Self-Assessment of Sexual Maturation in Thai Children by Tanner Photograph

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Abstract

Assessment of sexual maturation in adolescence is crucially important in clinical practice, because the possibility of concealed disease during the earlier period of child development needs to be detected. However, to undress children sometimes is problematic and unethical in several countries. Therefore, in this study the authors evaluated the concordance between children's self-assessment by Tanner photograph with a written description, and examination by pediatricians. One hundred and ninety four children (100 girls, 94 boys), aged 7-15 years, were recruited in this study. The outcome demonstrated that the two processes of investigation were in good concord: the weight kappa of 0.76 and 0.79 for the breast stage (B) and pubic hair stage (PH), respectively, in girls. In boys, the weight kappa were 0.59 and 0.73 for genital stage (G) and pubic hair (PH) stage, respectively. However, the weight kappa for genital stage was improved after the subjects were provided more time to examine themselves before choosing the photograph. In girls, the mean chronological age (CA) for B stage II, III, IV was 10.4±1.3, 12.5±1.3, 13.6±0.7 years and for PH stage II, III, IV was 11.9±1.4, 12.9±1.2, 13.5±0.9 years. The normal CA for the onset of puberty in girls was between 7.8-13.0 years. In boys, the mean CA for G stage II, III, IV was 11.3±1.7, 12.4±1.2, 13.2±1.2 years, and for PH II, III, IV was 12.2±1.3, 13.1±1.0, 13.9±1.7 years. The normal CA for the onset of puberty in boys was 7.9-14.7 years. In addition, the authors constructed the normal value for penile length in Thai boys, aged between 9-15 years, to be used as a reference. Therefore, this study demonstrated a good concordance between the self-assessment by Tanner photograph and examination by pediatricians. This can be applied for use in filed research, school screening and clinical practice.

Key word : Pubertal Staging, Tanner Photograph

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Adolescence is a period of rapid changes, bridging childhood to adulthood, that take place simultaneously: physical, psychological and social. The physical changes are the result of the interaction between growth hormones from the pituitary gland, and sex hormones, from gonads and adrenal glands. These result into the physical growth spurt and appearance of secondary sex characteristics in order to prepare themselves for fertility. The appearance of breast buds is the earliest sign of puberty in girls, whereas the increased testicular volume of 4 ml is the earliest sign of puberty in boys, according to the Tanner staging[1]. Many countries studied their own population for normal sexual maturation because there were many interrelated factors affecting the time of puberty such as socio-economic status, geographical environment and a secular trend[2-5]. Many previous studies showed the method to evaluate the changes associated with puberty such as bone age[6], hematocrit[7] and serum alkaline phosphatase[8]. Physical examination is the simplest way to assess puberty. However, undressing an adolescent in order to assess the signs of puberty sometimes is awkward especially in the field research or in school examination. The aim of this study was to develop a better method of puberty assessment by evaluating the agreement between self-assessment by photograph with a brief written description and physical examination by pediatricians. In addition, the result of this study could be used for assessing a larger population of normal Thai children to develop the norms of pubertal changes in Thai children.

MATERIAL AND METHOD

Pilot study

The pilot study was performed at the Endocrine Unit, Department of Pediatrics, Chulalongkorn Hospital, for the prevalence (p) of agreement between children's self-assessment by Tanner photograph with a brief written description and pediatric endocrinologist's physical examination (S.W.). Forty children (17 girls, 23 boys) were recruited into this pilot study. This group of children presented at the endocrine clinic because of various conditions such as goiter, familial short stature, constitutional delayed growth and puberty, normal early puberty and obesity. They were presented with a Tanner photograph and brief description for each stage of puberty and they had to choose the one that was appropriate for their stages. The assessment of sexual maturation was performed by a pediatric endocrinologist as a routine physical examination. All of them had normal development and intelligence; and they all co-operated well in this study.

Table 1. The agreement between children's self-assessment and pediatrician's examination for breast staging in girls.

Self-assessment	Pediatrician's examination			
	Stage I	II	III	IV
I	22	4	0	0
II	3	22	5	0
III	0	4	21	3
IV	0	0	4	8
V	0	0	1	3

Table 2. The agreement between children's self-assessment and pediatrician's examination for pubic hair staging in girls

Self-assessment	Pediatrician's examination			
	Stage I	II	III	IV
I	39	2	1	0
II	9	21	2	0
III	0	2	9	4
IV	0	0	2	9

Table 3. The descriptive statistic for breast Tanner stage in girls.

Stage	Chronological age (yr)										
	Min	Mean	Max	SD	Percentile						
					3	10	25	50	75	90	97
II	8.0	10.4	12.9	1.3	8.2	9.0	9.5	10.4	11.3	12.0	12.8
III	9.9	12.5	14.3	1.3	9.9	11.0	11.7	12.9	13.6	14.0	14.1
IV	12.2	13.6	14.7	0.7	12.3	12.6	13.0	13.8	14.1	14.4	14.6

In girls, the p values in this pilot study were 0.65 and 0.76 for breast staging (B) and pubic hair staging (PH), respectively. In boys, the p values were 0.70 and 0.57 for genital staging (G) and pubic hair staging (PH), respectively.

