

Review on Medicinal and Nutritional Value of Bee's Honey: Senior Seminar on Animal Health

Negesa Tola¹, Geremew Haile^{1*}, Negesse Mekonnen² and Walkite Furgassa¹

¹Wollega University, School of Veterinary Medicine, Nekemt, Ethiopia

²National Animal Health Diagnosis, Sebeta, Ethiopia

*Corresponding author: Wollega University, School of Veterinary Medicine, P. O. Box 395, Nekemt, Ethiopia,

Email: geremewlov@gmail.com

Abstract: Honey is the name given to the sweet, yellowish liquid that is produced by honey bees and stored in honey combs. Bee's honey is one of the most valued and appreciated natural substances known to mankind since ancient times. According to modern scientific view, the best bee's honey is made by *Apis mellifera* (Family: Apidae). Nutritionally, it is composed of carbohydrate, water, minerals, protein, vitamins and enzymes like invertase, diastase and glucose oxidase, which are uses for nutritional values. The main nutritional and health relevant components are carbohydrates, mainly fructose and glucose that are used for athletic performance and infant nutrition increase digestion and absorption. The medicinal activities as antimicrobials, antifungal, anti parasitic and antiviral uses are due to its acidic and hydrogen peroxide. It is used as health inhancing by mixing with many natural products such as lemon, clover, milk, cinnamon and water for treatment of various ailments and other health disorders like: hearing loss, bad breath, obesity, influenza, bronchial asthma, arthritis, toothache, hair loss, bladder infections, skin infection and as well as use in beauty industry for cosmetic purpose. Honey as any other natural food can be contaminated from the environment, for instance pesticides, antibiotics; poison plants, which produce nectar containing toxic substances, can affect health status. The awareness of society on function of honey is not equally known with utilization of it. So, awareness creation in society about nutritional, medicinal and harmful effects of bee's honey well needed.

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1. Introduction

Forest is the heart of the environment. It provides everlasting and priceless service to the universe. Environment supplies every essential in maintaining this chain. The reproduction of plants helps to maintain the equilibrium of the environments and bees help this process by pollinating the flowers. The flowers gives beauties to the forest also provide food to bees and bees made honey from it [1]. Bee's honey is natural sweetener an important food for Homosapiens from very beginnings. The relation between bees and man started as early as Stone Age and several million years ago. The use of honey as food and medicine by man has been long years ago [2].

All religious books speak of it. The religion of Islam recommended the use of honey as food and medicine, and even named an entire chapter in the Holy Qur'an called Surah al-Nahl meaning chapter of the Honeybee [3]. In the book of hadith, Prophet Muhammad strongly advocated the use of honey for curative and healing purposes [4]. In Christendom, there are references made to the importance of bees and honey in the Bible, these include the Books of Exodus, Judges, Mathew and Proverbs. In accordance with this Christian holy book, the Bible, King

Solomon was quoted thus: "Eat honey my son, because it is good" [5].

Bee's honey is a natural product, which is consumed for its high nutritive value and for its effects on human health, with anti-inflammatory, antimicrobial, antifungal, antiviral as well as wound and burns healing effects [6]. Concerning its nutrient profile, it represents an interesting source of natural macro- and micro-nutrients, consisting of a saturated solution of sugars, of which fructose and glucose is the main contributor [7]. Also contains; enzyme, amino acids, vitamins, proteins, minerals and trace compounds [8].

The composition of honey is variable depends primarily on its floral source, seasonal, origin and geographical location where the honey is produced and it can be categorized as follows: Manuka.

honey (monoflora), Pasture honey, Jelly bush honey and African juggle honey (multiflora or polyflora). These varieties are due to components of the flower or several botanical sources [9]. There is a wide variety of honeys with different tastes and colours, depending on their botanical origin. Generally, honey with high fructose content is sweet compared to those with high glucose concentration [10].

The Physical aspects of honey are affected by heat and storage time. The loss of antibacterial activity on exposure of honey to heat about 50% honey to 100°C for 5 min, 80°C for 10 min, or 56°C for 30 min. Enzymatic activity, antimicrobial properties, microbial quality, color and chemical composition are all influenced by heat and storage [11]. All honeys are acidic with a pH-value generally lying between 3.2 and 4.5, due to the presence of organic acids that contribute to honey flavour and stability against microbial spoilage. In honey, the main acid is gluconic acid [12].

