


OVEREVIEW ON FORMULATED PHYTOMOLECULES FOR ANTI-CANCER ACTIVITIES

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ABSTRACT

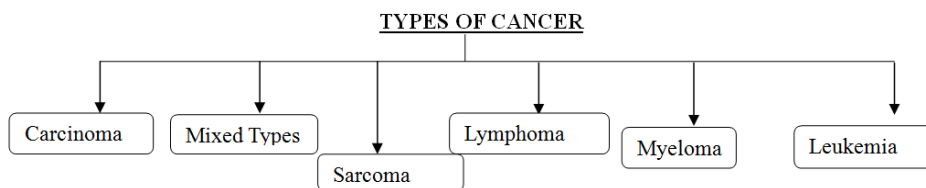
In this modern days cancer is the increased deadful disease a new drugs for cancer also invented and but they are derived or synthetically prepared from the natural source based on that the drugs which are mostly have the p53 gene activation or HSP70 inactivation activation the targeted hiting of drug in receptor was succeed with the help of molecular docking and compound which obey the lipsinki rule which have more affinity and the compounds in the drug source was converted into the ligands and aminoacids in cancer cells are consider as the targeted protein the protein ligand affinity was evaluated by the software called autodock and its derivatives this review represent the various plants used in the treatment of oral cancer and its phytomolecules and active amino acids on the the cancer cells where reviewed.

KEYWORDS: Cancer, Docking study, Phytomolecules, Anti-cancer.

INTRODUCTION

Cancer is a group of disease involving the abnormal cell formation with the potential to block or spread to other organs of the body it is also called as the neoplasm it have the symptoms including lump formation, abnormal bleeding, prolonged cough unexplained weight loss, and change in the bowel characteristics. Cancer which have

the special characteristic like abnormal cell propagation and medling of cells and progression of cells and also a cells are not well differentiated the cancer was divided into two catagories they a benign which means does not spread and another type is malignant cancer which replicate same as the normal cells. It is also called as neoplasm.



Types of Cancers

Carcinoma

- ❖ Which begins in the skin layer in later it spread through the internal organs of the human body.
 - ❖ They are generally classified into the two types one is invasivd carcinoma which means spread only to the closely present tissues.
 - ❖ And the another is the metastatic they spread to the overall body parts.
 - ❖ Based on the charecters they are classified into 3 yypes they are
- 1) Adenocarcinoma

- 2) Squmous cell carcinoma
- 3) Ductal carcinoma

Adenocarcinoma

❖ Which start in the cell lining of glands (Glandular epithelium) which is responsible for secretion of mucus, hormones, fluids, juices are called adenocarcinoma.

Basal Carcinoma

❖ Which it affect the region of the epidermis that means inner layer of the skin.

Squamous Cell Carcinoma

- ❖ It affect the part of epidermis which means outer layer of the skin which this is the type of cancer that affect the sun exposure regions.

Ductal Carcinoma

- ❖ Which it starts in the breast feeding glands which is cannot spread to other cells.

Squamous-cell carcinoma

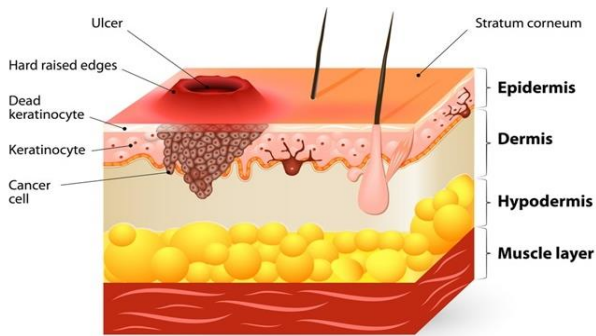


Figure 2: Squamous Carcinoma Cancer.

Sarcomas

Which it is particularly affect the region of the connective tissues like the tendons and bones.

- ❖ Osteosarcoma
Which means formation of immature and irregular bone.
- ❖ Ewigs sarcoma
Rapid development of the abnormal bones.
- ❖ Fibrosarcoma
Cancer which affect the Tendon region of the body.
- ❖ Chandrosarcoma
Cancer formation in the region of cartilages in the body.

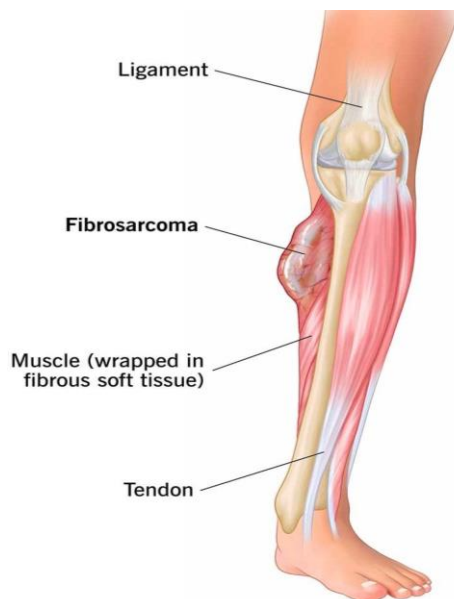


Figure 3: Fibro Sarcomacancer.

LEUEKEMIA

- ❖ It is the type of cancer which produce abnormal blood cell replication
- ❖ The leukemia is defined as the immature blood cell formation
- ❖ They are classified into two types one is myeloid leukemia and lymphocytic leukemia.
- ❖ Myeloid leukemia cancer which affect the basophils, easinophils, neutrophils.
- ❖ Lymphocytic leukemia cancer which targetly affect the lymphocytes and natural killer cells.

