

# Effect of taste and temperature on neonatal sucking behaviour

Zita MAKÓI, P. M. DUNN and B. D. SPEIDEL

First Department of Paediatrics, Semmelweis University Medical School, Budapest, Hungary, and Southmead Hospital, Bristol, England

Received March 5th, 1978

The sucking behaviour of 10 healthy newborns was studied while feeding them with milk of different types (V formula and EBM) and temperature (23.5°C and 37.5°C) on the 4th, 5th, and 6th days of life. Total feeding time, duration and number of intervals, frequency and pressure were analysed from 120 sucking patterns. The babies did not alter their sucking behaviour on feeding with different milks, but they reacted to the different temperature in one of three trials.

## INTRODUCTION

Normally, a healthy newborn experiences only the taste of amniotic fluid or breast milk, or sugar water of room or body temperature. Any change in the feeding habit may raise the question whether the newborn was able to distinguish differences in taste and temperature.

One of the first to study the infant's sensitivity to taste stimuli was Canestrini [2] who judged it on the basis of the fontanelle and breathing curve. Then Nelson [7] studied their taste preference to, and distinction of, various temperatures and fluids, and Maller and Desor [6] by measuring the ingested amount of food. Johnson and Salisbury [4] fed newborns with different milks, and found differences in their breathing, heart rate and sucking pattern.

In view of some differences in the above results we have made a study of the sucking pattern on feeding

with different kinds of nutrients of different temperature.

## MATERIAL AND METHODS

The sucking pattern was studied in 10 healthy newborns; their mean gestational age was 40 (38 to 42) weeks, their mean birth weight 3370 g. Nine babies were delivered vaginally, one by Caesarean section. Their Apgar score was 9 to 10 and the perinatal period uneventful.

All babies were bottle fed. The sucking pattern was recorded by a multichannel monitor connected to a transducer.

The test meals were offered at the usual feeding time at the age of 4, 5 and 6 days. The procedure was repeated each time in the order, cold V formula, warm V formula, warm EBM, cold EBM. The amount given was 20 ml/kg. The temperature of cold milk was 23.5°C, of the warm milk, 37.5°C.

Thirty sucking patterns were recorded with each type of feed, thus a total of 120 were obtained. The total feeding time, the duration and number of intervals, mean sucking frequency during 2 min and mean total pressure during 2 min were compared with V formula and EBM, at two different temperatures.

## TOTAL DURATION OF FEED

Comparison between warm and cold milk

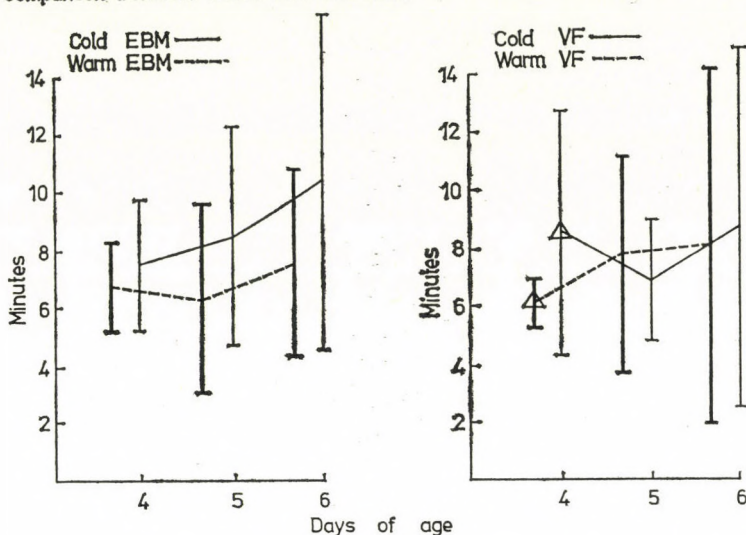


FIG. 1. Total duration of feed (comparison between warm and cold milk)

