

# Honey Pacifier Use Among an Indigent Pediatric Population

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## KEY WORDS

honey, food-borne botulism, infantile, pacifiers, knowledge, herbal medicine

Dr Benjamins, principle investigator, held primary responsibility for the design and implementation of the study and for the analysis of the data and writing of the results and the manuscript. Dr Gourishankar contributed significantly to the analysis of the data, as well as to the content of the manuscript; contributed significantly to the literature review and writing of the introduction; and approved the final version of the manuscript submitted. Ms Yataco-Marquez held primary responsibility for the collection and management of the data, aided in the analysis of the data and the writing of the manuscript, and approved the final version of the manuscript submitted. Dr Cardona contributed significantly to the design of the study as well as to the survey used; contributed significantly to the institutional review board application; contributed significantly to the literature review and writing of the introduction; and approved the final version of the manuscript submitted. Dr de Ybarrondo oversaw the implementation of the study and data collection, contributed significantly to the writing of the manuscript, and approved the final version of the manuscript submitted.

[www.pediatrics.org/cgi/doi/10.1542/peds.2012-3835](http://www.pediatrics.org/cgi/doi/10.1542/peds.2012-3835)

doi:10.1542/peds.2012-3835

Accepted for publication Feb 19, 2013

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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**FINANCIAL DISCLOSURE:** *The authors have indicated they have no financial relationships relevant to this article to disclose.*

**FUNDING:** No external funding.



**WHAT'S KNOWN ON THIS SUBJECT:** Botulinum spores are ubiquitous, found in the soil of most countries worldwide, and also in honey. It is well established that ingestion of honey by children aged <1 year can lead to infant botulism.



**WHAT THIS STUDY ADDS:** This study examines the prevalence of honey pacifier use among a pediatric population aged <1 year. We also assessed parental knowledge of the dangers of giving honey to children in this age group.

## abstract

FREE

**BACKGROUND:** Use of honey pacifiers by infants presenting to a pediatric clinic at a county hospital in Houston, Texas, was observed by several of our staff members. Although we could not find any published studies linking the use of honey pacifiers to infant botulism, we also could not find any studies assessing the prevalence of honey pacifier use in general.

**METHODS:** We conducted a cross-sectional, descriptive study using a novel survey that had 19 items. The survey was administered to the parents of children up to age 12 months presenting to a county hospital pediatric clinic for well-child care in Houston, Texas, from February 2010 to April 2011.

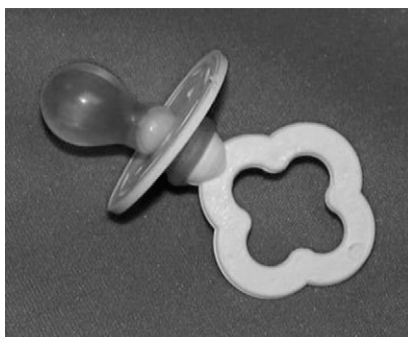
**RESULTS:** There were 397 respondents. Approximately 11% of the respondents reported using honey pacifiers with their infant children. Reasons for use included tradition, infant preference, and perceived health benefits (eg, helps with constipation or colic). Approximately 20% of the honey pacifier users and 23% of the entire group reported knowledge of honey potentially causing an illness in children <12 months of age. Nearly 40% of all respondents also reported using herbal or folk remedies.

**CONCLUSIONS:** Honey pacifier use was relatively common among this population, seen in ~1 out of 10 respondents. A majority of the mothers surveyed (~80%) were unaware of the potential dangers of giving honey to infants under age 12 months. Herbal medicine use was also common. *Pediatrics* 2013;131:1–4

It has been well documented that consumption of honey by a child aged <12 months is associated with infant botulism.<sup>1-4</sup> Botulinum spores are ubiquitous and found in most countries; the spores have also been found in honey. Although adults who swallow botulinum spores are almost never affected, infants can become ill because the spores can germinate in their large intestine and begin producing the botulinum toxin. This has been reported to occur even when the honey was only used to sweeten a pacifier.<sup>5</sup>

Infant botulism is age-related but does not seem to be affected by race or ethnicity; 95% of all cases occur in patients 6 weeks to 6 months of age.<sup>6</sup> More than 1500 cases have been identified in the United States since it was first recognized in 1976, with ~80 to 100 cases per year currently being reported.<sup>6</sup> A recent publication reviewing the global occurrence of infant botulism found that honey exposure was significantly more common among infants hospitalized outside of the United States.<sup>1</sup> Although *Clostridium botulinum* spores are known to be found in soils and dust worldwide, most countries have not yet reported cases of infant botulism, suggesting that the disease is either underrecognized and or underreported.<sup>1</sup> Likewise, the full extent of infant morbidity and mortality that result from the intestinal production of botulinum toxin is not known. However, on the basis of what is known, the single most effective way to prevent infant botulism is to avoid honey consumption altogether.

