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Apitherapy in Southwestern Nigeria: An Assessment of Therapeutic Potentials of some Honeybee Products

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ABSTRACT

Ethno-medicinal usage of honeybee products is a common practice in southwestern Nigeria and is gaining more popularity in the region. However, there has been no documentary evidence on the potentials of honeybee products for the treatment of various diseases and ailments. This explains the rationale behind this study. The therapeutic potentials of honeybee products in the six states of southwestern Nigeria were assessed. Out of the 31 listed ailments, honey was used for the treatment of 18 ailments some of which were cough, ulcer, fatigue, sleeplessness, sore throat and boils. Bee venom was responsible for the treatment of seven ailments (rheumatism, arthritis, high blood pressure, body pains, malaria, headache and stroke). Beeswax was used for the treatment of frigidity in women and weak penile erection in men, while propolis was used for the treatment of measles and ringworm. This study confirms the important role of Apitherapy in health care delivery in the region. The effectiveness of these products against stated ailments requires further scientific investigations.
Keywords: Apitherapy, honey, bee venom, beeswax, propolis, beekeepers.

1. INTRODUCTION

Apitherapy is the use of bee products to prevent, heal or recover somebody from one or more diseases/conditions. It is also the art and science of treatment and holistic healing through the honeybee and her products for the benefit of mankind and all the animal kingdom [6]. The practice of apitherapy has been common in many parts of the world for centuries and recently has received increasing attention from bee scientists [17] and alternative health practitioners [27], [32], [8].

Bee products are readily available to any local beekeeper and can be produced with minimal or zero capital outlay [1]. Bee stings are totally free because the removal of 10 – 20 foraging workers from one colony or from flowers cannot have negative impact on colony performance. Bee products are totally safe and do not require precise dosages as in allopathic medicines.

Honeybees produce six products, which have extraordinary medicinal and commercial values. These are honey, royal jelly (bee milk), pollen, propolis, beeswax and bee venom. Out of the six products, only four (honey, beeswax, propolis, Bee Venom) are easily extractable by beekeepers. This explained why this study evaluated the potential of only these four honeybee products.

Honey is the nectar and saccharine exudations of plants, gathered, modified and stored as honey in the comb by honeybees [7]. Honey is rich in carbohydrates and contains numerous trace elements, vitamins, minerals, amino acids, and enzymes [5]. It is the most popular of the bee products. It is a wholesome health food, efficacious medicament and natural cosmetics of great value [9]. Honey is a tonic food. It can be used as food to build up the body, promotes growth, and to maintain acid-base balance of the body. It is known to give vitality, good health and long life to people who take honey on regular basis. Beekeepers are known to have longer life span [10], [8], [1], [9]. The curative properties of bee products have been documented [6], [15], [29], [21].

Beeswax is produced in the special glands in the inside of the abdomen of young worker bees. The wax oozes through small pores in the body and forms tiny wax flakes on the outside of the abdomen. Beeswax is used to build honeycomb, which serves as the storage facility and hatchery for the bees. Beeswax is nutritious and medicinal [1], [12], [9].

Bee venom is the main object that makes the honeybee dreadful but ironically, bee venom has been found to be of great value medically. It has 18 powerful compounds all of which have potent healing properties, particularly against degenerative diseases like arthritis, rheumatism and multiple sclerosis [30], [6].

Propolis is a stick resin, which seeps from the buds and bark of the trees. The bees gather propolis for two main purposes. It is used to seal the crack in their hives by coating the inside of the

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passageway and to protect the hives against bacterial and viral infections. In fact, it is this latter role, which makes propolis beneficial to human health. Often called nature's penicillin, propolis has effective antibacterial, antiviral, antiseptic and antifungal properties [3], [6].

There have been claims and counter-claims about the ethno-medicinal uses of honey and other bee products in southwestern Nigeria. However, there is a dearth of research information about the ethno-medicinal potential of honeybee products in the region. This necessitated the need for this study.

