

# Health benefits of honey and ethno-botanical uses of its bee flora from Lakki Marwat district, Khyber Pakhtunkhwa, Pakistan

S. Ahmad <sup>1\*</sup>, M. Zafar <sup>1</sup>, M. Ahmad <sup>1</sup>, S. Sultana <sup>1</sup>, G. Yaseen <sup>1</sup>, K. Khan <sup>1</sup> and F. Khan <sup>2</sup>

<sup>1</sup> Department of Plant Sciences, Quaid-i-Azam University Islamabad, Pakistan

<sup>2</sup> University of Peshawar, Pakistan.

## ABSTRACT

Currently in many rural communities of district Lakki Marwat traditional knowledge of honey and bee flora are used to treat numerous diseases. Aim of the present study was to collect, identify, explore ethnomedicinal applications of melliferous plants and uses of honey in district Lakki Marwat for treatment of various diseases. A field survey was carried out from September 2018 to October 2019 in 13 different villages of the district. A total of 50 plants belonging to 25 different families and many medicinal uses of honey were reported from study area. According to questionnaire and interview taken from numerous people more than 22 diseases were cured through honey but most used for cough and eye infections followed by dysentery, stomach pain, fever, kidney problems and respiratory diseases. The results of current study showed that honey and its bee flora play an important role for curing different diseases in Lakki Marwat.

**Keywords:** honeybees, medicinal uses, Lakki Marwat, nectar, bee forage

## 1. INTRODUCTION

Honey is a viscous liquid, natural sweet substance produced by honeybees from nectars and pollen of flowering plants. It is composed of all essential food ingredients needed for a human body containing proteins, carbohydrates, fatty acids, lipids and minerals [1]. Honey has been medicinally used by ancient peoples, mentioned its applications in the holy book of

Quran, Bible, Talmud, and Torah [2]. The holy Quran and Prophet Muhammad (S.A.W) both prescribed uses of honey for various diseases of body. Our holy Prophet (S.A.W) said "Make use of two things, the holy Quran and Honey" [3]. In another Hadith the holy Prophet (S.A.W) strongly recommended the use of honey for its healing purposes. Abu Said Al-Khudri narrated that "A man came to the holy Prophet (S.A.W) and said there is pain in my brother stomach;

the holy Prophet (S.A.W) said “allow him to eat honey.” After some time, man return, the holy Prophet (S.A.W) allow him to eat it for such a disease. Again that, man came back for third time that no reduction occurred in pains of my brother stomach, the holy Prophet (S.A.W) then said “stomach of this man tells lie” because Allah said truth in holy Quran to be used for treatment of such diseases. So, his brother then allows him to eat honey and was cured.

Honey yield flora is traditionally used as medicines. Honey has been used for various diseases for therapeutic and healing and is even used for antibacterial activities [4]. Flora from Lakki Marwat district are very important for bee forage and honey productions [5]. Medicinal uses of honey and bee flora list were first time reported in the district. In Lakki Marwat district bee forage plants and honey has been used as folk medicine for curing many diseases. In Pakistan majority of peoples lack the knowledge of bee flora, its medicinal uses and source of honey productions. Study helps in providing appropriate knowledge about flowering periods of melliferous plants and stresses on its conservation. *Apis dorsata* and *Apis mellifera* are common but *Apis florea* are rare species for the studies. Knowledge collected from local peoples are useful for scientists working in the fields of Plant Ecology, Plant Taxonomy, Genetics, Pharmacology, Molecular Biology and Agriculture fields [6].