The world production of honey today comprises approximately 1.2 million tons. The demand for honey varies remarkably from one country to another, China and Argentina rank among the main exporters; these countries, however, have low annual consumption rates, close to 0.1 to 0.2 kg *per capita*. Indeed, honey consumption is higher in developed countries, where domestic production does not meet the market demand [8] while in countries such as USA, Canada and Australia the average per capita consumption is 0.6 to 0.8 kg/year [13]. Beekeeping has a long history in Ethiopia and she is a leading honey producer in Africa and one of the ten largest honey-producing countries in the world. Ethiopia has a share of around 23.58% and 2.13% of the total Africa and world honey production respectively [14]. Ethiopia is known with variation of agro-climatic conditions and biodiversity, which good for existence of diversified honeybee and huge number of colonies [15]. It has the largest bee population in Africa with over 10 million bee colonies, out of which about 5 to 7.5 million are estimated to be hived while the remaining exist in the wild [16].

Ethiopia has the potential to produce 500,000 tons of honey per year but currently production is limited to 43,000 tons of honey [17]. In the country, there are generally two honey-harvesting seasons: the major one that lasts from October to November and the secondary one from April to June. However, in addition to these major harvesting periods, there are many small harvesting periods, which depend on the type of flowering plants, and rainfall patterns in different agro-ecologies, which experienced beekeepers and local people easily [18]. The average household in Ethiopia is composed of six people, and annual honey consumption is estimated to be 10 kg per household. In generally honey produced as a cash crop, with yearly sales amounting to 90 to 95 percent of total production [19].

The quality of Ethiopian honey is generally poor, as 95% of beekeepers follow traditional method of beekeeping practice with no improved techniques or technology [20; 21] In Ethiopia, the largest part of the honey is used to brew *tej*, a local kind of honey-wine.

Also different kinds for those who prefer non-alcoholic drinks of tasteful sweetener juices made out of honey is '*birz*' which is consumed as a delicacy during religious festivities and weddings [22].

Currently, honey is widely used for nourishment, nutritious supplement and medicinal properties recognized all over the world but the awareness of its function is not as such known in all societies when we compare with its utilization. But awareness creation in societies about function, composition, harmful effect of honey prior to use and to improve the method and quality of honey in Ethiopia is needed.

Therefore; the objectives of this seminar paper are:

- To review nutritional values of bee's honey.
- To review the medicinal uses and health promoting properties of bee's honey.

2. Composition Of Bee'S Honey And Its Nutritional Value

2.1. Carbohydrates

Bee's honey has good nutritive value as it contains various components which used as food in different parts of the world. Honey is primarily made of water and carbohydrates; main sugars are the monosaccharides fructose and glucose. The chemical composition of honey is variable depends on regional, climatic conditions and the type of flowers visited by the bees thus, its classification as unifloral or polyfloral [23].

However, on average bee's honey is composed of 17.1% water, 82.4% carbohydrates [24, 25] It contains more than 180 substances [29]. The principal oligosaccharides in honey are disaccharides sucrose, maltose, trehalose and turanose, as well as some nutritionally relevant ones such as panose, 1-kestose, 6-kestose and palatinose. In the process of digestion after honey intake, the principal carbohydrates fructose and glucose are quickly transported into the blood and can be utilized for energy requirements by the human body. A daily dose of 20 g honey will cover about 3% of the required daily energy [26, 27, 28, and 30].

2.2. Proteins, Enzymes and Amino Acids

Bee's honey contains about 0.5% proteins, mainly enzymes and amino acids. Its contribution to human protein intake is marginal with respect to quantity. Three main honey enzymes are diastase (amylase), decomposing starch or glycogen into smaller sugar units, invertase (sucrose, glucosidase), decomposing sucrose into fructose and glucose, as well as glucose oxidase, producing hydrogen peroxide and gluconic acid from glucose. Enzyme glucose oxidase produces hydrogen peroxide (which provides antimicrobial properties) along with gluconic acid from glucose, which helps in calcium absorption.

