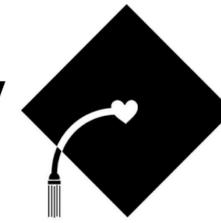


# Meat Consumption and its Association with Early-Onset Puberty

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## Introduction

### Abstract

This study was conducted to analyze the effects of consuming meat containing antibiotics and its effects on the development of early onset puberty in females. Enrolled in this retrospective case control study was 11 girls ages 12 -18. The dependent variable is the development of early-onset puberty. Precocious puberty is defined by symptoms of breasts development, menstruation, and growth of pubic hair and/or underarm hair before the age of 8 years old. The independent variable was measured based on the amount consumed per day. The analysis included 11 girls recruited through a school survey. A weak association was found in the odds ratio (OR) 0.95 (CI 0.66, 1.37) between the exposure of regular consumption of meat containing antibiotics and the outcome of females with early onset puberty. The results show no significant association between meat consumption containing antibiotics and early-onset puberty.

### Background

Society is moving at a fast pace and convenience foods are becoming a regular routine of everyday life. This alarming pace fosters the consumption of meat which has been linked to developmental influences. Several researchers suggest higher intakes of fat or animal protein are associated with earlier menarche, whereas higher intakes of carbohydrates, thiamine, iron, fiber and vegetable protein are related to later menarche.

In 1985, the Dortmund Nutritional Anthropometric Longitudinally Designed (DONALD) study investigated the extent to which current dietary recommendations are met in the years of preceding puberty onset was associated with the chronological age at the onset of pubertal growth spurt and body composition (Cheng et al, 1986). The study concluded that children with lower diet quality experienced early-onset puberty, independently of prepubertal body composition.

However, research done by Mi-Kyeong Kim, a pediatric specialist, analyzed the obesity index changes in girls with precocious puberty who needed more of the GnRHa treatment, as well as dietary habits of girls who needed weight loss (Heo, 2010). This study had its limitations due to the small number of subjects at a hospital participating in the questionnaires (Shim KS, 2011). The study showed that girls with precocious puberty had poor dietary habits and lifestyles in relation to obesity. This included but was not limited to fast eating and less physical activity which required intervention.

Although there has been numerous research and interest in the levels of nutrition habits in females, fewer studies have investigated a specific type of food product as an exposure. Antibiotics have been linked to the many adverse health effects in humans as well as a growing resistance in fighting certain bacterial strains (CDC). The current study was established to better understand how the consumption of meat containing antibiotics correlates to onset puberty in young females.

## Methods

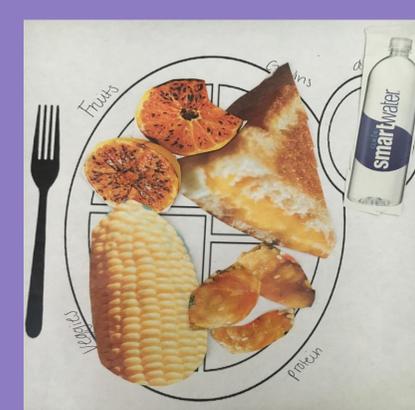
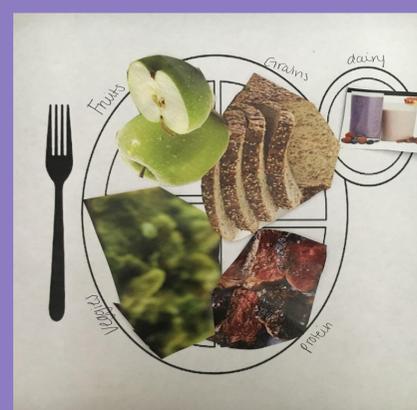
### Study Design/Sample

The data was gathered as a retrospective case-control study since precocious puberty is a rare condition yet a growing in incidence. Due to the target audience, females with self-reported early-onset puberty, time efficiency was imperative. However, because the sample consisted of minors, a distinction between primary and secondary participants was used to carry out the procedures of the study.

