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BIOLOGICAL AND PHARMACOLOGICAL POTENTIALS OF *TRIGONA IRRIDIPENNIS* BEE PRODUCTS: A REVIEW

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ABSTRACT

This review aims to present an update of bee product properties with emphesis of *Trigona iridipennis* Honey, propolis, wax and other honey bee products have been used since ancient times to treat various disease. Now a days the medicinal application of bee products increasing due to the resistance of the pathogens to the drugs, but still it is unofficial drugs in pharmacy. Among this propolis is the most important one, it's the resinous substance collected by honeybee from various plant source. Propolis posses hepatoprotective, antitumour, antioxidative, antimicrobial and anti-inflammatory properties. The chemical composition of propolis different in worldwide because its related to species of honeybee and geographical region, propolis comprise of flavanoids and terpenoids other bee products also posses various medicinal properties so they have enormous medicinal scope.

KEYWORDS: Propolis**,** Royally jelly, honey bee, Antimicrobial, Anti ulcer, Anticancer, Anti oxidant, Anti inflammatory.

INTRODUCTION

Like genus Apis *Trigona iridipennis* is another type of honey bee belongs to Apidae family also known as stinglessbees/dammer bees, are the smallest honey producing bees ranges from 2mm upto 5mm. They have no stings, in kerala called as cherutheanicha found in tropical and subtropical areas especially in wild areas. They are highly social insects living in permanent

colonies, nesting in dark places like cavities in tress, trunks, bamboos, empty logs, cracks and hole of old walls, pipes etc. Bee keeping with stingless bees called Melliponiculture. They construct numerous elliptical cells for storing pollen and honey by using special cerumen made of wax, resin, propolis and mud. These are considered as very valuable domestic species more than 500 speceis of stingless bees occur in the world among this *Trigona iridipennis* the only known species found in India. Ancient Egyptians, Assyrians, Chiness, Greek, Romans and Arbians used the stingless bee's products as a natural remedy for the beneficial effect of human health.[1]

Scientific Profile

Kingdom	Animalia
Phylum	Arthropoda
Class	Insecta
Order	Hymenoptera
Suborder	Apocrita
Superfamily	Apoidea
Family	Apidae
Subfamily	Apinae

Larval duration 11 to 13.5 days.

Pupae period 33 to 38 days Egg to Adult period 53 days Life span 80 to 87 days.

Fig. no. 1: *Trigona iridipennis.*

Stingless bees biochemically synthesis Royal jelly, Propolis, Bee pollen, Venom, Honey Royal jelly.

Royal jelly

Royal jelly is a substance produced by worker honeybees. It is a complex mixture of proteins (12%), sugar (12%), fats (6%) and variable amounts of minerals and pheromones. About 15% of the royally jelly is 10- hydroxyl –trans-(2)-decanoic acid which is probably the substance

that cause the queen bee to grow. Jelly is rich in B vitamins among this panthothenic acid is prominent. If fed to an oridinary female bee in the larval stage, royal jelly will transform her into the queen bee. As a queen, she will grow 1 ½ times normal size, become extremely fertile and lay over a thousand eggs each day. Incredibly, she may live over five years while all other bees live only a few weeks. The only difference is that she receives royally jelly others are not receive the jelly. Royally jelly has a history of folk use as a skin tonic and hair growth stimulant. The skin beneftis include nourishing process which reduce wrinkles. It is generally considered as a tonic that has a general systemic action rather than any specific biological action which benefits menopause and sexual performance. Its normally used as a energy activator.[2]

Bee pollen

Bee pollen is the pollen gathered from plants by honeybees, and brought back their hive. Bee pollen contains all of the eight essential amino acids in amount that vary between five to seven times the levels found in equal weight o traditional high protein foods. It also contains vitamins D, E, K, C and bioflavanoids and also completes B5 complex, especially panthothenic acid and niacin. The high levels of vitamin B5 better for adrenal gland in traditionally bee pollen used as antiaging food and energy food, olympic athletes are used to improve their performance.

