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Chemical bioactivity of plant latex as an herbal panacea

Sanjita Das

HOD & Professor

Noida Institute of Engineering & Technology (Pharmacy Institute)

Greater Noida, UP

ORCID 0000-0002-9863-9341

Corresponding author email: Sanjita8@yahoo.co.in

Divya

Master of Pharmacy (Pharmacology)

Noida Institute of Engineering & Technology (Pharmacy Institute)

Greater Noida, UP

ORCID 0000-0003-2586-1969

Email: divyadubey579@gmail.com

Anupam Dubey

Master of Pharmacy (Pharmacology)

Noida Institute of Engineering & Technology (Pharmacy Institute)

Greater Noida, UP

ORCID 0000-0003-1774-9299

Email: dubeyji963@gmail.com

Ashish

Master of Pharmacy (Pharmacology)

Noida Institute of Engineering & Technology (Pharmacy Institute)

Greater Noida, UP

ORCID 0000-0001-7661-535X

Email: dxvgi01@gmail.com

Sakshi Pal

Master of Pharmacy (Pharmacology)

Noida Institute of Engineering & Technology (Pharmacy Institute)

Greater Noida, UP

ORCID 0000-0003-2161-4557

Email: sakshipal.sp50@gmail.com

Abstract--Traditionally, latex containing plant existence have been viewed as the economical and health promotional entity from natural origin. Preliminary chemical investigations are based on protein or

peptide content; along with many other bioactive smaller molecules targeting the health promotion by the management of enlisted disorders in this manuscript. It has also been observed different important metabolites such as, terpenoids, cardenolides, alkaloids having prominent antibacterial, antifungal, anthelmintic, insect repellent and cytotoxic activities. Latexes include distinct phytocomponents that are dissimilar to those involved in their bearing plants. Surveying the viability of plant latex from kind of bioactive chemical resource, this review article covers the chemical depiction of plant latexes for the health benefits of mankind. Subsequently, the recounted persona of various scientific research on latex from different plant origins encouraged the review to explore more about the plant latexes by highlighting their pharmacological benefits for health management.

Keywords---Plant Latex, therapeutic uses, phytocomponents, plant defence, cytotoxicity.

Introduction

A crude polymer of plant that is excreted by highly exclusive laticifer-cells is termed as latex. It is a clouded milky fluid that is exuded by the channels of laticiferous tissue and particularly proceed through laticifers including stems, leaves, roots and fruits of blooming plants (Hagel et al., Pickard, 2008). It is an adhesive substance just like emulsion that is released from several parts of plant after having a slight tissue injury. Mostly latex is spurt out as white gum from the bark of plants. It is a composite fusion of different phytocomponents like alkaloids, proteins, sugars, starch, oils, tannins, gums, and resins (Thomus et al., 2008) It is stout dispersion of micro-particles of polymer in an aqueous vehicle that clots on air exposure. From some plants latex carry a flexible polymer that is connected to rubber (Yagami et al., 1994) and films are formed without emitting organic solvent². In recent years the scientific research on the plant latex has been enormously increasing to explore its industrial and pharmaceutical utility. It also carries profilins, chitin-related proteins and cysteine proteases that behave like catalytic and hydrolytic enzymes with beneficial effect to human health (Domsalla and Melzig, 2008). Latex also causes allergic responses and produce immediate type hypersensitivity because of the hazardous chemical content in them. Additionally latex carries vast variety of bioactive chemicals that manifest distinct biological properties like insecticidal, anti-inflammatory, antioxidant, anti-proliferative, anti-microbial, anti-carcinogenic, vasodilatory and antiparasitic (Mesquita et al., 2005) . This review highlights the major scientific investigations on latex from distinct herbal origins along with the important chemical compositions investigated with their medicinal potentiality.

Phytocomponents of Plant Latex

Literature reveals the latex from different plants possesses various constituents like fatty acids, alkaloids, tannins, sugars, sterols, resins, oils, gums as well as several enzymatic proteins like chitinases, peptidases, proteases, lipases,

esterase, plasmins, hevein, thrombins, lectins etc (Pintus et al., 2011; Leingrayon et al., 2011). The scientific investigations on the phytochemicals of the latex of different plant species disclosed the presence of different secondary metabolites like phenols, tannins, saponins, terpenoids, alkaloids, steroids, and glycosides. Most of the investigations on *Carica papaya* showed the presence of alkaloids, flavonoids, phenols and saponins. The latex of *Ficus benghalensis* is observed to contain alkaloids, while that of *Nerium oleander* is composed of flavonoids and phenols. On the other hand, latex of *Jatropha curcas*, *Calotropis procera*, *Jatropha gossypifolia* and *Nerium oleander* revealed to possess saponins (Manoorkar and Gachande, 2015). Under therapeutic investigations of different investigators have also evaluated the chemical phytochemicals of the latex of different plant species and also isolated and characterized the secondary bioactive components which are represented under the discussion of therapeutic uses of plant latex (Figure 1).