Study in normal children

From p values, the authors calculated the sample size to study in normal children. Sample size (N) = $Z_\alpha{}^2$ p q / d^2, $Z_\alpha = Z_{0.05/2=}1.96$ (two-tail) and q=1-p. The discrepancy accepted between self-assessment and pediatrician's examination (d) was 10 per cent.

Therefore, the sample sizes for B and PH in girls were 97 and 70 respectively. The sample sizes for G and PH in boys were 80 and 94 respectively. Two pediatricians (P.P. and T.K.) were trained to assess the pubertal development by pediatric endocrinologist (S.W.) and they were supervised throughout the study.

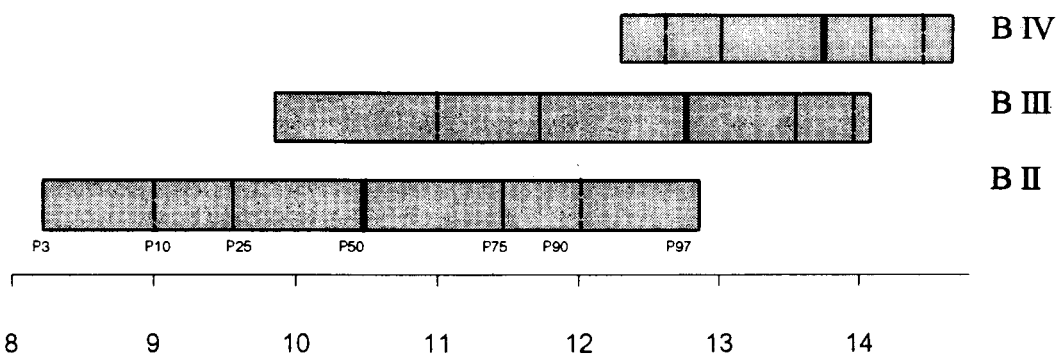

Fig. 1. Breast stage II, III, IV in Thai girls.

Table 4. The descriptive statistic for pubic hair Tanner stage in girls.

Stage	Chronological age (yr)										
	Min	Mean	Max	SD	Percentile						
					3	10	25	50	75	90	97
II	9.1	11.9	14.1	1.4	9.7	10.1	11.0	11.8	12.9	13.9	14.0
III	9.9	12.9	14.5	1.2	10.4	11.4	12.7	13.2	13.6	14.1	14.3
IV	11.9	13.5	14.7	0.9	11.9	12.1	12.9	13.9	14.0	14.2	14.6

Table 5. The agreement between children's self assessment and pediatrician's examination for genital staging in boys.

Self-assessment	Pediatrician's examination				
	Stage I	II	III	IV	V
I	3	3	1	0	0
II	0	19	9	4	0
III	0	6	16	10	0
IV	0	0	2	19	0
V	0	0	0	0	2

Table 6. The agreement between children's self assessment and pediatrician's examination for pubic hair staging in boys.

Self-assessment	Pediatrician's examination			
	Stage I	II	III	IV
I	17	6	2	0
II	2	28	4	1
III	0	3	21	5
IV	0	0	0	5

One hundred girls and 94 boys, aged 7-15 years, who attended the out-patient clinic because of acute illnesses were included in this study. All of them had normal intelligence observed by pediatricians and they studied in classes appropriate for their ages.

The process of the study was explained to the children and their parents and permission was given before performing the study.

Five Tanner stages of puberty (B and PH for girls, G and PH for boys) with a brief written description were presented to the subjects. If they

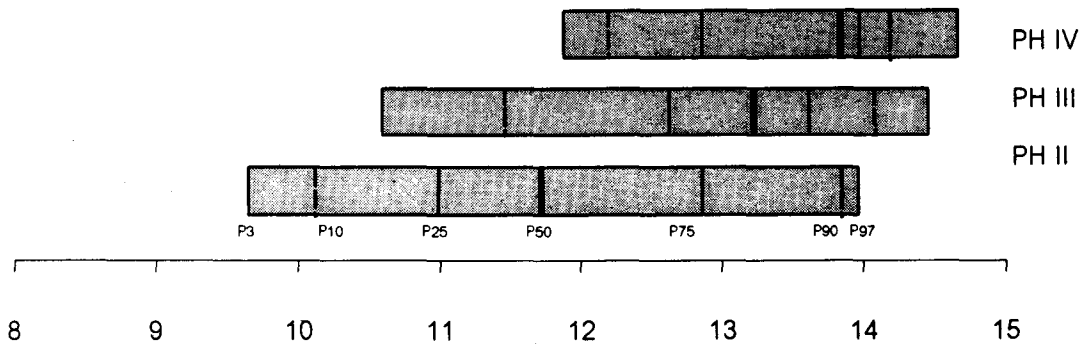

Fig. 2. Pubic hair stage II, III, IV in Thai girls.

