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THE EFFECT OF A SUPPORTIVE COMPANION ON PERINATAL PROBLEMS, LENGTH OF LABOR, AND MOTHER-INFANT INTERACTION

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Abstract We studied the effects of a supportive lay woman ("doula") on the length of labor and on mother-infant interaction after delivery in healthy Guatemalan primigravid women. Initial assignment of mothers to the experimental (doula) or control group was random, but controls showed a higher rate ($P<0.001$) of subsequent perinatal problems (e.g., cesarean section and meconium staining). It was necessary to admit 103 mothers to the control group and 33 to the experimental group to obtain 20 in each group with uncomplicated deliveries. In the final sample, the length of time from admission to delivery was shorter in the experimental group (8.8 vs. 19.3 hours, $P<0.001$). Mothers who had a doula present during labor were awake more after delivery ($P<0.02$) and stroked ($P<0.001$), smiled at ($P<0.009$), and talked to ($P<0.002$) their babies more than the control mothers. These observations suggest that there may be major perinatal benefits of constant human support during labor. (N Engl J Med. 1980; 303:597-600.)

IN all but one of 150 cultures studied by anthropologists, a family member or friend, usually a woman, remained with a mother during labor and delivery (Raphael D. Unpublished data). Before childbirth moved from the home to the hospital, it was also the practice in industrialized nations for family members to support the mother actively in labor, often with the assistance of a trained or untrained midwife. Although more fathers, relatives, and friends have been allowed into labor and delivery rooms in the past 10 years, a considerable number of mothers still undergo labor and delivery in some hospitals without the presence of family members or close friends. There has been little systematic study of this issue since the Newtons[1] reported that mothers who were quiet and relaxed and had better emotional relations with their attendants during labor and delivery were more pleased at the first sight of their babies. The study in Guatemala was designed to investigate the effects of a supportive companion (Raphael[2] termed such a person a "doula") on the length of labor and on mother-infant interaction after delivery in an obstetric setting in which mothers routinely undergo labor alone.

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METHODS

The study was conducted at the Social Security Hospital in Guatemala City, Guatemala. The women who delivered in this hospital, or their husbands, have had regular payroll deductions to entitle them to the medical benefits of the governmental Social Security system. Although their income level was low by United States standards, their general health was superior to that of the women who delivered at the free public hospitals.

In the maternity unit of the Social Security Hospital, the routine was for primigravid mothers in labor to be admitted to an observation ward when the dilatation of the cervix was 1 to 2 cm and regular uterine contractions were present. Mothers remained on this ward until the cervical dilatation was 3 to 4 cm, at which time they were transferred to labor rooms adjoining the delivery rooms. Hospital policies did not permit any family member, friend, or continuous nurse caretaker to be present in the rooms, apparently as a consequence of the large number of deliveries (average, 60 per day) and the limitation of space that was intensified in this hospital after the destruction of the previous maternity unit in the earthquake of 1976.

Primigravid mothers in early labor with cervical dilatation of 1 to 2 cm and no known preeclampsia or other medical problems were eligible for the study. The initial assignment of women to the control or experimental group was randomized by drawing an envelope after the woman entered the observation ward and agreed to participate in the study.

The control group followed hospital routines, which consisted of infrequent vaginal examinations to monitor the labor, auscultation of the fetal heart, and assistance to the mother during delivery. No electronic monitoring was used in this unit. In addition to the routine care, the mothers in the experimental group received constant support from an untrained lay woman from admission to delivery; one woman was present during the day and another at night. The support consisted of physical contact (e.g., rubbing the mother's back and holding her hands), conversation, and the presence of a friendly companion whom the mother had not met before.

A woman was removed from the study if the labor was false or prolonged; if evidence of fetal distress during labor or delivery necessitated an intervention (such as oxytocin augmentation, ce-

sarean section, or forceps); if the infant was asphyxiated (Apgar score below eight at five minutes), meconium-stained, depressed, stillborn, premature, or malformed; or if the infant had any evidence of illness such as respiratory distress. These clinical judgments were made by the attending physician, who did not know the purpose of the study. If a woman was removed, her group assignment was inserted at random into the pool of unused assignments. Women were enrolled in the study until there were 20 in the control group and 20 in the experimental group.