Therapeutic uses of plant latex

Derivative of latex styrene is used for diagnostic purposes to make ELISA plates as well as different immune diagnostic materials. Latex of plant holds a fusion of various biologically active compounds that showed several biological properties like proteolytic (Domsalla and Melzig, 2008), anthelmintic (Shivkar and Kumar, 2003), insecticidal (Kitajima et al., 2010), antioxidant, anti-inflammatory (Fernandez - Arche et al., 2010; De Marino et al., 2008; Mendonca et al., 2010) and anti-cancer actions (Tang et al., 1979). Latex is also utilised to cure infections through parasites and act as an anti-coagulant (Shivprasad et al., 2009). Some significant latex emitting plants like *Papaver somniferum* gives opium that holds alkaloids and opiates that own strong medicinal utility and are utilised for several medicinal motives (Tang et al., 1979). Likewise, proanthocyanidin secluded through the latex of *Jatropha curcas* exhibits broad defence to lesions (Esimone et al., 2008) whereas *Croton bonplandianum* latex shows elevated toxicity and restrict growth of mycelium of *Microsporium gypseum* as well as Trichophyton mentagrophytes (Asthma et al., 1989). It too utilised in veterinary, fishing as well as human medicine and even in biofuel (Tiwari and Singh, 2005; Tiwari and Singh, 2004). *Synadenium umbellatum* latex is utilised as anticoagulant and in the treatment of diabetes mellitus and tumour (Kalita and Siakia, 2004). Figure 1 enlists the latex containing plants scientifically evident for the mentioned pharmacological potentialities.



Figure 1. List of latex containing plants and their therapeutic uses and responsible bioactive constituents

Therapeutic uses of plant latex

Wound Healing Activity of Plant Latex

The numerous hydrolytic enzymes of plant latex were validated their wound haemostatic potentials. Different latex proteases have been explored for their wound healing activity. The molecular mechanism behind their wound healing effect was also observed in detail. It has been interpreted that the plant latex proteases are selectively interfering with blood coagulation factors and fibrinolytic cascade. These actions of plant proteases resulted in induction and dissolution of the final fibrin clot (Esimone et al., 2008; Dussourd and Eisner, 1987; Singh and Bindhu; Venkatesh et al., 2016). The complete mechanism of wound healing at its different stages by the plant latex proteases has been diagrammatically represented in the Figure 2 (Singh and Bindhu).

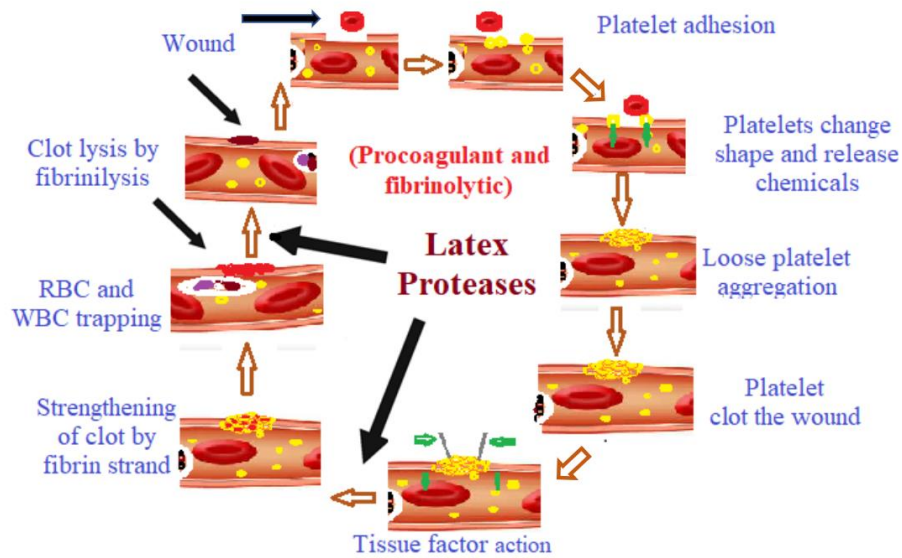


Figure 2. The mechanism behind the wound healing potential of plant latex proteases

As described by Singh et al the plant latex proteases potentiates the tissue factor action and helps in strengthening the fibrin blood clot. These also enhance the trapping of RBC and WBC on the site of wound facilitating further clot lysis by fibrinolysis (Singh and Bindhu).

