

Psychosocial Characteristics of Precocious Puberty In Korean Girls

JiEun Lee¹, Hye Young Ahn^{2*} and HyeSeon Choi³

^{1,2} College of Nursing, Eulji University
771-77 Beon-gil, Gyeryong-ro, Jung-gu, Daejeon 301-746, Korea
³ Department of Nursing, Woosuk University
* Corresponding Author: ahanaya@eulji.ac.kr

Abstract

The study compared body image and levels of self-esteem and depression between girls with precocious puberty and typical girls, identifying relationships between variables. Data were collected from July until August 2014. Study participants were first- to fourth-year female students in the D region who were diagnosed with precocious puberty in E university hospital and typical students in the same grades in the same region. The participants included 125 female students with precocious puberty and 176 typical students. Parents of both groups of females also participated. Using propensity score matching, 94 girls with precocious puberty and 94 typical girls were selected and their data were analyzed. The study used a body image scale called the Rosenberg's Self-esteem Scale, a tool to measure self-esteem, in addition to the Children's Depression Inventory. Collected data were analyzed using the SPSS/WIN 21.0 program. There was a significant difference in body image ($t=4.78$, $p<.001$), self-esteem ($t=3.81$, $p<.001$), and depression ($t=-3.32$, $p=.001$) between the two groups. The two groups showed that body image had a positive correlation with self-esteem and self-esteem had a negative correlation with depression. The analysis of girls with precocious puberty showed that body image had a negative correlation with depression, but typical girls showed that body image had a no correlation with depression. The study indicates the necessity for health education at home and school to help girls with precocious puberty perceive their body image in a positive way so that they can achieve healthy growth and development. In addition, this study can be used as a basis for understanding children with precocious puberty and for developing nursing interventions to promote psychosocial health.

Keywords: Precocious puberty, Body image, Self-esteem, Depression

1. Introduction

1.1. Necessity of Research

Female children begin puberty earlier today than they did 30 to 40 years ago, according to recent research conducted in the United States [1]. Korean girls also reach puberty earlier than before and they have their first menstrual period earlier by two to three months every decade [2]. With puberty starting earlier and social interest in this growing accordingly, the number of children visiting medical institutions due to early puberty signs are dramatically increasing. According to the results of a data analysis on 'precocious puberty (disease classification code E31.1)' conducted over five years, from 2006 to 2010, by the Health Insurance Review and Assessment Service in Korea, the number of patients receiving treatment for precocious puberty-related symptoms increased 4.4 times, from 6,400 in 2006 to 28,000 in 2010.

Precocious puberty refers to the appearance of puberty signs at early ages, with boys seeing their testicles start growing before age nine and girls experiencing breast development before age eight or their first period before age nine. Approximately one out of 5,000 to 10,000 children experience early puberty, and the number of girls with the condition is 10 times higher than that of boys. Precocious puberty is caused by an increase of a steroidal hormone secreted in the gonads, speeding up growth, enlarging body size and spurring bone growth. Early puberty, however, leads to the closure of growth plates earlier than that considered to be normal, which means a shortened time period for growth. Those with precocious puberty are taller than their peers during childhood, but eventually they may end up being shorter upon reaching adulthood [5].

Children with precocious puberty face physical changes earlier than do their peers, while their psychological growth does not keep up with their fast biological growth. Therefore, this fast physical growth can cause them to feel fear and confusion [6]. In addition, both the children that hit puberty earlier than expected and their parents experience anxiety [7]. Early sexual development can affect negatively girls. Researchers home and abroad have found that girls with precocious puberty were less satisfied with their body shapes than were their peers. In addition, they showed low self-esteem and were 1.9 times more likely to experience depression [8,9]. According to the studies carried out in Korea, earlier menarche resulted in a higher risk of emotional and behavioral problems, suggesting that early sexual development can adversely affect Korean girls as well [10].

