The target PDB structure of the binding ligands was downloaded from PubChem. Co-ordinates are prepared AutoGrid is runned Docking with AutoDock Evaluating the Results of a Docking.

RESULTS AND DISCUSSION

Phytochemical analysis

The phytochemical studies revealed the presence of flavonoids, steroids, terpenoid, saponins, resins, carbohydrates, proteins and essential oil in the hydroalcoholic extract of *Artemisia nilagirica*. (Table 1 and Figure 2).

Table – 1 phytochemical analysis of *Artemisia nilagirica.*

S.NO.	Phytochemicals	Result
1.	Resins	+++
2.	Carboxylic Acids	-ve
3.	Tannis	-ve
4.	Flavonoids	+
5.	Steroids	+++
6.	Carbohydrate	+++
7.	Dpph assay	+
8.	Glycosides	+ve
9.	Biuret test	-ve
10.	Sapon test	+++
11.	Gum test	+++
12.	Flavanoglycoside	-ve

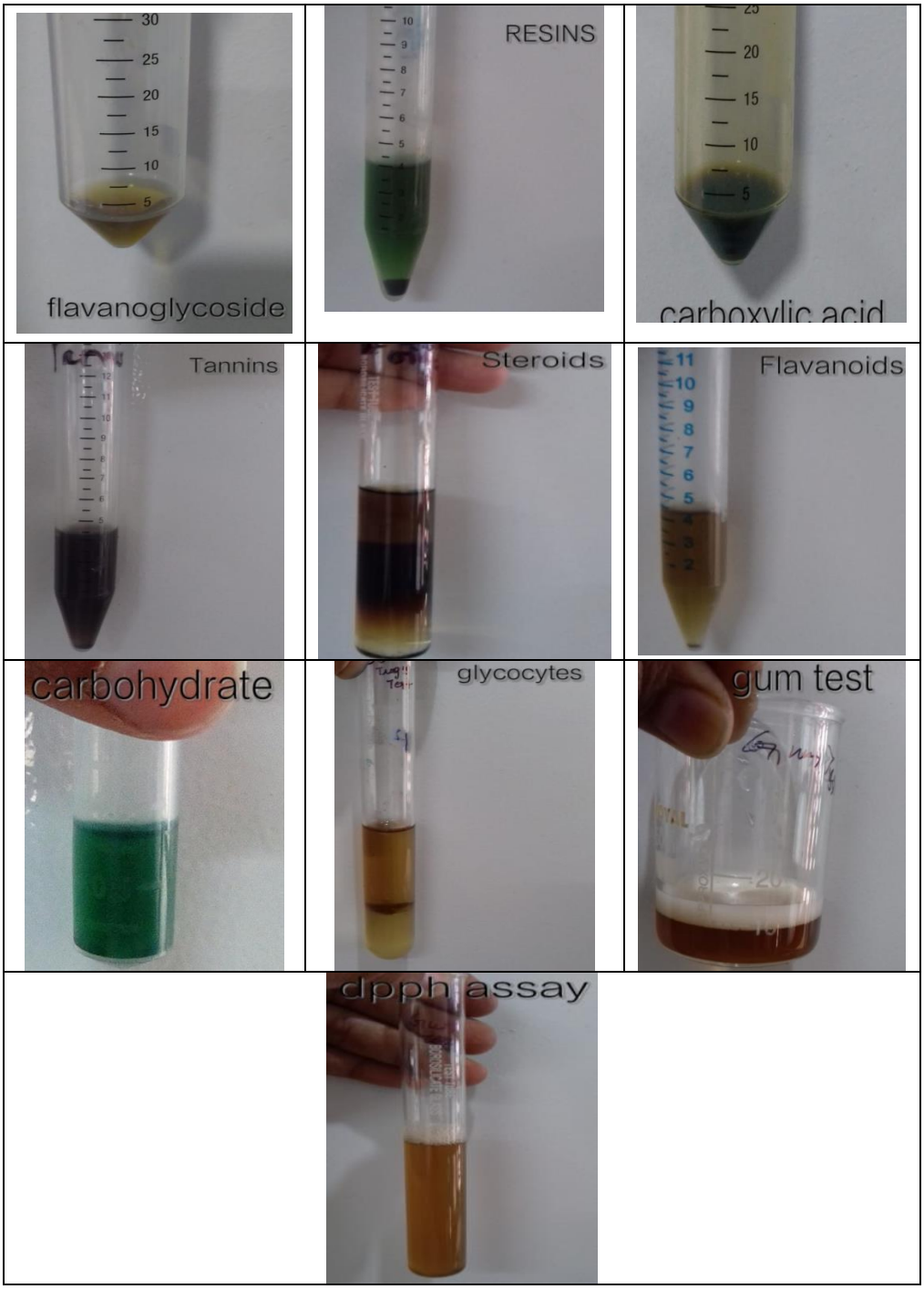

Figure 2. Showing the results of hydroalcoholic extract.