Antifungal effect of plant latex based on their plant defence

Latex shows a significant action in plant-insect reactions. It also regarded as homologous to animal poison as this holds cysteine proteases, that gives protection for vegan insects (Shivkar and Kumar, 2003) and phytopathogenic fungi (Souza et al., 2011). Likewise, both proteins thumatin and osmatin secluded from the latex of *Calatropis procera*, were found to be productive against several fungi like *Fusarium solini* (IC₅₀ 67 µg/ml), *Nurospora* (IC₅₀ 57.5 µg/ml), and *Collettricum gloesoriodes* 32.1 µg/ml^(Kalita and Siakia, 2004; Melo_reis et al., 2011). Same action was noticed from the latex proteins of *Euphorbia tirucallai* as well as *Plumera rubra* against phytopathogens (Souza et al., 2011). Commonly, latex of plant holds a defence protein termed as MLX56 and cardenolides, that run inducible defence in plant infection (Larhsini et al., 1997; Wasano et al., 2009) and do exhibit complex molecular reactions to vegans (Diaz-Perales et al., 1998; Konno et al., 2004; Hirayama et al., 2007). Plants consists of special defence molecular compounds generally chitin enzyme that affect skin of insects. Likewise, cysteine as well as papain proteases occur in latex of *Carica papaya* shield papaya from vegans. Likewise, chitinase proteins profusely found in latex of mulberry plant that exhibit a pivotal part in defence against vegans (Diaz-Perales et al., 1998; Konno et al., 2004). In recent years the scientific research on the plant latex has been enormously increasing to explore its industrial and pharmaceutical utility. These plant defence mechanism by the presence of latex in it can further be explored for different application in the biotechnological benefits in human like anticancer, antibacterial, antiviral and

antiprotozoan potentiality. The catalytic and hydrolytic enzymes which also termed as the antifungal proteins are found to protect against pathogenic fungi by interfering the fungal cell wall synthesis and by rupturing the membrane. However, the fungal strains are also observed to be susceptible to these plant latex proteins (Yagami et al., 1998; Sequeina et al., 2009).

Anticancer Activity

Latex of plant is traditionally served as a drug for cure of cancer. This elevates vascular porousness and grants various growth elements and cytokines to hit the destroyed tissues. It causes angiogenesis and support to heal wound, restrict tumoral growth as well as do tissue revascularization. Some active secondary metabolites like curcusone D, diterpenoids, curcusone C, 4Z-jatrogrossidentadion, multidione, 2-epi-hydroxyisogrossidion, 4-E-jatrogrossidentadion, 15-epi-4Z-jatrogrossidentadion, 2-hydroxyisogrossidion secluded through *Jatropha curcas* plant exhibited high cytotoxicity towards lymphoma cell lines (L5178y) of mouse. Likewise, alkaloids like, vincristine and vinblastine extracted through *Catharanthus roseus* were utilised to treat disease like Hodgkin and to prevent acute lymphoblastic leukaemia in paediatrics (Barbosa et al., 2020; aiyelaagbe et al., 2011). *Himatanthus drasticus* of family Apocynaceae, this plant latex is extremely affluent in triterpenes like botulin, calenduladiol, lupeol as well as botulinic acid are employed for the therapy of ulcers as well as tumours because of the existence of vast variety of components, exhibit excessive substrate selectivity (El-Sayed et al., 1983; Modesto, 1997). Same action against leukaemia was noticed scientifically termed as *Synadenium umbellatum*. This exhibited both antimutagenic as well as mutagenic actions in bone marrow cells of mice ((Kalita and Siakia, 2004). Furthermore, CMS2MS2 known as a cysteine protease secluded through the latex of *Carica cardamarcensis* improve L929 fibroblast proliferation, trigger the protein kinase and do exhibits mitogenic action on fibroblast (Torres et al., 2010). Likewise, antineoplastic property was noticed from the extracts of barks and roots of few plants belonging to family Apocynaceae (Yagami et al., 1998) like Allamanda (Schmidt et al. 2006), Alstonia (Schmidt et al. 2006), Catharanthus (Kewpradub et al., 1999), Calotropis (Kewpradub et al., 1999), Cerbera (Lhinhatrakool and Sutthivaiykti et al., 2006), Nerium (chang et al., 2000), Plumeria (Siddiqui et al., 1996), Tabernaemontana (Kardono et al., 1990), and so in *Ficus carica* (Lee et al., 2005).