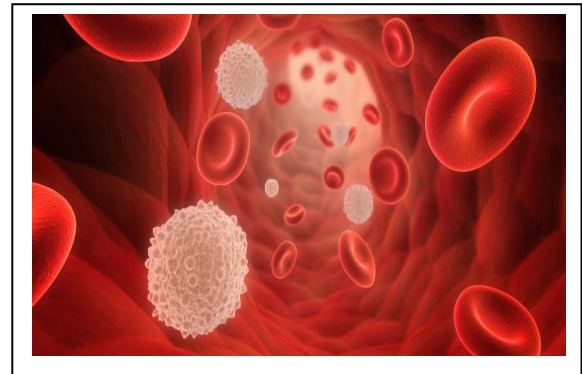


Figure 4: Leukemia Cancer.

Lymphoma

- ❖ The type of cancer which affect the lymphatic system which provide defense against the antigens.
- ❖ This type of cancer caused by the low immune power or due to the autoimmune disorder.
- ❖ And also due to the presence of virus like HIV and Epstein barr virus and kaposi sarcoma virus.
- ❖ The fatigue and stress also responsible for cancer formation.

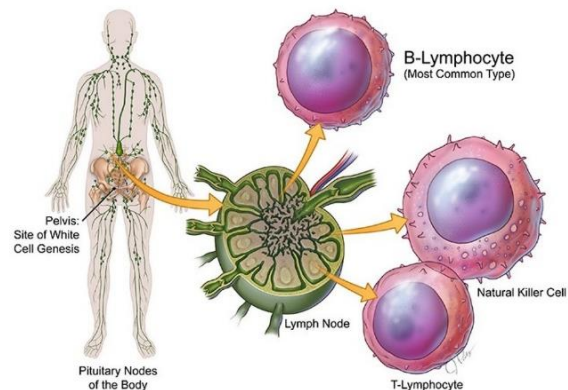


Figure 5: Lymphoma Cancer.

Central Nervous system cancer:

- ❖ It is the type of cancer involved in the brain and spinal cord region this is also called as the tumour.
- ❖ The most common form of brain cancers are astrocytomas star shaped glial cell in brain
- ❖ Medulla blastoma is the embryonal cancer occurs in the central and spinal in the childrens.
- ❖ The most common form of brain cancers are astrocytomas star shaped glial cell in brain



Figure 6: Central Nervous System Cancer.

Melanoma

- ❖ It is the type of cancer which is due to excess of melanocytes hypersecretion and hyperpigmentation.
- ❖ Which is derived from the neural crest.
- ❖ Which have the common type of melanoma called superficial melanoma and Nodular melanoma
- ❖ Lentigo melanoma and acral lentiginous melanoma.

MELANOMA

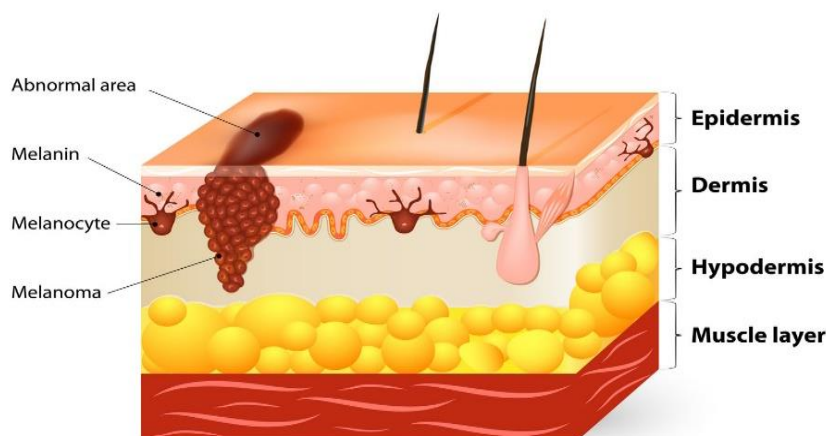


Figure 7: Melanoma Cancer.

ORAL CANCER

- ❖ Oral cancer are defined as the formation of cancer in the regions of tongue, mouth, tooth gums and cell cell line
- ❖ It is the seventh most affected cancer in the world wide
- ❖ The common causes of cancer is Tobacco, unhealthy oral hygiene, poor nutrition and genetic.

Symtoms of oral cancer

- a) Sore throat and mouth
- b) Irritation in the mouth and throat
- c) White or red thick pathches on oral cavity
- d) Pain and bleeding in oral cavity
- e) Ear pain also occur in some cases
- f) Lump formation in the neck.



Figure 8: Symtoms of Oral Cancer.

WHAT ARE MOUTH CANCER SYMPTOMS?

