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Factors Influencing Early Puberty in School-Age Girls: A Comparative Study between Garmian and Sulaymaniyah Provinces, Iraq

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ABSTRACT

Precocious puberty in females is a growing public health concern due to potential harm to the child's physical, psychological, and social development. Even though there is literature internationally that provides some possible causative factors, evidence within Iraq is still lacking, especially when it comes to regional variations and multiple environmental, genetic, and behavioral determinants. Hence, the main purpose of conducting this research is to describe factors associated with precocious puberty and compare regional variations among affected girls. In Iraqi girls from the Garmian and Sulaymaniyah provinces, 100 girls between the ages of 6 and 12 who had been diagnosed with early puberty participated in a quantitative descriptive cross-sectional study design. The findings show significant regional variations in precocious puberty causes among Sulaymaniyah and Garmian's schoolgirls, suggesting potential links between biological, environmental, and lifestyle factors and the issue. The results mentioned above can raise awareness and encourage more research on the problem in Iraq. Therefore, it is critical to identify and implement preventative interventions for Iraqi girls who are at risk of early puberty.

Index Terms: Precocious Puberty, Early Puberty, Early Menarche, School-age Girls, Iraqi Girls

1. INTRODUCTION

The abnormally early initiation of pubertal development in which a child's body starts to evolve into an adult pattern sooner than expected is known as precocious puberty [1], [2]. According to the Mayo Clinic (2025), it is typically characterized in girls as the emergence of secondary sexual traits before the age of 8 [3]. The condition has been documented in numerous nations with variable incidence rates, and it is more common in girls than in boys [4]. It is marked by the early onset of secondary sexual traits, such as breast growth, the emergence of pubic or axillary hair, and hastened linear growth [5]. Early puberty affects physical, psychological, and social development that can lead to significant short- and long-term effects for the impacted girls [6].

The worldwide occurrence of central precocious puberty in girls varies from 1 in 5,000 to 1 in 10,000, with higher rates observed in recent decades [7], [8]. This growing trend has raised issues concerning the possible impact of environmental and lifestyle factors on puberty time [9]. In Iraq, the epidemiological information regarding precocious puberty is scarce; nonetheless, research carried out in Baghdad indicated that central precocious puberty is the most prevalent type, representing 79.5% of instances, particularly in girls [10]. Although there is little data on prevalence in the Kurdistan Region, there appears to be a trend toward early menarche, which could indicate that girls have been going through early puberty [11].

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There are growing signs to suggest that precocious puberty can be regarded as a multifactorial medical condition, where both genetic and environmental elements are involved [6], [12]. Moreover, epigenetic processes might facilitate the interplay between genetic predisposition and environmental factors affecting the timing of puberty [12]. Environmental factors such as endocrine-disrupting chemicals, air pollution, and secondhand smoke have been more frequently associated with changes in the timing of puberty and the earlier onset of puberty in children [13]. Recent global research has highlighted the role of obesity, inadequate sleep quality, poor diet, and low levels of physical activity in the onset of precocious puberty [14]–[16].

Although there is an increasing amount of international research on precocious puberty, studies in Iraq, especially in the Kurdistan Region, remain limited. Earlier research has primarily concentrated on the clinical characteristics and causes of precocious puberty, with less emphasis on the interplay of genetic, environmental, lifestyle, and socioeconomic influences [17].

Despite the differences in climate and lifestyle between these regions, no comprehensive comparative studies have been conducted on these factors among school-age girls in Garmian and Sulaymaniyah provinces. This study is significant as it examines various factors influencing early puberty in two different areas that have distinct climatic and lifestyle traits. Recognizing these regional variations could enhance early detection, increase parental awareness, improve healthcare strategies, and facilitate preventive measures concerning precocious puberty in children. The purpose of this study was to determine and examine factors influencing early puberty in school-age girls in Garmian and Sulaymaniyah provinces in Iraq.

2. SAMPLE AND METHODS

2.1. Study Design and Setting

A cross-sectional quantitative descriptive study was conducted between October 2025 and June 2026 to identify factors associated with precocious puberty among school-age girls in Garmian and Sulaymaniyah provinces. Precocious puberty was defined as the development of secondary sexual characteristics before the age of 8 years in girls.