Since the saliva yields a sufficiently high activity of amylase and glucose oxidase, honey's contribution to sugar digestion is minor importance. Honey glucose oxidase producing hydrogen peroxide, might exert an antibacterial effect in the oral cavity. The amount of true protein is 168.6 mg/100g [32], [33].

Table 1: Composition of bee's honey

Constituents	Average %
Water	17.1
Fructose	38.5
Glucose	31.0
Maltose	7.2
Sucrose	1.34
Trisaccharides and higher carbohydrates	4.2
Minerals (Ca, Mg, K, Na, Fe, Zn, Cu, Co, Ni) Vitamins (B ₁ , B ₂ , B ₃ , B ₅ , B ₆ , B ₉ , biotin and C) Enzymes (diastase, glucose oxidase and invertase)	0.5
Ash	0.16

Source: [31].

Enzyme activities in honey are principally measured to evaluate possible heat defects. Low enzyme activities may also indicate ultra filtration of honey [34]. However, as the enzyme activities in honey decrease during storage and heat treatment Proline, the main amino acid in honey, originates predominantly from the bee. Its concentration is used as an indicator of honey ripeness and for the detection of adulteration. Free amino acid profiles have primarily been proposed for the determination of the geographical origin of honey [35].

2.3. Vitamins, Minerals and Trace Compounds

The amount of vitamins and minerals is small and the contribution of honey to the recommended daily intake (RDI) of the different trace substances is marginal. It must be born in mind that different unifloral honeys contain different amounts of minerals [32], [10]. Honey contains a number of other trace elements. From the nutritional point of view the minerals chrome, manganese and selenium are of nutritional importance, especially for children of the age of 1 to 15 year. The sulphur, boron, cobalt, fluorine, iodine, molybdenum and silicon can be important in human nutrition. Although there are no RDI values proposed for these elements. Honey contains 0.3-25 mg/kg chorine and 0.06 to 5 mg/kg acetylcholine. Chorine is an essential for cardiovascular and brain function, and for cellular membrane composition and repair, while acetylcholine acts as a neurotransmitter [36].

2.4. Nutritional Function of Bee's Honey

2.4.1. For athletic performance and infant nutrition

The physiological action of gel and powdered forms of honey as a carbohydrate source for athlete performance was studied recently [37]. The consumption of energy giving substances before, during and after any form of physical exercise improves the individual's performance and increases the rejuvenation of muscles. This is also associated with dietary supplementation with bee's honey, which provides up to 17 g of carbohydrates for every tablespoon consumed and gives the much needed energy, thus serving as an inexpensive substitute to commercially available sporting activities enhancers [38].

The physiological actions of bee's honey observed during this performance were a significant increase in heart frequency and a constant blood glucose level. These suggest honey as a better substitute to glucose. Honey increased significantly the heart frequency and the blood glucose level during the performance. It did not promote physical or psychological signs of hypoglycemia in fasted athletes or during resistance training [39]. Honey is well tolerated and can be an effective carbohydrate source for athletic performance. Summarizing the research on honey and sport nutrition it is recommended that the amount of honey should be adapted to the body weight and to the ingestion time before exercise. Four hours before exercise: ingest 4 g per kg body weight, one hour before exercise: ingest 1 gram per kg body weight, 10 minutes before exercise: ingest 0.5 g per kg body weight [40].

The application of honey in infant nutrition used to be a common recommendation. Infants on a diet with honey had better blood formation and a higher weight gain than when a diet without honey was applied. When infant were fed on honey rather than on sucrose an increase of hemoglobin content, a better skin color, lighter and thinner feces, less susceptibility diseases and no digestion problems were encountered [41]. However, there is a health concern for infants regarding the presence of *Clostridium (Cl.) botulinum* in honey which in the stomach of infants less than one year the bacteria spores from honey can survive and build the toxin. But they cannot build toxin in children older than 12 months can ingest honey without any risk [42].

