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Clinical Report

Appropriate Spoon Form for Feeding of Liquids in Infant Feeding Development

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Abstract

Feeding development in infants is important not only for the purpose of acquiring nutrition but also for developing the ability to intake liquids. Our previous study showed that the introduction of a straw was appropriate after an infant has acquired the ability to sip liquid from a spoon and/or cup. In this study, we investigated the effect of a bowl-shaped spoon on liquid intake. The aim of this study was to determine the appropriate form of spoon for infant feeding development. Eleven healthy infants (3 girls and 8 boys, 10–18 months old, mean age: 13.3 months) were recruited with their guardians’ consent. We made 3 types of prototype spoon: A, oval (a standard renge soup spoon); B, flared-out (with the margin of the bowl flared out); and C, hemispherical (with a hemispherical bottom, and smaller than type A or B). We observed infants taking liquid supported by their mothers and evaluated the following responses: 1) confusion with regard to lip position, 2) spillage and 3) choking. Type C showed statistically less confusion with regard to lip position than type A or B (p<0.01), and B showed less than type A (p<0.05). No statistically significant differences were observed in spillage or choking among the three types of spoon. The renge soup spoon is often used to smooth the transition from breast/bottle to cup feeding. In this study, we demonstrated the appropriate spoon form for infant feeding development.

Key words: Spoon form—Taking liquid—Lip position—Spillage—Choking

Introduction

Feeding development in infants is important not only for the purpose of acquiring nutrition, but also for developing the ability to intake liquids. The ability to intake liquids transitions from sucking milk from a breast/bottle to sipping liquid with a spoon and/or
cup at about 8 months of age\textsuperscript{3}. When infants reach the age of about 8 months, mothers often begin to use some kind of feeding device, such as a spoon, cup, spout mug or straw mug. In our previous study\textsuperscript{7}, the introduction of a straw was appropriate after an infant acquired the ability to sip liquid from a spoon and/or cup. Infants who began using a straw earlier than this required a long training time to functionally develop the ability to take in liquid using a spoon and/or cup. In addition, with the introduction of a cup it is often difficult at first for an infant to control one mouthful of liquid, and spillage or choking can occur. We focused on the spoon as an appropriate feeding device for transitioning smoothly and safely from the breast/bottle to cup feeding. One of the problems that arose with a standard spoon was confusion with regard to lip position. Confusion with regard to lip position led to the infant biting the spoon, which often happened when the bowl width did not match the lip width of the infant.

In 1927, Barton first reported an infant’s feeding spoon\textsuperscript{1} designed to have beak-like shape that would make it easy to pour water; bottom of bowl has depression. In Japan, a renge spoon (the flat-bottomed Japanese soup spoon) is often used for feeding liquid to infants. However, there are few reports about the relation of feeding devices to the development and learning of oral function\textsuperscript{2,6,8,9,11}. In the present study, we assessed the use of several feeding devices with new bowl forms for the purpose of taking liquid, and focused especially on the form of the renge spoon. The aim of this study was to determine the appropriate spoon form for infant feeding development.

**Materials and Methods**

Eleven healthy infants (3 girls and 8 boys, 10–18 months old, mean age: 13.3 months) were recruited with their guardians’ consent for this study. The age range of the infants was large so as to enable us to monitor acquisition of sipping function. We made 3 types of prototype spoon: type A, oval (a standard renge soup spoon); type B, flared-out (with the margin of the bowl flared out); and type C, hemispherical (with a hemispherical bottom, and smaller than type A or B). Figure 2 shows the details for each spoon.

We observed infants taking liquid supported by their mothers and evaluated the following responses: 1) confusion with regard to lip position, 2) spillage and 3) choking. In the correct position, the spoon is placed between the upper and lower lip. The spoon should be supported by the lower lip, with the surface of the water touching the upper lip. However, if the width of the mouth is insufficient to accommodate the spoon, problems will ensue with regard to lip position and the ability to intake liquid. If no such problems occur, then the infant will usually sip twice from each spoonful. In this study, spillage and
choking were recorded, however, even if only one sip was taken.

1. Analysis

We statistically compared the infants’ use of spoon types A, B and C in terms of confusion with regard to lip position, spillage and choking using the chi-square test (confidence level: p<0.05).