2. MATERIALS AND METHODS

The Study Area

This study was carried out in southwestern Nigeria which comprised Lagos, Ogun, Oyo, Osun, Ondo and Ekiti states (figure 1). The climatic condition of the region is suitable for beekeeping with annual rainfall of 1,000 – 1,400mm per annum. The climatic conditions also support both arable and permanent crops. Both wild and cultivated plants serve as sources of nectar and pollen to honeybees, thus favouring production of honey.

Sample and sampling techniques

The target group for the study consisted of the members of Beekeepers' Association of Nigeria (BAN) (who are also local apitherapists) in all the six states. Total membership in each state ranged from 61-68.

Structured questionnaires prepared by the researcher were administered to sixty members of BAN in each state giving an overall total of 360 respondents. The dependent variables were measured by asking the respondents to score statement of opinion given to them using Likert four points scale of strongly agree (4), agree (3), disagree (2) and strongly disagree (1).

Pilot study

A Pre-test study was conducted shortly before starting the actual field survey. This was to familiarize the researcher with the beekeepers. The questionnaires were administered to beekeepers in Ile-Ife, Ilesa and Osogbo to obtain their understanding of the various questions. The results and reactions to these were used to further improve and perfect the questionnaires before the actual study.

Data Collection and Analysis

The field survey was carried out between June 2010 and July 2011. The researcher was assisted by the officials of Beekeepers Association of Nigeria (BAN) and two enumerators, who helped to administer the questionnaires to other members. Research questions were developed to assess the opinion of beekeepers on the medicinal values of some bee products (honey, bee venom, propolis and beeswax).

The answered questionnaires were thoroughly checked. The 360 questionnaires were coded and entered into a database and analyzed using SPSS version 16.0 (SPSS, 2007). Descriptive statistics such as, means, standard deviations, t-test were used to analyse the data.

Research question: What are the opinions of beekeepers on the medicinal values of bee products?

Research Hypothesis: There is no significant difference in the mean ratings of the responses of beekeepers on the medicinal values of bee products.

Weighted mean and standard deviation were used to answer the above research question, while t-test statistic was used to test the hypothesis. A cut off point (arithmetic mean) of 2.50 was used to determine the items that are regarded as medically efficacious for the stated ailments. An interval scale of 0.05 was used to determine the upper limit of the cut off point (arithmetic mean) in which decision on each item was based, which was 2.55, any item with a weighted mean value of 2.55 and above was regarded as medically efficacious for the stated ailments, while any item with a mean value below 2.55 was not regarded as an important medicament for the stated ailments. The standard deviation was used to determine the closeness or otherwise of the opinion of the respondents from the mean. Any item with a standard deviation less than 1.96 showed that the respondents were close to the mean, while any item with a standard deviation above 1.96 showed that the respondents were not close to the mean and therefore the item was not very valid. The null hypothesis of no significant difference was accepted for any item whose t-calculated value was less than the t-table value, while it was rejected for any item whose t-calculated value was greater than the t-table value.