Antioxidant and anti aging

The oxidative damage leads to increasing level of free radicals and have been implicated in numerous process and primary factor in aging. Antioxidants are capable of providing protection, against this oxidative damage. Bee pollen provides significant antioxidant activity, which may explain its traditional use as an antiaging food. Bee pollen abolishes the effect of harmful ionizing radiation in the brain, normalize the activity of important glutathione system in the liver and markedly decrease lipid peroxide level.

Increase red blood cells and hemoglobin

Increase red blood cells and hemoglobin Traditionally, bee pollen has been used as a food to help increase energy levels. Bee pollen helps to increase the increase blood cells and the hemoglobin component of red blood cells. Hemoglobin the red cells that carry oxygen for energy metabolism, this may explain the relationship between bee pollen and energy. In a study on humans, bee pollen was found to be increase in the number of blood cells.[3]

Honey

Honey is the only natural sweetener anicients used honey for both nutritional and medicinal purpose. Honey is rich in carbohydrates, comprising about 95% of the dry weight. Beyond carbohydrate, honey contains numerous compounds such as organic acids, proteins, aminoacids, minerals, poly phenols, vitamins and aromatic compound. Honey provide various activities likes antimicrobials, antiviral, antiparasitic by inhibiting the growth of micro organism and fungi mostly against gram positive bacteria because honey contain low water content. Honey has been found to contain significant antioxidant activity including glucose oxidase, catalase, ascorbic acid, flavanoids, phenolic acids, carotenoid derivatives, organic acids, amino acids, proteins. Honey showing the antimutagenic and antitumour activity by significant inhibition of Trp-1 mutagenicity also activates the immune system this will help to prevention of cancer and metastasis. In inflammation honey preventing the formation of free radicals released from the inflammad tissues. The reduction inflammation could be due to the antibacterial activity of honey or to a direct anti inflammatory effect. Different nutritional studies of honey have confirmed various effects like improve oral heath, prevention of gastro intestinal disorders such as peptic ulcer, gastritis, gastroenteritis. In honey contain nitric oxide metabolites increased level of nitric oxide provide protective effect in cardiovascular disease and improve the heath. Infants on diet with honey had better blood formation, higher weight gain, better skin colour, no digestion problems, less susceptible to disease. Honey is a good energy source for athletes help to improve their energy its rich in carbohydrates significantly increase the heart frequency and blood glucose level during the performance.[4]

Venom

Venom is the other important bee product it is a very complex mixture of chemical it consists of 18 chemical compositions including peptides, enzymes, bioactive amines and other non peptide components and minerals. The principle toxin and the major active amphiphillic peptide is mellitin, mellitin displays powerful hemolytic and antibacterial, analgesic, anticancer, anti-inflammatory, antibacterial and antiviral effects. HIV infectivity is also attenuated by mellitin. Bee venom has been widely used in traditional medicine to various inflammatory disorders such as arthritis, rheumatism, angiocardiopathy, tendonitis, fibrosis, and lupus. Also recently used in the treatment of tumour including renal, lung, liver, prostate, bladder and mammary cancer cells as well as leukemia cells. Same time venom has certain deficiencies such as strong neurotoxicity, cardictoxicity, hemolytic and immunogenic

effects.[5]