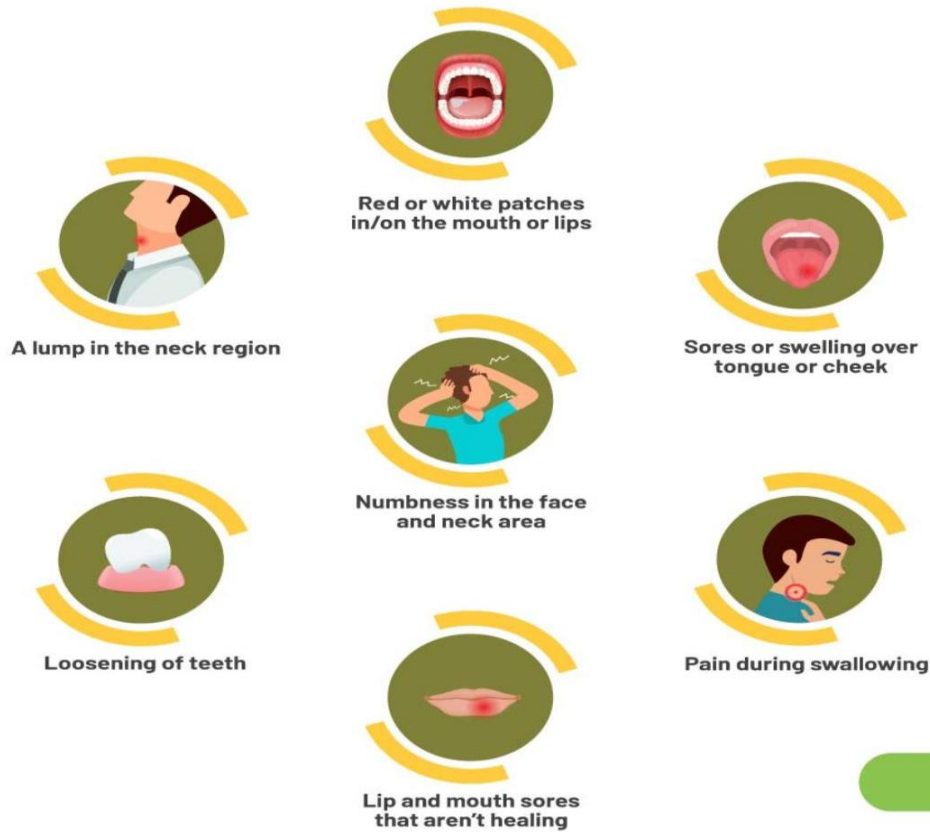




Figure 9: Symptoms of Oral Cancer.


Formulated Phytomolecules For Anti-cancer Activities



Many phytomolecules which are obtained from the medicinal plants have been reported to show the anti-cancer activity on several types of cancer. These phytomolecules are obtained from the medicinal plants and their explants by extraction process. The whole part of medicinal plant contain a many phytomolecules which has many uses. These medicinal plants synthesize many


chemical compounds for various function such as defense and protection against microorganism, insects, and also for many diseases.


<p>ACACIA CATCHUE</p> 	<p>Biological name: Acacia Catchue</p> <p>Family: Legumes</p>		Common name	
			Kannada	Kachhu
			Hindi	Khair
			Tamil	Senkarungali
<p>Description</p> <ul style="list-style-type: none"> ❖ It have the polyphenols which produce the anticancer activity. ❖ The Bark of the plant used as the anticancer agent. ❖ Which have the active constituent called catechin and taxifolin & procynadin.^[10] 				


ALLAMANDA CATHARTICA		Biological name: <i>Allamanda Cathartica</i>		Common name	
	Family: <i>Apocynaceae</i>	Kannada	Arasinhu	Hindi	Pilahanti
		Tamil	Manjal patti		
		Description It have the Flavanoids and Terpenoids which produce the anticancer activity The root of the plant used as a anticancer agent Which have the active constituent called rutin. ^[11]			


ALOE BARBADENSIS		Biological name: <i>Aloe Barbadensis</i>		Common name	
	Family: <i>Liliaceae</i>	English	Aloe vera	Hindi	Gwar patha
		Tamil	Katrazhai		
		Description ❖ It have the Anthraquinone which produce the anticancer activity. ❖ The whole plant where used as the anticancer agent. ❖ Which have the active constituent are called aleosaponarin I & II. ^[12]			


ANISOMELES INDICA		Biological name: <i>Anisomeles Indica</i>		Common name	
	Family: <i>Lamiaceae</i>	English	Cat mint	Hindi	Kalabhangra
		Tamil	Karithumbai		
		Description ❖ It have the chemical constituent called Ovatodiolide which produce the anticancer activity. ❖ The leaves are have the anticancer activity. ❖ Which have the chemical constituents called diterpenoid. ^[13]			
BAUHINIA RACEMOSA		Biological name <i>Bauhinia Racemosa</i>		Common name	
	Family: <i>Fabaceae</i>	English	Orchid tree	Hindi	Kachnar
		Tamil	Aathi		
		Description ❖ Due to presence of Flavanoids and Triterpenoids they produce the anticancer activity. ❖ The leaves are have the anticancer activity. ❖ Which have the chemical constituent called quecetin. ^[14]			


CAJANUS CAJAN		Biological name: <i>Cajanus Cajan</i>		Common name	
	Family: <i>Legumes</i>	English	Legumes	Hindi	Arhar dal
		Tamil	Thuvarai		
		Description ❖ Due to presence of isoflavonones they produce the anticancer activity ❖ The roots are have the anticancer activity ❖ Which have the chemical constituent called Formomentin, genistein, cajanin. ^[15]			


<p>CALOTROPHIS GIGANTIA</p> 	<p>Biological name: <i>Calotrophis Gigantia</i></p>	<p>Common name</p>	
	<p>Family:<i>Apocynacea</i></p>	English	Crown flower
		Hindi	Madar
		Tamil	Erukan
<p>Description</p> <ul style="list-style-type: none"> ❖ Due to presence of flavanoid they produce the anticancer activity ❖ The leaves are have the anticancer activity ❖ It have the phytochemical constituent are called iso rhemnetin rutinoside, Quercetin 3-0 rutinoside.^[16] 			