Thin layer chromatography

As shown in figure 3. the phytochemicals present in the plants are studied with the help of Thin Layer Chromatography. The RF value was calculated using the following formula.

TRAIL 1

Rf factor = Distance travelled by the solute / Distance travelled by the solvent

=4.4/4.9

=0.8979

Rf factor = Distance travelled by the solute / Distance travelled by the solvent

=5/5.5

=0.9090

Figure: 3 TLC analysis of *Artemisia nilagirica* hydroalcoholic extract.

GCMS analysis

As shown in figure 4. the GCMS analysis of the phytochemicals present in *Artemisia nilagirica* hydroalcoholic extract revealed the presence of 50 different phytocompounds (Table 2). The high efficiency compound detected in the hydroalcoholic extract of crude sample are 2-Propenoic acid, 3-(2-hydroxyphenyl)-, (E)-, MOME INOSITOL, 3-(2-HYDROXYPHENYL) ACRYLIC ACIDANDROST-4-ENE-3,17-DIONE. These phytocompounds were used for the auto docking with colorectal cancer receptor in insilico analysis.

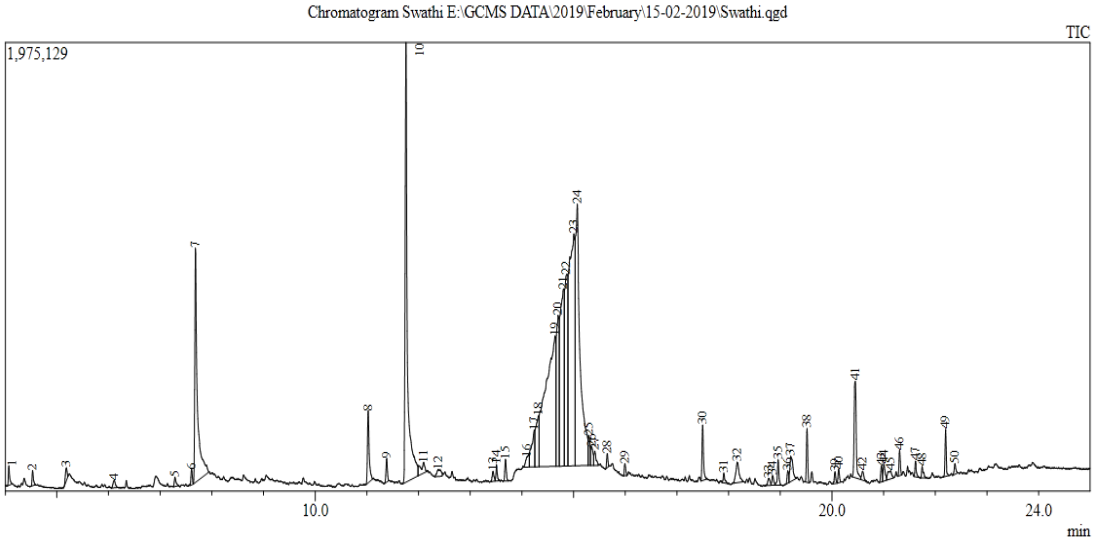

Figure 4. GC-MS chromatogram of *Artemisia nilagirica* hydroalcoholic extract.

Table 2. Showing the identification of 50 different phytocompounds *of Artemisia nilagirica alcoholic extract using GCMS analysis.*