Results

Type C elicited statistically less confusion with regard to lip position than types A or B (p<0.01), and B less than A (p<0.05). No statistically significant differences were observed in spillage or choking among the three types of spoon (Table 1).

Fig. 2 Dimensions of 3 prototype spoons

We made 3 types of prototype spoon: A, oval (standard soup spoon); B, flared-out (with margin of bowl flared out); and C, hemispherical (with hemispherical bottom; smaller than type A or B). All dimensions are shown in millimeters.
Discussion

The technique by which infants eat changes from sucking milk to taking sips of liquid. In accordance with this development, the feeding devices used by infants also change from breast-feeding or bottles to spoons, straws and cups. The introduction of the spoon-feeding of thin, smooth, pureed food and liquids occurs once a child reaches about a 6-month level developmentally.

In the present study, we made 3 types of prototype spoons for taking liquid, and observed infants’ responses, particularly their exhibiting confusion with regard to lip position, spillage and choking. The results showed that, in terms of confusion with regard to lip position, the hemispherical spoon (type C) was the most appropriate form, and the flared-out spoon (type B) was more appropriate than the oval spoon (type A).

We concluded that there are three reasons why the hemispherical spoon (type C) effectively prevented infants from becoming confused with regard to lip position. First, it was possible to drink liquid from this spoon from any direction, which means that a mother can assist her infant in feeding from any direction. Second, the width of the bowl was appropriate for an infant’s mouth size. In our previous study, the width of the spoon bowl was approximately 2/3 the width of the infant’s mouth.

Third, the size of the spoon was such that the amount of liquid that filled the spoon was suitable for one mouthful for an infant. To sip liquid, an infant’s upper lip must touch the surface of the liquid. For this to occur, the spoon must be filled with a sufficient amount of liquid. In contrast, in the oval (type A) and flared-out (type B) spoons, an amount of liquid suitable for one mouthful did not completely fill the spoons. Thus, the mother had to tilt the spoon and tip the infant’s head back and chin up. This position caused infant’s airway to open and created a high risk of aspiration. To avoid aspiration, the spoon should be completely filled with liquid.

The flared-out spoon (type B) caused less confusion with regard to lip position than did the oval spoon (type A). The lip fit of the flared margin was satisfactory because the upper lip easily touched the surface of the liquid and the lower lip easily touched the undersurface of the spoon. The flow of liquid from the spoon to the mouth also appeared to occur at an appropriate speed.

No statistically significant differences were observed for spillage or choking among the three types of spoon. However, improvements with regard to spillage or choking may occur more quickly as an infant grows with the use of the flared-out (type B) and hemispherical (type C) spoons compared with the oval spoon (type A) because they lead to less confusion with regard to lip position. A limitation of this study was that we could not assess the development over time of the infants’ skill at taking in liquid. In the future, we should better assess whether these new spoons actually make the transition from spoon to cup go more smoothly over time.

It has been observed that impaired infants are often not able to transition from breast-feeding or bottle use to using a spoon. However, such infants need to acquire the ability to intake liquid, just as do healthy infants. The

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<th>n = 11</th>
<th>Confusion of lip position (number of infant)</th>
<th>Spillage (number of infant)</th>
<th>Choking (number of infant)</th>
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<tbody>
<tr>
<td>Type A</td>
<td>7 *</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Type B</td>
<td>4 **</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Type C</td>
<td>1 *</td>
<td>6</td>
<td>1</td>
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*: p<0.05, **: p<0.01

Table 1 Infant feeding responses by spoon type

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hemispherical (type C) and flared-out (type B) spoons, which we assessed in this study, might support the ability of impaired infants to intake liquid safely. Morris reported that the treatment of children with swallowing dysfunction requires a holistic approach based on a global view of their problems and needs. The primary goal of such an approach is to develop the appropriate use of the mouth, respiratory, and phonatory systems through exploration, sound play, and as much oral feeding as possible.

The ability to take in liquid improved spectacularly in the infants in this study. In the course of this feeding development, they quickly acquired the ability to sip from a spoon, indicating that they would probably also learn to continuously swallow efficiently. In contrast, with the use of a cup it was difficult for infants in the initial growth phase to adjust the amount of one mouthful of liquid. The renge spoon has often been used as a way to transition smoothly from spoon to cup. The results of the present study, however, indicate that a hemispherically shaped feeding spoon is the most appropriate for infant feeding development.

References


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