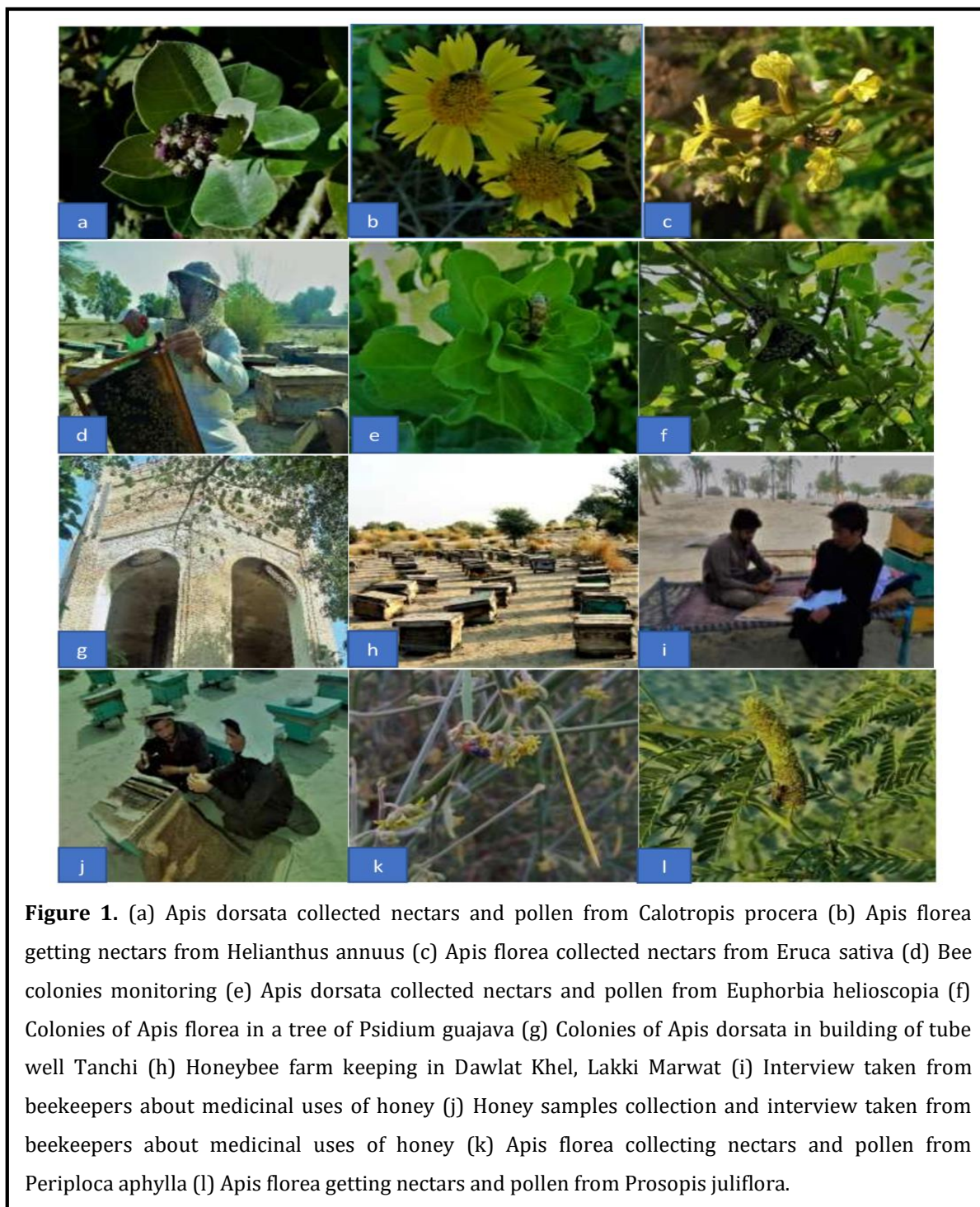
Medicinal applications of honey and traditional knowledge of plants are used by different rural communities of Pakistan for years [7-8].

Traditional knowledge of medicinal plants is a part of Pakistani culture, mostly used in all district of the country [9]. People of old civilization used bee forage plants and honey as medicines against numerous diseases like cough, fever, stomach pain, dysentery, kidney problems and respiratory diseases. Knowledge of medicinal uses of honey and plants were used lately in Pakistan as compared to other developed countries.

