ORIGINAL ARTICLE

Relationship between child rearing and child nutritional status during the first year of life in Thailand

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Abstract

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This descriptive study was conducted to determine relationship between child rearing and child nutritional status during the first year of life. A total of 4,245 cohort children were collected between July 2000 and June 2002 based on the Prospective Cohort of Thai Children. 60 twin infants and 35 dead and abnormal children were excluded. Then, the remaining 4,150 children were conducted for data analysis. The statistics was used by Chi-square tests and Multiple Logistic Regressions were used for identifying influential predictor and child nutritional status (underweight, stunting and wasting) at the first year of age.

The finding showed that 8.3% of the children were underweight (weight for age), 9.5% of the children were stunting (height for age) and 5.7% of the children were wasting (weight for height) according to WHO reference. After adjusting the potential confounding factors in the multiple logistic regression, this study found that birth weight was the most significant risk factor related to all three child nutritional status such as underweight (Adj. OR= 10.07, 95% CI= 2.87-35.28), stunting (Adj. OR= 4.49, 95% CI= 1.16-17.39) and wasting (Adj. OR= 3.94, 95% CI= 1.24-12.49). In addition, the significant factor associated with child underweight in the final model was controlling of sleeping time by using rational style (Adj. OR=4.71, 95% CI=1.16-19.10), and for wasting status was types of main caregivers (relative) (Adj. OR= 4.04, 95% CI=1.15-14.21).

This study indicated that child rearing style age 6 months among this population effect to nutritional status for children first year of life. Therefore, health policy and education regarding to appropriate child rearing pattern toward among parents in Thailand should be promoted.

Keywords: Child nutritional status, child rearing, underweight, stunting, wasting

ความสัมพันธ์ระหว่างการเลี้ยงดูเด็กและภาวะโภชนาการของเด็กในช่วงอายุขวบปีแรกของชีวิต ประเทศไทย

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บทคัดย่อ

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ความสัมพันธ์ระหว่างการเลี้ยงดูเด็กและภาวะโภชนาการของเด็กในช่วงอายุขวบปีแรกของชีวิต ประเทศไทย
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วัตถุประสงค์ของการศึกษาเชิงพรรณนี้เพื่อศึกษาความสัมพันธ์ระหว่างการเลี้ยงดูเด็กและภาวะโภชนาการของเด็กในช่วงขวบปีแรกของชีวิต การวิจัยครั้งนี้ได้ใช้ข้อมูลโครงการวิจัยระยะยาวในเด็กไทย จำนวนกลุ่มตัวอย่างที่ใช้ศึกษาจำนวนเริ่มต้น 4,245 คน เก็บข้อมูลระหว่างเดือน กรกฎาคม 2543 ถึง เดือนมิถุนายน 2545 ตัดข้อมูลของเด็กฝาแฝดจำนวน 60 คน และข้อมูลเด็กเสียชีวิตจำนวน 35 คน จึงเหลือข้อมูลที่ใช้ทำการวิเคราะห์ในการศึกษาครั้งนี้จำนวน 4,150 คน วิเคราะห์ข้อมูลโดยใช้การทดสอบไคสแควร์และการถดถอยลอจิสติคเพื่อศึกษาปัจจัยที่มีผลต่อภาวะโภชนาการของเด็กในช่วงอายุขวบปีแรก