<p>CARDIOSPERMUM HALIACEBUM</p> 	<p>Biological name: <i>Cardiospermum Haliacebum</i></p>	<p>Common name</p>	
	<p>Family:<i>Sapindaceae</i></p>	English	Balloon vine
		Hindi	Kanphata
		Tamil	Modakathan
<p>Description</p> <ul style="list-style-type: none"> ❖ Due to presence of flavanoids they produce the anticancer activity ❖ Whole plant have the Anticancer property ❖ Which have the phyto chemical constituents are kaemferol, apigenin, quercetin.^[16] 			


<p>CISSUS QUADRANGULARIS</p> 	<p>Biological name: <i>Cissus Quadrangularis</i></p>	<p>Common name</p>	
	<p>Family:<i>Vitaceae</i></p>	English	Adament creeper
		Hindi	Hadjod
		Tamil	Pirandai
<p>Description</p> <ul style="list-style-type: none"> ❖ It have the polyphenol which produce Anticancer activity ❖ The stem and leaves have the anticancer activiyy ❖ It have the phytochemical constituent Picetannol^[17] 			


<p>Curcuma zedoria</p> 	<p>Biological name: <i>curcuma zedoria</i></p>	<p>Common name</p>	
	<p>Family <i>Gingiberacea</i></p>	English	white turmeric
		Hindi	Ban haldi
		Tamil	kichili kizhangu
<p>Description</p> <ul style="list-style-type: none"> ❖ It have chemical compound sesquiterpine produce anticancer activity ❖ The rhizome have the anticancer activity ❖ Due to presence of the active constituent curcumenol and elemene¹⁸ 			


<p>Dioscorea bulbifera</p> 	<p>Biological name: <i>Dioscorea bulbifera</i></p>	<p>Common name</p>	
	<p>Family:<i>Dioscoreaceae</i></p>	English	Air potato
		Hindi	varahi kand
		Tamil	pannu kizhangu
<p>Description</p> <ul style="list-style-type: none"> ❖ phytosteroid sapogenin it have the phytochemical constituent ❖ The tubers have the anticancer activity ❖ Due to presence of the active constituent diosgenin^[19] 			

	Biological name: <i>Drosera indica</i>	Common name	
	Family <i>Droseraceae</i>	English	cape sundew
		Hindi	Kandulesa
		Tamil	manjal pathiri
Description <ul style="list-style-type: none"> ❖ It have the phytochemical constituent flavonoids. ❖ Due to presence of quercetin and isoquercetin produce anticancer activity and plumbagin. ❖ The tubers are have the anticancer activity.^[20] 			

	Biological name: <i>Gymnema Sylvestre</i>	Common name	
	Family: <i>Apocynaceae</i>	English	Australian cow plant
		Hindi	Gurmer
		Tamil	Sirukurinjan
Description <ul style="list-style-type: none"> ❖ The anticancer activity was produced by Flavanols ❖ The leaves and root used as the treatment for cancer. ❖ The active constituent present are quercetin and Kaempferol^[21] 			

	Biological name: <i>Embelia ribes</i>	Common name	
	Family <i>Myrsinaceae</i>	English	Embelin
		Hindi	Babarena
		Tamil	Vaivillongam
Description <ul style="list-style-type: none"> ❖ The active constituent are embelin and vilangin. ❖ They are alkaloids. ❖ The active constituents are obtained from the fruits of it.^[22] 			

	Biological name: Elephantopus scaber	Common name	
	Family <i>Asteraceae</i>	English	Elephant foot
		Hindi	Adhomukha
		Tamil	Yanai suvad
Description <ul style="list-style-type: none"> ❖ The phytochemical constituent is Sesquiterpenoids ❖ The active constituent Deoxy elephantopin^[23] 			

	Biological name: <i>Jatropha Gossypifolia</i>	Common name	
	Family: <i>Euphorbiaceae</i>	English	Bellyache bush
		Hindi	Ratanjoti
		Tamil	Katt ammanaku
Description <ul style="list-style-type: none"> ❖ They have the Flavanols. ❖ They have the chemical constituent called Myricetin and Azaleatin. ❖ The stem and bark have the anticancer activity.^[24] 			

Some other plants which have the Anti-Cancer Activity

Table 1: Plant *phytomolecules* have anticancer activities.^[26-57]