Ethnobotanically flora of Lakki Marwat district are very distinct and diversified [3, 10]. But such studies are limited upto some villages, creating gap in data collection and field survey of existed plants. Traditional uses of bee flora and medicinal uses of honey were explored to expand the indigenous knowledge in all over the world. The benefits of naturally prepared products and their positive impacts on health are widely studied worldwide [11]. Now a day’s use of ethno botanical knowledge has brought considerable attention about their medicinal importance amongst scientists. In many rural communities’ poor people does not afford expenses of modern medicines. Therefore, people urged to use such remedies of honey and bee flora for treatment of numerous diseases [12]. The aim of this study was to enlist the melliferous plants, their flowering periods, honey uses as folk medicines and to give information’s to beekeepers regarding to their business.

## **2. METHOD AND MATERIAL**

### *2.1. Research location*



**Figure 1.** (a) *Apis dorsata* collected nectars and pollen from *Calotropis procera* (b) *Apis florea* getting nectars from *Helianthus annuus* (c) *Apis florea* collected nectars from *Eruca sativa* (d) Bee colonies monitoring (e) *Apis dorsata* collected nectars and pollen from *Euphorbia helioscopia* (f) Colonies of *Apis florea* in a tree of *Psidium guajava* (g) Colonies of *Apis dorsata* in building of tube well Tanchi (h) Honeybee farm keeping in Dawlat Khel, Lakki Marwat (i) Interview taken from beekeepers about medicinal uses of honey (j) Honey samples collection and interview taken from beekeepers about medicinal uses of honey (k) *Apis florea* collecting nectars and pollen from *Periploca aphylla* (l) *Apis florea* getting nectars and pollen from *Prosopis juliflora*.

Lakki Marwat is one of the southern districts of Khyber Pakhtunkhwa, situated 32.161° N and 70.191° E. Honey of southern side of district are of better quality over other areas. Beekeepers from all over province arrange their business of honey in study area according to their season. In a year two season of honey production occurred,

autumn and spring season of which autumn is more favourable for honey yield [5].

## 2.2. Ethno-botanical data collection

Questionnaires were prepared for the interview. The beekeepers and experts' people of local area were interviewed in Pashto language.

Interviews were taken from majority of male but few female candidates including pharmacists, beekeepers, hakeem, farmers and other experts' people. Photographs and audio was collected during the interview. Information's regarding local name of the plant, flowering period, honey color, medicinal uses of plants and honey were collected from local people.

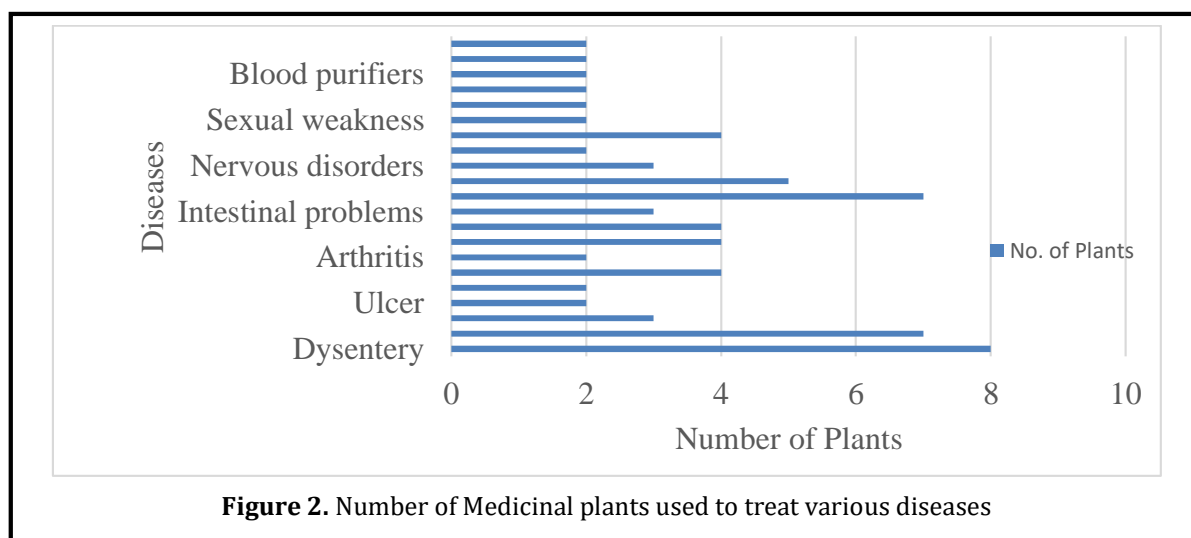
### 2.3. Collection, preparation and inventory of Plant species