It may not be standard in most practices to inquire about pacifier use; therefore, many practitioners may be unaware that their infant patients are using a honey-filled pacifier. Honey pacifiers are typically produced outside the United States but are widely available; the nipple is usually round and filled with honey (Fig 1). There are no published



**FIGURE 1**  
Honey pacifier.

studies on the prevalence of honey pacifier use and the link to infant botulism. There was, however, a recent recall of these pacifiers put out by the US Consumer Product Safety Commission because the nipples frequently detach from the base and pose a choking hazard.<sup>7</sup> In our clinical practice, we observed that the use of honey pacifiers is common among the indigent Hispanic patients of Mexican descent. Many of the families that use these pacifiers are unaware of the risks associated with using them. There are no documented studies regarding a connection between the indigent population and use of honey-filled pacifiers or published recommendations for prevention of its use. Therefore, we conducted a novel survey of the families visiting our clinic to assess their knowledge of infant botulism and their use of honey-filled pacifiers.

## METHODS

From February 2010 to April 2011, we conducted a cross-sectional, descriptive study using a novel survey that asked parents about use of honey pacifiers with their children aged <1 year. We estimated that the proportion of patients using honey pacifiers based on our clinical experience was ~1 out of 10. We therefore calculated that a minimum sample size of 384 patients would be needed to obtain a confidence level of 95% and a confidence interval of  $\pm 3\%$ . Approval from the University

of Texas Committee on the Protection of Human Subjects as well as the Harris County Hospital District Institutional Review Board was obtained.

## Subjects

The parents of children presenting to a pediatric clinic at a county hospital in Houston, Texas, were approached to participate in a 19-item survey. Families were eligible if they were bringing their infant for a well-child care visit, from newborn to 12 months of age. Families bringing their children for sick visits were excluded.

## Instrument and Data Collection

The 19-item survey was available in English and Spanish and included pictures of honey pacifiers (Fig 1). A research assistant who was fluent in both languages was also available to help administer the survey and answer any questions. There was a letter of explanation; willingness to complete the survey implied consent. Items included questions on the use of honey pacifiers, reasons these pacifiers were used, as well as questions about infant botulism and the association of honey consumption by infants. Additional items included questions about use of herbal remedies, alternative medicines, and demographic information including type of insurance (Medicaid, Children's Health Insurance Program, Harris County Gold Card, or private). After the survey was completed, the families were given a handout on infant botulism that briefly discussed causes, symptoms, and prevention.

## Statistical Analysis

We entered our data into an Excel spreadsheet and then analyzed by using Stata 11 (Stata Corp, College Station, TX) with descriptive statistics. To see if there were significant differences across groups, we also performed stratified analysis by demographic characteristics

using the  $\chi^2$  test. The level of significance was .05.

## RESULTS

There were 397 respondents; no one refused participation. Demographic information is presented in Table 1. A majority of the respondents were Hispanic (81%) and had either Medicaid or Children's Health Insurance Program as insurance for their child (86% combined). Approximately 11% of the population surveyed reported using honey pacifiers with their infants (Table 2). Use was 13.5% among Hispanic responders compared with 1.5% in African Americans and 0% in White and Asian responders. Reasons for use included tradition, infant preference, and perceived health benefits (eg, helps with constipation or colic). Approximately 40% of honey pacifier users reported ever noticing a hole or a leak in the pacifier nipple. About 22% of honey pacifier users and 18% of the entire group reported ever being told that the honey pacifier could be dangerous for their infant. Similarly, ~20% of the honey pacifier users and 23% of the entire group reported knowledge

**TABLE 1** Characteristics of Study Population,  $N = 397$

Age of mother, mean (SD), y (range: 15–44)	27.2 (6.5)
Age of child, mean (SD), d (range: 2–360)	114 (110)
Race/ethnicity, $n$ (%)	
Hispanic	323 (81.36)
African American, not Hispanic	66 (16.62)
Caucasian, not Hispanic	7 (1.76)
Asian	1 (0.25)
Type of insurance, $n$ (%)	
Medicaid	239 (60.20)
CHIP	104 (26.20)
Gold Card <sup>a</sup>	5 (1.26)
Private	2 (0.50)
Unknown	49 (12.34)
Method of feeding	
Breast	47 (11.84)
Bottle/formula	168 (42.32)
Both	182 (45.84)

CHIP, Children's Health Insurance Program.

<sup>a</sup> Harris County Hospital District Insurance Program.

of honey potentially causing an illness in children aged <12 months.

Nearly 40% of all respondents used other folk or herbal remedies, which included sage, rue, peppermint, aloe vera, eucalyptus, corn syrup, garlic, and oregano. The most commonly used herbal remedy was chamomile tea (84%). Mothers who gave honey pacifiers to their infants were also more likely to give their children these alternative remedies (Table 3). Hispanic ethnicity was also significantly related to honey pacifier use; no other factors that we examined were associated with use.