Body image refers to a person's subjective concept and attitude toward his or her body, and it continuously changes over the lifetime due to growth and development, interpersonal relationships, disease and environment [11]. Those with a negative body image show, behavioral, psychological, and emotional problems, such as depression, anxiety, and a decrease in the ability to cope. During the school-age period, children form their identity, thus, a negative body image leads to low self-esteem, creating problems in character building and in maintaining smooth interpersonal relationships [12]. In addition, school-age children are very sensitive to their looks and react sensitively if their looks are not similar to those of their friends [11]. Precocious puberty causes those in lower grades in elementary school to have distinct sexual development, which leads to feelings of shyness and awkwardness, resulting in a change to their body image [13]. Previous studies have reported that girls with precocious puberty experienced anxiety related to body changes and dissatisfaction with their body shape changes, suggesting the necessity of research closely related to their physical growth and emotional adaptation [14]. Therefore, identifying the psychological and emotional statuses of children with precocious puberty is considered very important at a time when the number of children with the condition is increasing. Despite this, nursing research on precocious puberty has rarely been conducted.

This study compares body image and levels of self-esteem and depression between girls with precocious puberty and typical girls, identifying relationships between the variables. Results of the study will act as baseline data for understanding children with precocious puberty and might lead to the development of nursing interventions for addressing the psychological and social difficulties in these children.

2. Study Methods

2.1. Study Design

This study is descriptive research that compares body image and levels of self-esteem and depression between girls with precocious puberty and typical girls, identifying relationships between the variables.

2.2. Study Subjects and Data Collection

Data were collected from July until August 2014. Study participants were first- to fourth-year female elementary school students with precocious puberty and their parents, and typical students in the same grades and their parents living in the same region. This study completed the investigation process of the Institute of Life Research and the Institutional Review Board (IRB) of E University Hospital (EMC-2014-05-023-003). The study participants were selected from among girls diagnosed with and in treatment for precocious puberty from a medical specialist in the pediatric endocrinology clinic of a university hospital in the D region. The participants showed secondary sexual characteristics before age nine. Girls in first- to fourth grades in elementary schools were included in the typical group. Girls who had ever visited a hospital due to signs of early puberty were excluded from the typical group. Only the girls who understood the purposes of the study and gave both their consent and the consent of their parents in writing were selected as the study subjects.

To produce the number of samples required for the t-test, G-Power, a program to calculate the size of sample, was used. In referring to studies on elementary school students [13, 15] and based on the effect size of 0.35, a significance level of 0.05, and a statistical power of 0.80, a total of 272 samples, 136 per each group, were produced. The questionnaire was distributed to 136 girls with precocious puberty and the same number of copies was collected (100% collection rate). For typical girls, who were supposed to fill out the questionnaire together with their parents at home, a total of 217 copies were distributed, considering those who could be dropped out of the survey, and 200 copies were collected (92% collection rate). Out of the gathered copies of the questionnaire, 24 copies filled out by those who had visited hospitals due to precocious puberty-related signs and 11 surveys from girls with precocious puberty who are not included in the age group set by this study were excluded. By using the propensity analysis, a statistical technique to match data of the combined 301 girls according to age and grade, 94 girls with precocious puberty and 94 typical girls were chosen for analysis.

2.3. Study Tools

The study prepared two sets of questionnaires, one for parents and the other for children. The questionnaire for parents consisted of 10 questions: six on general characteristics of children and four on their physical growth. The other questionnaire for children consisted of 27 questions, including 10 on body image and 10 on self-esteem.

2.3.1. Body Image: The study used a tool [18] prepared by selecting part of the body image scale [17] that was modified for children. Osgood [16] developed the tool to measure body image [16]. The study's tool, which objectively measured subjective semantic representations, such as linguistic meanings or values, consisted of 10 questions based on the concept of "My body is." With each question rated on a five-point Likert scale, higher points reflect a positive body image. Cronbach's α , the reliability of the tool, was .81 [17] in the study that used the modified version, while the part of the survey selected for this research was found in previous research to have a Cronbach's α of .90 [18]. In this study, Cronbach's α was .86.