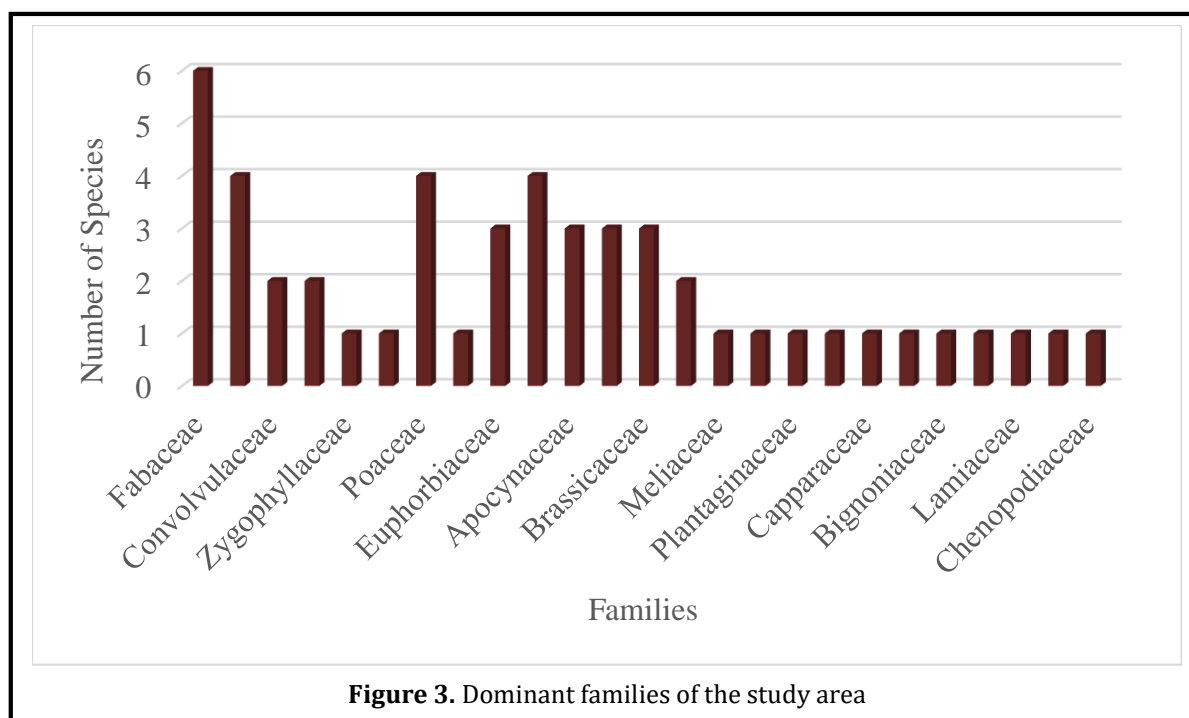
Different field surveys were arranged from September 2018 to August 2019 in all over the district to investigate bee forage plants visited by honeybees and find out medicinal uses of honey used by local peoples. A total of 50 species were collected and identified. About 173 different people were interviewed including beekeepers with age ranging more than 25. Plants were photographed by digital camera and collected carefully after visited by honeybees. Flower color, habit, habitat, and collection site were noted during field survey. Species were identified by Prof. Dr Mir Ajab Khan and compare with the sample of Herbarium (ISL) Quaid-i-Azam University Islamabad. List of bee

forage plants were also compared with available literature of extinct and threatened species for identification purposes. The identified plants were then submitted in the Herbarium of Pakistan.