ผลการวิจัยพบว่าเมื่อใช้เกณฑ์อ้างอิงขององค์การอนามัยโลก ร้อยละ 8.3 เป็นเด็กมีน้ำหนักน้อยกว่าเกณฑ์ (น้ำหนักตามเกณฑ์อายุ) ร้อยละ 9.5 เป็นเด็กเตี้ย (ส่วนสูงตามเกณฑ์อายุ) และร้อยละ 5.7 เป็นเด็กผอม (น้ำหนักตามเกณฑ์ความสูง) หลังจากปรับอิทธิพลของปัจจัยกวนโดยใช้การถดถอยลอจิสติค พบว่าน้ำหนักแรกเกิดเป็นปัจจัยเสี่ยงที่มีนัยสำคัญสูงที่สุดของเด็กน้ำหนักน้อยกว่าเกณฑ์ (Adj. OR= 10.07, 95% CI= 2.87-35.28), เด็กเตี้ย (Adj. OR= 4.49, 95% CI= 1.16-17.39) และเด็กผอม (Adj. OR= 3.94, 95% CI= 1.241-12.49) นอกจากนี้ปัจจัยที่มีความสัมพันธ์อย่างมีนัยสำคัญทางสถิติกับเด็กที่มีน้ำหนักน้อยกว่าเกณฑ์ ได้แก่ การเลี้ยงดูแบบการใช้เหตุผลโดยการควบคุมเวลานอนหลับ (Adj. OR=4.71, 95% CI=1.16-19.10) สำหรับเด็กที่ผอม ได้แก่ ประเภทของผู้ดูแล (ญาติ) (Adj. OR= 4.03, 95% CI= 1.14-14.20)

การศึกษานี้ชี้ให้เห็นว่าแบบแผนการเลี้ยงดูเด็กมีผลต่อภาวะโภชนาการของเด็กในช่วงอายุขวบปีแรก ดังนั้นนโยบายด้านสุขภาพและการศึกษา ควรมุ่งส่งเสริมเรื่องแบบแผนการเลี้ยงดูเด็กที่เหมาะสมในประเทศไทย

Keywords: ภาวะโภชนาการของเด็ก การเลี้ยงดูเด็ก รูปแบบการเลี้ยงดูเด็ก น้ำหนักน้อยกว่าเกณฑ์ ภาวะเตี้ย ภาวะผอม

Introduction

Globally, about 10 million children under 5 years of age die every year from preventable disease[1-3]. One least half of these death are caused by malnutrition[1,4,5]. In developing countries, malnutrition is the main health problem[1,5]. It is accepted that malnutrition is an important factor associated with the high morbidity and mortality rates observed in children under 5 years of age in developing countries[6].

The most recent estimated of the global burden of malnutrition in children under 5 years of age is that 99 million were underweight, 162 million were stunting and 51 million were wasting in 2012[7-9].

Malnutrition or growth failure is caused by multiple circumstances and determinants. The prevalence of malnutrition is due to the fact that it is deeply rooted in poverty and underprivileged social environments rather than biomedical causes[10]. It is commonly assumed that growth faltering starts at around 3 months of life[11]. Therefore, it is malnutrition prevention measures and interventions needs to start in early life.

The nutritional situation of Thailand dramatically improved during the 1980s to middle 1990s, with the implementation of multi- sector policies and programs focusing on poverty reduction and primary health care. Economic improvements, better access to health care services, and effective community- based programs contributed to these positive trends. However, still remained at 10-15% for underweight and 10-12% for stunting over the past 20 years. Wasting has been comparatively low at 5%[12].

The nutritional status of children has an impact on child growth and development. Therefore, the physical, mental, social and nutritional status of children, as well as other characteristics related to malnutrition should be evaluated periodically to monitor malnutrition, thereby enabling appropriate measures that can be implemented to prevent malnutrition[1].

Parental child rearing ways or techniques are important in influencing child growth and development. In the causal matrix of malnourished, an important underlying determinant is care provided to children. There is increasing awareness that cultural and behavioral practices with regards to child rearing practices influence child nutrition[13].

Parenting style is a psychological construct symbolizing standard strategies that parents use in their child rearing. The construct parenting styles has been widely known by Baumrind[14-19] who published defining parenting style in four basic elements that are demanding controlling and undemanding low in control attempts versus accepting responsive and rejecting unresponsive as an shape successful parenting. These three parenting styles are referred conceptualization of authoritarian, permissive and authoritative by Baumrind's[14-19]. On the one hands, a study[20] were found broaden parenting styles into four categories involving a combination of demand and control versus acceptance and responsiveness. These four styles are identified to as authoritative, authoritarian, indulgent and neglectful[15, 16, 19, 20].

Parenting styles need to be emphasized as an important aspect of prevention. Parental attitudes are prediction for obesity, eating behavior, physical activities and hyperactivity problems in school children[21-24]. Attachment parenting is a highly respected approach that promotes securely attached children,

but baby parenting that have been known to include detachment leads to behavior disorders, dehydration, failure to thrive, irritability, infant anorexia and even infant death[25].

