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Not giving honey to infants:

A recommendation that should be reevaluated

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Editor's note: The American Apitherapy Society, by publishing this study, seeks to inform readers about the controversy regarding feeding honey to infants. The decision to publish the study does ***not*** *represent an endorsement of one or any particular position on this matter.*

Abstract

The possible association of Clostridium botulinum (C. botulinum) in Bee Honey (BH) and the recommendation not to give it below the age of 1 year are controversial. This study aimed at identifying a possible relation between BH intake before the age of 1 yr and infant botulism. The study was carried out in Al Khafji National Hospital in the Kingdom of Saudi Arabia. We examined 221 BH samples from different sources without detecting C. botulinum spores. A questionnaire was conducted among 719 mothers regarding BH intake during an infant's first year of life, and we found that 1,525 infants of 545 mothers received BH during that time without mortality or significant morbidity that could be attributed to infant botulism. Furthermore, no case of infant botulism was reported between 1995 and 2002 in all hospitals of Al Khafji, nor in the local health office. We thus conclude that the recommendation not to give bee honey to children younger than 1 year should be re-evaluated.

Abbreviations used

BH	bee honey
BHO	bee honey orally
C. botulinum	Clostridium botulinum
KNH	Al Khafji National Hospital
KSA	Kingdom of Saudi Arabia

Introduction

Bee honey is a supersaturated solution of sugars, mainly fructose, glucose and maltose-like sugars, with traces of sucrose, glucose oxidase, hydrogen peroxide, phenolics, flavonoids, terpenes, etc. [1]. The sugars make honey hygroscopic (moisture absorbing) and viscous, and the sugar concentration plus other factors including low pH, hydrogen peroxide, and the flavonoids, phenolics, and terpenes make honey an antimicrobial agent [2]. The high acidity of honey plays an important role in the system which prevents bacterial growth. The pH of honey varies from 3.2 to 4.5 (average pH = 3.9), making it inhospitable for attack by most bacteria. Its low moisture content also forms an important part of the system that protects honey from attack by microorganisms. Honey's hyperosmotic nature prevents the growth of bacteria and yeast as it draws water out of the organisms, killing them by desiccation [3].

Bee honey was the most used medication in ancient Egypt. Of the almost 1000 different remedies on record, more than 500 were honey-based [4]. It has been demonstrated that BH has multiple benefits, including anti-inflammatory [5], antimicrobial [2], wound healing [4], and mucolytic expectorant effects [4], [5], [6]. Some researchers have identified honey as a possible source of C. botulinum spores. They discourage giving it to infants under 1 yr of age because in extremely rare cases the gut flora of some infants may not be mature enough to combat these spores, and this may result in infant botulism [7], [8], [9], [10].

Yet others [11], [12], [13] have not detected these spores in bee honey. Furthermore, infant botulism is a mainly unavoidable disease, and most patients probably inhale and then swallow airborne clostridial spores; these cases cannot be prevented [7]. It was observed that some people in Al Khafji of KSA used to give BH to their children, including those below 1 yr of age, intentionally as a food of good nutritive value and as a non-traditional medicine to treat different illnesses, without consulting their physicians.

Aim of the study

We wanted to find out any possible relation between BH intake before the age of 1 yr and infant botulism. This would be achieved by (1) examination of BH samples from different sources for the presence of Clostridium botulinum spores and (2) a survey seeking information about frequency of BH intake below the age of 1 yr and the prevalence of infant botulism in Al Khafji of the Kingdom of Saudi Arabia (KSA).

Subjects and methods

This study was carried out at Al Khafji National Hospital (KNH) of KSA between February 1998 and November 2002. It consisted of (1) an examination of BH samples for the presence of Clostridium botulinum spores, (2) a questionnaire about BH intake during the first year of life, and (3) an estimation of the prevalence rate of infant botulism in Al Khafji between 1995 and 2002 as shown in the records of the hospitals of Al Khafji (KNH, Government Hospital, and Arabian Oil Company Hospital) and the local health office of Al Khafji.

Examination of BH samples for C. botulinum spores

A total of 221 BH samples were examined for the presence of C. botulinum spores by direct gram-stained films and cultures for 48 hours under strict anaerobic conditions [14]. One hundred and fifteen (115) samples were products of KSA; 70 of these were of commercial origin, while 45 were from local producers. The remaining 106 BH samples were from the U.S., Germany, Switzerland, China, Australia, Pakistan, Turkey, Al Shishan, Egypt, Yemen, Sudan, Syria, and Iran.

Survey of BH intake during the first year of life

Questions were posed directly to 719 mothers who were randomly chosen from the family files of KNH. They were asked how many children received bee honey orally (BHO) before the age of 1 yr, and at what age BHO was started, and whether there was any mortality or significant morbidity that could be attributed to infant botulism among these children.

Results

Clostridium botulinum spores were not detected in any of the BH samples examined. The questionnaire revealed that 545 out of 719 mothers (75.8%) gave BHO to their infants (1,525 infants) at least once before the age of 1 yr without mortality or significant morbidity that could be attributed to botulism. None of those infants developed manifestations suggestive of botulism, and none developed serious respiratory illness requiring intubation or ventilation. A total of 378 mothers (69%) used BH intentionally as a food and as a medicine with which they observed recovery from illnesses and subsequent less frequent physician consultations. On the other hand, 167 mothers (31%) used BH intentionally as a food only.

Table1. Age of onset of giving BHO as revealed from the questionnaire (total no. of infants = 1,525)

Age	**Number of infants (%)**
1 – 28 days	57 (3.7)
1 – 6 mo.	611 (40.1)
6 mo. – 1 yr.	857 (56.2)

In addition to the findings presented in Table 1, the survey revealed that 19 mothers started giving BHO to their infant during its first few days of life. Of them, 10 (52.6 %) used it to treat neonatal jaundice. No case of infant botulism was reported between 1995 and 2002 in the 3 hospitals of Al Khafji or in the local health office.

Discussion

The ideal medicine is both safe and effective; this applies to BH, which has been used successfully for centuries and has proved to have many curative properties [2], [3], [5], [16], [17] while serious side effects have been reported.

Yet controversy surrounds the possible existence of C. botulinum spores in BH. Some researchers [7], [8], [9], [10] detected these spores, while this study and other studies [11], [12], [13] found no such spores. In none of the research was the type of honey — comb (raw, unprocessed) or processed — specified. Huhtanen and his colleagues [13] tried to find out the incidence and origin of C. botulinum spores in honey. They tested 80 honey samples. All were negative by one method, while five and six respectively were positive by two other testing methods, with some ambiguous results when these were re-tested by yet another method. They experimentally inoculated the bees with spores by feeding a sugar-water solution and they found that the spores were incorporated into the honey produced.

C. botulinum spores are widely found in nature: in soil, dust, air, and raw agricultural products. They have also been detected in corn syrup, fresh and processed meats, and fruits and vegetables [7]. Therefore the recommendation not to give BH before the age of 1 yr should also include all other sources of C. botulinum spores, and this may be not be feasible. Furthermore, pacifiers, feeding bottles, toys, a baby's hands, and food may be contaminated by house dust, which is another source of C. botulinum spores.

The implication of honey as a cause of infant botulism has been based on the fact that a small number of infants who developed the disease were fed honey that was found to contain the spores. However, in our opinion, this is not enough to conclude that honey is responsible for botulism. We should first exclude the possibility of swallowing the spores from other sources — such as air [7]. In sum, the suggested recommendation not to give bee honey to infants below 1 yr of age should be re-evaluated. ¤

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