2.3.2. Self-Esteem: The study used the Korean version of Rosenberg's Self-Esteem Scale (RSES) [20], a body image measurement tool Rosenberg [19] developed. This tool is a self-report instrument consisting of 10 questions on the attitudes individuals have toward themselves. Each response is rated on a four-point Likert scale, with higher points indicating higher self-esteem. The reliability (Cronbach's α) of the Korean version was .78 [20]. In this study, it was .74.

2.3.3. Depression: To measure depression, the study used the Korean version of the Children's Depression Inventory (CDI-K) [22], developed by Kovacs and Beck[21]. The Korean version was adapted to Korea's specific situations and its reliability and validity were proven. This tool, which can be used for children aged 8 to 13, consists of 27 questions that measure depression, behavioral disorders, loss of interest, self-deprecation, and physiological symptoms. In this self-report assessment, each question receives zero to two points, with higher points indicating higher levels of depression. Cronbach's α of the tool at the time of development was .88. In this study, it was .81.

2.4. Data Analysis

SPSS 21 was used for the data analysis. Frequency, percentage, average and standard deviation were utilized to analyze general characteristics of study subjects. A χ^2 test and an independent t-test were used to analyze the differences in physical growth-related characteristics, body image, self-esteem and depression between the typical group and the precocious puberty group. To identify the relationships between body image and self-esteem and depression, a Pearson's correlation coefficient was used.

3. Study Results

3.1. General Characteristics of Girls with Precocious Puberty and Typical Girls

The test for homogeneity was conducted according to the general characteristics of the girls with precocious puberty and typical girls before the propensity analysis. The test found that the two groups were not homogeneous in their grades and ages. Thus, these variables were matched to each other through the propensity analysis and, as a result, homogeneity was secured with no significant difference found between the two groups.

A significant difference between the two groups was found in average height, with the precocious puberty group standing at, on average, 136.93 cm and those in the typical group having an average height of 134.23 cm ($t=-2.23$, $p=.027$). The two groups also showed a significant difference in average weight, with the former weighing 36.07 kg on average and the latter 30.49 kg ($t=-5.10$, $p<.001$). A significant difference between the two groups was found in average BMI, with the former at 19.02 and the latter at 16.82 ($t=-5.58$, $p<.001$) (Table 1).

Table 1. General Characteristics among Girls with Precocious Puberty and Typical Girls

Variable	Categories	Total sample (N=301)				Matching sample (N=188)			
		Precocious puberty (n = 125)		Typical (n = 176)		Precocious puberty (n = 94)		Typical (n = 94)	
		n (%) or m \pm SD	n (%) or m \pm SD	χ^2 or t	p	n (%) or m \pm SD	n (%) or m \pm SD	χ^2 or t	p
Grade	1	7 (5.6)	34 (19.3)	15.13	.002	6 (6.4)	6 (6.4)	0.00	1.000
	2	21 (16.8)	37 (21.0)			19 (20.2)	19 (20.2)		
	3	40 (32.0)	50 (28.4)			25 (26.6)	25 (26.6)		
	4	57 (45.6)	55 (31.3)			44 (46.8)	44 (46.8)		
Age (yr.)		8.89 \pm 0.98	8.34 \pm 1.28	-4.25	< .001	8.8 3 \pm 1.03	8.87 \pm 1.03	0.28	.778
Birth body weight (kg)		3.22 \pm 0.46	3.18 \pm 0.47	-0.66	.510	3.23 \pm 0.38	3.20 \pm 0.44	-0.53	.599
Height (cm)		137.39 \pm 7.33	131.60 \pm 9.47	-5.98	< .001	136.93 \pm 7.49	134.23 \pm 0.07	-2.23	.027
Body weight (kg)		36.54 \pm 8.39	29.13 \pm 6.25	-8.36	< .001	36.07 \pm 8.44	30.49 \pm 6.43	-5.10	< .001
BMI (Body Mass Index)		19.15 \pm 3.01	16.69 \pm 2.29	-7.70	< .001	19.02 \pm 2.96	16.82 \pm 2.44	-5.58	< .001

