

Normal anal position in Thai newborn infants: A preliminary report

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ABSTRACT

Background: The normal position of anal opening in children, measured by anal position index (API), has been wildly reported. The clinical significance of anterior displacement of anus has been advocated as a common cause of constipation in children. However, the normal anal position in Thai children has never been studied.

Objective: To determine the anal position index of normal Thai newborn infants.

Material and Methods: A prospective study of 122 normal newborn infants born at HRH Maha Chakri Sirindhorn Medical Center was performed. Demographic data and anal position index are reported separately for each gender spilt and gestational age group.

Results: There was significant difference of anal position index between male newborn infants (0.52 ± 0.09) and female newborn infants (0.42 ± 0.09). In males, the means API of preterm and term infants were 0.55 ± 0.07 and 0.52 ± 0.09 , respectively. In females, the means API of preterm and term infants were 0.48 ± 0.07 and 0.42 ± 0.08 , respectively.

Conclusions: Anal position indexes in Thai newborn infants are 0.52 and 0.42 in male and female, respectively ($P < 0.01$). In each gender identity, there is no statistically significant difference in API between premature and term newborn infants.

Key words: Anal position index, newborn infant, Thai



INTRODUCTION

The normal position of the anus was first defined in 1984. Reisner et al¹ reported the means anal position index (API), the ratio of anal-fourchette distance to coccyx-fourchette distance for female infants and the ratio of anal-scrotum distance to coccyx-scrotum distance for male infants, of 0.58 in male newborn infants and 0.44 in female newborn infants as the normal index. Recently, Bar-Maor² and Genc³ also reported the normal API of 0.56 and 0.53 in male neonates and 0.39 and 0.46 in female neonates, from Israel and Turkey respectively. Nevertheless, the normal values for the anal position index in Thai newborn infants have never been reported in Thailand.

Anterior displacement of the anus is a common development abnormality of anorectal malformation.¹ The association of constipation with anterior displacement but otherwise "normal" anus has been described in large number of children by Leape and Ramenofsky⁴ and Hendren⁵. According to the study of Leape and Ramenofsky⁴, more than one third of patients who come to consultation for chronic constipation had anterior displacement of the anus.

The aim of the present study is to establish the normal values of the API in Thai newborn infants and to assess whether the API is different between male and female. In addition to comparison API among sex, the API regarding gestational age was also compared.

MATERIALS AND METHODS

One hundred and twenty two normal newborn infants born at HRH Maha Chakri Sirindhorn Medical Center between November 2003 and February 2004 were included into study. Anal position index (API), the ratio of anus-fourchette distance to coccyx-fourchette distance for the girls and anus-scrotum distance to coccyx-scrotum distance for the boys, were measured

within the first week of life. To measure the distances, the newborn was held in the lying position with hips and knees flexed. A transparent adhesive tape was placed along the long axis of coccyx-fourchette distance or coccyx-scrotum distance. The positions of the coccyx, the center of the anus and the posterior fourchette (scrotum) were marked and the distances between them were measured on a plain surface.

The parents were informed about the nature and requirements of the study. Informed consent was obtained, and the study was approved by the Ethics committee of Faculty of Medicine, Srinakharinwirot University. No parents refused to participate in this study.

Statistical analysis

Demographic data, anal-fourchette (scrotum) distance, coccyx-fourchette (scrotum) distance and anal position index were reported as the means and standard deviations separately for each gender split and gestational age group. Categorical data were analyzed using a Chi-square or Fisher exact test. Continuous variables were compared by using a Student's t-test. Statistical analyses were performed using a SPSS 10.0 software package, and the differences were considered as significant if P value < 0.05.

RESULTS

One hundred and twenty two newborn infants included into the study were normal at birth with no major congenital abnormalities. The modes of labor were normal labor in 69, cesarean section in 37, vacuum extraction in 14 and forceps extraction in 2 patients. There were no major complications during pregnant except 2 of intrauterine growth retardation and 2 of pre-eclampsia. There was an equal gender split with 50% boys. The means birth weight, length and head circumference were 2880 g, 51.0 cm and 32.8 cm, respectively, with no gender difference. There were no differences in gestational age, birth weight, length, head circumference,

APGAR score, labor methods, paternal and maternal age between gender identities. The details of demographic findings of children are shown in Table 1

Ninety-six percents of children were examined for the anal position index within the first four days of age. There were significant differences of anus-fourchette (scrotum) distance (2.48 cm in boys and 1.39 cm in girls), coccyx-fourchette (scrotum) distance (4.67 cm in boys and 3.25 cm in boys) and anal position index (0.52 in boys and 0.43 in girls) between boys and girls ($p < 0.01$). Eight girls and 8 boys were prematurely born with the

means gestational age of 35.4 weeks in both gender identities. There were significant differences of anus-fourchette (scrotum) distance, and coccyx-fourchette (scrotum) distance but not of anal position parameters between gender splits in premature newborn infants. In each gender identity, there were no significant differences of anus-fourchette (scrotum) distance, coccyx-fourchette (scrotum) distance and anal position index between term and premature newborn infants. The details of anal position parameters are shown in Table 2 and 3.

Table 1. Demographic data .