Propolis

Propolis is a resinous product consists of plant materials that are initially collected on the hind legs of worker bees, this material is then masticated and salivary enzymes are added and mixed with wax to produce bee glue. The word propolis is derived from Greek word in which pro means at the entrance to and polis for community or city this help to construction and protection of the hive from the external invades like snakes, lizards and from weathering threads like wind, rain, etc. so propolis is otherwise called as hive defenser. Stingless bee propolis are rich source of bioactive constituents and extensively used for the well being of the society, ancient times it has been used as a folk medicine to ancient times it has been used as a folk medicine to cure several health problems. In 17th century London pharmacopoeia listed propolis as official drugs due to its antibacterial activity. At the end of the 20th century propolis become very popular in Europian counteris, due to its fast healing property it was widely used in 2nd world wars. Ancient Egyptians used propolis to emblam their cadaver due to its well known putrefactive properties ancient also used as remedies for wound, especially for topical application of the mucosal and cutaneous, burns, sore throats, ulcer, acne, herps simplex, genitalis, neuroprotective and also used as cosmetics like powder, creams and as a health food such as health powder and also in beverages. The composition of propolis varies greatly depending on its geographic and botanical origin, more than 300 chemical constituents have been identified in different samples of propolis, its composition varies with the season and the vegetation in the areas in which it is collected. Its color varies from yellowish green to dark brown depending on its source and age. Its hard and brittle when cooled but becomes soft and very sticky when warm it was found to contain wax, resins, balsams, essential olis, aminoacids and sugars with prevalence of flavanoids and derivatives of cinnamic acids. Propolis is rich in inorganic elements, volatile compounds mainly sesquiterpenoids are present in low concentration.[6,8]

Propolis against bacteria, fungi, molds and parasites

The antimicrobial activity of propolis is the most important biological property of propolis, it effective against harmful and pathogen organism. Propolis kills the fungi and also the viruses, while the growth of the latter is also inhibited, most notable is activity against the influenza virus.[9,10]

Antioxidant activity

Propolis is a powerful antioxidant, this effect is due to the high concentration of phenolics and other antioxidant compounds. The radical theory in human physiology claims that the active free radicals are involved in almost all the cellular degradation process and leads to cell death. Oxidative stress is thought to contribute to the development of chronic and degenerative diseases such as cancer, autoimmune disorders, aging, cataract, rheumatoid arthritis, cardiovascular and neurodegenerative diseases. Propolis can be regarded as a supplement preventing chronic degeneration diseases, e.g. cancer.[11,15]

Hepatoprotective activity and antiradiation activity

The liver is perhaps the hardest working organ of the body. It has hundreds of tasks to perform, including detoxification of the blood. A sluggish liver means fatigue and toxemia and a high risk of various chronic diseases. Phenolics are known to have a hepatoprotective function. Hepatoproctive activity for different types of propolis has been reported, which correlated to the antioxidant activity. Propolis counteracts hepatoxic effects of alcohol liver injury in mice and also of paracetamol induced liver damage of mice and carbon tetrachloride induced liver damages in rat.[16,19]

Antitumor effects

Propolis shows the chemopreventive activity in animal models by inhibiting DNA synthesis in tumour cells, their capability to induce apoptosis of tumour cells, and their property to activate macrophages to produce factors capable of regulating the function of B, T and NK cells, respectively. Especially interesting is the synergy between propolis and anticancer agents, moreover flavonoids from propolis play a protective role against the toxicity of the chemotherapeutic agents. The combination with an adjuvant antioxidant therapy may enhance the effectiveness of chemotherapy by ameliorating the side effect on leukocytes, liver and kidney.[20,23]

Antiinflammatory activity

Inflammation is the complex biological response of vascular tissues to harmful stimuli, such as pathogens, damaged cells, irritants and free radicals. Antiinflammatory activity is thus defined as the primary effect of the host defence system. This antiinflammatory activity can be explained by the presence of active flavonoids and cinnamic acid derivatives. The former includes acacetin, quercetin, and naringenin the latter includes caffeic acid phenyl ester (CAPE) and caffeic acid (CA) propolis suppressed prostaglandin and leukotriene generation

propolis significantly suppressed the lipoxygenase pathway of arachidonic acid metabolism during inflammation.[24,26]

Digestion and the gut

Recent studies indicate that dietary polyphenols are relevant in the modulation of gut microbiota and that these microorganisms convert polyphenols into active and bioavailable metabolites hence, variations in gut microbiota can affect polyphenol activity also there is a complex interaction between polyphenols and the gut mucus barrier. Polyphenol rich propolis extract strengthens intestinal barrier function by activating AMPK (adenosine monophosphate activated protein kinase) and ERK (extracellular signal regulated kinase) signaling and provide novel insights into the potential application of propolis for human gut health. propolis supplementation reduces inflammatory response.[27,30]