## DISCUSSION

While there have been no published reports of honey pacifiers being linked to infant botulism, the risks of giving honey to infants aged <1 year are well established. Even though 1 out of 10 of the families surveyed reported using these pacifiers, most were unaware of the risks. The mean age of starting honey pacifier use was ~2 months of age, which is within the peak incidence of infant botulism. Furthermore, the majority of the families that used honey pacifiers with their infants also gave them other folk remedies and herbal medications, some of which can be potentially harmful. For example, *Clostridium botulinum* spores have been isolated in chamomile as well,<sup>8</sup> which was the most frequently used alternative remedy in our population. This underscores the need of physicians to be aware of common practices within their population and to educate their families about possible risks. Although these pacifiers are primarily manufactured in Mexico, they are widely available in Texas through Mexican stores, chain grocery stores, and flea markets, despite the recent recall of these products. Nearly half of our respondents purchased their honey pacifiers in Houston. This may indicate a need for better regulation of such

**TABLE 2** Honey Pacifier Use and Other Related Questions

No. of children who use a honey pacifier, $n$ (%)	45 (11.34)
Age of child when started using the honey pacifier, mean (SD), days	67.7 (69.4)
No. of moms that used a honey pacifier with other children, $n$ (%)	18 (4.62)
Reasons mom chose a honey pacifier, $n$ (%)	
Preferred by baby	7 (20.00)
Tradition/used it in Mexico	7 (20.00)
Softer than other pacifiers	5 (14.29)
Family member gave/recommended	4 (11.43)
Health benefit (eg, for constipation)	4 (11.43)
It was a gift	3 (8.57)
Convenience (eg, only one in store)	3 (8.57)
Tastes better	2 (5.71)
Does honey pacifier sooth better, $n$ (%), yes	15 (33.33)
Does child prefer honey pacifier, $n$ (%), yes	16 (35.56)
Where honey pacifier was purchased, $n$ (%)	
Mexico	20 (44.44)
Hispanic store in United States ( <i>tienda Hispana</i> )	7 (15.56)
Chain grocery store	6 (13.33)
Flea market	3 (6.67)
Gift	4 (8.89)
Ever noticed a hole or leak, $n$ (%), yes	17 (37.78)
Ever been told that a honey pacifier could be dangerous, $n$ (%), yes	10 (22.22)
Entire group ( $n = 397$ )	72 (18.14)
Ever told honey can cause illness in children aged <1 y, $n$ (%), yes	9 (20.00)
Entire group ( $n = 397$ )	91 (22.92)
Use other folk remedies, $n$ (%), yes	27 (60.00)
Entire group ( $n = 397$ )	155 (39.04)

products within US cities close to the Mexican border. Lastly, at the time of our study, it was understood that these pacifiers were filled with honey. More recently, pacifiers marketed as *chupon con miel* are reportedly filled with corn syrup. Previous studies have found botulinum spores in corn syrup as well as a possible association with infant botulism,<sup>9,10</sup> although more recent changes in corn syrup production has made this less likely (at least in the United

**TABLE 3** Honey Pacifier Use by Characteristics, *N* = 397

Characteristic	Honey pacifier use		<i>P</i> value
	Yes	No	
Race/ethnicity <sup>a</sup>			.031
Hispanic	44	280	
African American, not Hispanic	1	64	
Caucasian, not Hispanic	0	7	
Asian	0	1	
Use of other folk remedies <sup>a</sup>			.002
Uses	27	128	
Does not use	18	224	
Feeding method			.521
Breast	3	44	
Bottle/formula	20	148	
Both	22	160	

<sup>a</sup> *P* ≤ .05.

States).<sup>11</sup> Regardless, the parents we interviewed believed the pacifiers were filled with honey; a majority of them were unaware of risks associated with honey. Lacking this knowledge could make other behaviors, such as dipping the pacifier in honey, or adding it to other foods or drinks, a possibility.

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The use of a novel survey to address an issue, which has previously not been written about, is one of this study's strengths. Although our results may not be generalizable to other populations throughout the United States, it emphasizes the importance of asking families about the use of alternative medications. Similar findings, in terms of alternative medicine use, have been found by other authors; Pitetti et al found that the rate of use was 12% among patients presenting to a pediatric emergency department<sup>12</sup>; Lanski et al found a rate of 45% of herbal use among their pediatric population.<sup>13</sup> In the Lanski study, a majority of the families interviewed were also unaware of possible side effects of these substances. Furthermore, physicians often underestimate the use of alternative medications by their patients,<sup>14</sup> and many families do not discuss this use with their doctor.<sup>15,16</sup> Some folk and herbal remedies have potentially harmful side effects, and a surprisingly

large number of parents in our study gave their infants ≥ 1 herbal remedies.

## CONCLUSIONS

Approximately 10% of our population surveyed used honey pacifiers with their infants. Use was predominantly seen among Hispanic mothers and was associated with the use of other folk remedies. Most mothers who used these pacifiers did not know that they could be dangerous. A majority of the mothers surveyed (~80%) were unaware of the potential dangers of giving honey in general to infants under the age of 12 months. This highlights the need among this population for education about the risks of giving honey to infants, as well as the importance of asking about alternative medicine use.

## ACKNOWLEDGMENTS

We thank all of the families that participated in this study.

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*Pediatrics* originally published online May 6, 2013; originally published online May 6, 2013;

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*Pediatrics* originally published online May 6, 2013; originally published online May 6, 2013;

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<http://pediatrics.aappublications.org/content/early/2013/05/06/peds.2012-3835>

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