In the Children nutrition evidences encouraging the feeding of honey to new born babies by some customs and traditions. It is now an established fact that feeding honey to infants will improve memory and growth, reduce anxiety and enhance the children's performance in later life. In a review on the importance of honey relative to sucrose in children's

nutrition improved hematological profiles and calcium uptake [43].

2.4.2. Increase digestion and absorption

Bee's honey contains several enzymes which enhance the digestion of food substances especially carbohydrates such as sugars and starch [7]. The simple sugar molecules in honey are in pre-digested forms, and can be directly absorbed into the human system. The honey is act to aid digestive processes in the body [44]. The gastrointestinal tract (GIT) contains lot of essential and beneficial bacteria, especially Bifidobacteria for the maintenance of life and good health. It has been suggested that one can increase these bacteria populations in the GIT by consuming foods with rich supply of prebiotics such as natural honey [45].

Prebiotics are substances that facilitate the enhanced growth and the biological activity of those good and beneficial bacteria. Several experimental trials involving both in vitro and in vivo studies have been documented on the importance of dietary supplementation with natural honey on the growth of the beneficial bacteria (Bifidobacteria and lactobacilli) and their prebiotics effects in the GIT [46]. In some cases, the consumption of relatively large amounts of bee's honey (between 70 to 95 g) can produce a mild laxative effect in people with fructose mal-absorption or inadequate absorption. Generally, honey has a laxative effect on the digestive system of individuals. Another nutraceutical function of honey is provision of calcium. Honey consumption provides calcium, which is readily absorbable and strengthen bone mass development. This can help reduce the risk of osteoporosis or low bone mass (causative agent of fractures) in old individuals [47].

3. Medicinal Uses Of Bee'S Honey

3.1. Anti Bacterial Effects

Bee's honey is a very potent broad-spectrum antibiotic which most multi-resistant bacteria are found sensitive to antimicrobial activity is present in all types of honey. It against many pathogenic bacteria like *Bacillus anthracis*, *Escherichia coli*, *Salmonella spp*, *Staphylococcus aureus*, *Shigella spp* and others depending on the concentration used. Pasture honey (4-8%) and 5-11% manuka honey were bacteriostatic where as bactericidal activity was achieved at 5-10% and 8- 15% (v/v) concentrations, respectively [48].

The mechanisms of antimicrobial activity of honey are different from antibiotics, which destroy the bacteria's cell wall or inhibit intracellular metabolic pathways. The antibacterial activity of honey is related to four properties. First, honey draws moisture out of the environment and thus dehydrates bacteria. Due to sugar content and also high enough to hinder the growth of microbes, but the sugar content alone is

not the sole reason for antibacterial properties. Second, the pH of honey is between 3.2 and 4.5, this acidity is low enough to inhibit the growth of most microorganisms. Third Hydrogen peroxide produced by the glucose oxidase is the most important antibacterial component. Lastly, several phytochemical factors for antibacterial activity have been identified in honey [49].

3.2 Anti Viral Effects

The bee's honey has exhibits antiviral activity used to treat many diseases among the most successful in inhibiting the spread of virus. The Honey has antiviral activity against Rubella virus and it is used topically to treat recurrent herpes simplex lesions [51]. Antiviral activity of honey was reported that has been shown to inhibit in vitro the *Rubella* virus, *Herpes* virus and has anti- HIV-1 activity as tested due to methylglyoxal [52].

High inhibitory activity against the influenza virus of various sources was reported for manuka honey [53]. Pasture honey are also utilized as anti-infective (especially antiviral) activity, due to hydrogen peroxide. Raw honey can eradicate herpes as compared to acyclovir. The possible mechanism of action that the honey enters the virus and inhibits its replication also at appropriate concentration neutralizes the virus [54].

3.3. Anti Fungal Effects

Honey has fungicide activity, but not many fungi species have been tested. It has antifungal activity against dermatophytes that can cause mycoses (*Tinea*), *Epidermophyton*, *Microsporum* and *Trichophyton*, all species that can affect humans. The conventional treatment of fungal disease is limited, and part of the reason is due to the limited spectrum of the currently antifungal drugs, and the expensive treatment, particularly due to the need of prolonged therapy. In recent years, several studies on the *in vitro* susceptibility of superficial mycoses to antifungal of honey [55].