S. No	Biological Names	Family	Phytomolecules Have anti-cancer activities
1	<i>Allium sativum</i>	<i>Liliaceae</i>	Alliin, Allicin, Alliin, Alliinase
2	<i>Actinidia chinensis</i>	<i>Actinidiaceae</i>	Polysaccharide (ACPS-R)
3	<i>Aloe ferox, Aloeburbadensis</i>	<i>Liliaceae</i>	Aloe-emodin, emodin, aloin
4	<i>Ananas comosus</i>	<i>Bromeliaceae</i>	Bromelanin
5	<i>Angelica sinensis</i>	<i>Umbelliferae</i>	Polysaccharide fraction "AR-4"
6	<i>Annona species</i>	<i>Annonaceae</i>	Acetogenins
7	<i>Arctium Lappa</i>	<i>Compositae</i>	Potent Anticancer Factors
8	<i>Astragalus membranaceus</i>	<i>Papilionaceae</i>	Swainsonine
9	<i>Agapanthus Africanus</i>	<i>Agapanthaceae</i>	Isoliquiritigenin
10	<i>Aglaila sylvestre</i>	<i>Meliaceae</i>	Silvesterol
11	<i>Betula Utilis</i>	<i>Betulaceae</i>	Betulin
12	<i>Camellia Sinensis</i>	<i>Theaceae</i>	Epigallocatechin gallate
13	<i>Catharanthus roseus</i>	<i>Apocynaceae</i>	Vinblastine, Vincristine
14	<i>Hedyotis diffusa</i>	<i>Oocystaceae</i>	Lysine
15	<i>Colchicum luteum</i>	<i>Liliaceae</i>	Colchicines, demecolcine
16	<i>Combretum caffrum</i>	<i>Combretaceae</i>	Combretastatin
17	<i>Corcus sativus</i>	<i>Iridaceae</i>	Safranal, Crocetin, Crocin
18	<i>Echinacea Angustifolia</i>	<i>Asteraceae</i>	Arabinogalactan
19	<i>Fagopyrum esculentum</i>	<i>Polygonaceae</i>	Amygdalin, Rutin
20	<i>Ginkgo Biloba</i>	<i>Ginkgoaceae</i>	Ginkgolide-B, A, C and J
21	<i>Glycine Max</i>	<i>Leguminosae</i>	Zinc, Selenium, (Vit-A, B1, B2, B12, C, D, E and K)
22	<i>Glycyrrhiza glabra</i>	<i>Leguminosae</i>	Glycyrrhizin
23	<i>Gossypium barbadense</i>	<i>Malvaceae</i>	Gossypol
24	<i>Gyrophora esculenta</i>	<i>Umbilicariaceae</i>	Polysaccharides Beta-Glucans, alpha-glucans
25	<i>Lentinus edodes</i>	<i>Agaricaceae</i>	Lentinan
26	<i>Linum usitatissimum</i>	<i>Linaceae</i>	Synogenetic Glycosides, Lignans
27	<i>Mentha Species</i>	<i>Labiatae</i>	Monoterpene Ketones
28	<i>Ochrosia elliptica</i>	<i>Apocynaceae</i>	Ellipticine and 9-Methoxy Ellipticine
29	<i>Panax ginseng</i>	<i>Araliaceae</i>	Ginsenosides, Panaxosides
30	<i>Picrorrhiza kurroa</i>	<i>Scrophulariaceae</i>	Picrosids, I, II, III and Kutkoside
31	<i>Podophyllum Hexandrum</i>	<i>Berberidaceae</i>	Podophyllin, Astragalin
32	<i>Taxus brevifolia</i>	<i>Taxaceae</i>	Taxanes, Taxon cephalomannine
33	<i>Withania Somnifera</i>	<i>Solanaceae</i>	Withanolides, Withaferin
34	<i>Zingiber Officinale</i>	<i>Zingiberaceae</i>	Curcumin, Gingerenone A, Gingeols, Shogaols, Zingerone
35	<i>Colchicum Autumnale</i>	<i>Liliaceae</i>	Colchicine
36	<i>Betula Alba</i>		Betulinic acid
37	<i>Comptothea acuminata</i>	<i>Cornaceae</i>	Camptothea, Topotecan, CPT-11, 9-aminocamptothecin
38	<i>Taxus baccata</i>	<i>Taxaceae</i>	Docetaxel, Taxol
39	<i>Cannabis satiba</i>		Delta-9-tetrahydrocannabinol
40	<i>Tabebuia Imbetiginosa, T. avellaneda</i>	<i>Cannabaceae</i>	Beta-lapachone, Lapachol
41	<i>Podophyllum Peltatum</i>	<i>Berberidaceae</i>	Podophyllotoxin, Etoposide, Podophyllinic acid and teniposide
42	<i>Nothapodytes foetida</i>	<i>Icacinaceae</i>	Acetylcamptothecin, camptothecin, scoplectin
43	<i>Heracleum persicum</i>	<i>Apiaceae</i>	
44	<i>Gmelina asiatica</i>	<i>Verbenaceae</i>	
45	<i>Adiantum venusutum</i>	<i>Adiantaceae</i>	
46	<i>Anemopsis californica</i>	<i>Saururaceae</i>	Cuymene, Limonene, Piperitone and Thymol
47	<i>Alangium salviifolium</i>	<i>Alangiaceae</i>	Quercetin, Kaemferol
48	<i>Acorus Calamus</i>	<i>Araceae</i>	beta-asarone, linalool, farnesol, methyleugenol, alpha & beta-Pinene, [E]-Caryophyllene, beta-elemene, ocimene, aromadendrene, camphor
49	<i>Aspidosperma tomentosum</i>	<i>Apocynaceae</i>	
50	<i>Antiaris Africana</i>	<i>Moraceae</i>	Betulinic acid, 3beta-acetoxy-1beta, 1alpha-dihydroxy-