S. No	Name of the phytocompound identified using GC-MS
1.	METHOXY, PHENYL- ,OXIME_
2.	1,2-Cyclopentanedione
3.	PHENOL
4.	Benzaldehyde, 3-benzyloxy-2-fluoro-4-methoxy-
5.	3-Mercaptohexanol
6.	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-
7.	3-(2-HYDROXYPHENYL)ACRYLIC ACID
8.	Hydrocoumarin
9.	Pyrrolidine, 1-(1-cyclohexen-1-yl)-
10.	2-Propenoic acid, 3-(2-hydroxyphenyl)-, (E)-
11.	3-Phenyl-2-ethoxypropylphthalimide
12.	.beta.-D-Glucopyranose, 1,6-anhydro-
13.	1H-PYRROL, 2-(2,4,6-HEPTATRIENYL)-
14.	1,2-BENZENEDICARBOXYLIC ACID, DIETHYL ESTER
15.	2-Dimethylaminobenzoic acid
16.	1,2,3,4-Tetrahydro-cyclopenta[b]indole
17.	Arachidonic amide, N-[5-hydroxy-n-pentyl]-
18.	MOME INOSITOL
19.	MOME INOSITOL
20.	MOME INOSITOL
21.	MOME INOSITOL
22.	MOME INOSITOL
23.	MOME INOSITOL
24.	MOME INOSITOL
25.	Chamazulene
26.	2,2-Diallylpyrrolidine
27.	TETRADECANOIC ACID

28.	2(4H)-BENZOFURANONE, 5,6,7,7A-TETRAHYDRO-
29.	6-HYDROXY-4,4,7A-TRIMETHYL-, (6S-CIS)- BENZENE,
30.	ETHYLPHENOXY-
31.	l-(+)-Ascorbic acid 2,6-dihexadecanoate
32.	RETINAL
33.	9-OCTADECENOIC ACID (Z)-
34.	Trehalose
35.	9,12-Tetradecadien-1-ol, acetate, (Z,E)-
36.	Phytol
37.	Z,Z-3,13-Octadecadien-1-ol
38.	Dichloroacetic acid, tridec-2-ynyl ester
39.	2(3H)-FURANONE, 3-(2-(DECAHYDRO-6-HYDROXY-5-(HYDROXYMETHYL)-5,8A-DIMETHYL-2-METHYLENE-1-NAPHTHALENYL)ETHYLIDENE)DIHYDRO-4-HYDRO
40.	1H-CYCLOPROP[E]AZULEN-4-OL, DECAHYDRO-1,1,4,7-TETRAMETHYL-, [1AR(1A.ALPHA.,4.ALPHA.,4A.BETA.,7.ALPHA.,7A.BETA., 7B.ALPHA.)]-
41.	ANDROST-4-ENE-3,17-DIONE
42.	RETINAL
43.	Cyclopentanecarboxylic acid, 3-isopropylidene-, bornyl ester
44.	BORNYL ESTER OF 3-ISOPROPYLIDENE-CYCLOPENTANECARBOXYLIC ACID
45.	4-Hydroxy-4-(2,6-dimethylcyclohex-3-enyl)butan-2-one
46.	7,14-METHANO-4H,6H-DIPYRIDO[1,2-A:1',2'-E][1,5]DIAZOCIN-4-ONE, 7,7A,8,9,10,11,13,14-OCTAHYDRO-, [7R-(7.ALPHA.,7A.BETA.,14.ALPHA
47.	Phenol, 2,4-bis(1-phenylethyl)-
48.	Phenol, 2,4-bis(1-phenylethyl)-
49.	Phenol, 2,4-bis(1-phenylethyl)-
50.	HEXADECANOIC ACID, 2-HYDROXY-1-(HYDROXYMETHYL)ETHYL ESTER

AUTODOCK

The phytocompounds were docked with (MUC1) or Musin 1.This study will be useful to studythat how far it is active against colectral cancer. The best compounds were screened out based on the binding energy and their interaction with the receptor molecules. Hence the study has been done by using autodocking methods to solve the problem, Musin 1(MUC 1) activity as a major role so it is selected as a target and the *Artemisia nilagirica* derivatives are tested against the target. Among the four High efficiency of phytocompounds presented in *Artemisia nilagirica*, 2-propenoic acid,3-(2-hydroxyphenyl)-(E) showed the high binding energy -3.75.