Thus, nowadays many researches are focused on the therapeutic properties of natural honey and its antifungal activity [56]. Recently multifloral honey samples were evaluated for their ability to inhibit the growth of 40 yeast strains. Some of them include *Candida albicans*, *C. krusei*, *C. glabrata* and *Trichosporon* [57.] The unifloral honey antifungal activity against *Penicillium* species is mostly at concentration higher than 10% [58].

3.4. Anti- Parasite Effects

The anti-parasitic properties of honey have been investigated for anthelmintic activity using earthworms (*Pheretima posthuma*), tapeworms (*Raillietina spiralis*) and roundworms (*Ascaridia galli*). Various concentrations (100–300 mg/ml) of sweeteners extract have been tested in the bioassay.

Determination of paralysis and death time of the worms has been recorded by honey concentration. Anthelmintic activity of natural honey is due to its

acidic pH level (3.2 -4.5); which prevents the growth of many helminthes and poor environment for their growth [59].

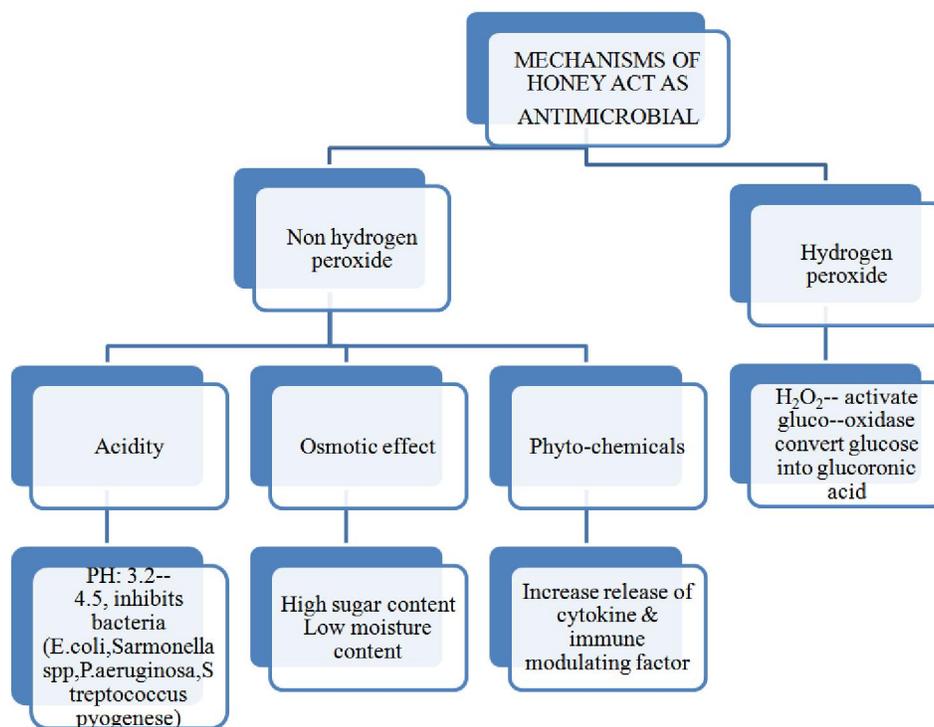


Figure 1: Mechanism of Anti-Microbial Action of Honey

Source: [50].

The result has shown that aqueous extract possesses vermifugal activity and has found to be effective as an anthelmintic. Higher concentration of extract has produced paralytic effect much earlier and the time to death has been shorter for all worms. Aqueous extract has showed anthelmintic activity in dose dependent manner giving shortest time of paralysis and death with 300 mg/ml concentration, for all three types of worms [60].

3.5. Bee's honey for wound healing purpose

The use of honey to treat wounds started back to 2000 BC. Numerous reports document the efficacy of honey in wound healing, and several studies even indicate that honey appears to be superior to many modern methods of treatment. Honey has been used for cleansing and accelerating the healing of wounds for centuries; however, the scientific basis for its success was not elucidated until the twentieth century. It is currently used worldwide to treat human patients with contaminated wounds or infected body cavities [61].