The women who constituted the final sample remained in the delivery room for up to one hour after delivery for the completion of the third stage of labor and episiotomy repair. During this period the baby was cleaned and kept in a bassinet in the same room. The median stay in the delivery room was 30 minutes (range, 20 to 60) for the control group and 28 minutes (range, 15 to 50) for the experimental group (Mann–Whitney U, 180; $P>0.50$).

Mothers in both groups were allowed 45 minutes of skin-to-skin contact with the undressed infant in a private room. A radiant-heat panel kept the babies warm. During the first 22.5 minutes of contact, an observer who did not know the previous experience of the mother watched the mother and infant through a one-way window for 15 seconds at 45-second intervals.

The observer recorded the mother's state (awake or asleep) and whether she maintained trunk-to-trunk contact with the baby. The mother's way of handling the infant was recorded — the part of the hand used (fingertips or palm), the part of the infant handled (head, trunk, or extremities), and whether the mother simply touched the infant or used a stroking motion. Looking (including en face), smiling, kissing, and talking (including nonspeech vocalizations) by the mother directed toward the infant, and nursing behavior by the mother and infant were also recorded. Spontaneous movement, opening or closing of the eyes, and crying by the infant were recorded, but only crying could be recorded reliably because of the position of the observer with respect to the mother and infant. Some maternal behaviors (i.e., kissing and obvious attempts to elicit a response from the baby) as well as crying by the infant were recorded, but they occurred too infrequently to be analyzed for group differences. Agreement between two observers (based on the observation of six mother-infant pairs not involved in the study) ranged from 0.88 to 0.98 for the items included in the analysis.

Results

Table 1 shows the demographic characteristics of the 40 mothers and babies in the final sample. There were no statistically significant differences between the groups in the marital status or age of the mothers or in the birth weights or sex distribution of the infants.

Perinatal Problems and Need for Intervention during Labor and Delivery

It was necessary to admit 103 mothers to the control group and 33 to the experimental group to obtain the final samples of 20 in each group with uncomplicated labors and normal vaginal deliveries. In other words, 83 women assigned to the control group and 13 assigned to the experimental group were not studied after the development of one or more of the problems described above: evidence of fetal distress requiring intervention during labor or delivery, meconium staining, or other manifestations of neonatal asphyxia. After exclusion of nine mothers — four in the control group and one in the experimental group who were removed because of false labor, and four others in the control group (three with premature infants and one with extreme anxiety) — a chi-square analysis indicated an association between the presence of a supportive companion during labor and a lower incidence of the problems of labor, delivery, or the neonate that were used as criteria for exclusion (chi-square with 1 degree of freedom = 17.2; $P<0.001$). Table 2 contains the number of women excluded for each reason. It should be noted that each mother was listed only once, under the first problem to occur. Thus, if a cesarean section was performed, the mother was excluded from the study and no further problems (e.g., meconium staining) were listed.

Table 1. Demographic Characteristics of Mothers and Infants.

Characteristic	Control Group	Experimental Group
No. of mothers	20	20
Mean age of mothers (yr)	21	20
Father not in household (no.)	3	1
Mean infant birthweight (g)	3061	2943
Sex of infant		
Male (no.)	12	10
Female (no.)	8	10

Table 2. Total Study Population, Including Mothers Removed Because of Problems or Intervention.

Characteristic	Control Group	Experimental Group
	95 mothers	32 mothers
	% of mothers *	
No problems	21 (20)	63 (20)
Problems or intervention †		
Meconium staining	25 (24)	9 (3)
Depressed newborn	3 (3)	0 (0)
Stillbirth	2 (2)	0 (0)
Cesarean section	27 (26)	19 (6)
Oxytocin augmentation	17 (16)	6 (2)
Forceps	5 (4)	3 (1)
Total removed	79 (75)	37 (12)

*Figures in parentheses denote number of mothers.

†Chi-square (1 degree of freedom) = 17.2 ($P<0.001$) for the association between the group and the total number of problems or interventions. Nine other women not listed here (eight in the control group and one in the experimental group) were eliminated for reasons explained in the text.