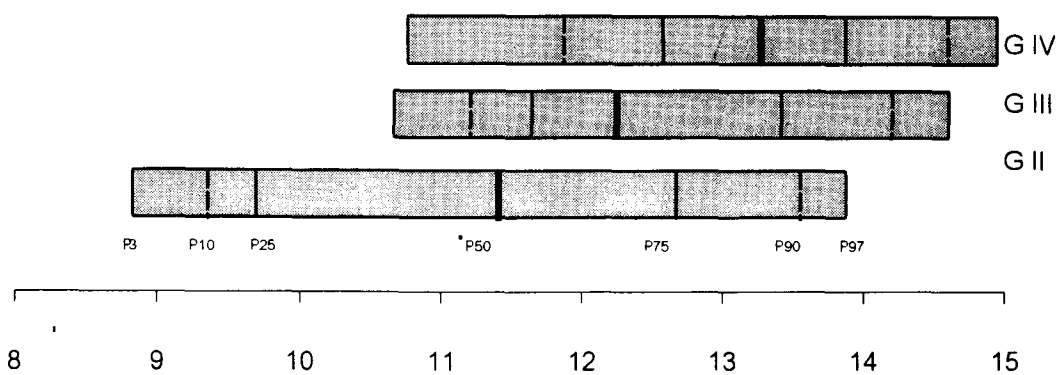

Fig. 3. Genital stage II, III, IV in Thai boys.

Table 7. The descriptive statistic for genital Tanner stage in boys.

Stage	Chronological age (yr)										
	Min	Mean	Max	SD	Percentile						
					3	10	25	50	75	90	97
II	8.1	11.3	14.1	1.7	8.8	9.3	9.7	11.3	12.7	13.6	13.9
III	10.6	12.4	15.1	1.2	10.7	11.1	11.7	12.2	13.3	14.2	14.6
IV	9.8	13.2	16.3	1.2	10.8	11.9	12.6	13.3	13.9	14.7	15.0

Table 8. The descriptive statistic for pubic hair Tanner stage in boys.

Stage	Chronological age (yr)										
	Min	Mean	Max	SD	Percentile						
					3	10	25	50	75	90	97
II	9.4	12.2	14.8	1.3	10.4	10.7	11.2	12.1	13.2	14.2	14.8
III	9.8	13.1	14.9	1.0	10.7	12.3	12.8	13.5	13.8	14.0	14.7
IV	11.9	13.9	16.5	1.7	11.2	11.9	13.1	13.7	15.2	16.3	16.4

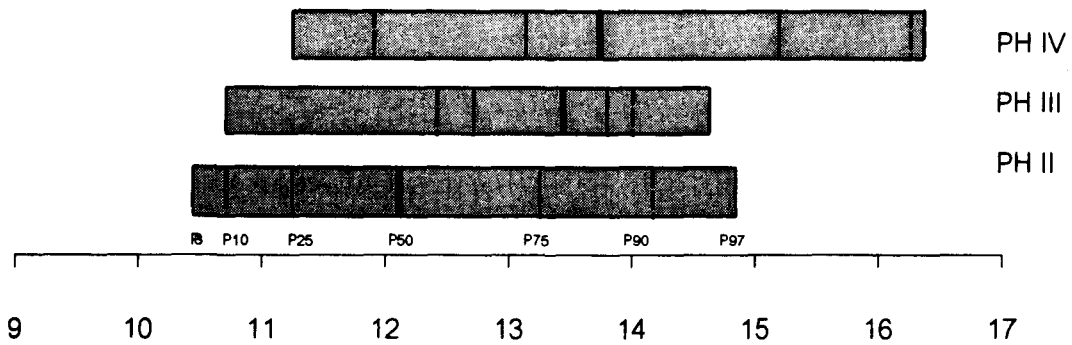

Fig. 4. Pubic hair stage II, III, IV in Thai boys.

Table 9. Mean and SD for penile length in Thai boys.

Age (yr)	N	Mean penile length (cm)	SD
9.1-10	9	4.9	1.2
10.1-11	9	5.5	1.4
11.1-12	17	6.1	1.4
12.1-13	17	7.8	1.7
13.1-14	26	7.1	1.7
14.1-15	9	7.5	1.3

had any queries, they could ask the pediatricians to explain more about the pubertal changes for each stage. They had to choose which one of five stages was appropriate for them. Subsequently, they would be examined by pediatricians to assess their pubertal staging. In addition, the height and weight of all children were recorded. The testicular volume was assessed by Prader orchidometer, and stretched penile length was also recorded for boys.

The data collected from pediatrician's examination was calculated for the mean chronological age for each stage of sexual maturation.

Statistical analyses

The data presented as mean, standard deviation and percentile. The measure of agreement was assessed by "Weighted Kappa".

RESULTS

Girls

One hundred girls presented at the outpatient clinic with various acute illnesses. This included 27 girls with upper respiratory tract infection (URI), 14 girls with peptic ulcer, 13 girls with viral and dengue infection, 14 normal girls and 32 girls with other minor problems.