It may be difficult to define "good" child rearing, because there are many strategies and changing according to child situation and environment. However, it is important to mention about appropriate child rearing for parents and caregivers to make an effort to take proper care of their children.

Children especially infants often heavily favor the company of parents in the first years of life. The attachment bond responsible for this behavior is an emotional connection that help children trust parents, which eventually aids in relationship development later in life. Moreover, the procedure to verify the validity of the child rearing patterns have not been fully explored.

Most of studies in Thailand focused on children at school age and adolescent years and the information about child rearing patterns during the infancy period is limited. Therefore, the study was conducted to determine relationship between child rearing and child nutritional status during the first year of life. The benefit of this study will be used to improve children health care through "good" child rearing and which will reduce nutritional and developmental problems in children. Thus it will be improved quality of child life in the future.

Methods

This study conducted to determine by using data of the participants from the Prospective Cohort study of Thai Children (PCTC). PCTC is an observational prospective cohort study. This study is comprised community- based in four different rural area (Central, South, North and North East) and hospital- based in an urban area (Bangkok) in Thailand. This study focused on the possibility that the factors of child rearing at age 6 months old is affecting child nutritional status of children of the age of 12 months as a cross sectional descriptive study.

The PCTC project have participants a total of 4,245 children who were born from the 1st of July, 2000 to the 30th of June, 2002. 60 twin infants and 35 dead and abnormal children were excluded. Then, the remaining 4,150 children were conducted for data analysis.

The data were collected from communities. The determinant variables of children at first year of life were given by database of the PCTC Project that were collected from interviewing and hospital records. Research assistants got data from local midwives that went to home-visits within three days after delivery and made appointments for take physical examinations at a hospital when children become a month. Mother could decide place for interviewing that at home or the local hospital depending on their preference. Interviews for demographic and predictor variables were conducted children aged 28 days, 3 months, 6 months and after that every 6 months.

For the instruments of anthropometric, PCTC project growth instrument was developed locally at Nutrition Institute, Mahidol University, Thailand. The Anthropometric measurements were taken according to recumbent length and was measured in all children using a graduate board with a fixed headboard and movable footboard (1 m/0.1 cm), and recorded to the nearest 0.1 cm. The weight machine measurement from the United State's company were used and

was calibrated regularly with minimum 100 gram. All research assistants and team members were well trained to use standardized methods carefully of an anthropometric measurement and outcome collecting procedure which was rigorous standard of recording and simply to apply for physicians and research assistants recorded into case report form.

Each child nutritional status was expressed as a number of standard deviations (Z- score) above or below the median for the reference population, taking into account age and gender. Z- score for weight for age, height for age, weight for height were computed using WHO growth standards Anthropometric software, version 3.2.2[26]. A cut-off point of -2 SD was used to identify the determinants of underweight, stunting and wasting.

Database was provided for the risk of five parts of factors related to nutritional status as follows. Part 1 included general characteristic of children (gender, birth weight, birth height, illness within 12 months) and type of main caregiver. Part 2 included socio- demographic and family characteristics (location, religion, mother age, mother height, education of mother, occupation of mother, number of family member and family income). Part 3 consisted of utilization of health services (frequency of ANC and immunization status). Part 4 consisted of feeding practice, age at which children were introduce such as rational or not rational style. Part 5 included child rearing characteristics (mother activities during the day time in the week such as going for a walk, playing a doll, singing and body playing). There were 4 questions and divided 2 groups, group 1 is yes (always/ sometimes), group 2 is no (never).

Father activities during the day time in the week; (going for a walk, playing a doll, singing and body playing) There have 4 questions and divided 2 groups, group 1 is yes (always/ sometimes), group 2 is no (never/ father is not here/ don't have a father). Child rearing pattern (control of feeding time, food introduction, control of sleeping time and responding to cry). It was divided 2 groups, first group is rational parenting style (authoritative) and second group is control (authoritarian), over protection (permissive/ Indulgent), neglect (neglectful) and other parenting style.