Antioxidant Activity

Aloe harlana plant consists of chromone and aloin (anthrone), which has shown antioxidant property (Oliveira et al., 2010; Asamenew et al., 2011). Likewise, *Ficus carica* as well as *Jatropha curcas* of family moraceae exhibits free radical rummaging and anti-inflammatory property. These plants consist of polyphenolic components specifically flavonols, flavonoids and proanthocyanidin, which act as intense antioxidant agent (Igbinosa et al., 2011). Likewise, methanolic extract of the latex of *Calotropis procera* prevents oxidative stress and inflammation in Freund's complete adjuvant induced mono-arthritis in rats. Likewise, the unimpregnated forms of Tocopherol (vitamin E) that is tocotrienols present in the leaves of tobacco plant acts as effective antioxidants as well as prevent

peroxidation of membrane lipids (Kumar & Roy, 2009; Matringe *et al.*, 2008). *Synadenium grantii* exhibits antioxidant activities, restrict manufacturing of ROS (reactive oxygen species) as well as exhibit strong FRAP (ferric ion reducing power), and TBARS property (lipid peroxidation thiobarbituric acid reactive substance) (Matringe *et al.*, 2008).

Anthelmintic Activity

Latex of pineapple and papaya have exhibited anthelmintic property in vitro in opposition to parasitic nematode in II juvenile stage, i.e., *Globodera rostochiensis* and *Meloidogyne* *Meloidogyne*. Anthelmintic property of latex of papaya acts against *Heligmosomoides polygyrus* infection in mice (Docampo *et al.*, 2010; Stepek *et al.*, 2006). The latex of papaya exhibited anti-parasitic potency against nematodes present in intestine of mammalian hosts. This was also noticed efficacious against crude infection of *Ascaris suum* in contaminated pigs (Satrija *et al.*, 1995). Likewise, latex of *Carica papaya* and *Ficus carica* were observed to inhibit the growth of *Ascaris suum* in vivo (Satrija *et al.*, 1994). Additionally, anthelmintic property of *Ficus racemose* extract was noticed that was found mainly because of the existence of ficin (proteolytic fraction) (Nagaty *et al.*, 1959). Likewise, in a separate studies *Ficus carica* and *Ficus insipida* latex also exhibited anthelmintic property in mice naturally contaminated with *Vampirolepis nana*, *Aspiculuris tetraptera* and *Syphacia obvelata*, whereas *Ficus glabrata* latex is traditionally utilised to destroy intestinal helminths (Chandrashekar *et al.*, 2008; Amorin *et al.*, 1999).

Antiproliferative Activity

Latex of plants *Vallisneria spiralis*, *Datura metel*, *Alstonia angustiloba*, *Kopsia fruticosa* and *Calotropis gigantea* associated with apocynaceae family exhibited anti-proliferative (ARF) actions because of the existence of tannins, saponins, terpenoids and cardenolides (Hansson *et al.*, 1986). Likewise, cardenolides podophyllotoxin as well as its analogues, betulinic acid secluded from *Pentopetia androsaemifolia* exhibited ARF action (Wong *et al.*, 2011). Apart from this prominent anti-proliferative potential was shown by *Croton lecheri* (Adou *et al.*, 2010). Furthermore, proliferation of cell lines (SKBR3) of breast cancer were inhibited by the latex of *Garcinia mangostana* (Rossi *et al.*, 2003) whereas protein kinase C enzyme was activated by phorboids, diterpenes found specifically in the latex of plants of Euphorbiaceae family and exhibit tumour degrading effects because of diminished cell proliferation (Moongkarndi *et al.*, 2004).