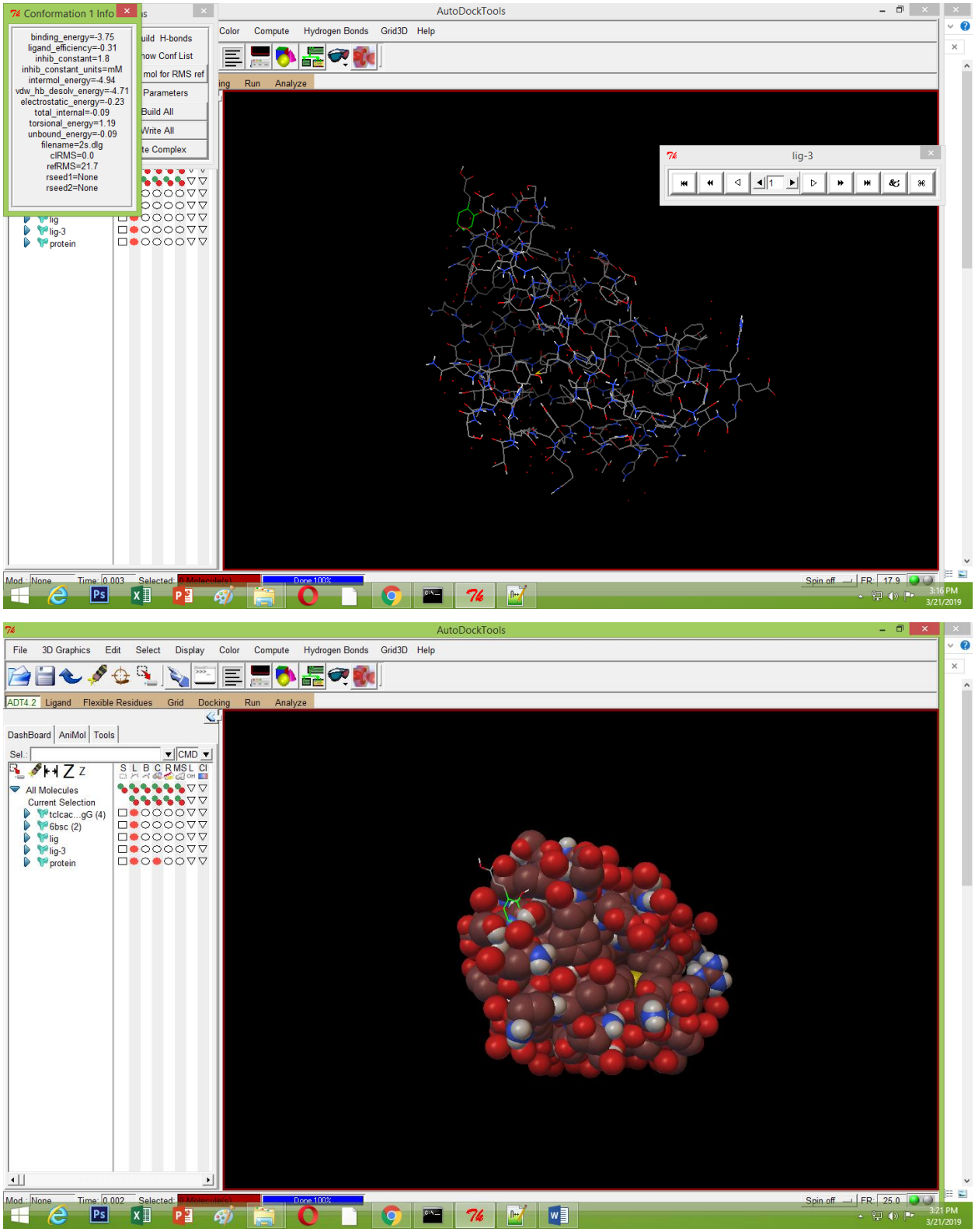

Figure 5. Auto docking of phyto compound with the receptors of phytocompound.

DISCUSSION

The therapeutic potential of herbs or medicinal plants come from its phytochemical constituents. The common phytochemicals that cause effective results on human health care

are flavonoids, alkaloids, tannins, glycosides etc. The phytochemical screening of *A. nilagirica* have shown presence of many biologically active chemical compounds such as alkaloids, tannins, flavonoids, glycosides and terpenoids. In the present study, phytochemical characterization and GC-MS analysis of *nilagirica* hydroalcoholic extract was done followed by AutoDock docking of phytocompound of *Artemisia nilagirica* with colorectral cancer receptor.

Phytochemical test were carried out on the *A. nilagirica* extracts to determine the natural bioactive compound. By studying the presence of phytochemical in *A. nilagirica*, the medicinal value of the plant can be explained scientifically. The phytochemical screening of extracts showed the presence of major derivatives. The analysis showed the occurrence of Resins, Carboxylic acid, Tannis, Steroids, Flavanoids, Carbohydrates, Glycosides, Biuret test, Sapon test, Gum test and Flavanoglycoside in hydroalcoholic extracts. Furthermore, flavonoids and tannins of various plants extracts proven to be effective antimicrobials. Our results are also in agreement with these studies suggesting the efficacy of hydroalcoholic extract of *A. nilagirica* against phytochemical test.