			olean-12-ene, ursolic acid, oleanolic acid, strophanthidol, Periplogenin, convallatoxin, strophanthidinic acid, methyl strophanthinate, and 3,39 dimethoxy-49-O-beta-delta-xylopyronosyl ellagic acid
51	<i>Amoora rohituka</i>	<i>Meliaceae</i>	
52	<i>Aegle marmelos</i>	<i>Rutaceae</i>	Butylt-tolyl sulfide, 6-methyl-4-chromanone and 5 methoxypsoralen
53	<i>Hiviscus mutabilis</i>	<i>Malvaceae</i>	
54	<i>Arnebia nobilis</i>	<i>Boraginaceae</i>	Arnebin
55	<i>Aesculus Hippocastinum</i>	<i>Sapindaceae</i>	beta-escin
56	<i>Biophytum sentivum</i>	<i>Oxalidaceae</i>	amentoflavoe, Isoorientin, Orientin, Vitexin< Epicatechin 1,2 dimethoxy benzene Linaol oxide, Linalyl, acetate, Isophorone
57	<i>cuscuta reflexa</i>	<i>Convolvulaceae</i>	kaempferol, Uercitin, Hydrovinnamic acid, scoparone, melanettin, uercetin, hyperoside, cuscutalin, isorhamnetin-3-0-neohesperidoside apigenin-7-0-rutinoside, lycopoe, amarbelin
58	<i>caesapinia bonducella</i>	<i>Caesalpiniaceae</i>	Bonducin, Caesanoll, 6B, 7B dibenoyloxyvoiacaeen-5-a-ol, Bonducellpins A, B, C, D
59	<i>cassia fistula, cassia tora, cassia absus, cassia auriculata, cassiasenna</i>	<i>Fabaceae</i>	Anthraquinone, fistullic acid, rhein glucoside, phlobaphenes, emodin, chrysophanic acid, fistuacacidin, hexacosanol, obtsin, chryso-obtusin, obtusifolin, ononitol, monohydrate, rubrofusarin gentiobioside, panwar gum, chaksie, isochksine, hydnocarpin, apigenin rafinose, di-(2-ethyl) hexyl pathalate, sennoside A, B, C, D palmidin A, rhein, aleo-emodin, myricyl alcohol, salicylic acid, m barbaloin
60	<i>cleome gynandra</i>	<i>capparidaceae</i>	centauredin, myricitin, taraxaserol, capric acid, lauric acid, glucocaparin, hexacosanol, viscosic acid, viscosin, glucoiberine, neoglucobrassicin, glucobrassicin.
61	<i>centella asiatica</i>	<i>apiaceae</i>	Asiatic acid, madecassic acid, asiaticoside, madicassoside, braminoside, brahmoside, centelloside
62	<i>cola nitida</i>	<i>Malvaceae</i>	1,3,7-trimethyl-1H-prine-2,6(3h,7H)-dione, n-Hecadecanoic acid
63	<i>cirsium japonicum</i>	<i>Asteraceae</i>	cireneolG, ciryneol H, ciryneol C, p-coumaric acid, syringing, linarin, ciryneone f, ciryneol A
64	<i>citrus medica</i>	<i>Rutaceae</i>	Methyl ferulic acid m dihydro-N-caffeoyltyramine, acacein, B-ecdysterone, (-)- baanophonin, p- menthoxy cinammic acid, umbelliferone, ferulic acid, diosmetin, 4-methoxy salicylic acid
65	<i>ciss quadrangularis</i>	<i>Vitaceae</i>	iridoids, stilbenes
66	<i>clerodendrum serratum, clerodendrum viscosum</i>	<i>Verbenaceae</i>	hispidulin, cleroflavone, apigenin, scutellarein, serratagenicm actoside, verbascoside, clerodermic acid clerodolone, clerodone, clerosterol
67	<i>crinum asiaticum</i>	<i>amaryllidaceae</i>	criasiaicidine A, lycorine, pratorimine, crinamine, hippadine, hamayane, plaforinine, norgalnathamine, epinorglanthamine
68	<i>Daucus caota</i>	<i>Apiaceae</i>	carotene, carotin
69	<i>Embelia ribes</i>	<i>Myrsinaceae</i>	Embelin, cristembine
70	<i>Jatropha curcas</i>	<i>Euphorbiaceae</i>	5a-stigmastane-3,6-dione, nobiletin, B-sitosterol, taraxrol, jatropholone, jatropholoneB, caniojane, daucosterol
71	<i>Kaemferia galangal, kaempferia rotunda</i>	<i>Zingiberaceae</i>	Et-p-MeO-trans-cinnamate, crotepoxide
72	<i>lanata camara</i>	<i>Verbenaceae</i>	valecene, isocarypohyllene, bicyclogermacrene, germacrene D
73	<i>lens culinaris medikus</i>	<i>Fabaceae</i>	-
74	<i>limonia acidissima</i>	<i>Rutaceae</i>	Bergapten, orentin, vitedin, mamin, feronolide, feronone, feronialactone, geranyyk umberlliferone, marmesin,