Data were analyzed using the SPSS version 16, descriptive statistics was used to determine number and percentage of each independent and dependent variable. Then, chi-square tests and simple logistic regression were used to identify and association between each independent variable and dependent variable. Lastly, multiple logistic regression was used to determine associations between child rearing and child nutritional status during the first year of life. The significance level was set at 0.05.

Results

Child nutritional status in this study is shown in Table 1. The prevalence of malnutrition was 8.3% of children were underweight, 9.5% were stunting and 5.7% were wasting.

General characteristics of children in this study showed that about half of gender were boy (49.3%) and girl (50.7%) whose age were the first year of age. Only 7.8% children were low birth weight and about half (50.5%) of children were less than 50 cm of tall at birth. In addition, only 9.7% children were

reported to get illness within 12 months. Over 70 % of main caregiver of children were relative like a grandfather, grandmother, uncle and aunt.

Socio- demographic and family characteristics in this study found that 79% were Buddhism religion. 88.2% of mother belonged to age group over 20 years old, 3.3% of the mother had height less than 145 cm as Thai reference tall. Over half of mother (52.7%) reported education level less than primary school. Over 80% of mother were working and 17.9% of the mother were either unemployed such as housewife and students. For the family 45.8% had more than 5 people in household, 25% of the family had low income less than 52,000 Baht for a year.

Utilization of health services in this study showed that 86.9% of mothers had antenatal care visits at least four visits. Feeding practices in this study found that concerning the age at which the children were stopped from breastfeeding, 55.8% were stopped breastfeed before 6 months and 90 % of the children were introduced rice and banana before 6 months.

Child rearing characteristics in this study is shown table 2. As parent's activities, over 90% of mother and over 75 % of father sometime playing with their children. Singing is lower in parent's activities and about half 61.7% of mothers and 43.2% of father were reported to always or sometimes sing to their child. As child rearing pattern, over half of children have got over protection parenting style in child rearing pattern: food introduction, control of sleeping time and responding to cry. Whereas over half of children (56.1%) have got rational parenting style for control of feeding time of child rearing pattern.

The results of the chi- square test for association between child rearing and child nutritional status are shown in Table 3. This study found that patterns of child rearing characteristics such as mother activities: playing a doll, father activities: playing a doll, singing and body playing, child rearing pattern: control of sleeping time were found to be associated with underweight. Five patterns of child rearing such as mother activities: playing a doll, father activities: playing a doll, child rearing pattern: control of feeding time, food introduction and control of sleeping time were found to be associated with child stunting. Four variables of child rearing such as father activities: go for walk, playing a doll, singing and body playing were found to be associated with child wasting.

The significant factors identified by the chi-square test were further tested by Multiple Logistic Regressions to determine which factors had the most significant association for child nutritional status as shown Table 4. All three nutritional status were significantly associated with birth weight. Low birth weight (< 2500 g) were 10 times for underweight, 4.5 times for stunting and 3.9 times for wasting greater risk of being these nutritional status than standard birth weight. For, mother activities, mothers who were not singing was a protective factor for child underweight. Children who have caregiver who control, neglect, over protection and others parenting style about control of sleeping time were 4.7 times greater risk of being underweight than children who have caregiver who rational parenting style. Children whose main caregiver are relative had 4 times greater risk of being wasting than children whose main caregiver is parents.

Table 1   Percentages of children by child nutritional status

Child nutritional status	Frequency	Percentage
Underweight (Weight for Age)		
Not underweight	3686	91.7
Underweight	334	8.3
Total	4081	100
Stunting (Height for Age)		
Not stunting	3597	90.5
Stunting	377	9.5
Total	3974	100
Wasting (Weight for Height)		
Not wasting	3749	94.3
Wasting	225	5.7
Total	3974	100

Table 2   Percentages of children by child rearing

Child rearing	Frequency	Percentage
Mother activities: Go for a walk	3012	87.3
Always	368	10.6
Sometimes	72	2.1
Never	3452	100
Total		
Mother activities: Playing a doll	2710	78.5
Always	516	15.0
Sometimes	225	6.5
Never	3451	100
Total		
Mother activities: Singing	1366	39.6
Always	760	22.2
Sometimes	1321	38.3
Never	3447	100
Total		
Mother activities: Body playing	2677	77.6
Always	625	18.2
Sometimes	146	4.2
Never	3448	100
Total		
Father activities: Go for a walk	1772	51.6
Always	1049	30.5
Sometimes	316	9.2
Never	298	8.7
Father is not here/ Don't have father	3435	100
Total		
Father activities: Playing a doll	1603	46.6
Always	1031	30.0
Sometimes	505	14.7
Never	298	8.7
Father is not here/ Don't have father	3437	100
Total		

Table 2   Percentages of children by child rearing (cont.)