The agreement between children's self-assessment and pediatricians' physical examination are shown in Table 1 for breast Tanner staging, and Table 2 for pubic hair Tanner staging. The Weighted

Kappa (Kw) for breast staging was 0.76 and for pubic hair staging was 0.79.

The authors could not identify breast and pubic hair Tanner stage V from physical examination in our children.

In breast Tanner II, 4/30 (13.3%) children overestimated and 4/30 (13.3%) underestimated their staging. However, 3/14 (21.4%) children overestimated and 3/14 (21.4%) underestimated their breast stage IV.

Similarly, 2/25 (8%) children over-and underestimated their pubic hair stage II. Four of thirteen (30.8%) children underestimated their pubic hair stage IV and nobody overestimated in this stage.

The mean chronological age (CA) for breast stage II was 10.4±1.3 years, stage III 12.5±1.3 years and stage IV 13.6±0.7 years. The percentile of breast stage is shown in Table 3 and Fig. 1.

The mean CA for pubic hair stage II was 11.9±1.4 years, stage III 12.9±1.2 years and stage

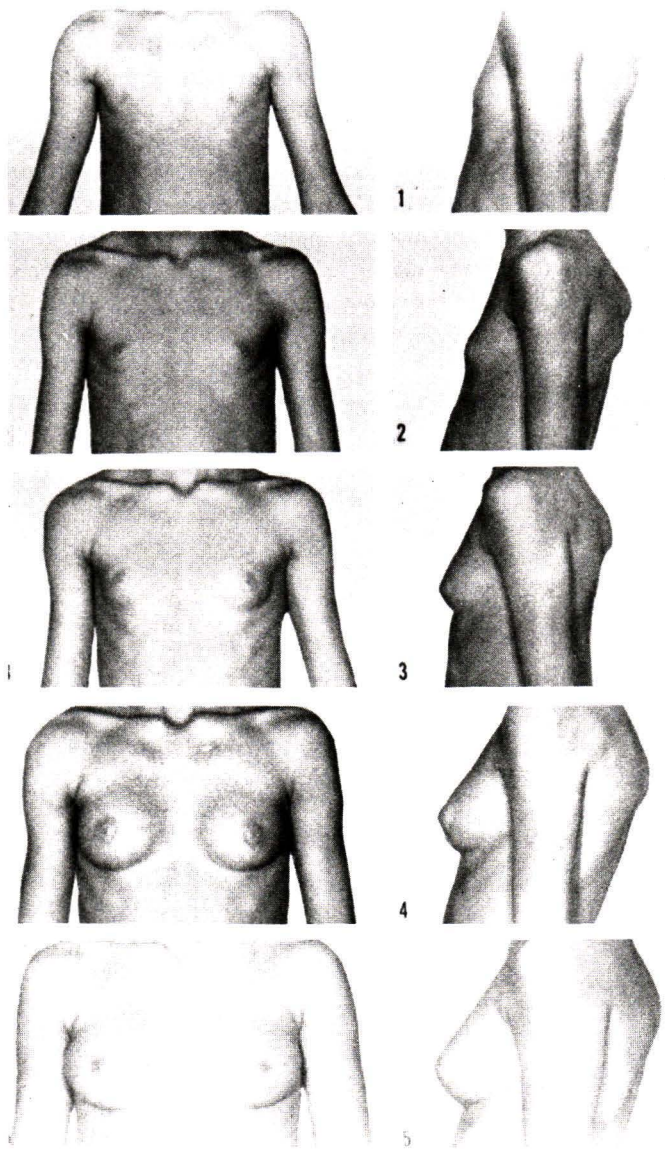

Fig. 5. Breast Tanner stage I, II, III, IV and V(1).

IV 13.5±0.9 years. The percentile of pubic hair stage is shown in Table 4 and Fig. 2.

The mean height difference between breast stage II and stage III was 13.3 cm and between stage III and stage IV was 4.2 cm.

Boys

Ninety-four boys presented at the outpatient clinic with various acute illnesses. This included 22 boys with upper respiratory tract infection (URI), 8 boys with peptic ulcer, 7 boys with allergic diseases, 5 boys with skin infection and 32 normal boys.

The agreement between children's self-assessment and pediatricians' physical examination are shown in Table 5 for genitalia Tanner staging and Table 6 for pubic hair Tanner staging. The Weighted Kappa (Kw) for genital staging was 0.59 and for pubic hair staging was 0.73. To improve the agreement for genital assessment, the authors studied another 11 boys by allowing them to examine themselves after seeing the photograph in the private room, and then they had to select the pubertal stage appropriate for them. Kw for G stage was improved to 0.85.

Similar to the study in girls, nobody had pubic hair Tanner V and only 2 boys had genital stage V from physical examination.

In genital staging, 6/28 (21%) children and 3/28 (10.7%) children over- and underestimated their genital stage II. No children and 14/33 (42.4%) children over-and underestimated their genital stage IV.