3.2. Physical Growth-Related Characteristics of Girls with Precocious Puberty and Typical Girls

Among physical growth-related characteristics, statistically significant differences between the two groups were found in signs of puberty: ‘breast budding’ ($\chi^2=83.64$, $p<.001$), ‘breast tenderness when lightly touched or tickled’ ($\chi^2=15.96$, $p<.001$), ‘increased acne and sedum production’ ($\chi^2=6.83$, $p=.009$), ‘vaginal discharge’ ($\chi^2_3=6.12$, $p=.029$), and ‘increased odor emanating from the scalp and armpit region’ ($\chi^2_3=19.07$, $p<.001$). A statistically significant difference was found in breast development between the two groups as well ($\chi^2=19.40$, $p<.001$) (Table 2). Of the girls with precocious puberty, 29.8% (n=28) were in the first stage of breast development (flat chest with only nipples), 63.8% (n=60) in the second stage (raised nipples with breast buds and small mounds beneath the nipple area), and 6.4% (n=6) in the third stage (breasts and areolas getting larger). In typical girls, 61.7% (n=58) were in the first stage of the breast development (flat chest with only nipples), 35.1% (n=33) in the second stage (raised nipples with breast buds and small mounds beneath the nipple area), and 3.2% (n=3) in the third stage (breasts and areolas getting larger).

These results are consistent with the results of a previous study [23]. A total of 69.9% of the children with precocious puberty in the Jeolla provinces showed breast development and hair growth in the pubic region, according to the previous study. Of the children with precocious puberty in Seoul, 96% saw their breasts grow bigger and 12% experienced hair growth in the pubic region. In addition, breasts of the girls with precocious puberty started to grow earlier than did those of typical girls, according to this study. This is line with the investigation [23] that found that 88.6% of the child patients visiting the department of pediatric medicine reported early breast development as the main symptom, and that early puberty and early breast development are among the main causes of precocious puberty [23]. In particular, the study discovered that some of the participants were diagnosed with precocious puberty for breast budding though their height and weight were typical. This suggests that if a child experiences breast development earlier than do her peers, she needs to see the doctor to get a correct diagnosis. Children themselves may not recognize such physical changes if they are young, so their parents should pay close attention to their children’s physical changes.

Table 2. Physical Growth-related Characteristics among Girls with Precocious Puberty and Typical Girls

Variable	Categories	y	Precociouspubert		χ^2	p
			(n = 94) n (%)	Typical (n = 94) n (%)		
Sign Of Puberty *	Breast development	es	71 (75.5)	9 (9.6)	83.64	< .001
		o	23 (24.5)	85 (90.4)		
	Breast tenderness when lightly touched or tickled	es	30 (31.9)	8 (8.5)	15.96	< .001
		o	64 (68.1)	86 (91.5)		
	Increased acne and sedum production	es	13 (13.8)	3 (3.2)	6.83	.009
		o	81 (86.2)	91 (96.8)		
	Hair growth in armpits and the pubic region	es	3 (3.2)	1 (1.1)	1.02	.621 [†]
		o	91 (96.8)	93 (98.9)		

(N=188)