Child rearing	Frequency	Percentage
Father activities: Singing		
Always	621	18.1
Sometimes	862	25.1
Never	1652	18.1
Father is not here/ Don't have father	298	8.7
Total	3433	100
Father activities: Body playing		
Always	1619	47.2
Sometimes	1078	31.4
Never	435	12.7
Father is not here/ Don't have father	298	8.7
Total	3430	100
Child rearing pattern: Control of feeding time		
Every 3- 4 hours and observe the child (Rational)	2249	56.1
No schedule but based on my need (Neglect)	112	2.8
Never let the child hungry, feed all the time (Over protection)	1377	34.3
Every 3- 4 hours and must be as scheduled (Control)	145	3.6
Others (No applicable)	128	3.2
Total	4011	100
Child rearing pattern: Food introduction		
Try and force till success (Control)	389	9.7
Encourage and let him/ her eat as he/ she can (Rational)	1369	34.0
Doesn't matter, not a big deal (Neglect)	65	1.6
Depend on the child (Over protection)	2138	53.1
Others (Not applicable)	65	1.6
Total	4026	100
Child rearing pattern: Control of sleeping time		
Always trying to be on time (Control)	581	14.4
Schedule but flexible (Rational)	1109	27.5
Depend on myself (Neglect)	83	2.1
Depend on the child (Over protection)	2259	56.0
Total	4032	100
Child rearing pattern: Responding to cry		
Left till stop (Neglect)	58	1.4
Yell or smack till stop (Control)	22	0.5
Hold up immediately, not allow crying (Over protection)	3218	79.8
Find the cause and calm down (Rational)	728	18.1
Others (Not applicable)	7	0.2
Total	4033	100