The current study was conducted at Dr. Jamal Ahmad Rashid Pediatric Teaching Hospital, the oldest governmental pediatric teaching hospital located in Sulaymaniyah within the Kurdistan region of Iraq. The hospital was established in 1975 and offers both inpatient and outpatient medical care at no cost to children in Sulaymaniyah and neighboring governorates. The hospital also features specialty facilities such as the pediatric intensive care unit, the neonatal intensive care unit, the general pediatric ward, the nutritional rehabilitation department, and the chronic disease department.

All information was collected only from the chronic disease department, which serves as the referral and follow-up center for children with chronic diseases, including endocrine disorders. Children from other cities referred by the pediatricians to this department for further investigations, and then the professional committee of pediatricians decides whether the condition is confirmed or not according to the standard diagnostic criteria.

All participants of the present research were diagnosed by specialists in this department and visited for further follow-up. Diagnoses were verified by consulting the patients' records. No diagnostics were carried out during this study, and all collected information concerned the factors that lead to precocious puberty according to a special questionnaire.

2.2. Study Population and Sample Size

Convenience sampling was used in this study to get a sample size of 100 school-age girls with early puberty disorder, of which 55 came from Sulaymaniyah and 45 from Garmian. All eligible girls in the chronic disease department within 3 months of data collection were included because it is extremely rare to get a large sample size with confirmed premature puberty disorder, and the study was limited to one referral institution.

2.2.1. Eligibility Criteria

Girls aged 6–12 years residing in the Garmian or Sulaymaniyah province, with a current or previous diagnosis of precocious puberty and parental or guardian consent to participate, were eligible for inclusion. Girls were excluded if they had an unconfirmed diagnosis of precocious puberty or incomplete data. Boys, children outside the 6–12-year age range, and those residing outside this two area did not meet the study population definition and were not considered.

2.3. Data Collection Instrument

A structured questionnaire that was developed based on a review of the literature and earlier research on the variables influencing early puberty was used to gather data. To make sure that every question was understood correctly, it was

translated into Kurdish. The researcher performed in-person interviews in a departmental private room to get the data. Each interview lasted (40–45) min on average. Since the subjects were children between the ages of 6 and 12, the mothers (or, in the absence of mothers, the father or guardian) answered the questions, and the child's medical records and anthropometric and clinical measurements were taken directly from the child. Every family selected for this research was Kurdish. Three Families that declined to take part in the study had their data removed from the research.

Anthropometric measurements, family and genetic history, medical history, puberty characteristics, environment and lifestyle factors, and sociodemographic characteristics made up its six components.

2.4. Validity and Reliability

A group of 20 experts in the fields of pediatric nursing, pediatric medicine, community health nursing, maternity nursing, psychiatric nursing, and adult nursing reviewed the questionnaire's content validity. Modifications were made according to their recommendations.

The pilot testing involved 10 children diagnosed with precocious puberty to test the validity of the instrument, the time required for data collection, and its relevance. The participants in the pilot study were excluded from the final sample size of the study.

Cronbach's alpha was used to calculate the reliability coefficient of the questionnaire, which amounted to 0.887.

2.5. Statistical Methods

All statistical computation is better with the use of statistical methods (Statistical Package for the Social Sciences 24). The facts had been coded, tabulated, and introduced in a descriptive form. The statistical system that was utilized to determine the outcomes of the present study included: Descriptive data such as (Frequency, Percentage, Mean, and Stander deviation) and additionally Inferential statistics analysis: Chi-square test.

There are criteria for determining the probability level of significance of the test: *P*-value as:

1. High significant ($P < 0.001$)
2. Significant ($P < 0.05$)
3. Non-significant ($P > 0.05$)
4. Very highly significant ($P < 0.000$).

2.5.1. World Health Organization (WHO) body mass index (BMI) for children (5–19 years)

The WHO assesses BMI in children using BMI-for-age charts rather than fixed adult BMI cutoffs.