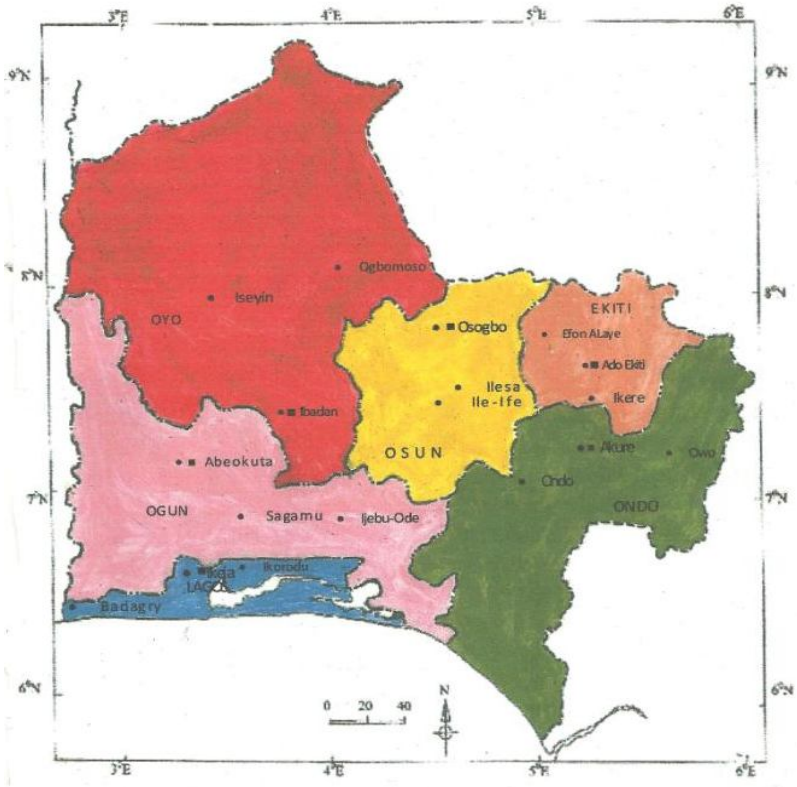

Figure 1: Map of Southwestern Nigeria showing the different sampling locations

- Headquarters for Beekeepers' Association where questionnaires were administered to members

RESULTS

Tables 1 and 2 revealed that all the items had their mean values ranged from 2.75 to 3.83. This showed that the means were above the cutoff point of 2.55 indicating that the respondents agreed to the medicinal values of the products. The table also showed that the standard deviation (SD) of the items ranged from 0.43 to 1.00, which was below 1.96. This indicated that the respondents were not too far from the mean and from the opinion of one another in their responses. This showed that the items were valid. Furthermore, all the 31 items (except items 12 and 13) had their t-calculated values less than their t-table values. This indicated that there was no significant difference in the mean ratings of the responses of the respondents on the medicinal values of bee products. Therefore, the null hypothesis of no significant difference was accepted for all the items (except items 12 and 13). The result showed that the beekeepers agreed that honey is being used for the treatment of 18 diseases/ailments, bee venom for the treatment of seven diseases/ailments and beeswax for the treatment of only two diseases/ailments while propolis was used for the treatment of measles and ringworm (Tables 1 and 2). The beekeepers' opinion differs on the use of honey for the treatment of mouth infections and bed-wetting.

Table 1: Mean Ratings (X) and t-test Analysis of the Responses of Beekeepers on the Medicinal values of some bee products in southwestern Nigeria.

S/N	Item statement	X	SD	t-cal.	t-tab.	Remarks
	(A) **Honey**: Honey is used to treat the following diseases:					
1	Cough	2.75	.43	1.26	1.96	NS
2	Ulcer (Duodenal and Epigastric)	2.90	.48	1.42	,,	NS
3	Fatigue	2.96	.51	1.49	,,	NS
4	Insomnia (Sleeplessness)	3.03	.53	1.55	,,	NS
5	Inflammation of the middle ear	3.09	.59	1.62	,,	NS
6	Sore throat	3.08	.54	1.61	,,	NS
7	Pimples	3.04	.53	1.56	,,	NS
8	Bedsores	3.09	.61	1.63	,,	NS
9	Burns	2.91	.55	1.44	,,	NS
10	Wounds	2.91	.53	1.44	,,	NS
11	Dandruff	3.09	.67	1.63	,,	NS
12	mouth infections	3.67	.95	2.24	,,	S
13	Bed wetting	3.83	1.00	2.40	,,	S
14	Ringworm	3.33	.75	1.88	,,	NS
15	Boils	3.17	.75	1.72	,,	NS
16	Whitlow	3.17	.85	1.73	,,	NS
17	Measles	2.98	.53	1.51	,,	NS
18	Stomach ache	3.04	.52	1.57	,,	NS
19	maintenance of skin beauty	3.04	.51	1.56	,,	NS
20	Rashes	3.03	.55	1.56	,,	NS

Table 2: Mean Ratings (X) and t-test Analysis of the Responses of Beekeepers on the Medicinal values of some bee products in southwestern Nigeria.