Table 3   Association between child rearing and child nutritional status

Child rearing	Weight for Age (Underweight)			Height for Age (Stunting)			Weight for Height (Wasting)		
	≥ -2SD (%)	< - 2SD (%)	Crude OR (95% CI)	≥ -2SD (%)	< - 2SD (%)	Crude OR (95% CI)	≥ -2SD (%)	< - 2SD (%)	Crude OR (95% CI)
Mother activities: Go for a walk									1
Yes	3040 (90.9)	303 (9.1)	1	2973 (89.7)	343 (10.3)	1	3116 (94.0)	200 (6.0)	0.698
No	65 (92.9)	5 (7.1)	0.77 (0.308-1.931)	67 (95.7)	3 (4.3)	0.388 (0.121-1.241)	67 (95.7)	3 (4.3)	(0.218-2.237)
Mother activities: Playing a doll									
Yes	2915 (91.4)	273 (8.6)	1	2864 (90.5)	300 (9.5)	1	2972 (93.9)	192 (6.1)	1
No	189 (84.4)	35 (15.6)	1.977*** (1.350-2.896)	175 (79.2)	46 (20.8)	2.509*** (1.776-3.546)	210 (95.0)	11 (5.0)	0.811 (0.435-1.513)
Mother activities: Singing									
Yes	1903 (90.6)	198 (9.4)	1	1858 (89.2)	224 (10.8)	1	1959 (94.1)	123 (5.9)	1
No	1197 (91.6)	110 (8.4)	0.883 (0.692-1.127)	1177 (90.6)	122 (9.4)	0.860 (0.682-1.085)	1219 (93.8)	80 (6.2)	1.045 (0.782-1.398)
Mother activities: Body playing									
Yes									
No	2972 (91.1)	292 (8.9)	1	2911 (89.9)	328 (10.1)	1	3046 (94.0)	193 (6.0)	1
	129 (89.0)	16 (11.0)	1.262 (0.962-1.717)	125 (87.4)	18 (12.6)	1.278 (0.770-2.122)	133 (93.0)	10 (7.0)	1.187 (0.614-2.293)
Father activities: Go for a walk									
Yes									
No	2553 (91.4)	240 (8.6)	1	2484 (89.7)	284 (10.3)	1	2616 (94.5)	157 (5.6)	1
	538 (89.2)	65 (10.8)	1.285 (1.291-2.146)	541 (90.0)	60 (10.0)	0.970 (0.723-1.301)	515 (91.7)	50 (8.3)	1.562* (1.120-2.178)
Father activities: Playing a doll									
Yes	2400 (92.1)	206 (7.9)	1	2345 (90.7)	240 (9.3)	1	2448 (94.7)	137 (5.3)	1
No	693 (87.5)	99 (12.5)	1.664*** (1.120-1.829)	682 (86.8)	104 (13.2)	1.490** (1.166-1.904)	721 (91.7)	65 (8.3)	1.611** (1.185-2.189)
Father activities: Singing									
Yes	1358 (92.6)	108 (7.4)	1	1311 (90.4)	140 (9.6)	1	1385 (95.5)	66 (4.5)	1
No	1731 (89.8)	197(10.2)	1.431** (1.120-1.829)	1712 (89.4)	204 (10.6)	1.116 (0.889-1.400)	1780 (92.9)	136 (7.1)	1.603** (1.185-2.169)
Father activities: Body playing									
Yes									
No	2449 (91.8)	220 (8.2)	1	2384 (90.1)	263 (9.9)	1	2501 (94.5)	146 (5.5)	1
	637 (88.2)	85 (11.8)	1.485** (1.140-1.936)	636 (88.7)	81 (11.3)	1.154 (0.887-1.503)	661 (92.2)	56 (7.8)	1.451* (1.054-1.998)
Child rearing pattern: Control of feeding time									
Rational parenting style	2036 (92.1)	175 (7.9)	1	2007 (91.5)	187 (8.5)	1	2076 (94.6)	118 (5.4)	1
Another parenting style	1578 (91.1)	155 (8.9)	1.143 (0.912-1.433)	1520 (89.0)	187 (11.0)	1.320* (1.067-1.634)	1603 (93.9)	104 (6.1)	1.141 (0.870-1.498)
Child rearing pattern: Food introduction									
Rational parenting style	1237 (92.8)	96 (7.2)	1	1211 (92.2)	103 (7.8)	1	1245 (94.7)	69 (5.3)	1
Another parenting style	2393 (91.1)	233 (8.9)	1.255 (0.980-1.607)	2331 (89.6)	271 (10.4)	1.367* (1.078-1.733)	2449 (94.1)	153 (5.9)	1.127 (0.842-1.510)
Child rearing pattern: Control of sleeping time									
Rational parenting style	1019 (93.7)	69 (6.3)	1	998 (93.2)	73 (6.8)	1	1007 (94.0)	64 (6.0)	1
Another parenting style	2614 (90.9)	263 (9.1)	1.486* (1.129-1.956)	2548 (89.4)	303 (10.6)	1.626** (1.246-2.121)	2692 (94.4)	159 (5.6)	0.929 (0.689-1.253)
Child rearing pattern: Responding to cry									
Rational parenting style	661 (92.1)	57 (7.9)	1	639 (89.9)	72 (10.1)	1	667 (93.8)	44 (6.2)	1
Another parenting style	2973 (91.5)	275 (8.5)	1.073 (0.797-1.444)	2908 (90.5)	304 (9.5)	0.928 (0.708-1.216)	3033 (94.4)	179 (5.6)	0.895 (0.637-1.257)

* p-value < 0.05 ** p-value< 0.001
Remarked: N/A refers to insufficient data for analysis

Table 4   The final model of Multiple Logistic Regression for the child nutritional status