2.5.2. BMI formula

$\text{BMI} = \text{Weight (kg)} \div \text{Height (m)}^2$

2.5.3. WHO categories

WHO Z-score	Classification
<−3 SD	Severe thinness
−3 SD–<−2 SD	Thinness
−2 SD–+1 SD	Normal weight
>+1 SD–+2 SD	Overweight
>+2 SD–+3 SD	Obesity
>+3 SD	Severe obesity

SD: Standard deviation, WHO: World Health Organization

2.6. Ethical Considerations

The University of Sulaimani's College of Nursing's Research Ethics Committee and the Sulaymaniyah Directorate of Health granted the study ethical approval. All participants' parents or guardians have given their written consent before the experiment. In addition, the children participating in the study were informed about its goal and asked for their verbal agreement in age-appropriate language. All information collected was used only for research, and participants' privacy and identity were protected throughout the study.

2.7. Statistical Analysis

Version 24 of the Statistical Package for Social Sciences was used to analyze the data. The study's variables were summarized using descriptive statistics, including frequency, percentage, mean, and standard deviation. In inferential statistics, the Chi-square test was used to assess correlations between categorical variables and their regional distribution. Statistical significance was defined as a $P < 0.05$.

3. RESULTS

Table 1 shows how the selected characteristics are distributed within the study sample in Sulaymaniyah and Garmian provinces. The ages of participants were distributed mainly in both provinces according to their chronological age. Majority of the participants were between the ages of 8 and 10 years (46.00%), while the next largest group was those aged between 10 and 12 years (44.00%).

Only a small group of participants (10.00%) was <8 years of age. Although there was a slight difference between the

TABLE 1: Distribution of the sample according to socio-demographic characteristics and anthropometric measurement

Socio- demographic	Total	Sulaymaniyah	Garmian	*P*-value
	Fr (%)	Fr (%)	Fr (%)	
Age (years)				
6–8	10 (10.00)	6 (10.91)	4 (8.89)	0.104
8–10	46 (46.00)	30 (54.55)	16 (35.56)	
10–12	44 (44.00)	19 (34.54)	25 (55.55)	
Mean±S.D	9.98±1.69	9.67±1.62	10.35±1.72	
BMI according to the WHO				
Severe thinness	5 (5.00)	4 (7.3)	1 (2.2)	0.493
Normal weight	66 (66.00)	35 (63.6)	31 (68.9)	
Overweight	19 (19.00)	10 (18.12)	9 (20.0)	
Obesity	10 (10.00)	6 (10.9)	4 (8.9)	
Mean±S.D	23.67±6.78	23.74±4.49	23.58±7.74	
Total	100 (100)	55 (100)	45 (100)	

SD: Standard deviation, WHO: World Health Organization, BMI: Body mass index

two provinces, with Sulaymaniyah having a higher proportion of 8–10-year-olds (54.55%) and Garmian having a higher proportion in the 10–12-year-old age group (55.55%), the differences were not statistically significant ($P = 0.104$). Furthermore, the average age of participants in Garmian was slightly older (10.35 ± 1.72 years), compared to Sulaymaniyah (9.67 ± 1.62).

In terms of BMI, the majority of the participants (66%) were classified as having a normal weight. The second largest group was participants who were overweight (19%). The third largest group was participants who were obesity (10%). The number of participants classified as Severe Thinness was minimal (5.00%). There were some differences between the two provinces concerning the proportion of participants in the overweight group, where Garmian had more participants, but those differences were not statistically significant ($P = 0.68$). Overall, the similarities observed in the socio-demographics suggest that there are comparable distributions between the two provinces.

Table 2 shows that 82% of individuals developed their breasts before the age of eight, and 59% of them experienced pubic and axillary hair development before the age of 8. In addition, 44% of girls reached menarche before turning 10, with a statistically significant difference between the Sulaymaniyah and Garmian ($P = 0.035$). As a result, the Garmian administration has a greater rate of early menarche. In addition, 22% of girls had body odor, mood swings, or acne before the age of 8.