Antibacterial Activity

A strong anti-bacterial action against *Staphylococcus aureus*, *Candida albicans*, *Escherichia coli*, *Bacillus subtilis* and *Salmonella typhi* was manifested by *A. ochroleuca* crude latex (Hohmann & Molnar 2004). Likewise, N-acetyl- β -D-glucosaminidase and α -D-mannosidase secluded through latex exhibit synergistic activity and restrict growth of yeast (Alamri & Moustafa, 2010). Anti-fungal action in case of phytopathogens have been manifested by the proteins through the latex of plant *Carica candamarcensis*, *Calotropis procera*, *Euphorbia tirucalli* and *Plumeria rubra*. Likewise, a plant from South Africa; *Hyaenanche globosa*

belonging to family Euphorbiaceae exhibited poisonous action because of existence of a few toxic components (Giordani et al., 1996). Monophene present in the fruit extract of *Hyaenanche globose* showed cytotoxic as well as inhibitory action in several cell lines of cancer and in HeLa cells (Momtaz et al., 2010). Latex of the plant *Hancornia speciosa* belonging to family apocynaceae were observed to manifest action against *Enterobacter*, *Klebsiella*, *Burkholderia*, and *Pantoea* (Mahmoud et al.), whereas anti-fungal action towards *Cryptococcus neoformans* and *Trichosprum cutaneum* was exhibited by the latex of *Hevea brasiliensis* (Silva et al., 2011). This too shows fine action towards multiple drug resistant *Salmonella typhimurium*, *Staphylococcus aureus* and *Candida albicans*. Likewise, Jain et al. reported anti-bacterial action in *Calotropis procera* (Giordani et al., 1991; Asamenew et al., 2011).

Antiviral Activity

Latex of plant grant the production of anti-viral agents as it consists of potential cell wall inhibitors. In ancient times to cure skin infections that are caused due to viruses the *Ficus carica* (Fig fruit) latex was utilised as medicine. Its hexane-ethyl acetate as well as hexane extracts restricted replication of viruses and functions against HSV-1 (herpes simplex virus-I), ADV (adenovirus) and ECV-II (echovirus type-II) infections. Likewise, a metalloproteinase refined via *Euphorbia cotinifolia* latex known as cotinifolin, hydrolyzes ingenuous substrates like haemoglobin, azo-albumin, and casein with elevated action. It exhibits lysis of casein (Jain et al., 1996; Lazreg et al., 2011; Kumar et al., 2011). Likewise, calanolide secluded through *Calophyllum lanigerum* var. *austrocoriaceum* and *Calophyllum teysmanni* var. *inophylloide* exhibited anti-HIV property whereas diterpenes secluded through *Euphorbia laurifolia* and *Euphorbia lacteal* exhibited distinctive action towards HIV-I (Avila et al., 2010). The anti-viral action from the extract of medicinal plant from India, *Swertia chirata* was examined for HSV-I (herpes simplex virus type-I) (McKee et al., 1996). Likewise, *Ficus nitida* latex was reported effective towards plant viruses like Zucchini yellow mosaic virus (ZYMV); bean-tobacco necrosis virus (TNV) and broad bean yellow mosaic virus (BYMV) (Verma et al., 2008). Likewise, anti-viral property was found to exhibit by 3-methylethers of kaempferol, and quercetin secluded through *Phyllanthus* sp. and *Euphorbia lathyris*. Likewise, 3-methoxy flavones acts as strong cell synthesis inhibitor (Sabry et al., 2010; Itokawa et al., 1989; Unander et al., 1995).

Antiprotozoan Activity

Plant latex is observed as an ordinary source of antiprotozoal agents (Van Hoof et al., 1984). Although, numerous antimalarial drugs have been secluded from plant origin (Camacho et al., 2000) which led to become potent phytomedicines. Whereas plant latex from some plant species like *Himatanthus sucouba* was found active against intracellular amastigotes (Frederich et al., 2008), whereas *Calotropis procera* exhibits schizonticidal property (Soares et al., 2010). Likewise, antiprotozoan property towards *Leishmania* amastigotes or promastigotes was exhibited by the lectins secluded from the latex of *Synadenium carinatum* (Sharma & Sharma, 2000). Likewise, in one study *Conobea scoparioides* also exhibited antimalarial and trypanocidal property in vitro (Afonso-Cardoso et al., 2011).