In pubic hair staging, 3/37 (8.1%) children and 6/37 (16.2%) children over- and underestimated their pubic hair stage II. No children and 6/11 (54.5%) children over-and underestimated their pubic hair stage IV.

The mean chronological age (CA) for genital stage II was 11.3±1.7 years, stage III 12.4±1.2 years and stage IV 13.2±1.2 years. The percentile of genital stage is shown in Table 7 and Fig. 3.

The mean CA for pubic hair stage II was 12.2±1.3 years, stage III 13.1±1.0 years and stage IV

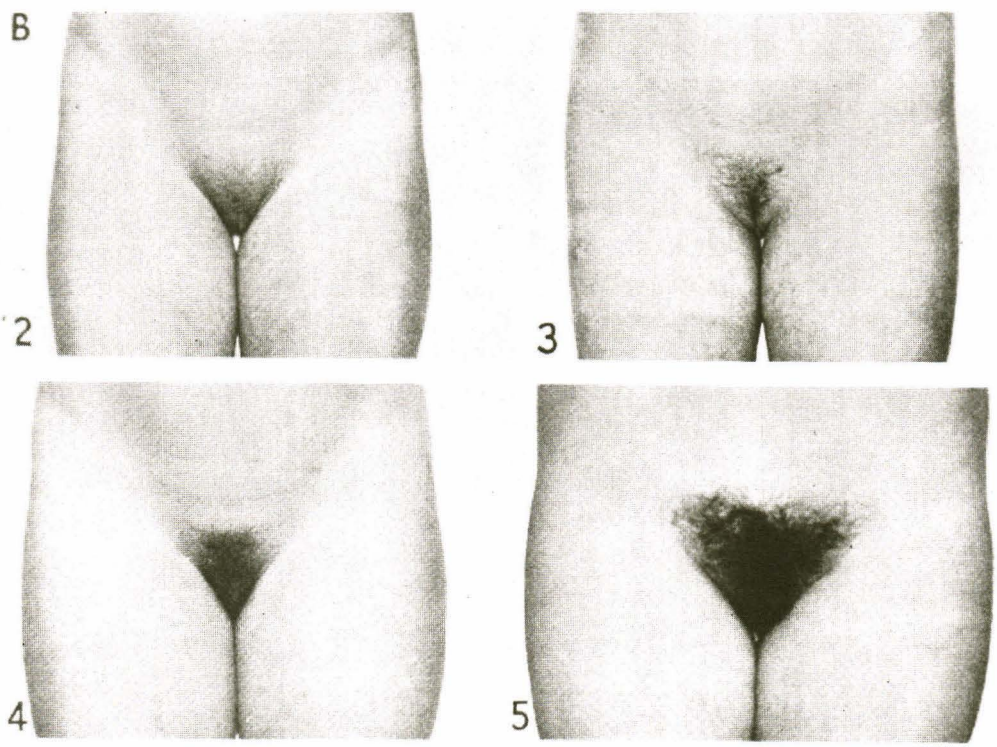

Fig. 6. Pubic hair Tanner stage II, III, IV, and V in girl(1).

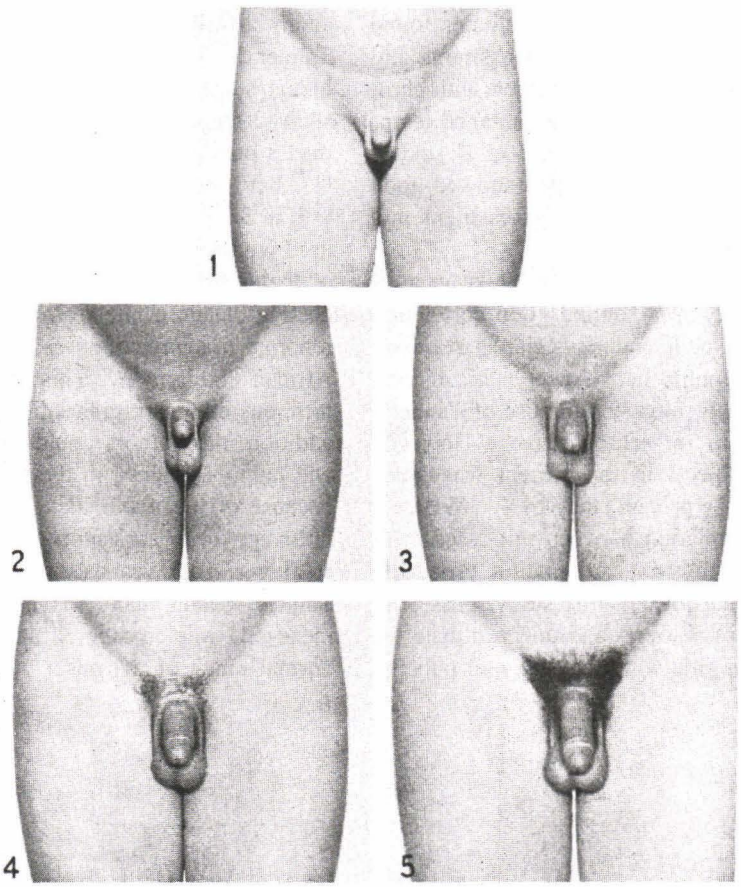

Fig 7. Genitalia Tanner stage I, II, III, IV, and V[1].