Table 3 shows that, depending on the geographic distribution of girls who experienced early puberty, there were significant relationships between the delivery mode and birth weight. The incidence rate for vaginal delivery was considerably higher in the Garmian area compared to the Sulaymaniyah area, where the incidence rate of cesarean section deliveries was considerably higher ($P = 0.002$). In addition, birth weight was observed to differ significantly between the two regions ($P = 0.043$).

Table 4 shows that, girls from Garmian showed a substantially greater positive maternal history than girls from Sulaymaniyah, indicating a significant association between early puberty history and regional distribution ($P = 0.002$). The differences were not statistically significant, although Garmian mothers were more likely to develop pubic/axillary hair before the age of 8, first menstrual cycle before the age of 10, develop acne or odor before the age of 8, develop breast tissue before the age of 8, have early puberty in siblings, and have a family history of endocrine disorders.

Table 5 presents the distribution of participants according to lifestyle characteristics in Sulaymaniyah and Garmian. Significant differences were observed between the two provinces regarding exposure to smokers ($P = 0.043$), cosmetic product use ($P < 0.001$), nutritional supplement use ($P = 0.046$), plastic container/heating food use ($P = 0.008$), diet type ($P = 0.010$), and snacking habits ($P = 0.003$). Overall, 54.0% of participants were rarely exposed to smokers, while 20.0% were always exposed. Cosmetic product use was reported as 41.0% sometimes and 19.0% always. Most of the participants (65.0%) rarely used plastic containers for heating food, and 84.0% reported consuming a natural diet. Nearly half (48.0%) reported snacking at night, whereas 28.0% snacked between meals.

TABLE 2: Distribution of the sample according to puberty-related signs

Puberty-related sign	Items	Total	Sulaymaniyah	Garmian	*P*-value
		Fr (%)	Fr (%)	Fr (%)	
First breast development <8 years	No	18 (18.00)	12 (21.82)	6 (13.33)	0.272
	Yes	82 (82.00)	43 (78.18)	39 (86.67)	
pubic or axillary hair development <8 years	No	41 (41.00)	25 (45.45)	16 (35.56)	0.317
	Yes	59 (59.00)	30 (54.55)	29 (64.44)	
First menstruation (menarche) <10 years	No	56 (56.00)	36 (65.45)	20 (44.44)	0.035
	Yes	44 (44.00)	19 (34.55)	25 (55.56)	
Acne/mood changes, or body odor before 8 years	No	78 (78.00)	46 (83.64)	32 (71.11)	0.133
	Yes	22 (22.00)	9 (16.36)	13 (28.89)	
Total		100 (100)	55 (100)	45 (100)	

TABLE 3: Distribution of the sample according to neonatal and birth characteristics

Birth characteristics	Total	Sulaymaniyah	Garmian	*P*-value
	Fr (%)	Fr (%)	Fr (%)	
Gestational age				
Full-term	15 (15.00)	6 (10.91)	9 (20.00)	0.309
Post-term	82 (82.00)	48 (87.27)	34 (75.56)	
Preterm	3 (3.00)	1 (1.82)	2 (4.44)	
Birth mode				
Natural vaginal delivery	59 (59.00)	25 (45.45)	34 (75.56)	0.002
Cesarean section	41 (41.00)	30 (54.55)	11 (24.44)	
Birth weight				
2.5–3.5 kg	22 (22.00)	7 (12.73)	15 (33.33)	0.043
>3.5 kg	66 (66.00)	40 (72.73)	26 (57.78)	
<2.5 kg	12 (12.00)	8 (14.54)	4 (8.89)	
Birth order				
First	46 (46.00)	29 (52.73)	17 (37.78)	0.232
Second	28 (28.00)	15 (27.27)	13 (28.89)	
Third or more	26 (26.00)	11 (20.00)	15 (33.33)	
Breastfed (>12 month)				
No	20 (20.00)	12 (21.82)	8 (17.78)	0.615
Yes	80 (80.00)	43 (78.18)	37 (82.22)	
Total	100 (100)	55 (100)	45 (100)	

Participants from Garmian had higher proportions of regular exposure to smokers, frequent cosmetic product use, processed food consumption, and night-time snacking, while those from Sulaymaniyah more commonly reported rare exposure to smokers, limited cosmetic product use, and natural dietary habits. No statistically significant differences were found for sleeping habits, screen time, physical activity, activity duration, polluted area exposure, or total sleep hours ($P > 0.05$).