Honey is an effective treatment of wounds because it is non-irritating, non-toxic, self sterile, bactericidal, nutritive, and more comfortable than other dressings. It is easy to apply, painless, harmless

to tissues, stimulates healing and epithelialisation. These activity is due to have high osmolarity (low water content) which draws exudates or lymph from wound and its nutrition use for regenerating tissue due to sugar content, due to Glucose oxidase produces gluconic acid (which is the principal acid in honey) and hydrogen peroxide (H_2O_2), from glucose antibacterial. Therefore, honey's low pH (3.2 to 4.5) will accelerate healing as well as increase antibacterial effects due to phytochemical that come from the nectar of plants [62].

The treatment of wounds with honey has rendered them bacteriologically sterile within 7-10 days of the start of the treatment and promoted healthy granulation of tissue. Anti-fungal activity of Honey has been also tested on *Candida albicans*, *C. pseudotropicalis*, *C. stellatoidea* and *C. tropicalis* and all were found to be susceptible [63]. Honey was also found to be more effective as an antibacterial agent against several *Pseudomonas* and *Staphylococcus* strains than the antibiotic of gentamicin [64].

Honey has cleansing action of wounds, stimulates tissue regeneration, reduces inflammation and heals the dead or damaged tissue is replaced by the growth of new connective tissue and a new outer

layer of skin (epithelium) [65]. The mechanisms associated with wound cleansing and healing properties of honey include decreased inflammatory edema, attraction of macrophages to further cleanse the wound, accelerated sloughing of devitalized tissue, provision of a local cellular energy source, and formation of a protective layer of protein over the wound and a healthy granulation bed [62].

3.6. The Benefits of Bee's Honey with Other Substances

3.6.1. To treat health disorders

Bee's honey may be used alone or in combination with other substances, and which administered both orally and topically. It treatment of various ailments and some of these illnesses are listed. Eyesight: 10 ml of honey mixed with 10 ml of carrot juice and consumed regularly will improve eyesight. It is very helpful for those who sit before a computer for long hours [1].

Obesity: Keep garlic immersed in bee's honey for one year. Then, use 1 clove of garlic daily before breakfast. One glass of warm water taken with 10 ml (2 teaspoon) of honey and 5 ml (1 teaspoon) of lemon juice in early morning reduces fat and purifies blood. Daily in the morning 1/2 hour before breakfast on an empty stomach and at night before sleeping, drink honey and cinnamon powder boiled in one-cup water. If taken regularly it reduces the weight of even the most obese person. Also drinking of this mixture regularly does not allow the fat to accumulate in the body even though the person may eat a high calorie diet [66].

Stomach ulcers: 5 ml of new bee's honey diluted in 10 ml of water and given twice a day before meals. The inflamed stomach line infected by helicobacter pylori treating is due to antibacterial activity [67]. Burns, Cut and Wounds; apply fresh bee's honey directly on burns, cut and wounds. Stress / Fatigue; 15 ml of bee's honey given orally reduce stress and fatigue [68]. Bad breath; 5 g of powdered cinnamon bark and 5ml of bee's honey mixed with water and use as a mouth wash [69].

Diarrhea: Drink 5 ml of old bee's honey thrice a day before meals [70]. Arthritis; 30 ml each of bee's honey and coconut vinegar is mixed in 100ml of water and given twice a day to reduce arthritis. Its effect is repair of intestinal mucosal (lining of intestine) and grows tissue which damaged by infection [71]. Vomiting; 2.5g each of powder of fruit of Piper longum and popped rice is ground with 15ml of bee's honey and given orally as an antiemetic [72].

Cold and Cough: Those suffering from common or severe colds should take one tablespoon Luke warm honey with 1/4 teaspoon cinnamon powder daily for 3 days. This process will cure most cough, cold and clear the sinuses. Bronchial asthma; A mixture of 2.5g of black pepper powder, 5ml of honey

and juice of ginger consumed thrice daily help to relieve the symptoms of asthma due to its amino acid and vitamins dilating of airways. Hypertension: Daily intake of 10 ml of honey mixed with 5 ml of garlic juice helps to control blood pressure and consuming one spoon of honey daily helps us to lead a healthy long life due to purifies blood. Bladder infection:

Take two tablespoons of cinnamon powder and one teaspoon of honey in glass of Luke warm water and drink it. It destroys the germs of the bladder. Skin infections: Applying honey and cinnamon powder in equal parts on the affected parts cures eczema, ringworm and all types of skin infections [66]. Hair loss: Those suffering from hair loss or baldness may apply a paste of hot olive oil, one tablespoon honey, one teaspoon cinnamon powder before bath and keep it for approx. 15min. and then wash the hair. It was found very effective even if kept for 5 min due to grow connective tissue and epithelization [65].