Predictors	Underweight Adjusted OR (95 % CI)	Stunting Adjusted OR (95 % CI)	Wasting Adjusted OR (95 % CI)
Gender			
Girl	1	1	N/A
Boy	2.194 (0.857-5.613)	2.082 (0.738-5.875)	
Birth weight			
≥ 2500 g	1	1	1
< 2500 g	10.068** (2.873-35.282)	4.490* (1.159-17.390)	3.937* (1.241-12.487)
Birth length			
≥ 50 cm	1	1	1
< 50 cm	2.229 (0.175-1.885)	2.344 (0.713-7.701)	1.638 (0.598-4.484)
Type of main caregiver			
Parents	1	1	1
Relative	0.574 (0.175-1.885)	0.355 (0.098-1.277)	4.035* (1.146-14.208)
Location			
Bangkok	1		1
Central	1.447 (0.000- .)		1.285 (0.000- .)
South	3.931 (0.000- .)	N/A	2.605 (0.000- .)
North East	1.313 (0.000- .)		8.349 (0.000- .)
North	4.180 (0.000- .)		3.336 (0.000- .)
Religion			
Buddhism	1	1	1
Not Buddhism	6.960 (0.957-50.608)	1.975 (0.389-10.019)	1.797 (0.215-15.032)
Mather age			
≥ 20 years old	1	N/A	1
< 20 years old	0.220 (0.048-1.013)		0.325 (0.067-1.583)
Mother height			
≥ 145 cm	N/A	1	N/A
< 145 cm		2.829 (0.254-31.540)	
Education of mother			
> Primary school	1	1	1
≤ Primary school	1.722 (0.599-4.952)	1.288 (0.440-3.770)	1.556 (0.569-4.260)
Number of family member			
< 5 people	1	1	1
≥ 5 people	1.686 (0.669-4.252)	0.544 (0.189-1.562)	1.320 (0.546-3.192)
Family income			
< 52,000 Baht	1	N/A	N/A
≥ 52,00 Baht	1.668 (0.565-4.926)		

* p-value < 0.05 ** p-value< 0.001
Remarked: N/A refers to insufficient data for analysis

Table 4   The final model of Multiple Logistic Regression of child nutritional status (cont.)

	Underweight	Stunting	Wasting
Predictors	**Adjusted OR (95 % CI)**	**Adjusted OR (95 % CI)**	**Adjusted OR (95 % CI)**
Frequency of ANC			
≥ 4 times	N/A	1	N/A
< 4 times		0.588 (0.107-3.230)	
Immunization OPV-DPT			
Completed	1	1	N/A
Not completed	0.380 (0.109-1.318)	0.734 (0.224-2.402)	
Age at which children were stopped breastfed			
< 6 months	1	1	1
≥ 6 moths	1.557 (0.434-5.585)	1.314 (0.355-4.867)	1.312 (0.372-4.624)
Time of introduced of complementary food: rice			
< 6 months	N/A	1	N/A
≥ 6 months		0.533 (0.059-4.771)	
Time of introduced of complementary food: banana			
< 6 months	1		
≥ 6 months	0.204 (0.017-2.505)	N/A	N/A
Mother activities: Playing a doll	N/A	1	1
Yes		0.481 (0.035-4.828)	2.090 (0.520-8.394)
No			
Mother activities: Singing			
Yes	1	1	1
No	0.309* (0.110-0.869)	0.501 (0.163-1.542)	0.716 (0.285-1.795)
Mother activities: Body playing			
Yes	1	1	1
No	0.372 (0.050-2.774)	0.356 (0.028-4.480)	0.616 (0.108-3.521)
Father activities: Go for walk			
Yes	1	N/A	N/A
No	1.982 (0.689-5.698)		
Father activities: Playing a doll			
Yes	N/A	1	1
No		2.014 (0.590-6.875)	0.868 (0.339-2.227)
Child rearing pattern: Control of feeding time			
Rational style	N/A	N/A	1
Not Rational style			0.881 (0.348-2.232)
Child rearing pattern: Food introduction			
Rational style	N/A	1	1
Not Rational style		2.325 (0.609-8.874)	0.802 (0.322-1.996)
Child rearing pattern: Control of sleeping time			
Rational style	1	1	1
Not Rational style	4.714* (1.163-19.097)	1.401 (0.363-5.412)	1.839 (0.585-5.781)
Child rearing pattern: Responding to cry			
Rational style	1	1	N/A
Not Rational style	1.966 (0.445-8.686)	1.569 (0.386-6.385)	

* p-value < 0.05 ** p-value< 0.001
Remarked: N/A refers to insufficient data for analysis

Discussion

This study showed that 8.3% of the children were underweight, 9.5% of the children were stunting and 5.7% of children were wasting by using WHO reference 2006[26].