### 3. RESULTS AND DISCUSSION

The current study revealed usage of honey and various species of plants as traditional medicines for curing many diseases in Lakki Marwat district. Knowledge of bee flora was obtained from 25 different families divided into 13 trees, 7 shrubs and 30 herbs. Dominant traditional medicinal plant families of the area belongs to family Fabaceae containing 6 species followed by 4 species of Asteraceae, Poaceae, Solanaceae, 2 species of Euphorbiaceae, Apocynaceae, Cucurbitaceae, Brassicaceae, Convolvulaceae, Rhamnaceae, Amaranthaceae and 1 species of Zygophyllaceae, Moraceae, Asphodelaceae, Meliaceae, Apiaceae, Plantaginaceae, Fumariaceae, Capparaceae, Cyperaceae, Boraginaceae, Rutaceae, Lamiaceae, Myrtaceae and Chenopodiaceae (Fig. 2). Trees and shrubs were highly foraged by bees during flowering period in autumn and herbs in spring.





The plants which are considered as the minor source of honey productions are also included (Table 2). A total of 50 plants were identified belonging to 25 different families, out of which 12 plants were (*Ziziphus jujuba*, *Citrus limon*, *Cestrum nocturnum*, *Ocimum basilicum*, *Periploca aphylla*, *Brassica campestris*, *Eruca sativa*, *Prosopis cineraria*, *Prosopis juliflora*, *Eucalyptus camaldulensis*, *Acacia modesta* and *Acacia nilotica*) grouped in major source and 38 in minor source of honey productions showed in (Table 2).

Most common plants visited by honeybees during month of September is *Zizyphus jujuba* and *Brassica campestris* in March. Flora of district are very distinct containing different types of plants including trees, shrubs, subshrubs, herbs, climbers, and weeds. Plants visited by honeybees were noted its flower color, habit, habitat, and flowering periods. The most represented families visited by honeybees were Rhamnaceae, Brassicaceae, Lamiaceae and

Mimosaceae. Most common plant visited by honeybees during autumn is *Ziziphus jujuba* and *Brassica campestris* in spring. Investigated floras were comprised of vegetables, fruits, medicinal plants, lactiferous plants, ornamental plants, fodders, cereals, and oil producing plants. Sep-Nov and Feb-Apr were recorded as the main season of honey harvestings. More than 22 diseases were cured by honey in the study area, but most used for colds and abdominal pains. Traditional practices of honey and its bee flora as medicines are common in study area which form base for pharmaceutical industries. Study helps in plant identifications, determining seasons for beekeepers and recognizes traditional uses of honey as medicines in the district.

Medicinal uses of honey and bee forage plants were found to be used against various diseases in district Lakki Marwat (Table 1). Species of honeybees examined in the study area were *Apis dorsata*, *Apis florea* and *Apis mellifera*. *Ziziphus*

*jujuba*, *Citrus limon*, *Cestrum nocturnum*, *Ocimum basilicum*, *Periploca aphylla*, *Brassica campestris*, *Eruca sativa*, *Prosopis cineraria*, *Saccharum spontaneum*, *Prosopis juliflora*, *Eucalyptus camaldulensis*, *Acacia modesta* and *Acacia nilotica* are considered as the species of major source of honey productions (Fig. 3).

Honey mixed with different compounds like water, milk, lemon solution, ginger, cinnamon powder, pomegranate and seeds of *Nigella sativa* used against cold, stomach pain, fat loss, impotence, asthma, hair loss, joint pain, constipation, liver and heart diseases (Table 2). Different parts of a plant possess some active compounds which are used for treatment of various diseases [13]. Plants part are used in the form of decoction, latex extraction, powder, seeds crushing, infusion and oil extraction are prepared from fresh or dried parts of the plants. Aerial parts, flowers, seeds, bark, oil, roots, fruits, latex and as whole plants are used against disease of hepatitis, ulcer, indigestion, cholera, arthritis, inflammations, cough, intestinal problems, cold, kidney stones, nervous disorders, asthma, respiratory disorders, sexual weakness, headache, skin disease, blood purifiers, urinary problems, anaemia and many other diseases (Fig. 2). Among the plant parts used, leaves were mostly used against many diseases [14].