			ursolic,flavanone glycoside-7-0-methylporiol-4-B-xylopyranosyl-D- glycopyranoside
75	<i>Macrotyloma unniflorum</i>	<i>Fabaceae</i>	psoralidin, agglutinin, pyroglutamylglutamine mimosine, 2-mercaptoaniline
76	<i>Mimosa pudica</i>	<i>Mimosaceae</i>	mimosine,2-mercaptoaniline
77	<i>Nicotiana tabacum</i>	<i>Solanaceae</i>	Rutin, chlorogenic acid, glutamic acid, anabasine, myosmine, coinine, tabacine, tabacine, anthalin, nicotelline, nicotanine
78	<i>Rhinacanthus nasuta</i>	<i>Acanthaceae</i>	Rhinacanthine, rhinacanthin-C, rhinacanthin-D
79	<i>Zanthoxylum armatum</i>	<i>Rutaceae</i>	A-amyrin, armatonaphthyl arainoside, 1-linoleo-2,3-diolein
80	<i>xanthium strumarim</i>	<i>Compositae</i>	Spathulenol, A-cadinol, a- muurolene, copaene
81	<i>salvadora persica</i>	<i>Salvadoraceae</i>	salvadoricine, slavaoside, salvadorside, manisic acid, salvadorea[1,3-bis(3-methoxy-benzyl)-urea]
82	<i>symplocos cochinchinensis</i>	<i>Symplocaceae</i>	Phloretin-2-glucoside
83	<i>vernonia cinerea</i>	<i>Asteraceae</i>	Luteoline-7-desmethyl emetin, sabinene, a-pinen
84	<i>vitex trifolia</i>	<i>Verbenaceae</i>	caryonphyllene, vitricin
85	<i>solanum nigrum</i>	<i>Solanaceae</i>	Diosgenin
86	<i>Tinosporacardifolia</i>	<i>Menispermaceae</i>	Columbin, tinosporaside, jatrorhizine, tembeterine, tinocordifolioside, tinosporic acid, tinsporal, tinosporon
87	<i>momoridica dioica</i>	<i>Cucurbitaceae</i>	Momordicin, momdicarsenol, gypsogenin
88	<i>cynodone dactylon</i>	<i>Poaceae</i>	ortho hydroxyphenk acetic acid, syringic acid, para coumaric acid
89	<i>drosra indica</i>	<i>Droseraceae</i>	rossoliside, hyperoside
90	<i>Barleria grandiflora</i>	<i>Acanthaceae</i>	iridoids, acetylbarlerin, scutellarein-7-rhamnosyl.
91	<i>Terminalia chebula</i>	<i>Combretaceae</i>	arjunglucoside I arungenin, chebulosides I and ii chebulin, 2,4-chbulyl-B-D-glucopyranose, chebulinic acid, chebuli acid, terchebin
92	<i>cucurbita maxima</i>	<i>Cucurbitaceae</i>	cucurbitacin, cucurbitin, pheophytin A niacin thiamine

MOLECULAR DOCKING^[58-62]

- ❖ Molecular docking is defined as the modeling technique how the enzymes of targeted protein (receptor) are bind with the ligand (drug).
- ❖ It is the type of the insilico method which is alternate to the experimental animals
- ❖ That means using the computational drug design the target was identified and protein interaction and formation confirms the affinity of the drugs which required to bind at low energy.
- ❖ The selection of ligand is play the crucial role in pharmacology which increases the drug affinity and
- ❖ Reduce the adverse effect due to target hitting a drug which produce targeted effect so unwanted was reduced.
- ❖ The ligand which are also called as the pharmacophore
- ❖ Based on the bond the efficacy of the drug may be identified

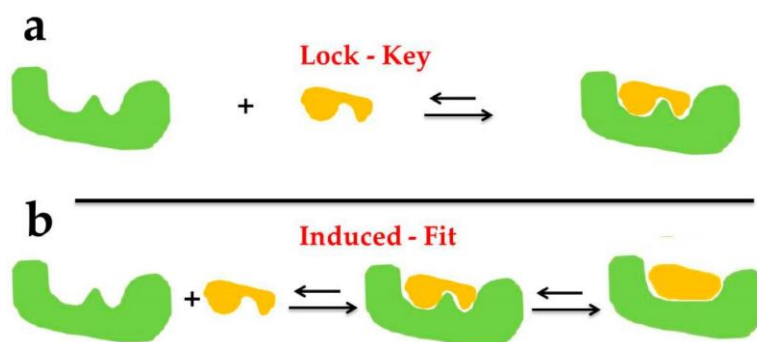


Figure 10: Mechanism Of Molecular Docking.

MOLECULAR DOCKING FOR ORAL ANTICANCER DRUGS

- ❖ The oral cancer cells are developed due to many physical reasons but biologically the inhibition of p53 gene is the main reason
- ❖ Because p53 gene which is responsible for the inhibition of abnormal cell growth.
- ❖ Also the main reason for oral cancer is over expression of HSP 70 gene.
- ❖ It is responsible for cell proliferation

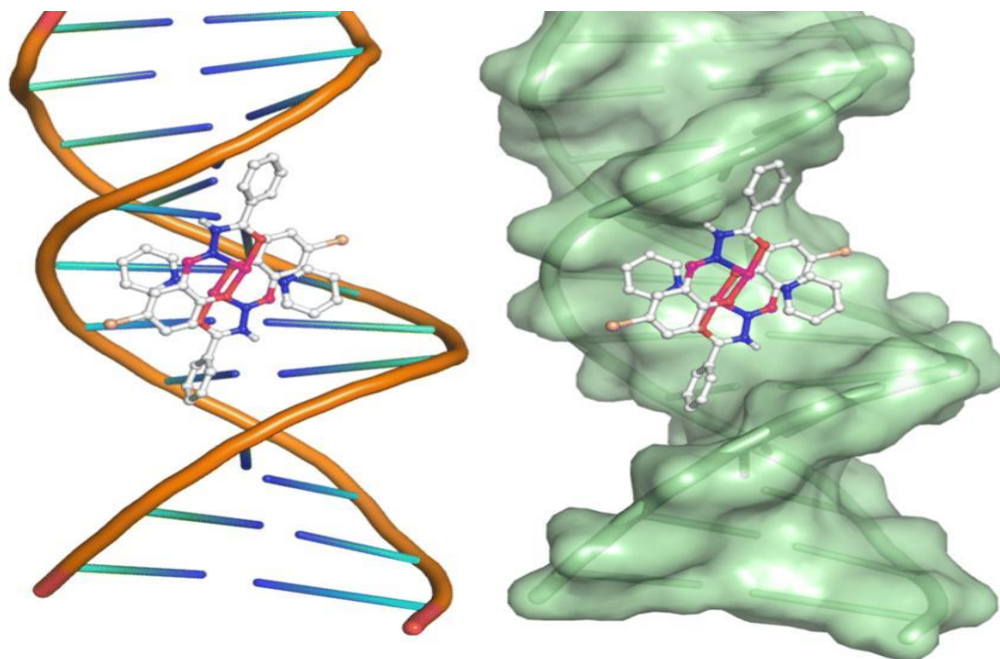


Figure 11: Model Formolecular Docking.