	Overall	Male	Female	P value
N	122	61	61	
Gestational age, years (SD)	38.2 (1.5)	38.3 (1.6)	38.1 (1.4)	0.28
Premature, n (%)	16 (13)	8 (13)	8 (13)	1.0
APGAR score at 1 minute (SD)	8.6 (0.8)	8.7 (0.7)	8.5 (0.9)	0.19
APGAR score at 5 minutes (SD)	9.9 (0.3)	9.9 (0.3)	9.9 (0.4)	0.55
Birth weight, g (SD)	2880 (433)	2952 (437)	2808 (421)	0.07
Birth length, cm (SD)	51.0 (3.0)	51.5 (3.1)	50.6 (3.0)	0.12
Head circumference, cm (SD)	32.8 (1.5)	33.0 (1.7)	32.5 (1.3)	0.05
Mode of labor, n				0.29
• Normal labor	69	33	36	
• Cesarean section	37	22	15	
• Vacuum extraction	14	6	8	
• Forceps extraction	2	0	2	
Paternal age, yr. (SD)	30.6 (7.0)	31.3 (6.6)	29.9 (7.4)	0.26
Maternal age, yr. (SD)	26.6 (5.7)	27.2 (5.6)	26.0 (5.8)	0.25

Table 2. Anal position parameters of 122 newborn infants .

	Male (n = 61)	Female (n=61)	P value
Anus-fourchette (scrotum) distance, cm (SD)			
• Overall	2.84 (0.68)	1.39 (0.31)	<0.01
• Premature	2.36 (0.62)	1.56 (0.39)	<0.01
• Term	2.50 (0.69)	1.36 (0.29)	<0.01
Coccyx-fourchette (scrotum) distance, cm (SD)			
• Overall	4.67 (0.85)	3.25 (0.46)	<0.01
• Premature	4.28 (0.77)	3.21 (0.60)	<0.01
• Term	4.73 (0.85)	3.26 ((0.44)	<0.01
Anal position index, (SD)			
• Overall	0.52 (0.09)	0.42 (0.09)	<0.01
• Premature	0.55 (0.07)	0.48 (0.07)	0.10
• Term	0.52 (0.09)	0.42 (0.08)	<0.01

Table 3. Birth weight, length, heads circumference and anal position parameters of premature and term newborn infants.

	Premature infants	Term infants	P value
Birth weight, g (SD)	2438 (418)	2947 (396)	<0.01
Birth length, cm (SD)	48.6 (3.5)	51.4 (2.8)	<0.01
Head circumference, cm (SD)	31.9 (1.6)	32.9 (1.4)	0.02
Anus-fourchette (scrotum) distance, cm (SD)			
• Male	2.36 (0.62)	2.50 (0.69)	0.60
• Female	1.56 (0.39)	1.36 (0.29)	0.08
Coccyx-fourchette (scrotum) distance, cm (SD)			
• Male	4.28 (0.77)	4.73 (0.85)	0.16
• Female	3.21 (0.60)	3.26 ((0.44)	0.80
Anal position index, (SD)			
• Male	0.55 (0.07)	0.52 (0.09)	0.50
• Female	0.48 (0.07)	0.42 (0.08)	0.05

Table 4. Anal position index from existing reports .

Study	Country	Age group	Anal position index (SD)	
			Male	Female
Reisner 1984 [1]	Israel	Newborn	0.58 (0.06)	0.44 (0.05)
		4-18 months	0.56 (0.4)	0.40 (0.06)
Bar-Maor and Eitan 1987 [2]	Israel	3 days- 12 years	0.56 (0.20)	0.39 (0.09)
Genç 2002 [3]	Turkey	Newborn	0.53 (0.05)	0.46 (0.08)
Mohta 2004 [7]	India	0-3 years	0.43 (0.05)	0.37 (0.06)
Present study	Thailand	Newborn	0.52 (0.09)	0.42 (0.09)

DISCUSSION

The anal position was first described by Leape and Ramenofsky⁴ as the midway between the vaginal fourchette (scrotum) and the tip of the coccyx in 1978. However, the normal anal position index was not stated until 1984. Reisner¹ firstly reported the anal position index (API) from normal newborn infants as 0.58 (SD 0.06) in male and 0.44 (SD 0.05) in female whereas in infants aged 4-18 months they were 0.56 (SD 0.4) and 0.40 (SD 0.06) in male and female respectively. Reports on the normal index of anal position from different institutes were varying (Table 4). The only report from eastern country was found to be differing from the western countries. Factors affecting the difference of API are poorly understood but may include the difference in age group and lower body weight in eastern population⁷. Although Bar-Maor² found no affect by age or ethnic differences, there were increasingly reported of the differences of API among studies. Moreover, anterior displacement of anal opening is increasingly being recognized in the literatures as a cause of constipation⁴⁻⁶. The measuring of anal opening in the young age infants will help to early detect the abnormality, which is not easy to detect and to monitor the long-term outcomes. Therefore, the best group in which to study the anal position is in the newborn infants.

As reported previously, the normal anal opening in female children were more closure to the genitalia. Anal position indexes are compared with other studies that had significantly higher ratio in boys than in girls. However, our results did not shown a significant difference in API between gender identity among premature newborn infants, as there was a trend toward higher API in premature than term infants of the same gender identity. This may be explained by the small sample size of the premature infants in this study. We also show that gestational age, birth parameters such as birth weight, length and head circumference had no affect on API.

The correlation between anterior displacement of the anal opening and constipation has been stated⁴⁻⁶. Malformation of the middle portion of the external sphincter and weakness of the corresponding segment of the anal canal has been postulated to be the cause of constipation in anterior abnormal opening of anus⁶. Clearly further studies are required to determine the magnitude of constipation problems in children with anterior displacement of the anus. We advocate that the long-term follow up of cohorts, in which the time point of constipation is known and no confounding factors of constipation exist, are required.

In conclusion, there appears to be significant difference in anal position index between genders in newborn infants. Anal position indexes in Thai infants are compared with API from the other literatures, in which there is significantly higher API of male than API of female newborn infants. It had no significant affect of gestational age on API in each gender identity.

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