Participants were recruited through parent letters sent to Chucktown Squash students. Families who wished to participate were instructed to mail the letters with a the completed survey back to our corporate office. Notification of those who were eligible/ineligible were sent to corresponding households. The initial sample was 9 girls aged 12-18. Primary participants were excluded if adopted, albino, had not yet begun puberty, had a personal history of brain trauma/tumor(s), had/has a chronic diseases of malabsorption. The eligible sample was comprised of 11 girls (4cases, 5 controls): African American (N=9). The mean age of the sample was 13 years old. Parent demographics were taken separately.

After conducting my research, I followed it by a post-test intervention. The intervention was simply informing the females of eating healthier with less proportions of meat. To measure this, the girls had to correctly create a My-plate with the use of magazines. This method turned out to be most effective concluding my study.

	Early-Onset Puberty	No Early-Onset Puberty	Total
High Consumption of Meat Containing Antibiotics	1	2	3
Regular/Low Consumption of Antibiotic-Free Meat	1	5	6
<b>Total</b>	<b>2</b>	<b>7</b>	<b>9</b>



## Results

### Measures

Prior to the data collection, approval was obtained through the parent letters. The recruitment survey, Survey 1, was used to determine cases and controls. Survey 1 asked primary participants general questions regarding demographics specifically, race and age as well as "at what age did you begin menstruation; at what age did you begin breast development; and at what age did you notice the development of pubic hair and/or hair under your arms." There were 2 responses that followed the questions: (a) 8 years of age ;(b) >9. Secondary participants were asked about general demographics as well, specifically race and income.

The follow-up survey, Survey 2, was more specific to eating patterns prior to the onset of the primary participants puberty. Survey 2 asked the secondary participants "what type of meat with the following labels: Certified Organic and American Grassfed Certified, Animal Welfare Approved, and Certified Humane." For those who answered yes, the following question asked participants to specify which labeled meat products that purchased. Another question asked "how often does the subject consume these products?" The choices were (a) 4 days per week and (b) 3 days per week.

### Results

Of the total participants, 22% experienced early-onset puberty and 77% did not. Of the 22% that experienced early-onset puberty, 11% were exposed to regular consumption of meat containing antibiotics. Additionally, it was surprising to find that of the 22%, African American females accounted for the majority (4) of the cases, although the results remain insignificant.

The calculated OR expressed a 0.95 (CI 0.66, 1.37) weak increased association of consuming meat antibiotics with the outcome of early-onset puberty. The OR was adjusted for body mass index (BMI), income, insurance coverage, race. Since the odds ratio was more than 1, there was an increased odds of consuming meat with antibiotics among females with early-onset puberty compared to females without early-onset puberty. The calculated confidence interval was found to not be statistically significant since it the interval crossed over the value of 1. From all of our calculated statistically measures, we did not find a significant link between the regular consumption of meat with antibiotics and females who experienced early-onset puberty.

## Conclusions

Analysis revealed that more than half of the girls with regular consumption of meat containing antibiotics experienced a normal onset of puberty. The lower than expected percentage of girls who experienced precocious puberty concluded a rejection in the null hypothesis. Since the odds ratio was more than one, there was an weak increased association of exposure among females with early-onset puberty compared to females without early-onset puberty.

The study shows strength in it being one of the first studies to explore the association between the consumption of meat containing antibiotics and the onset of puberty. Additionally, the study uses a diverse sample of participants and a sufficient case to control ratio. Study limitation can be contributed to the many confounders that were unable to be accounted for including foods eaten outside of the household such as school lunches, current health state, and the environment. Lack of information regarding the true amount of antibiotics within meat products and a more precise account of how much meat was eaten by participants may have negatively impacted the study.

Due to the nature of the study, we are unable to pinpoint an exact exposure because the exposure has already occurred. Future studies should use a prospective study to better measure the association. A prospective study design, it will allow the participants to track their nutritional intake which will adhere to more accurate results. More research should be done to clarify the independent variable and its effects on the onset of puberty.

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