Length of Labor

The number of vaginal examinations performed to monitor cervical dilatation for each patient was determined by the obstetric staff and influenced by the clinical course of individual patients; such examinations were limited to minimize the risk of infection. The mean time from admission to the observation ward until delivery for the 40 mother-infant pairs retained in the study was 19.3 hours for the control group and 8.7 hours for the experimental group — ($t[38] = 3.81$; $P<0.001$).

Maternal Behavior

When the mothers in the two groups were observed alone with their infants in a private room, there were

differences in maternal state and behavior. (The normal approximation to the Mann–Whitney test, corrected for ties,[3] was used to compare the groups.) The amount of time during which the mothers remained awake in the period of observation was greater for the experimental group than for the control group ($z = 2.51$; $P<0.02$). Because some mothers slept for part of the time, scores for individual behaviors were expressed as a proportion of the number of time-sampled periods during which a mother was awake.

While the mothers were awake, there was a substantial difference in the amount of stroking, with the experimental mothers stroking more than the control mothers ($z = 4.09$; $P<0.001$) (Fig. 1). However, there was no significant difference in the amount of simple touching of the infants ($z = 1.87$; $P = 0.06$). The proportion of handling time (time spent touching or stroking the infant) that mothers spent in contact with the infant's head, trunk, or extremities did not differ between groups. Similarly, there was no difference between the groups in the proportion of handling time during which mothers used their fingertips or palms.

The mothers in the experimental group also talked to their infants ($z = 3.10$; $P<0.002$) and smiled at them ($z = 2.66$; $P<0.009$) more than the mothers in the control group (Fig. 1). However, the groups did not differ in the amount of time spent in body-to-body contact, en face, looking at the baby, or nursing.

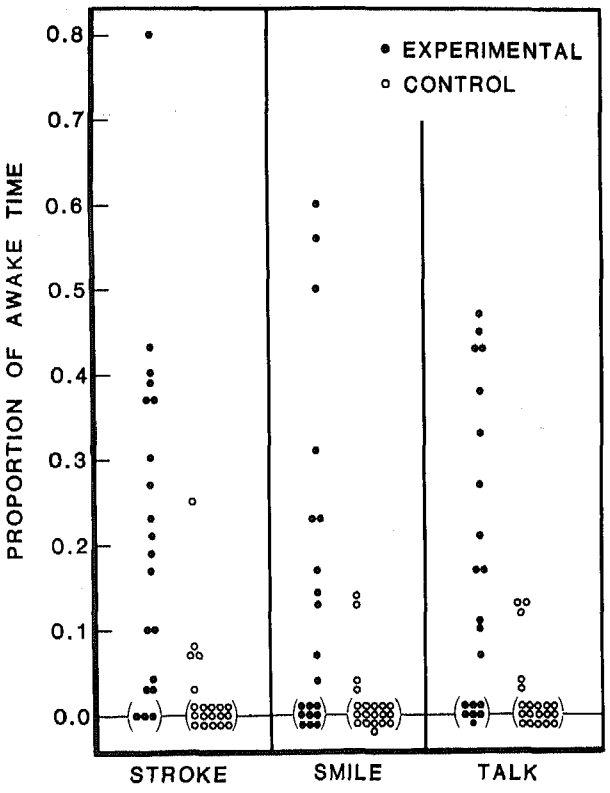

Figure 1. Maternal Behaviors during the First Hour after Birth for Which There Were Significant Differences between the Experimental (Doula) and Control Groups, Expressed as the Proportion of Awake Time.

Spearman rank-correlation coefficients were computed between the length of labor and the specific maternal behaviors for which there were group differences. Except for a marginal correlation with the amount of stroking by the control mothers ($r = 0.39$; $t[18] = 1.77$; $P = 0.09$) there were no significant correlations ($P>0.25$) between the length of labor and maternal behavior in the first hour after birth. The marginal association in the control group is positive — an indication that longer labors were associated with more stroking of the infant rather than less. Thus, it is unlikely that the group differences in these behaviors were primarily a result of differences in the length of labor.