13.9±1.7 years. The percentile of pubic hair stage is shown in Table 8 and Fig. 4.

The mean height difference between genital stage II and stage III was 9 cm and between stage III and stage IV was 11 cm.

The mean and SD for penile length according to CA is shown in Table 9.

The mean penile length of genital stage II, III, IV was 4.2±0.7, 6.6±1.2 and 8.1±1.2 cm, respectively.

DISCUSSION

Assessment of sexual maturity is crucial for both healthy adolescents and children with chronic diseases. It is necessary to early recognize and early intervene in certain problems of child development such as precocious or delayed puberty, and short or tall stature, etc. In addition, the delay in puberty may reflect the severity of chronic illness. Physical examination is the most accurate to assess the pubertal staging in both boys and girls. This method needs to undress the children. Therefore, it is not easy to perform especially in field research and school screening. Furthermore, general physicians often ignore examination of the pubertal signs. It may be because of non-privacy in examination rooms or feeling uncomfortable examining an adolescent's private parts. If there was an alternative method to assess pubertal signs without examining the naked body, it would be more acceptable for both physicians and children. A method of pubertal self-assessment has been studied for many years[9-11]. However, the results were discrepant. This may be due to the different numbers of the children in each

study, the ethnic background, the age of children or the method used in the study. Many studies found good concordance between self-assessment and physician's examination even in children with chronic diseases[12] or in socially disadvantaged learning-disabled adolescents[13]. Williams et al studied obese adolescents and the result also showed good correlation between adolescent's assessment and physician's examination[14].

Previous studies in girls by Duke et al[9] and Lawrence SN et al[15] found good correlation between self-assessment and physician's examination in breast and pubic hair except pubic hair in the latter study. They suggested the use of Tanner's standard photographs for self-assessment. However, the size of the subjects in the present was much larger. In contrast, the present study by Wu WH et al [16] found less correlation between self-assessment by photograph and physical examination, especially in pubic hair. In the present this study, girls with late puberty were more over- and underestimate the stage of breast than girls with early stage of puberty. The explanation for this was probably due to the small difference between breast Tanner IV and Tanner V. In the present study, the mean CA of breast stage II or thelarche was 10.4 years. This showed the earlier stage of adolescence was sooner than a previous study in 1987 for normal Thai girls [17] but later than the study by Jaruratanasirikul et al [18] in Southern Thai schoolgirls. The reference data used worldwide by Tanner et al found the mean age of thelarche was 11.2 years[2]. In a recent year, a decline of age at thelarche and menarche has been reported in many countries, especially in American-African children[19]. This is probably due to the different ethnic origins and different life style. In addition, the authors could not demonstrate breast and pubic Tanner V in the present study. This was because of the maximal age of was 15 years. The mean age for breast Tanner stage V studied by Tanner et al was 15.3 years[2]. Asian girls may develop Tanner V later than girls in Western countries. If mean±SD was considered as the normal range, the normal range of the onset of puberty in Thai girls