4. DISCUSSION

The results from Table 1 suggest that the sample was rather homogeneous in terms of age, since the largest number of girls belonged to the 8–10-year-old group, and their average age was 9.98 ± 1.69 years, with no significant difference between the two provinces ($P = 0.104$). The age distribution pattern is identical to that of the study on pubertal girls in Sulaimani by Albassam *et al.* [17]. Regardless of whether the girls were from Garmian or Sulaymaniyah, the majority of them had a normal BMI (66.00%) in terms of their anthropometric status ($P = 0.493$).

However, it is noted that about 25% of the respondents (29 cases) fell into the category of being overweight or obese. While this is not the primary factor, it can contribute to precocious puberty in girls to some degree without having an overall impact on the determination of puberty for the entire sample population. The findings obtained here are different from those of another case–control study carried out in China [18] and a study [19] that found a strong correlation between high BMI among girls and early puberty in Sulaymaniyah.

TABLE 4: Distribution of the sample according to family and genetic history

Family and genetic history	Items	Total	Sulaymaniyah	Garmian	*P*-value
		Fr (%)	Fr (%)	Fr (%)	
Maternal history of early puberty	No	85 (85.00)	53 (96.36)	32 (71.11)	0.002
	I don't know	6 (6.00)	1 (1.82)	5 (11.11)	
	Yes	9 (9.00)	1 (1.82)	8 (17.78)	
Maternal pubic or axillary hair development <8 years	No	91 (91.00)	52 (94.55)	39 (86.67)	0.354
	I don't know	5 (5.00)	2 (3.64)	3 (6.67)	
	Yes	4 (4.00)	1 (1.81)	3 (6.66)	
Maternal menarche <10 years	No	82 (82.00)	48 (87.27)	34 (75.56)	0.066
	I don't know	4 (4.00)	0 (0.00)	4 (8.89)	
	Yes	14 (14.00)	7 (12.73)	7 (15.55)	
Maternal acne/mood/body odor <8 years	No	88 (88.00)	49 (89.09)	39 (86.67)	0.196
	I don't know	7 (7.00)	5 (9.09)	2 (4.44)	
	Yes	5 (5.00)	1 (1.82)	4 (8.89)	
Maternal breast development <8 years	No	76 (76.00)	42 (76.36)	34 (75.56)	0.955
	I don't know	8 (8.00)	4 (7.27)	4 (8.89)	
	Yes	16 (16.00)	9 (16.37)	7 (15.55)	
Sibling/relative with early puberty	No	73 (73.00)	44 (80.00)	29 (64.44)	0.120
	I don't know	9 (9.00)	5 (9.09)	4 (8.89)	
	Yes	18 (18.00)	6 (10.91)	12 (26.67)	
Family history of endocrine disorders (thyroid disorders)	No	58 (58.00)	33 (60.00)	25 (55.56)	0.87 0
	I don't know	7 (7.00)	4 (7.27)	3 (6.67)	
	Yes	35 (35.00)	18 (32.73)	17 (37.77)	
Total		100 (100)	55 (100)	45 (100)	

The present study found a higher prevalence of normal BMI among school-age girls compared with the findings reported in studies [18] and [19], although both studies focused on girls with early-onset puberty. As a result, the impact of BMI on people cannot be ignored, and it cannot be utilized as a differentiator in the comparison of the two provinces in this study.

Results in Table 2 support the findings of the study done in Slovenia that discovered the commencement of puberty due to the premature maturation of the hypothalamus–pituitary–gonad axis is the primary indicator of precocious puberty, which is characterized by early breast development, early pubertal hair development, and early menarche. Similarly, the present study found that the appearance of secondary sexual characteristics before the age of 8 years was common among the participants, consistent with the definition of precocious puberty in girls [20].