Discussion

The findings of this study suggest the importance of human companionship during labor and delivery. Labor was shortened, and some aspects of maternal behavior in the first hour after delivery were enhanced. Unexpectedly, the likelihood of development of certain problems that require intervention during labor and delivery was lower for mothers who had a supportive companion. Since data on the length of labor for mothers who were eliminated from the study were not available, the relation between length of labor and the incidence of such problems could not be analyzed.

An earlier study of low-income, inner-city mothers in Cleveland suggested that the effects of the supportive companion on maternal behavior may last beyond the first hour after delivery.[4] In that study, mothers who were awake in the first 40 minutes of contact with their babies were more affectionate, attentive, and responsive to their infants at one month than were mothers who fell asleep. However, there are some difficulties in the use of the results of that study to argue for the long-term effects of a supportive person. In that investigation, mothers who fell asleep were also more heavily medicated, but in the present study, none of the mothers in the final sample received any medication. In addition, contact between mothers and infants in the Cleveland study was limited by hospital routine to feedings lasting 20 to 30 minutes every four hours plus five hours of continuous contact each day, in contrast to almost continuous contact from birth in our study.

Our findings raise the possibility of an association between acute anxiety and arrests of labor or fetal distress. Other studies of human and primate mothers have suggested that one mechanism to account for this relation is an increase in levels of catecholamines, which are known to decrease uterine contractility.[5] Lederman et al.[6] found that plasma epinephrine levels and self-reported anxiety at 3 cm of cervical dilatation were significantly correlated in 32 normal primigravid women. Physiologic elevations of plasma

epinephrine were associated with decreased uterine contractile activity at the onset of labor (3 cm of cervical dilatation) and a longer duration of labor from 3 to 10 cm of cervical dilatation.

Fetal distress could be secondary to increased levels of catecholamines as well, but this effect would be due to decreased uterine and placental blood flow. Barton et al.[7] noted marked reductions in blood flow (up to 50 per cent) to the sheep uterus after an injection of epinephrine and norepinephrine. Catecholamines administered to pregnant rhesus monkeys by Adamsons et al.[8] resulted in fetal asphyxia, but they had no such effect when injected only into the fetus. Myers[9] noted that psychological stress alone, without pain or physical contact with the pregnant monkey, resulted in fetal asphyxia.

It should be emphasized that in our study the combination of the crowded hospital conditions, the absence of prenatal preparatory classes, and the unfamiliar hospital environment may have markedly increased maternal anxiety and exaggerated the effect of the supportive companion. In any event, future studies are needed to determine whether the effects can be correlated with maternal catecholamine levels.

The powerful effects of the presence of the supportive companion in this investigation raise the possibility that human companionship may have influenced the results in studies of the effectiveness of electronic fetal monitoring. In four randomized control studies of fetal monitoring in mothers at high risk,[10-15] the rate of cesarean section was increased in the monitored group, presumably because of evidence of fetal distress or failure to progress in labor. Haverkamp et al.[15] suggested that the control group of patients in their study had more individualized nursing care and close physical contact for auscultation of the fetal heart, and that as a result these patients had less anxiety. They proposed that the added attention and physical contact might have contributed to the favorable outcome in the group that received personal nursing care rather than electronic monitoring. The results of our investigation suggest that further studies of any labor intervention must ensure that both groups receive the same amount of time and support from nurses and medical personnel.

The observations in our study, if confirmed, may have important implications for the future care of mothers and neonates in industrialized and developing nations. They are particularly relevant to the care of low-income, single, or teenage mothers, who may not receive positive support from their families during labor and delivery and who may have had no formal or strong cultural preparation for childbirth. How often has false labor or a dramatic deceleration of a mother's labor after she enters the hospital resulted from her reaction to the strange, inhibiting, or frightening aspects of the hospital environment? An untrained woman provided the friendly support in this study, but similar or greater benefits may be expected when a family member or a friend remains with the mother throughout the labor and delivery. This low-cost intervention may be a simple way to reduce the length of labor and the number of perinatal problems for parturient women and their infants.

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