S/N	Item statement	X	SD	t-cal.	t-tab.	Remarks
	(B) **BEE VENOM**: Bee venom is used to treat the following diseases					
21	Rheumatism	2.91	.50	1.43	1.96	NS
22	Arthritis	2.93	.49	1.45	,,	NS
23	High blood pressure	2.87	.50	1.39	,,	NS
24	Body pains	3.01	.52	1.53	,,	NS
25	Malaria	3.13	.58	1.66	,,	NS
26	Headache	3.14	.58	1.67	,,	NS
27	Stroke	3.03	.52	1.55	,,	NS
	(C) BEESWAX Beeswax is used to treat the following diseases:					
28	Frigidity in women	3.11	.58	1.63	,,	NS
29	Weak penile erection	3.11	.57	1.64	,,	NS
	(D) PROPOLIS Propolis is used to treat the following diseases:					
30	Measles	2.86	.54	1.39	,,	NS
31	Ringworm	2.90	.55	1.43	,,	NS

3. DISCUSSIONS

In many cultures of the world, honey has long been used as a medicine. Recently the medical profession has “rediscovered” honey as a therapeutic substance and it is gaining acceptance as an antibacterial agent for treatment of different diseases and wounds. Also in conventional medicine, honey is used as a carrier for drugs [23]. Traditional healers in Tanzania used honey on its own and mixed with other ingredients to cure coughs, stomach ulcers, malaria and burns [23]. Honey is used also to improve assimilation and is well known for its effectiveness in chronic intestinal cases such as constipation, duodenal ulcers and liver disturbances. In its pure and unprocessed form, honey helps against infections, promotes tissue regeneration and reduces scarring [23]. In Burkina Faso, honey has been reported for the treatment of various gastrointestinal disorders, respiratory ailments, fatigue, vertigo, ophthalmic disorders, toothache, measles, wounds, burns, chest pains, period pains , postnatal disorders, male impotence as well as its application as a skin cleansing agent [16].

In this study, the respondents claimed that honey was effective in the treatment of 18 ailments; bee venom for the treatment of seven ailments, beeswax for the treatment of two ailments and propolis for the treatment of measles and ringworm. It is however interesting to note that all ethno-medicinal claims of honey and other bee products are supported by medical research findings in the literatures.

Honey has anti-bacteria, anti-fungal and anti-viral properties that render it an appropriate medicine for virtually all ailments. In addition it is hygroscopic [18], [19] and thus can rehydrate the

skin in cases of burns and severe cuts. Honey is effective in treating common colds and coughs, stomach ulcers, eye and ear infections, skin disorders and has application in malnutrition, for pregnant and lactating mothers, to guard against illness and to improve liver and heart function [13]. In vitro studies of *Helicobacter pylori* isolates which cause gastritis have been shown to be inhibited by a 20% solution of honey. Even isolates that exhibited a resistance to other antimicrobial agents were susceptible [17].

Clinical and animal studies have shown that honey reduces the secretion of gastric acid. Additionally, gastric ulcers have been successfully treated by the use of honey as a dietary supplement [11]. An 80% recovery rate of 600 gastric ulcer patients treated with oral administration of honey has been reported [11]. Radiological examination showed that ulcers disappeared in 59% of patients receiving honey.