This study follows the typical pattern of pubertal onset in girls, where pubic hair appears first, followed by menarche [21]. The findings of one study, which examined women in Karbala, Iraq, and discovered that the average menarche age was 12.09 ± 1.39 years, are in conflict with those of another study. Less than 10 years old was the typical menarche age in the current study. According to the current study, Garmian had a higher prevalence of early menarche than Sulaymaniyah [22]. Thus, one may conclude that early menarche, pubic hair appearance, and breast growth are some key signs of precocious puberty.

Findings in Table 3 are consistent with recent research [23]–[25] that revealed low birth weight and cesarean delivery had an impact on early hormonal and metabolic development, increasing the risk of early puberty initiation. High birth weight and vaginal delivery may be linked to early hypothalamic–pituitary–gonadal axis activation [23]–[25].

The most recent results are consistent with the study that found that breastfeeding was linked to a higher incidence of central precocious puberty in girls, but low birth weight children had a lower risk [16]. Similarly, another study noted that the beginning of female precocious puberty may be linked to certain prenatal characteristics and environmental exposures [18]. Precocious puberty in this study was not significantly influenced by gestational age or birth order.

Conclusion, the findings of this research imply that premature puberty may be influenced by features during the neonatal period and childbirth, such as delivery type and birth weight.

Results in Table 4 are corroborated by a research [18], which indicated that maternal early breast development and early menarche age were important risk factors for female premature puberty [18]. Similarly, genetic and family variables

TABLE 5: Distribution of the sample according to lifestyle and environmental exposure

Lifestyle and environmental exposure factors	Items	Total	Sulaymaniyah	Garmian	*P*-value
		Fr (%)	Fr (%)	Fr (%)	
Girls exposed to Second hand smoking (passive smoking)	Rarely	54 (54.00)	33 (60.00)	21 (46.67)	0.043
	Sometimes	26 (26.00)	16 (29.09)	10 (22.22)	
	Always	20 (20.00)	6 (10.91)	14 (31.11)	
Cosmetic products use	Rarely	40 (40.00)	27 (49.09)	13 (28.89)	0.000
	Sometimes	41 (41.00)	26 (47.27)	15 (33.33)	
	Always	19 (19.00)	2 (3.64)	17 (37.78)	
Sleeps with light on at night	Rarely	68 (68.00)	38 (69.09)	30 (66.67)	0.548
	Sometimes	16 (16.00)	10 (18.18)	6 (13.33)	
	Always	16 (16.00)	7 (12.73)	9 (20.00)	
Bedtime after 22:00 PM	Rarely	15 (15.00)	8 (14.55)	7 (15.56)	0.837
	Sometimes	22 (22.00)	11 (20.00)	11 (24.44)	
	Always	63 (63.00)	36 (65.45)	27 (60.00)	
Night sleep <10 h	Rarely	21 (21.00)	12 (21.82)	9 (20.00)	0.37
	Sometimes	33 (33.00)	21 (38.18)	12 (26.67)	
	Always	46 (46.00)	22 (40.00)	24 (53.33)	
Waking up frequently at night	Rarely	54 (54.00)	33 (60.00)	21 (46.67)	0.16
	Sometimes	31 (31.00)	17 (30.91)	14 (31.11)	
	Always	15 (15.00)	5 (9.09)	10 (22.22)	
Nutritional supplements use (Multivitamin or Vitamin D)	Rarely	53 (53.00)	33 (60.00)	20 (44.44)	0.046
	Sometimes	25 (25.00)	15 (27.27)	10 (22.22)	
	Always	22 (22.00)	7 (12.73)	15 (33.34)	
Plastic containers/heating food (plastic use in cooking at home or outside, like plastic bottles for water)	Rarely	65 (65.00)	41 (74.55)	24 (53.33)	0.008
	Sometimes	17 (17.00)	10 (18.18)	7 (15.56)	
	Always	18 (18.00)	4 (7.27)	14 (31.11)	
Polluted area (Living near factories and agricultural areas)	No	94 (94.00)	52 (94.55)	42 (93.33)	0.528
	Not sure	1 (1.00)	0 (0.00)	1 (2.22)	
	Yes	5 (5.00)	3 (5.45)	2 (4.45)	
Screen time/Day	<1 h	15 (15.00)	10 (18.18)	5 (11.11)	0.351
	1–3 h	37 (37.00)	22 (40.00)	15 (33.33)	
	>3 h	48 (48.00)	23 (41.82)	25 (55.56)	
Physical activity	Yes	51 (51.00)	30 (54.55)	21 (46.67)	0.433
	No	49 (49.00)	25 (45.45)	24 (53.33)	
Activity duration/Day	>2 h	2 (2.00)	2 (3.64)	8 (17.77)	0.538
	1–2 h	15 (15.00)	8 (3.64)	7 (0.00)	
	<1 h	34 (34.00)	20 (36.36)	14 (15.56)	
	None	49 (49.00)	25 (45.45)	24 (53.33)	
Child's physical activity/Week	Daily	12 (12.00)	7 (12.73)	5 (11.11)	0.726
	4–6 times	1 (1.00)	1 (1.82)	0 (0.00)	
	1–3 times	38 (38.00)	22 (40.00)	16 (35.56)	
	None	49 (49.00)	25 (45.45)	24 (53.33)	
Sleep hours	<10 h	13 (13.00)	9 (16.36)	4 (8.89)	0.384
	8–10 h	59 (59.00)	33 (60.00)	26 (57.78)	
	<8 h	28 (28.00)	13 (23.64)	15 (33.33)	
Diet type	Natural	84 (84.00)	47 (85.45)	37 (82.22)	0.01
	Mixed	8 (8.00)	7 (12.73)	1 (2.22)	
	Processed	8 (8.00)	1 (1.82)	7 (15.56)	
Snacking (fast food, sweets, fruits)	No snacks	24 (24.00)	18 (32.73)	6 (13.33)	0.003
	Between meals	28 (28.00)	19 (34.55)	9 (20.00)	
	At night	48 (48.00)	18 (32.73)	30 (66.67)	
Total		100 (100)	55 (100)	45 (100)	