The common protein receptors involved in the oral cancer are

- > Epidermal growth factor(EGF)
- > Platelet derived growth factor(PDGF)
- > Vascular endothelial growth factor(VEGF)
- > Beta Transforming growth factor (TGF)

The proteins involved in the oral cancer are:

- 1) Desmoglein-3
- 2) Cytokeratin-4
- 3) Cytokeratin-16
- 4) Vimentin
- 5) Alpha Defensin 1,3
- 6) Keratin-4
- 7) Cornulin
- 8) Stratifin
- 9) Filamin
- 10) Fasin
- 11) Transglutaminase 3
- 12) Insulin growth factor
- 13) Metalloproteinase
- 14) Interleukin

METHODOLOGY

Protein Preparation

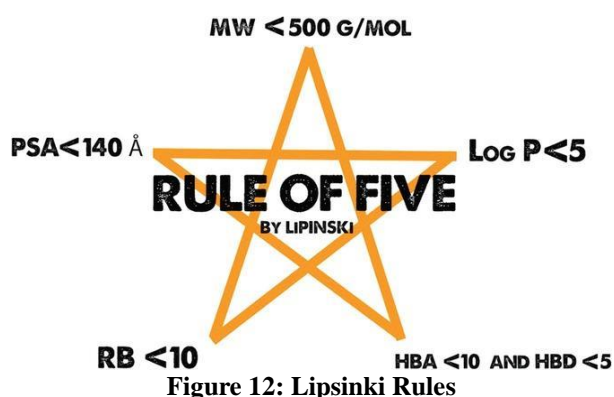
- ❖ The oral cancer cell proteins and amino acids are collected from the protein data bank.
- ❖ The stability of the proteins are checked by the online web servers.
- ❖ They are:
 1. Inps-MD
 2. Inps-ED
 3. Inps-3D
 4. Inps-RSA

Ligand Preparation

- > Based on the phytochemical investigationthe secondary metabolites where analyzed.
- > The chemical constituents are converted into the ligand by using the pub chem software
- > Common amino acids in cancer cells
 - > Glutamate
 - > Glycine
 - > Alanine
 - > Aspartate
 - > Serine
 - > Leucine
 - > Lysine
 - > Threonine
 - > Isoleucine
 - > Phenylalanine
 - > Tyrosine

Lipsinki Rule of Five

1. Hydrogen bond donars should be less then 5
2. Hydrogen bond acceptor should be less then 10
3. The molecular weight should be less than 500 daltons
4. Partition coefficient and log p should be less then 5
5. Not more then one rule is violated



Docking Tools Analysis

- Before starting the docking process the water molecules from the compound have to be removed
- Because accurate ligands are only accepted in the software
- Docking tools used are
 1. Dock
 2. Autodock
 3. FlexAid
 4. Le dock
 5. R dock
 6. Novo dock

CONCLUSION

There are several herbal medicinal plants in this world, which contain many phytochemicals. It deals with a number of diseases and is resolved. Many plants having excellent anticancer activities. Some medicinal plants have been proven to show anti-cancer activities. We have investigated such as *Acacia Catechu*, *Allamanda cathartica*, *Aloe barbadensis*, *Anisomeles indica*, *Bauhinia racemosa*, *Cajanus cajan*, *Calotropis gigantea*, *Cardiospermum halicababum*, *Cissus quadrangularis*, *Curcuma zedoaria*, *Dioscorea bulbifera*, *Drosera indica*, *Gymnema sylvestre*, *Embelia ribes*, *Elephantopus scaber*, *Jatropha gossypifolia*, *Allium sativum*, *Camellia sinensis*, *Ginkgo biloba*, *Glycine max*, *Combretum cafrum*, *Corchorus sativus*, *Echinacea angustifolia*, *Fagopyrum esculentum*, *Lentil esculenta*, *Mentha speciosa*, *Ochrosia elliptica*, *Panax ginseng*, *Podophyllum hexandrum*, *Withania somnifera*, *Zingiber officinale*, *Colchicum autumnale*, *Betula alba*, *Biophytum centium*, *Cuscuta reflexa*, *Citrus medica*, *Daucus caota*, *Mimosapudica*, *Vitex trifolia*, *Solanum nigrum*, *Cynodone dactylon*, *Cucurbita maxima*, *Betula alba*, *Gmelina asiatica*, *Acorus calamus*, *Amoora rohituka*, *Cassia fistula*, *Cola nitida*, *Crinum asiaticum*, *Kaempferia galangal*, *Rhinacanthus nasuta*, *Salvodra persica*, *Momordica dioica*. The goal of our review work is to study about these plants and their phytochemicals and also some plants proved their activities by using docking study on cancer.

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