

## Effects of Swimming and Touching on Physiological Jaundice of Neonates within ten days of birth

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**Abstract:** Objective To explore effects of swimming and touching on physiological jaundice of neonates within ten days of birth. Methods Divid 110 cases of full-term newborns into 2 groups with 59 cases in the experimental group and 51 cases in the control group on a voluntary basis of the family. The infants in the experimental group were given swimming and touching for 15 minutes once everyday while the infants in the control group given shower till the tenth day. Measure the jaundice index in the forehead, chest and abdomen and record the times of breastfeeding, urination and bowel movements. Results The difference in the average jaundice index of the first 24 hours between the two groups is not statistically significant ( $P > 0.05$ ) while that of the second, the third and the tenth day is of significance ( $P < 0.05$ ). Both the average volume of breastfeeding and the times of elimination between the two groups from the first to the tenth day are of statistical significance ( $P < 0.05$ ). Conclusion Swimming and touching increase the volume of intake and elimination, motivate the early appearance of the peak and help with the fading.

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**Key words:** Newborn, swimming, touching, jaundice

With the development of living standards and the transforming of human's healthy conception, more and more parents have pay attention to child health care. It has been proved that swimming and touching can promote the growth and development of infants<sup>[1-3]</sup>. Much data have shown that swimming and touching can improve neonatal jaundice<sup>[4-6]</sup>, yet most study was limited to the observation of jaundice index changes during newborn's hospitalization (within 7 days after birth). Few study was on the swimming and touching effects on jaundice index of newborn who was more than 7 days after birth. Accordingly, this research focuses on 110 case of full-term newborns form Fujian Provincial Maternity and Children's Hospital and prolonged the study after discharge—the 10th day after birth. It aims at further exploring the regularity of swimming and touching effect on early jaundice index changes of newborns.

### 1. Research object and Methods

#### 1.1 Research object

110 full-term newborns who were born in January 2009 to April 2010 were recruited. Based upon the voluntary of the family, 110 cases of newborns were divided into 2 groups, with 59 cases in the experimental group and 51 cases in the control group. The test relies on the family's informed consent. The accepting criterion was full term infant (gestational age at 37~42+6 weeks), weight 2500~4000g, Apgar score $\geq$ 9, rooming-in and breast feeding as well as mothers and infants without serious complications. The differences in the puerpera's age, gestational

weeks, parity and delivery as well as the newborns' birth weight and height between the two groups were not statistically significant ( $P > 0.05$ ) (Table 1).

#### 1.2 Methods

1.2.1 The experiment group: Newborns, after 24 hours of birth, exercised in water under the care of specific swimming pool and laps for 2 hours after feeding. The swimming pool which is about 60cm depth can maintain the water temperature 38 degrees. After swimming exercises, newborns were touched by specialist who has been under the rigorous professional training recommend by Chinese nursing association and Johnson Company of U.S.A. Repeat above once a day for 15 minutes. Under the informed consent of their family, the post-discharged newborns were taken back to hospital for the training of swimming and touching until 10 days after birth in order to keep the continuity and accuracy of the test.

1.2.2 The control group: Newborns were taken routine shower once a day. Post-discharged newborns will take shower at home and a specially-assigned person visited the family once a day until 10 days after birth.

1.2.3 Observation index: Jaundice index on the forehead, chest and abdomen were measured within 24 hours following the two groups of newborns birth. After 24 hours of birth, jaundice index at the same parts of the body were measured after 2 hours of swimming or shower everyday. We use JD-2 transcutaneous jaundice device (made in Tianjin medical machinery research institute) to measure the jaundice index. The jaundice index, breastfeeding

times, urine and excrement times of the two groups were recorded until 10 days after birth.

**1.3 Statistical analysis SPSS**

The database was established by 13.0. Two-sample t test and chi-squared tests were used to

analyze the data.  $P < 0.05$  was considered to be statistically significant.

**2. Results**

**2.1 The maternal and infants' basic situation of the two groups (Table 1)**

Table 1. The maternal and infants' basic situation of the two groups ( $\bar{x} \pm s$ )

Group	n	Mothers				infants	
		age(year)	Weight(kg)	height(cm)	gestational week (week)	weight(kg)	Height(cm)
The Experimental Group	59	28.19±3.36	64.12±6.97	160.19±4.70	39.55±0.97	3.41±0.31	49.81±1.20
The Control Group	51	29.49±4.99	63.00±7.92	158.51±5.33	39.67±1.20	3.31±0.36	49.47±1.42
t		-1.63	0.79	1.76	-0.62	1.51	1.38
p		0.11	0.43	0.08	0.54	0.14	0.17