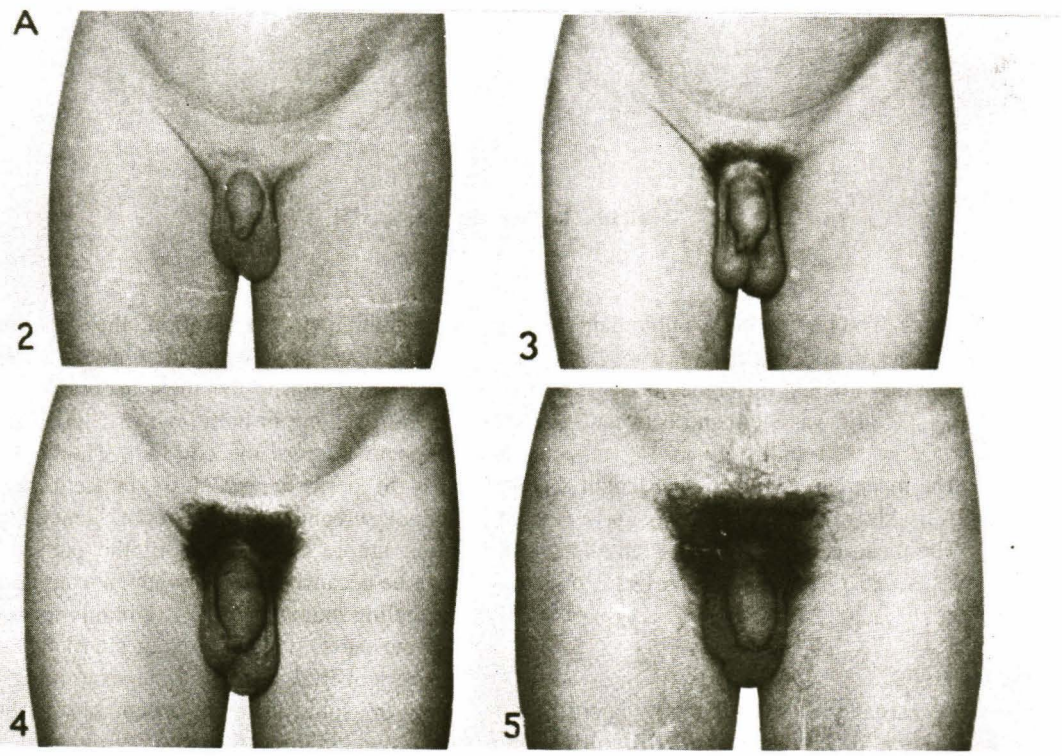

Fig. 8. Pubic hair Tanner stage II, III, IV, and V in boy[1].

would be 7.8 to 13 years. The pubarche was 1 year later than thelarche which was similar to other studies.

In boys, the assessment may be more complicated than in girls. Duke et al[9] found excellent agreement when they combined the genital and pubic hair stage for self-assessment. Initially, the agreement of genital staging in the present study was not so good. This was due to the small difference between each stage and some boys could not assess their own physical changes. However, we found the better agreement after was found allowing them to survey their pubertal signs in a private room after looking at the photograph and small discussion or drawing a picture. In contrast to girls, boys had a tendency to underestimate their genital and pubic hair stage in the advanced stage of puberty than those in early stage of puberty. This was similar to a previous study[13]. In the present study, only 2 boys had reached genital stage V and neither had pubic hair stage V. The reason for this was the same in girls. The mean age for genital stage V, studied by Tanner et al, was 14.9 years[3]. In the present study, however, the normal range of onset of puberty in boys was 7.9 to 14.7 years. The mean CA for the onset of puberty in boys was 11.3 years and this was not different from the onset in previous studies in Western countries[3,20,21]. However, no study in Thai boys has been performed before.

In conclusion, the pubertal self-assessment by photograph with a brief written description had a good concordance with the pediatrician's examination in both genders. To reach a more accurate assessment in boys, more time should be given for them to examine themselves after seeing the photograph and participating in a discussion. This method would be easier and more practical for field research or screening in schools. Furthermore, it could be used to find the norms of pubertal stages among nations by avoiding physical examination.

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REFERENCES

1. Tanner JM. Growth at adolescence, 2nd edition. Oxford, Blackwell, 1962.
2. Marshall WA, Tanner JM. Variation in the pattern of pubertal changes in girls. Arch Dis Child 1969; 44: 291-303.
3. Marshell WA, Tanner JM. Variation in the pattern of pubertal changes in boys. Arch Dis Child 1970; 45: 13-23.
4. Herman-Giddens ME, Slora EJ, Wasserman RC, et al. Secondary sexual characteristics and Menses in young girls seen in office practice: A study from the pediatric research in office settings network. Pediatrics 1997; 99: 505-12.
5. Loukid M, Baali A, Hilali MK. Secular trend in age at menarche in Marrakesh (Morocco). Ann Hum Biol 1996; 23: 333-5.
6. Daniel WA. Sex maturity rating. J Pediatr 1979; 95: 255-6.
7. Daniel WA. Hematocrit: Maturating relationship in adolescence. Pediatrics 1973; 52: 388-94.
8. Hope GM, Dyment PG. The relationship of serum alkaline phosphatase leves to stages of pubic hair defelopment. Cleve Clin Q 1975; 42: 313-7.
9. Duke PM, Litt IF, Gross RT. Adolescents' self-assessment of sexual maturation. Pediatrics 1980; 66: 918-20.
10. Carskadon MA, Acebo C. A self-assessment rating scale for pubertal development. J Adol Health 1993; 14: 190-5.
11. Berg-Kelly K, Erdes L. Self-assessment of sexual maturity by mid-adolescents based on a global question. Acta Paediatr 1997; 86: 10-7.
12. Boas SR, Falsetti D, Murphy TD, Orenstein M. Validity of self-assessment in adolescent male patients with cystic fibrosis. J Adol Health 1995; 17: 42-5.
13. Hardoff D, Tamir A. Self-assessment of pubertal maturity in socially disadvantaged learning-disabled adolescents. J Adol Health 1993; 14: 398-400.
14. Williams RL, Cheyne KL, Houtkooper LK, et al. Adolescent self-assessment of sexual maturation: Effect of fatness classification and actual sexual maturation stage. J Adol Health 1988; 9: 480-2.
15. Lawrence SN, Francine RK. General considerations in adolescent health care. In: Lawrence SN. Adolescent Health Care A Practice Guide. 3rd edition. Maryland USA, 1996: 3-37.
16. Wu WH, Lee CH, Wu CL. Self-assessment and physicians' assessment of sexual maturation in adolescents' in Taipei. Chung-Hua Min Kuo Hsiao Erh Ko I Hsueh Hui Tsa Chih 1993; 34: 125-31.
17. Khanjanasthiti P, Wattanakasert S, Junnanond C, Kotchabhakdi N, Sriwatanakul K. Adolescent growth. J Med Assoc Thai 1987; 70: 187-97.
18. Jaruratanasirikul S, Lebel L. Ages at thelarche and menarche: Study in southern Thai schoolgirls. J Med Assoc Thai 1995; 78: 517-20.
19. Kaplowitz PB, Oberfield SE. Reexamination of the age limit for defining when puberty is precocious in girls in the united states: Implications for evaluation and treatment. Pediatrics 1999; 104: 936-41.
20. Reynolds EL, Wines JV. Physical changes associated with adolescence in boys. Am J Dis Child 1951; 82: 529.
21. Barton WH, Hunt Jr EE. Somatotype and adolescence in boys: A longitudinal study. Hum Biol 1962; 34: 254.