Propolis and the Brain

Numerous publications that show a positive influence of propolis depression, Alzheimers and dementia. Polyphenols generally have a preventive function in dementia due besides to their antioxidant, antiinflammatory and neuroprotective properties also to their modulatory action of the P-glycoproteins. Parkinson is also a neurodegenerative disease due to oxidative stress and propolis has thus also antiparkinson properties also, propolis extracts decreases neurotrophic factors and protects tyrosine hydroxylase neurons in the brain in rat model Parkinson disease.[31,34]

Dentistry

The application of propolis in dentistry is probably the most well scientifically documented and now practically applied in many countries, mostly the developing ones. Propolis is applied in the different dental specialities: oral hygiene, periodontology and oral mucosa pathologies, oral surgery, orthodontics, restorative dentistry, endodontics and prosthetic dentistry. Propolis inhibits different pathogenic microbes in the mouth such as bacteria, fungi and viruses and can be successfully applied against the different stomatological pathologic conditions plaque formation, mouth wounds and ulcers, denture and aphthous stomatitis, paradontosis, periodontitis, gingivitis, dentinal hypersensitivity and caries and against Candida- associated denture Stomatitis. The soft and periodontal tissues surrounding dental implants are particularly susceptible to bacteria invasion and inflammatory reactions due to complex histological structures. Propolis-containing toothpaste was found to be distinctively effective in improving oral health and hygiene and the occurrence of gingivitis triggered by

dental plaque. An unpleasant breath, is also largely related to hygiene of the oral cavity. The byproducts of degradation of microorganisms located in the mouth are one of the reasons of bad breath. Microbes particularly related to the creation of bad breath include the red complex bacteria propolis helps to reduce the bad smell.[35,40]

Respiration diseases

Following diseases have been treated, using propolis.

Chronic and acute inflammation of the inner ear, Common acute cold, acute and chronic inflammation of the upper respiration path, Synositis, Laryngitis (larynx inflammation), Tonisillitis, Pulmonary tuberculosis (sometimes together with antibiobics and together in complex of anti tuberculosis measures), bronchial asthma, common acute cold, acute and chronic inflammation of the upper respiration path, synositis, inflammation of the inner ear.[41,43]

Gastroentorology

Propolis is known as a powerful inhibitor of *Helocobacter pylori*, the causative agent of gastric, duodenal ulcers and gastritis and it was used alone or in combination with antibiotics for in the prevention and treatment of gastric ulcers. Due to its antiinflmmatory and antimicrobial properties propolis supplements can be used for the prevention of bacterial infection and of inflammation of the stomach and duodenum.[44,46]

Skin diseases

Proplis used against epidermophytosis, skin tuberculosis alopecia, psoriasis, different microbial and chronic eczemas, cutaneous conditions of cold regions, pyoderma, Trichophyton skin inflammation.[48]

Gynocology and urology

The applications of propolis in gynocology and urology are based on the antibacterial and antiinflammatory effects of propolis. Most successful is the treatment of the inflammation of the vagina and of the female genital area. It was registered that Hippocrates prescribed its use to help heal external and internal sores and ulcers. Documentary evidence of its therapeutic use comes from the beginning of 20th century. It seems that first use of the propolis in modern Era was during the Bore war, when it was employed for disinfection of wounds and tissue regeneration. Afterwards, it became a traditional remedy in folk medicine. It was successfully used in the treatment of Antimicrobial activity, antiprotozoal and antiparsitic activity,

antiinflammatory, anti agents causing ulcers, antitumor activity, hepatoproctive activity, protective effect of brain, protective effect on heart. Propolis is one of the few natural remedies that have maintained its popularity over a long period of time. So *Trigona iridipennis* is a natural remedy for the treatment of many diseases.

CONCLUSION

In this review we conclude that bee products of *Trigona iridipennis* have good therapeutic activities, it can be used as a therapeutic agent in many serious disease like cancer, allergic disorders, ulcer, diabetics etc. one of the major benefit of this product s are low side effects with less toxic.

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