that regulate the hypothalamic–pituitary–gonadal axis have a significant impact on the timing of pubertal development [26]. Conclusion, it can be said that precocious puberty may be largely caused by genetic and familial determinants.

Results in Table 5 in this study suggest that passive smoking is linked to early puberty onset, confirming the presence of a strong association between exposure to passive smoking and geographical differences [6]. In addition, the higher

use of plastic materials and cosmetics in this study aligns with the results of some studies [18], [26]. Nonetheless, a study in China discovered that problems with sleep and overexposure to screens have been associated with early pubertal development, while sleep features and screen time were not significant in this study [18].

Regarding nutrition, it is noteworthy that the association between snacking and diet composition found in this study is in line with the findings of research [27], which found that snacking, sweets, and fried foods cause early puberty. Furthermore, the present study found that lack of physical activity was associated with early puberty, consistent with findings from a study conducted in Saudi Arabia [28].

5. CONCLUSION

The results of this study showed that there were some statistically significant differences between school-age girls in Garmian province and Sulaymaniyah province who had early puberty. These variables include early menarche, delivery method, birth weight, mother's history of early puberty, exposure to passive smoke, use of cosmetics and nutritional supplements, use of plastics when heating and storing food, physical activity, dietary habits, and snacking habits. Breast development before the age of 8 (82%), pubic/axillary hair development before the age of 8 (59%), and menarche before the age of 10 (44%) were among the most prevalent characteristics of pubertal development in the study group. Girls from the province of Garmian had a much greater incidence of early menarche.

Although the majority of participants had normal BMIs, 29% were overweight or obese. A number of factors were common to most people, such as eating habits, screen usage, sleep duration, and delayed bedtime. Some individuals also reported a family history of endocrine abnormalities, and several of them had mothers who had gone through early puberty.

In conclusion, the study's findings indicate that the school-age girls in Garmian and Sulaymaniyah under investigation had early puberty due to a variety of demographic, perinatal, familial, environmental, and behavioral factors. The findings of this study can contribute to our understanding of early puberty in Garmian and Sulaymaniyah girls.

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7. CONFLICTS OF INTERESTS

No conflicts of interest.

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