**2.2 The average jaundice index of the infants within 10 days after birth**

2.2.1 The average jaundice index on the forehead, chest and abdomen of the infants (Table 2)

Table 2. The average jaundice index of the infants every day ( $\bar{x} \pm s$ )

The days after birth	The Experimental Group (n=59)	The Control Group (n=51)	t	P
d0	2.62±0.72	2.74±0.67	-0.90	0.3721
d1	6.59±1.43	5.27±1.17	5.23	0.0000
d2	8.74±4.06	6.57±1.21	3.67	0.0004
d3	8.77±2.06	8.17±1.48	1.73	0.0863
d4	8.35±2.53	8.71±1.95	-0.83	0.4103
d5	8.66±2.37	8.55±2.21	0.26	0.7960
d6	8.18±2.82	8.38±2.73	-0.38	0.7083
d7	7.93±2.86	7.80±2.04	0.27	0.7863
d8	7.41±3.09	7.78±2.07	-0.72	0.4739
d9	6.75±3.13	8.18±5.38	-1.73	0.0870
d10	6.23±3.02	7.31±2.43	-2.04	0.0436

2.2.2 The line chart of the infants' average jaundice index for the two groups (Chart 1)

D0-D10 The line chart of the infants' average jaundice index

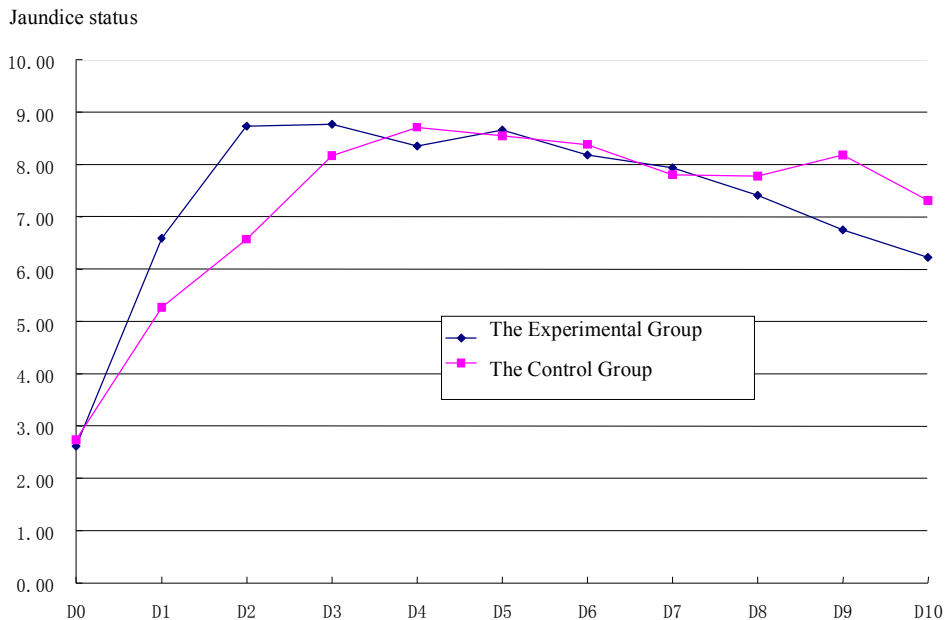


Chart 1. The line chart of the infants' average jaundice index

### 2.3 The breastfeeding times, urine and excrement times of the two groups (Table 3)

Table 3. The breastfeeding times, urine and excrement times of the two groups ( $\bar{x} \pm s$ )

The days after birth	breastfeeding times		Urine times		excrement times	
	Experimental Group	Control Group	Experimental Group	Control Group	Experimental Group	Control Group
d1	9.50±2.75	7.69±3.51	5.00±2.05	3.55±2.27	3.86±1.67	3.41±1.85
d2	10.89±2.42	9.72±2.70	6.36±1.94	5.25±1.76	4.12±1.22	4.22±1.51
d3	10.69±2.41	8.84±2.43	7.66±1.94	5.84±1.41	4.90±1.90	4.31±1.58
d4	10.27±2.61	8.70±2.35	7.88±2.06	6.31±1.45	5.34±1.77	4.98±1.76
d5	10.26±2.27	8.90±2.39	8.54±2.25	6.59±1.46	4.73±2.21	5.00±1.65
d6	10.65±2.85	8.61±3.15	8.76±2.14	6.57±1.92	5.07±2.24	4.76±1.75
d7	10.66±2.51	8.63±2.53	9.37±3.31	6.94±1.62	4.71±2.59	4.82±2.07
d8	11.38±2.85	8.84±2.24	9.46±2.45	7.61±2.30	4.83±2.49	4.73±1.92
d9	10.74±2.86	8.64±2.24	9.64±2.71	7.39±2.12	4.95±2.64	4.82±1.94
d10	10.59±2.44	9.10±2.73	9.54±2.34	8.18±2.71	4.92±2.31	5.27±2.21

Both the breastfeeding times and urine times between the two groups from the first to the tenth day after birth were of statistical significance ( $P < 0.05$ ). Yet there was no statistically significant difference in the excrement times between the two groups ( $P > 0.05$ ).