Whereas terpenoids from *Guarea rhopalocarpa* exhibited antiprotozoal property against *Leishmania donovani* promastigotes and *Trypanosoma brucei* blood stream trypomastigotes (Afonso-Cardoso et al., 2011; Weniger et al., 2001) whereas neolignans secluded from *Virola* species (Camacho et al., 2001) and carbocyclic triterpenes and biflavonoids from *Celaenodendrum mexicanum* exhibited antiprotozoal property (Van Hoof et al., 1984). Some natural results like bisbenzyl isoquinoline, quinones, flavonoids and coumarins secluded from *Triclisia patens* and *Galphimia glauca* have exhibited antiprotozoal property in vitro (Barata et al., 2000) and were found active against *Leishmania donovani* and *Trypanosoma brucei* in vitro (del Rayo Camacho et al., 2002). Likewise, antiamebic and antiplasmodial properties were recorded in alkaloids secluded from *Strychnos usambarensis* (del Rayo Camacho et al., 2004) and quassinoids from *Brucea javanica* fruits in defence of *Plasmodium falciparum*. Likewise, monomeric isoquinoline alkaloids, parthenin and its imitative exhibited antiplasmodial, antiamebic property in vitro (Wright et al., 1991; Wright et al., 2000). Furthermore, *Croton lechleri* latex holds crofelemer, that exhibited anti-secretory antidiarrheal property (Kirby et al., 1990) whereas poly-o-acylated jatrophene diterpenes secluded from latex of *Pedilanthus tithymaloides* was found to exhibit antiplasmodial property (Tradtrantip et al., 2010). Likewise, quinine an aminoquinoline alkaloid secluded from the bark of *Cinchona* species (Rubiaceae) is utilised as strong anti-malarial agent. Likewise antimalarial property was recorded in cassane and norcassane-type diterpenes secluded through *Caesalpinia crista* (Adzu et al., 2008), flavanones and dihydrochalcones through *Piper hostmannianum* var. *berbicense* (Kalauni et al., 2006) and alkaloids from *Teclea trichocarpa* (Portet et al., 2007). Likewise, furoquinoline and acridone and indole alkaloids were found active against *Plasmodium falciparum* (Muriithi et al., 2009). Quinoline alkaloids secluded from *Galipea longijlora*, were found active against malaria and cutaneous leishmaniasis (Basco et al., 1994). Likewise, bioorganic constituents secluded from *Esenbeckia febrifuga* exhibited antiplasmodial property (Shivkar & Kumar, 2003). Moreover, some plant species like *Xylopiya aromatica*, *Casearia sylvestris*, *Cupania vernalis* and *Aspidosperma Macrocarpon* have exhibited antiplasmodial property, whereas *Casearia sylvestris* showed property against *Trypanosoma cruzi* (Dolabela et al., 2008; de Mesquita et al., 2007).

Anti-arthritis, Laxative and Vasodilatory Activity

Some species of plants like *Aloe vera* are utilised to cure arthritis. Constant utilisation of unrefined gel and juice of *Aloe vera* is highly effective in soothing pain of arthritis. This is used in removing pain and gives calm motility. Topical application of mixture of *Aloe* gel and squashed aspirin provide immediate comfort from joint pain. Whenever this mixture is applied with wet cloth it immediately lowers swelling. Laxative activity was also shown by the latex of *Aloe vera* as it consists of aloin. Its juicy composition also utilised as purgative tonic. *Calotropis procera* latex exhibits antiarthritic action and reduces arthritic ache of joints (Espindola et al., 2004). Vasodilatory effect in *Rana hexadactyla* (green frog) was caused by *Calatropis gigantean* (Kumar & Roy, 2009). Likewise, *Viscum album* and *Ligustrum delavayanum* exhibits vasodilative action (Sheela et al., 2010; Stankovicova et al., 2001; Tenerio et al., 2005).