The results from interview taken showed that honey and its bee flora are used for veterinary and homeopathic diseases in rural communities excessively. Walzer *et al.*, 1991 revealed that beside availability of modern medicines people of rural areas are still dependent on traditional medicines prepared from honey and melliferous

species [15]. But now a day much reduction in traditional knowledge and use has been observed in rural areas. Data collected from interviewers were compared with available literature for confirmation purposes. For further studies on phytochemical basis and anti-microbial activities it forms base line. Using methods of honey and plant parts as traditional medicines varies within different communities of study area.

Honey is commonly used for cough, eye infections, stomach infections, Dysentery, intestinal infections, respiratory and many digestive disorders are mostly treated. Preparing extracts of medicinal plants in hot water is common in many regions of the world [16]. In majority cases honey and its bee flora were used in form of making solution with milk and water, such methods are commonly practiced in Lakki Marwat district. From different regions of the world, researchers investigated medicinal uses of honey and bee forage flora [17]. The flora of district is very diverse and important for honey productions and its ethnobotanical uses throughout Pakistan. Annually honey production occurred twice in a year. Major productions of honey occurred during months of September and October [5]. Beekeepers arranged their colonies during start of autumn season where enough species of *Zizyphus* visited by honeybees. While in spring, arranged their business in areas where abundant species of *Brassica campestris*, *Asphodelus tenuifolius* and *Astragalus hamosus* exists. Knowledge regarding bee flora not only helps in plant identifications and its traditional usage as medicines but very helpful regarding to agriculture maintenance, beekeeping practices,

industries, and biodiversity conservations [18]. During interview taken from local people of the study area it was also observed that excessive usage of honey and bee flora can causes side effects on a human body.

Honey color depends on a plant species from which honeybees collect nectars and pollen. Honey color of *Ziziphus jujuba* are red-dark, *Helianthus annuus* have yellowish and *Brassica campestris* have yellow color (Table 1). Some plants supply more nectars, but less pollen whenever foraged by bees and vice versa. *Ziziphus jujuba* supply high amount of nectars and minute numbers of pollen.

Honey is used by local peoples of an area as folk medicines in numerous ways. Present study investigated that honey are used for cure of indigestion, hair loss, stomach pain, pimples, fatigue, liver diseases and for the purpose of wound healings (Table 1). Beside medicinal importance, honey possesses much nutritional values, rich in all essential elements which are necessary for a healthy body. It is recommended that flora of Lakki Marwat district are very important for bee forage, honey productions and their local uses for treatment of numerous diseases. Identification of bee flora helps in development of beekeeping industries in many rural areas [19]. Bee flora of study area now a days going to become extinct which causes loss of honey productions and ethno medicinal knowledge.

#### 4. CONCLUSION

In present study ethno botanical knowledge of bee forage plants and medicinal uses of honey were collected from local inhabitants of the

study area. Study declared that district is rich in melliferous plants, highly production of honey occurred and used against various diseases. Numerous diseases of digestive, respiratory tract, arthritis, constipation, kidney stones and toothache are commonly treated through honey. Study revealed that bee flora and honey of district Lakki Marwat are very disparate, important, and commonly used as traditional medicines in numerous rural communities. Most represented families were Rhamnaceae, Brassicaceae and Fabaceae foraged by honeybees and utilized against diseases. Current ethno-botanical studies of bee flora and medicinal uses of honey revealed honey productions, beekeeping business, medicinal applications and further conservations of both honeybee and plants in study area. Government should cultivate bee foraged plants so that much increase in production of honey occurred annually.

#### 5. ACKNOWLEDGEMENT

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#### 6. CONFLICT OF INTEREST

The authors have declared that there is no conflict of interest.

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