Another analysis by Ahameethunisa et al. have shown the presence of major chemical compounds such as flavonoids, alkaloids, phenol, tannins, amino acids, quinines and terpenoids. Tannins were reported to be present only in ethanol, diethyl ether and methanol extracts. Volatile oils were present in methanol, hexane and petroleum ether. Also, saponins and amino acid were present in ethanol and methanol extracts with carbohydrates exclusively present in methanol extract. Interestingly, hydrolysable tannins were absent in all the extracts.

Thin layer chromatography is usually done for a better identification of the bioactive compounds. In the present study the TLC profiling of *A. nilagirica* plant extracts again revealed the presence of different metabolites such as alkaloids, flavonoids, phenols and tannins. It was observed that methanol was found effective in extracting maximum number of secondary metabolites. Different Rf values of the compounds provides an idea about their polarity that may also help in selecting a particular solvent system for further isolation of any compound from the plant extracts using chromatographic and spectroscopic techniques.

Another qualitative analysis of the Artemisia species was performed by GC-MS and presence of 50 different various secondary metabolites and bioactive compounds were confirmed. Furthermore, extracts of Artemisia spp. were used as natural pesticide and also in the

treatment of few human diseases (Mueller., 2000). Biological activity was detected in a series of compounds such as eupatilin (anticancer); artemisolide (anti-inflammatory); α-thujone (toxicity against adult mites); chamazulene, 1,8-cineole, and β-caryophyllene (toxicity against the cigarette beetle); luteolin (anti-inflammatory, anticancer, antimicrobial, antioxidant); and eriodictyol (anti-inflammatory properties, beneficial effect in treatment of diabetic retinopathy, emmenagogue) (Andreea Cosoveanu., 2018). The phytochemicals such as, alkaloids, saponins, steroids, tannins, flavonoids, amino acids, and trigonillin were responsible for biological activity. The leaves and seed have been widely used to prepare concentrates and powders for restorative uses (Swati *et al*., 2014). Bioactive compounds are known for their antitoxin resistance and as a reliable source of antimicrobial treatments, and are widely used as anti-infective supplements and adjuncts in combination with other compounds (Parameswari *et al*., 2019). Autodocking of phyto compounds such as 2-Propenoic acid, 3-(2-hydroxyphenyl)-, (E)-, MOME INOSITOL, 3-(2-HYDROXYPHENYL)ACRYLIC ACIDANDROST-4-ENE-3,17-DIONE with the receptors of colorectal cancer cells revealed the anticancer potential of *Artemisia nilagirica* in insilico level.

CONCLUSION

Artemisia nilagirica is widely distributed across India and has shown potential for various therapeutic properties, including anti-inflammatory, antifungal, antimicrobial, antiulcer, antifilarial, anticancer, and antioxidant activities. Studies confirm the antibacterial and antifungal capabilities of *A. nilagirica*, highlighting its therapeutic potential. This plant serves as an important source of various phytochemicals with pharmaceutical applications.

The leaf extract of *A. nilagirica* demonstrated significant activity against a range of bacteria and fungi, suggesting that this plant could lead to the discovery of novel agents with effective treatments for various diseases and disorders. Phytochemical analysis revealed the presence of components such as resins, carboxylic acids, tannins, steroids, flavonoids, carbohydrates, glycosides, as well as positive results from biuret, saponin, gum tests, and flavanoglycosides in the hydroalcoholic extracts of *Artemisia nilagirica*.

Characterization of *Artemisia nilagirica*. This analysis is relevant for both consumers and food scientists, as the herbal drug may offer health benefits to the public and serve as a medicine for various diseases. The herb *A. nilagirica* is widely used in Ayurveda for treating different disorders, and the results presented here are significant. However,

most of the observed medicinal effects have not yet been studied preclinically, and researchers have not focused on its potential antiulcer or antidiarrheal activities. Literature suggests that most of the plant's activities have been evaluated using the leaves and extracts of flowering meristems. Although the root of the plant is known for its medicinal properties and has been used in Ayurvedic medicine for treating various ailments, it has not yet been examined for pharmacological activities using animal models. Therefore, in vivo experiments with the root extract should be conducted, as historical and traditional usage indicates significant potential.

Furthermore, developing natural antimicrobials could help reduce the negative effects associated with synthetic drugs. Future work will involve the fractionation and characterization of these active compounds. Additionally, the in vitro culture and genetic modification of the plant can help prevent overexploitation and may lead to the production of novel and more potent varieties.

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