

OLFACTORY STIMULATION TEST FOR QUALITATIVE NEUROLOGICAL EVALUATION IN THE NEWBORN INFANT

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SUMMARY

One hundred newborns were subjected to olfactory stimulation test in relation to gestational age. Premature infants showed increased mean response time and delayed arousal which were statistically significant. Because of its easy applicability, this test is recommended as a routine for ascertaining functional integrity of the olfactory system of the newborn. Its role in asphyxiated babies and in infants with suspected brain damage needs evaluation.

INTRODUCTION

The importance of complete examination of the newborn including the routine neurological examination can not be over emphasized. The specialist in obstetrics and gynaecology is usually the first to examine the newborn and alert the parents regarding any congenital problem (Ambani, 1982) particularly in the hospitals lacking in neonatal nursery services.

This study was undertaken to ascertain the functional integrity of the olfactory system of newborn infants and to observe any change in the clinical response to an olfactory stimulation in relation to gestational age.

MATERIAL AND METHODS

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One hundred live newborn infants of either sex from primiparous and multiparous mothers having reliable menstrual history were the subjects for this study. The gestational age as calculated from LMP ranged between 36 and 42 weeks.

The examination was done between 12 and 24 hours after birth in undisturbed sleeping conditions to cut off any visual impulses. Olfactory stimulation was given by means of peppermint oil.

Cotton wool soaked with 1 ml of oil was placed in a test tube. The mouth of the test tube was closed by the thumb of the right hand. A stop watch (recording upto 1/10th of a second) was held in the left hand. The test tube was taken near the nostril of the sleeping baby without touching it. The thumb was removed from the mouth of the test tube and the stop watch simultaneously

TABLE I
RELATION BETWEEN GESTATIONAL AGE AND MEAN TIME OF RESPONSE

Gestational age (weeks) (No. of cases)	Mean time of response (second)			Overall mean response time (second)
	0-5	5.1-10	10	
37 (12)	3.61 (2)	8.74 (6)	15.69 (4)*	10.20*
37-40 (67)	2.62(39)	7.38(23)	13.44 (5)	5.59
40 (21)	2.17(12)	8.02 (8)	11.40 (1)	4.84

* Statistically significant (p 0.05)

TABLE II
Different types of responses and the mean time taken to show each type of response in relation to gestation age.

Gestational age (weeks) (No. of cases)	Type of response & the mean time taken by each (In seconds)							
	Only	Arousal (40)		Only	Sucking (45)		only	Grimace (15)
		+with- drawal	+Crying		+Arou- sal	+Grimace		Movements of other parts
37 (12)	16.4 (3)*	0	13.6 (1)	9.6 (1)	4.1 (2)	7.8 (3)	9.7 (2)	0
37-40 (67)	2.8 (7)	10.6 (11)	5.7 (14)	7.8 (8)	3.7 (11)	2.9 (5)	3.9 (9)	4.2 (2)
40 (21)	3.8 (3)	3.6 (1)	0	2.2 (4)	5.6 (8)	5.1 (3)	11.4 (1)	6.4 (1)

*Statistically significant (p 0.05).

started. As soon as any response occurred the watch was stopped. The time of response and the type of response was recorded.

The data were statistically analysed with the application of Chi-square (χ^2) test (Snedecor, 1946).

OBSERVATIONS

Three basic types of responses i.e. arousal, sucking and grimace were observed either singly or in various combinations. The infants were grouped as premature (less than 37 weeks), term

(37-40 weeks) and past term (More than 40 weeks).

All the babies responded within 20 seconds. The mean time of response of the whole sample was 5.98 seconds with a mean response time of 10.20 seconds for premature, 5.59 seconds for term and 4.84 seconds for past term infants.

58 per cent of term and 57 per cent of past term infants responded in less than 5 sec. with a mean response time of 2.62 sec. and 2.17 sec. respectively (Table I), whereas only 17 per cent of premature infants with a mean response time of

3.61 sec. responded within 5 sec. On the other hand, 33 per cent of premature babies took more than 10 seconds to respond as compared to 7% and 5% in case of term and past term infants respectively.

The sucking type of response was observed in 45%, arousal in 40% and grimace in 15% of newborns, In premature group the arousal type of response was significantly delayed showing a mean response time of 16.4 sec. in 25% cases (Table II). In other types of the responses, the response time was independent of the type of response.

DISCUSSION

This study shows that newborn infants normally possess the sense of smell which is essential for the survival mechanism of finding and obtaining food, particularly for the newborn infants whose audio-visual activity and perceptual integration are yet to be properly developed (Holt, 1977). Olfactory system starts developing at the 6th to 7th week of intrauterine life, perception appears at about 32 weeks. The links between taste and smell are well developed in the neonatal period, therefore, a normal olfactory stimulation

is likely to evoke a sucking movement in the newborn infant which has been observed in 45% cases of the present study.

The clinical responses of the sleeping neonates to olfactory stimulating by peppermint oil may be used as a qualitative test to assess the integrity of the olfactory system of the newborn infants. The increased response time beyond 10 seconds in 33%, overall mean response time of 10.20 seconds and delayed arousal (Mean 16.4 seconds) in 25%, all seen in premature infants, are statistically significant (p 0.05).

This method of testing may be inadequate for the determination of the quantitative integrity of the olfactory function but its qualitative value and easy application may be considered for its inclusion in the routine neurological examination of the newborn infants, olfactory gross prematurity, asphyxiated infants and infants with brain damage.

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The present prospective study was conducted in the Department of Paediatrics, Christian Medical College, Vellore, Tamil Nadu, India, from January 1980 to December 1982, comprising of 311 consecutive newborns with 329 postnatal days.

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