	Lower abdominal cramping	es	4 (4.3)	-	4.09	.121 [†]
		o	90 (95.7)	4 (100)		
	Vaginal discharge	es	6 (6.4)	-	6.20	.029 [†]
		o	88 (93.6)	4 (100)		
	Increased odor emanating from the scalp and armpit region	es	24 (25.5)	3 (3.2)	19.07	< .001
		o	70 (74.5)	91 (96.8)		
Breast Development	Step 1: Flat chest with only nipples		28 (29.8)	58 (61.7)		
	Step 2: Raised nipples by breast buds and small mounds beneath the nipple area		60 (63.8)	33 (35.1)	19.40	< .001 [†]
	Step 3: Breasts and areolas getting larger		6 (6.4)	3 (3.2)		
Pubic hair Development	Same condition as pre-adolescence		87 (92.6)	89 (94.7)		
	Sprouting of lightly colored pubic hair		6 (6.4)	5 (5.3)	1.09	.767 [†]
	Increased hair growth in the pubic region		1 (1.1)	-		
Onset of menstruation	Yes		3 (3.2)	1 (1.1)	1.02	.621 [†]
	No		91 (96.8)	93 (98.9)		

* multiple response

†: Fisher's exact test

3.3. Body Image, Self-Esteem and Depression in Girls with Precocious Puberty and Typical Girls

A statistically significant difference was found in body image between girls with precocious puberty and typical girls, with the former scoring 39.97 points on average and the latter, 44.06 points ($t=4.78$, $p<.001$). The two groups also showed a significant difference in self-esteem, with the former garnering 31.84 points on average and the latter, 33.96 points ($t=3.81$, $p<.001$). A significant difference between the two groups was also found in depression, with the former standing at 34.34 points on average, and the latter at 32.07 points ($t=-3.32$, $p=.001$) (Table 3).

As described above, the scores of the precocious group's body image and self-esteem were lower than were those of the typical group's. These results are similar to results from previous studies [24] that reported girls with precocious puberty as being highly dissatisfied with their body image. This reflects the characteristics of school-age children. School-age children become aware of physical differences from their peers, and if they are not similar to their peers in appearance, they become self-conscious regarding the difference [11]. In particular, girls with precocious puberty who develop secondary sexual characteristics earlier than do their peers become self-conscious of their physical growth, and self-consciousness is not found to the same extent in children with typical development. This seems to have a negative influence on the body image of the girls with precocious puberty.

Self-esteem is related to body image. According to the research [25] on the effects of children's perception of body shape and body image on their negative emotions, children who perceive themselves as being obese are more likely to rate themselves low and feel depressed. The results of this previous research support the results of the current study. This study also found that the depression score of girls with precocious puberty is higher than that of typical girls, which is similar to the results of the previous study [26] showing a negative correlation between body image and depression in elementary school students.

Table 3. Body Image, Self-esteem and Depression among Girls with Precocious Puberty and Typical Girls

(N=188)

Variable	Precocious puberty (n = 94)	Typical (n = 94)	t	p
	Mean ± SD	Mean ± SD		
Body Image	39.97 ± 6.00	44.06 ± 5.74	4.78	<.001
Self-esteem	31.84 ± 4.10	33.96 ± 3.50	3.81	<.001
Depression	34.34 ± 4.92	32.07 ± 4.44	-3.32	.001

3.4. Correlation between Body Image, Self-Esteem and Depression in Girls with Precocious Puberty and Typical Girls

The analysis of girls with precocious puberty showed that body image had a positive correlation with self-esteem ($r=.547, p<.001$) and a negative correlation with depression ($r=-.370, p<.001$). Self-esteem had a negative correlation with depression ($r=-.589, p<.001$). In typical girls, body image also had a positive correlation with self-esteem ($r=.478, p<.001$), and self-esteem had a negative correlation with depression ($r=-.386, p<.001$).

The analysis of the entire group study subjects showed that body image had a positive correlation with self-esteem ($r=.557, p<.001$) and a negative correlation with depression ($r=-.318, p<.001$). Self-esteem also had a negative correlation with depression ($r=-.532, p<.001$). In summary, higher body image scores indicate higher scores for self-esteem and lower scores for depression, and the higher self-esteem children have, the more depressed they feel (Table 4).

As seen above, the result that the more positive the body image children have, the higher their self-esteem levels is similar to the results of a previous study [27] that reported a positive correlation between body image and self-esteem in obese children. In other words, children with a negative perception of their body image had lower self-esteem than did those who positively perceived their body image.