การประเมินขั้นตอนของการเปลี่ยนแปลงทางเพศในเด็กไทยด้วยตนเองโดยใช้รูปภาพของแทนเนอร์

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การตรวจร่างกายเพื่อประเมินขั้นตอนการเปลี่ยนแปลงทางเพศมีความสำคัญในการวินิจฉัยโรคบางอย่าง แต่การตรวจร่างกายในระบบดังกล่าวบางครั้งทำได้ยากเนื่องจากจะต้องมีการถอดเสื้อผ้าออก ดังนั้นคณะผู้วิจัยได้ทำการศึกษาวิธีการประเมินขั้นตอนของการเปลี่ยนแปลงทางเพศด้วยตนเองโดยใช้รูปภาพพร้อมคำบรรยายของ Tanner เปรียบเทียบกับการตรวจร่างกายโดยกุมารแพทย์ เพื่อหาความสอดคล้องกันของวิธีดังกล่าว จากการศึกษาเด็กปกติที่มิได้มีโรคที่ทำให้เกิดความผิดปกติของการเข้าสู่วัยเจริญพันธ์จำนวน 194 คน (เด็กผู้หญิง 100 คน, เด็กผู้ชาย 94 คน) อายุ 7–15 ปี พบว่าการประเมินความสอดคล้องโดยใช้ weighted kappa มีค่าเท่ากับ 0.76 สำหรับการเปลี่ยนแปลงของเต้านม และ 0.79 สำหรับการเปลี่ยนแปลงของขนบริเวณหัวเหน่าในเด็กผู้หญิงและมีค่าเท่ากับ 0.59 สำหรับการเปลี่ยนแปลงของอวัยวะเพศและ 0.73 สำหรับการเปลี่ยนแปลงของขนบริเวณหัวเหน่าในเด็กผู้ชาย และพบว่าในเด็กผู้ชายถ้าให้เวลาได้สำรวจตัวเองก่อนที่จะมีการเลือกรูปภาพที่เข้าได้มากที่สุดพบว่า weighted kappa มีค่าดีขึ้น นอกจากนั้นจากการศึกษาครั้งนี้ยังได้ข้อมูลค่าปกติของ เต้านมระยะที่ II, III, IV เท่ากับ 10.4±1.3, 12.5±1.3, 13.6±0.7 ปี และขนบริเวณหัวเหน่าระยะที่ II, III, IV เท่ากับ 11.9±1.4, 12.9±1.2, 13.5±0.9 ปี ในเด็กผู้หญิง สำหรับในเด็กผู้ชายการเปลี่ยนแปลงของอวัยวะเพศระยะที่ II, III, IV มีค่าเท่ากับ 11.3±1.7, 12.4±1.2, 13.2±1.2 ปี และการเปลี่ยนแปลงของขนบริเวณหัวเหน่าระยะที่ II, III, IV เท่ากับ 12.2±1.3, 13.1±1.0, 13.9±1.7 ปี ช่วงอายุปกติที่เริ่มเข้าสู่วัยเจริญพันธ์ในเด็กผู้หญิงคือ 7.8–13 ปี และในเด็กผู้ชายคือ 7.9–14.7 ปี นอกจากนั้นการศึกษาครั้งนี้ยังได้ข้อมูลของความยาวองคชาติในเด็กผู้ชายปกติช่วงอายุ 9–15 ปี ดังนั้นผลจากการวิจัยครั้งนี้สรุปได้ว่าการประเมินขั้นตอนการเปลี่ยนแปลงทางเพศด้วยตนเองสอดคล้องกับการตรวจร่างกายโดยกุมารแพทย์ และสามารถนำวิธีดังกล่าวไปใช้ประเมินขั้นตอนการเปลี่ยนแปลงทางเพศในงานวิจัยที่ต้องทำการศึกษาในประชากรจำนวนมากหรือนำไปใช้ในการประเมินเด็กในโรงเรียนและการตรวจในห้องตรวจของแพทย์ทั่วไปได้

คำสำคัญ : ขั้นตอนการเปลี่ยนแปลงทางเพศ, รูปภาพแทนเนอร์

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