Anti-inflammatory and Analgesic Activities

Anti-inflammatory action of *Hancornia speciosa* latex was exhibited by the inhibition of PGE₂ and nitric oxide and also by the production of cytokines (Rajesh et al., 2005). Except these plants also consists of NSAIDs that are strongly beneficial for the cure of infections (Espindola et al., 2005). Protein fraction present in the *Calotropis procera* latex was shown to relief of ache as well as inflammation felt by the patients of arthritis (de Mesquita et al., 2007). This exhibits same activities whenever performed on animal models (Marinho et al., 2011). Likewise, latex from *Himatanthus drasticus* belonging to family apocynaceae which consists of lupeon that is pentacyclic triperpene which exhibit anti-inflammatory activities induce production of few biologically active components like lupeol acetate and pentacyclic triterpene lupeol exhibits pro-inflammatory cytokines (Osadebe & Okoye, 2003). For the treatment of inflammation and cancer it acts as chemoprotective as well as therapeutic agent (Pasero & Marson, 2011). Additionally, some synthetic compounds like phenylbutazone are beneficial like analgesics. It was evident that Lactucin as potent anti-inflammatory as well as analgesic agent whereas tramadol was utilised in the cure of rheumatoid arthritis (Saleem, 2009; Wesolowska et al., 2006). This is a pain abolishing drug of muscle spasms, abdominal colic or hurting menstruation. Likewise, the flow of nursing mother's breast milk was found to be elevated by the *Lactuca virosa* seeds as it consists of lactucopicrin as well as lactucin. On the other hand, it was reported that for the prevention of inflammation the latices of *Ficus carica* and *Euphorbia lactea* were used (Bischoff et al., 2004; Ali et al., 2011).

Clinical and Pathological Effects of Plant Latex

Latex of plant created pathological outcomes in animals like hydropericardium, abomasum ulcers, mild ascites, mild liver haemorrhage, pulmonary swelling, flaccid heart, kidney's juxtamedullary cortex. It showed to possess hepatotoxic and cardiotoxic property (Ali et al., 2011). It carries numerous proteins, that are strongly basic and shows high fibrinogenolytic, proteolytic and anticoagulant property. *Calotropis procera* latex results in pathological alterations in pregnant women and elevates the amount of creatinine, aspartate aminotransferase, urea, alkaline phosphatase, globulin and progesterone, whereas in non-pregnant women it was found to cause loss of appetite, inflammation in vagina and lack of condition (Lima et al., 2011). Lactucopicrin was found to restrict enzyme cholinesterase and caused sedation in men (Wesolowska et al., 2006). This is even utilised to abolish lack of sleep as well as anxiety (Saleem, 2009). Likewise, crude rubber latex from *Hevea brasiliensis* was observed to produce autism (El Badwi & Bakhiet, 2010). Carrageenan dextran-induced paw oedema was inhibited by lupeol acetate and influence the neutrophil migration to the cavity of peritoneum (Saleem, 2009), whereas latex of *Synadenium grantii* is toxic and results in exfoliative dermatitis in patients. Likewise, *Euphorbia lactea* latex carry tetracyclic triterpene termed as tirucallol, that reduced swelling of ear in mouse as well as affect entry of granular leukocytes in reaction of topical administration of 12-o-tetradecanoylphorbol-acetate (TPA) in the ear of mouse. Latex from *Carica papaya* holding lipase was found to exhibit lipolytic properties whereas protease like papain from the similar plant show proteolytic property (Shen et al., 2011; Abdelkafi et al., 2011; Dubey et al., 2007).

Conclusion

Latex is a fine origin of several secondary metabolites, that exhibit growth restrictive effect in virus, bacteria, cell lines of cancer and tumours. This is also found that these exhibit harm to insects, perform like reproductive cycle as well as growth restrictor. This often performed anticancer as well as cytotoxic property and also broadly served as purgative and antiarthritic agent. Latex also consists of several hydrocarbons that are used to manufacture biodiesel. Plant latex is a vast source of numerous biologically active phytocomponents like terpenoids, flavonoids, glycosides, saponins, proteases, chitins and proteinases that gives major protection against herbivore insects. However, several uses of latex are less well known yet and its complete ethnobotanical utilities are quite not known. It is also much thoughtful for the evolution of new antibiotics from latices of plants. Whereas, despite its medicinal, clinical as well as industrial utilities its clinical trial is essential. Nearly all activities of latices should be surveyed. On the other, latices are industrially significant crude matter which should be smoothly accessible for manufacturing of cheaper antibiotics for general microbial infections which is an extension estimation of the plant defence efficacy of latex of the plant itself. Additionally, there is also probability to produce variety of profit-oriented products by utilising plant latices specifically fibres, films, adhesives, contraceptives, glues, floorings, paints, teats, finger stalls as well as immunodiagnostic agents. The review is collectively a comprehensive enlist of medicinally potent latex containing herbal origins which will be helpful in extending the research to get their novel formulation for the management of different disorders. This study will also be a source to explore potent responsible natural bioactive moiety from the enlisted herbal latex to the field of medicine for socio-economic benefit.

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