## TOTAL DURATION OF INTERVALS

Comparison between warm and cold milk

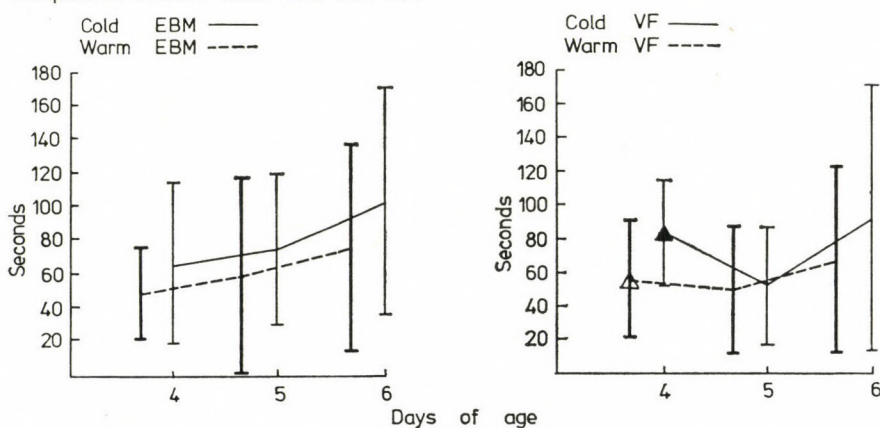


FIG. 2. Total duration of intervals (comparison between warm and cold milk)

## RESULTS

The duration of feeding, the length and number of the intervals and the frequency of sucks/min differed significantly in one of the three trial

feedings with cold and warm V formula. This meant that the feeding time, the duration of intervals was longer, the number of intervals was higher and the frequency of sucks lower with cold milk. Sucking pressure

was not affected in any case, nor did the temperature of EBM cause changes in the sucking pattern. Milks different in taste (such as EBM and formula V) failed to cause differences in any of the parameters.

#### DISCUSSION

Neonatal sucking behaviour is known to affect somatic development and may reflect the neurological condition of the baby.

In the newborn, the taste buds, which appear in the 12th week of gestation, are fully mature. The two kinds of milk applied were both sweet and the differences in their taste were not relevant. In any case, the newborns did not react to it as they did not alter their sucking behaviour.

Sucking behaviour, however, is a complex process and is not considered to reflect taste discrimination [8]. Nor is there, as it has been shown in fetal sheep, a direct correlation between the neural response and behavioural responsiveness [1].

On the other hand, the sucking behaviour displayed a significant change in one among three trials on feeding with cold and warm V Formula. A change in the sucking pattern occurs when the temperature of milk is below 20°C or above 40°C [5], and it was shown [9] that in all

homeothermic animals the response of the gustatory nerve is greatest at the temperature of the tongue.

#### ACKNOWLEDGEMENT

Z. M. is indebted to the Wellcome Trust for a research fellowship.

#### REFERENCES

1. BRADLEY, R. M., MISTRETTA, C. M.: Investigations of taste function and swallowing in fetal sheep. In: Oral sensation and perception. Bethesda, Md. 1973. p. 185.
2. CANESTRINI, S.: Über das Sinnesleben des Neugeborenen. Springer-Verlag, Berlin 1913, p. 104.
3. JENSEN, K.: Differential reaction to taste and temperature stimuli in newborn infants. Genet. Psychol. Monogr. **12**, 361 (1932).
4. JOHNSON, P., SALISBURY, D. M.: Breathing and sucking during feeding in the newborn. In: Ciba Foundation Symposium on Parent-Infant Relation. North Holland, Amsterdam 1975, p. 119.
5. KASHARA, M.: The curved lines of suction. Amer. J. Dis. Child. **12**, 73 (1916).
6. MALLER, O., DESOR, J. A.: Effect of taste on ingestion by human newborns. In: Oral sensation and perception. Bethesda, Md. 1973, Chapt. **18**, 279—292.
7. NELSON, A. K.: A study of taste, smell and temperature reactions in infants. Ph. D. Thesis. Ohio State University, 1973, p. 173.
8. PRATT, K. C., NELSON, A. J., SUN, K. H.: The behavior of the newborn infant. Ohio State Univ. Stud. Contrib. Psychol. No **10**, 237 (1930).
9. SATO, M.: Gustatory response as a temperature-dependent process. Contrib. sens. Psychol. **2**, 223 (1967).

Z. MAKÓI, M. D.

Bókay J. u. 53.

H-1083 Budapest, Hungary