In this study, the precocious puberty group displayed a negative correlation between body image and depression, but the typical group showed no correlation between the variables. This is consistent with the findings of a previous study [26] of elementary school students. In this previous study, children with low body image experienced high degrees of depression because body image has a significant negative effect on depression. In particular, a negative correlation that appeared only in the girls with precocious puberty and not in typical girls indicates that precocious puberty-driven early physical changes have a significant psychological and emotional influence on the children with the condition.

In addition, self-esteem had a negative correlation with depression in both the precocious puberty group and the typical group. This is in line with the study on the effects of self-esteem on adolescents [12]. This study, however, showed that the correlation between self-esteem and depression is much stronger in the precocious puberty group than in the typical group. Considering the previous study [28], which reported that low self-esteem in school-age children has an impact on negative emotions, such as depression, leading to problematic behavior, such as difficulty adapting to school life, the findings of this study suggest that girls with precocious puberty should be given more attention and interventions compared to typical girls.

Table 4. Correlations among Body Image, Self-esteem and Depression

(N=188)

Variable		Body Image	Self-Esteem	Depression
Precocious puberty (n=94)	Body Image	1		
	Self-esteem	.547*	1	
	Depression	-.370*	-.589*	1
Typical (n=94)	Body Image	1		
	Self-esteem	.478*	1	
	Depression	-.136	-.386*	1
Total (n=188)	Body Image	1		
	Self-esteem	.557*	1	
	Depression	-.318*	-.532*	1

* $p < .001$

4. Conclusion

This study is descriptive research comparing girls diagnosed with and being treated for precocious puberty and typical girls of a similar biological age and the same social age using the one-to-one matching technique. The study found that, compared to typical girls, those with precocious puberty perceived their body image more negatively and that the more negatively they perceive their body image, the higher their depression level. In girls with precocious puberty, a correlation between body image and depression was found, and a stronger correlation was found between self-esteem and depression. This suggests negative influences of precocious puberty on body image and self-esteem in school-age children. For children with precocious puberty, the early appearance of signs of physical development can cause emotional and psychological problems. In other words, early appearance of easily detectable physical changes can cause children with precocious puberty to be the target of bullying, making it difficult for them to accept their physical changes. All of this indicates the necessity for health education at home and school to help girls with precocious puberty perceive their body image in a positive way so that they can achieve healthy growth and development. In addition, the study suggests the importance of early detection and treatment of precocious puberty in girls.

Health education should be provided at home and school so that girls with precocious puberty perceive their body image more positively and achieve healthy growth and development. The initial effort should concentrate on the development of programs on growth and development that reflect characteristics of children with precocious puberty and their special needs. In addition, close attention is required to prevent not only those with precocious puberty but also school-age children in general from experiencing physical change-driven psychological and social problems. Also required is the creation of an environment at home and school that allows children to more easily accept their bodily changes as a natural process.

Finally, this study, which identified the relationship between body image, self-esteem and depression among girls with precocious puberty and typical girls, is significant since its results can be used as baseline data for developing intervention programs for children with precocious puberty.

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Authors



Ji-Eun Lee, She got her Master of Science in Nursing at Eulji University, Daejeon, Korea. On March 2015 she got Doctor's course of Science in Nursing at Eulji University, Daejeon, Korea. On March 2015 she is a part-time lecturer, Department of Nursing, Woosuk University, Korea E-Mail :lje7399@naver.com.

Hye Young Ahn, She got her Bachelor of Science in Nursing, Seoul National University, Seoul, Korea. On 1992, she got her Master of Science in Nursing, Seoul National University, Seoul, Korea. On 1998, she studied Doctor of Science in Nursing, Seoul National University, Seoul, Korea. She is now a professor at the Department of Nursing, Eulji University, Daejeon, Korea E-mail:ahanaya@eulji.ac.kr