Similar result of another study in urban and rural area in Thailand showed that prevalence of underweight were 9.3%, stunting were 11.9%, wasting were 4.1% for children under 5 years of age in 2005- 2006[27]. However, results of the studies in same study area but children of particular case was diffed in this study. Prevalence of malnutrition was 36.9% by weight for age, 42.5% by height for age and 17.8% by weight for height for children 1- 5 years of age in malaria endemic area of Thailand in 1998[28]. The result of the study of the slum area in Bangkok, Thailand was 25.4% by weight for age, 18.1% by height for age, 6.9% by weight for height for children 1- 5 years of age in 2001[29]. This study was revealed that prevalence of child nutritional status has large differences by region or situation of children in Thailand[30-32]. This can be suggested that strongly recommend to support nutritional education in those populations.

The study showed that parent's activities related significantly all three child nutritional status, but those were different results by the items of activities. After adjusting the confounding factors in the final model, singing from mother activities, mothers who were not singing was a protective factor for child underweight.

Playing for children improve many aspects of psychological well-being and reduce stress, depression, anxiety, loneliness and sleep problem. Playing also promotes enjoyment, which is essential for health[33-34]. The study of USA showed that play is essential to development that is contributed to the cognitive, physical, social and emotional well-being of children[35]. Play has always been part of learning and growing as well as providing enjoyment. The study of Europe found that according to research conducted in homes, play material and the quality of the mother's involvement with the child were significantly related to cognitive development during infancy[35-36]. Infant needs to provide stimulation and make sensory such as auditory, visual and tactile through playing. It is important that playing toys will create imagination and listening songs will develop languages. Moreover, the amount of play varied with the amount of family economy[37-38]. It may be possible reason that play is influence not only child development but child nutritional status as well. Therefore, parent's activities for child revealed the need for child development, growth and health in this study.

The study found that child rearing pattern except responding to cry related significantly nutritional status of underweight and stunting. After adjusting the confounding factors in the final model, control of sleeping time was the most significant factor for only underweight.

The same PCTC study of parenting style[39] showed that pattern of parenting style among infancy are unpredictable and not stable[40]. Parental responses will be related to parental attitudes, adjustment and sensitivity to child care practices[39, 40]. However, this study revealed that parenting style affected child nutritional status during the first year of life. Parents need to adopt authoritative parenting style that combine high levels of acceptance and warmth with firm control[41]. Authoritative parenting style such as rational parenting style is recommended as central approach but this study found that over pro-

tection parenting style was remarkable in Thailand41. According to Baumarind theory[33-34], permissive parenting style such as overprotect parenting style is lacked demanding dimension[39-44]. This parenting style unlike authority and control over their children[39]. The study of Iran showed that children who have parents or caregivers who permissive parenting style become dependent and lack social responsibility and are low in cognitive development[45]. Thus, child rearing and parenting has its advantages and disadvantages and is impact to child develop and health[46]. Any children have individuality, hence it is difficult to raise the children with uniform way. However, it is important that caregivers should learn way of thinking and gain knowledge about child rearing and parenting and find appropriate patterns of rearing that suit for own children.

Recommendations

The health care provider should explain and guidance about child rearing to mothers and families before baby discharge from hospital and at the well-baby clinic centers. Caregivers should be encouraged to use and read MCH handbook. Providing education program about child rearing class in child health centers would be useful, and to create knowledge sharing among mothers or caregivers will benefit for them and increasing opportunity, reflect and reconsider parenting style. Playing with the children and to combine play with other activities or health care services for all health care service centers should be involved and encouraged. In addition, consultation service individually in the hospitals or provided the guidance about importance of playing regularly will improve child psychological health and child development. Kinder garden's staff should be promoted to improve the environment of child rearing, the support from the policy makers among local administrators should be addressed.

Acknowledgements

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