3.6.2. Cosmetic purpose

Bee's honey are used in the beauty industry as a skin moisturizer, softener and to heal the skin tissue. Some cosmetic applications of it were listed. Facial to improve softness; Mix 2 tablespoons of honey with 2 teaspoons of whole milk apply over the face and keep for 15 min. Rinse off with warm water, and then with cold water [73].

Lotion for dry patches of skin: Mix 5ml of bee's honey, 5ml of olive oil and 2.5 ml of lemon juice. Apply on skin and wash after 15 min. Hair luster; Mix 5ml of bee's honey into 4 cups of warm water. Use as a hair rinse. Conditioner: Mix 10 ml of olive oil into 5ml of bee's honey and apply on hair. Wash after 15 min. Cracked lips; Apply bee's honey on cracked lips [68].

4. The Harmful Of Bee'S Honey And Its Precaution Prior To Use

Honey as any other natural food can be contaminated from the environment, for instance pesticides, antibiotics, poison plants and etc [74]. A few plants are known to produce nectar containing toxic substances. Diterpenoids and pyrazolidine alkaloids are two main toxin groups relevant in nectar. Some plants of the *Ericaceae* family belonging to the sub-family *Rhododendron*, example *Rhododendron ponticum* contain toxic polyhydroxylated cyclic hydrocarbons or diterpenoids [75].

Ingestion of the above contaminated honey causes some complaints such as dizziness, nausea-vomiting, sweating, weakness, blurred vision, convulsions and loss of consciousness, extremity parenthesis, excessive perspiration, headache, stomach ache, delirium, sight weakness and salivation and those poisonous plants are known to the local beekeepers, thus honey, which can contain poisonous

substances is not marketed [76]. Toxicity of honey from other plants has also been reported: *Datura* plants, belladonna flowers, *Hyoscamus niger* plants, *Serjania lethalis*, *Gelsemium sempervirens*, *Kalmia latifolia*, *Tripetalia paniculata* and *Ledum palustre* [77].

There is a health concern for infants regarding the presence of *Clostridium botulinum* in honey. Spores of this bacterium can survive in honey, but they cannot build toxin. Thus, in the stomach of infants less than one year the bacteria spores from honey can survive and transform into toxic in immature intestinal tract leading to illness and even death [78]. To minimize risks of honey born poisoning where plants with poisonous nectar are growing advised to buy honey from the market only and not from individual beekeepers [79].

5. Conclusion And Recommendations

In conclusion, bee's honey is a natural product that can be used for different purposes started from ancient till today. The main nutrition and health relevant components are the carbohydrates, which make an excellent energy source especially for children and sportsmen but for all age groups. Besides its main components, honey contains also a great number of other constituents in small and trace amounts, producing numerous nutritional and biological effects: such as antimicrobial, antiviral, anti-parasitic, anti-inflammatory and anti fungal activities. In addition, bee's honey uses in many situations such as cosmetics and health disorders with mixing different substances. Although, bee's honey is useful as health promoting, it can be contaminated from the environment, for instance pesticides, antibiotics and a few plants nectar produce toxic, which leads to disorder of health status.

Based on the above conclusion, the following recommendations are forwarded:

➤ The awareness of society on function of honey is not equally. So, there should be awareness creation about nutritional and medicinal value of bees honey for society and prevent to honey harvesting during poisons plants flowers.

➤ Ethiopia has good condition for presence of many colonies of bees but quality of honey is poor. So, Modern system of beekeeping should be applied to harvest high quality and quantity of honey.

➤ All age groups like honey but properly dosage and age should be considering to enhancing health status.

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