### 3. Discussions

#### 3.1 Swimming and touching can increase the nutrition intake and urinary output of the newborn within ten days, decreasing the jaundice index.

Normal bacteria flora hasn't formed in the intestinal tract of the newborn, which cannot make conjugative bilirubin return to bilirubin. Swimming can increase the newborn's expenditure of energy, impelling food intake ahead of time. This will quicken the formation of normal bacteria flora in the intestinal tract, make it convenient for bilirubin to return to urobilinogen and to be excreted from the body. The level of bilirubin will be reduced, thus decreasing the jaundice index of the newborn<sup>[7]</sup>. Swimming can impel the motility of the gastrointestinal tract of the newborn, increase the secreting of gastrin and insulin, promote the food to be digested and assimilated<sup>[8]</sup>. This research improves that swimming is conducive to increase the newborn's appetite. This research roughly estimates the newborn's intake through daily times of breast feeding and urine discharge. Search results: as for the newborn between one day and ten days old, the experimental group's daily average times of breast feeding and urine discharge are significantly more than the control group's ( $P < 0.05$ ). According to the figure in Table 3, the experimental group's intake is calculated to increase. As is reported, increasing infant's urine discharge can promote bilirubin to discharge<sup>[9, 10]</sup>. This illustrates that the experimental group are promoted to discharge bilirubin, decreasing the jaundice index.

#### 3.2 Neonatal swimming and touching can cause neonatal physiological jaundice peak appears

#### ahead of time and has a steady decline

Most of the present domestic reports are limited to the influence of jaundice status for the hospitalized neonatal swimming and touching, and it is less for 1-week newborns. So this group of neonatal swimming and touching has kept continuous observation for 10 days after birth. The result shows that obvious difference between two groups on the 1st, 2nd, 10th day after birth for the average newborn jaundice status, which are obviously different from Qi Weimin<sup>[11]</sup>: swimming and touching can make jaundice status significantly lower than the control group for 2 to 5-day newborns. Chen J neonatal touching can alleviate the full-term newborn jaundice, baby milk supply, urine output increases through touching, and bowel movement promoted so as to reduce the serum bilirubin<sup>[12]</sup>. This research shows that swimming and touching can increase times for breastfeeding and urine discharge significantly but not for stools, which is obviously differently from the report by Zhang Qunying<sup>[13]</sup>: swimming and touching can make times for defecate increasing, which is significantly different from the control group for 1 to 7-day newborns. Also different from the report by Luo Hong<sup>[14]</sup>: the increasing number of swimming, can accelerate meconium discharge. The conclusion for this study is that the newborn swimming, touching can decrease jaundice status, especially for the first few days after birth. The decline is mainly caused by swimming, touching which increase the amount of neonatal diet and urine. Table 2 and figure 2.2 show the experimental group jaundice status peak appears on the third day after birth in advance, while the control group on the 4th day after birth, which approaches 4.1 days for the experiment group and 5.7

days for the control group<sup>[15]</sup>. Research shows that the experimental group jaundice peak appears earlier than in the control group, the peak period of time is short. Jaundice status shows a steady decline on the 5th day after the birth, while the control group began to decline on the 5th day after birth, but not by a big down radian, and exists rebound phenomenon. Obvious differences observed till the 10th day after birth of two groups, as can be seen from the figure 2.2, on the 10th day after born, two groups of jaundice status curve trend obvious separation. The above conclusion is also confirmed that if continuous observation days for two groups after birth are different, the conclusion is also different.

In conclusion, swimming and touching on physiological jaundice of neonates can bring many benefits to newborns. First, it can increase the times of breastfeeding, urination and bowel movements, lower the icteric index for newborns of the second, the third and the tenth day after birth. Second, it can also motivate the peak of physiological jaundice in newborns to appear in advance, and reduce steadily. Therefore, in order to promote the growth and development of infants, the importance of publicizing and training the skills on swimming and touching is emphasized. Also, it is vital to provide the neonatal breastfeeding guidance on such skills, and direct the puerperae and the families to insist doing so after discharging from hospitals. Because the two groups are divided based on the voluntary of families, it is hard to achieve accurate measurements of the volume of intake. The intake volume in this study is thus measured on the basis of the times of breastfeeding and bowel movements. This study remains to be further proved and discussed.

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