Conversely, honey is an effective treatment of wounds because it is non-irritating, non-toxic, self-sterile, bactericidal, nutritive, easily applied and more comfortable than other dressings [20]. 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 [26]. Patients suffering from wound breakdown after operation for carcinoma of the vulva were treated by pouring honey on the wounds twice daily. The wounds became bacteriologically sterile within 3-6 days and in vitro studies of bacteria cultured from the wounds showed that undiluted honey not only failed to sustain growth of the bacteria (*Proteus mirabilis, Ps. aeruginosa, E.coli, Streptococcus faecalis, Clostridium perfingens* and *Staphylococcus aureus*), but actually killed them. The in vitro anti-fungal activity of honey has been also tested on *Candida albicans, C. Pseudotropicalis, C. stellatoidea* and *C. tropicalis*. They were all found to be susceptible [11].

Bee venom in the form of bee stings has many therapeutic applications, particularly for arthritis, rheumatism, chronic pain, and also multiple sclerosis in Europe and US [22], [31], [4]. Stinging on the point of pain or on associated acupressure points can have remarkable results, in some cases instantly relieving pain for prolonged periods or permanently. Iodine deficiency induced thyroid problems (goiters) may respond well to treatment. For women, stinging in the lumbar region can treat menstrual disorders, Pre-Menstrual Syndrome (PMS) and also infertility [4]. Bee acupuncture therapy is an important part of traditional Chinese medicine and very recently, has been gaining popularity in other countries [12].

Beeswax is produced by the (female) worker honeybees. The wax is secreted from wax glands on the underside of the bee's abdomen and is molded into six-sided cells which are filled with honey, then capped with more wax [24]. Beeswax has great application in the preparation of medicinal skin creams and ointments [14]. These are highly efficacious in the treatment of dry and chapped skin and lips, cut, skin disorders and discoloration. Hot beeswax can be applied to arthritic joints or taken internally for stomach ulcers. The use of beeswax for the treatment of frigidity in women has been reported. The waxes are burnt and mixed with black soap for bath. The use of the soap to wash the weak male organ improves penile erection for better sexual performance in men [1].

Propolis or bee glue was an official medication in the London pharmacopeias of the seventeenth century. However, there was a long hiatus in its popularity between the seventeenth and the late twentieth century; now propolis once again is receiving considerable attention from both laypersons and scientists. The unusual medication is a brownish resinous material collected by bees from the buds of various trees and used by the insects to fill cracks or gaps in their hives [2]. Those who advocate its therapeutic use claim that propolis has an antibacterial activity greater than that of penicillin and other common antibiotic medicine [9]. They maintain the product "works" by raising the body's natural resistance to infection through stimulation of the immunity system. It is supposed to be especially beneficial in the treatment of tuberculosis. Duodenal ulcers and gastric disturbances are also thought to benefit from propolis therapy. Applied externally in the form of a cream, advocates say it relieves various types of dermatitis, especially those caused by bacteria and fungi. Propolis is commercially available in the form of capsules (both pure and combined with 50% pollen), throat lozenges, cream, chips (used like chewing gum), and as a powder (to prepare a tincture) [3]. More than 25 different constituents of propolis have now been tested scientifically against various species of bacteria and fungi for antibacterial and antifungal effects [3]. Results indicate that the antimicrobial properties of the medication are attributable mainly to the flavonoids, pinocembrin, galangin, pinobanksin, and pinobanksin-3-acetate; in addition p-coumaric acid benzyl ester and a chaffiest acid ester mixture were also active. Pinocembrin, a 5,7-dihydroxyflavanone, showed considerable antifungal activity. However, none of these isolated principles was as effective as various antibiotics or sulfa medicine with which they were compared: streptomycin, oxytetracycline, chloramphenicol, nystatin, griseofulvin, and sulfamerazine [2].

CONCLUSION

Honey, Beeswax, Propolis and Bee venom were claimed by respondents in this study to possess effective medicinal properties. Although most medicinal claims of honey and other bee products have been corroborated with scientific research in advanced countries, more studies are still necessary, especially in Nigeria.

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