Azim Premji University

TEACHER'S GUIDE III: CAN EATING EGGS ALTER THE ONSET OF PUBERTY?

Parents of some preadolescent and adolescent students may hold the belief that including eggs in midday meals may alter the onset of their child's puberty. Teachers can use this question to invite Grade VIII students to connect what they learn about nutrition in the Grade VI science curriculum and puberty in the Grade VIII science curriculum. Discussions around this theme can also help students think more critically about the food choices they make and how diet can affect their development. It may be important to keep in mind that students at this age are often self-conscious and uncomfortable about physical changes in their appearance. For this reason, this exercise will be most effective if handled with sensitivity and respect for each student in class.

Opportunities for the classroom:

Chapter 7 ('Reaching the Age of Adolescence') of the Grade VIII science textbook (NCERT, 2024-2025) introduces students to puberty in this way: *"Growth begins from the day one is born. But upon crossing the age of 10 or 11, there is a sudden spurt in growth which becomes noticeable. The changes taking place in the body are part of growing up. They indicate that you are no longer a child but are on the way to becoming an adult... The period of life, when the body undergoes changes, leading to reproductive maturity, is called adolescence... The human body undergoes several changes during adolescence. These changes mark the onset of puberty. The most important change which marks puberty is that boys and girls become capable of reproduction. Puberty ends when an adolescent reaches reproductive maturity".*[1] This chapter also tells students that: *"Adolescence begins around the age of 11 and lasts up to 18 or 19 years of age... In girls, adolescence may begin a year or two earlier than in boys. Also, the period of adolescence varies from person to person".*[1] Teachers can expand on this theme and share that a variety of factors can affect the age of onset of puberty. These include our genetics, ethnicity, general health, socio-economic status, and even the chemicals we are exposed to in our environment.[2]

Highlight the importance of a healthy diet in supporting our nutritional needs during this period of change. Activity 7.4 of Chapter 7 in the Grade VIII science textbook invites students to: *"Make a group with your friends. Write down the items of food in your breakfast, lunch, and dinner you had on the previous day. Identify the items responsible for proper growth. Also identify the junk food that you consumed the previous day".*[1] Encourage students to try this activity out. Discuss any observations or reflections that they feel comfortable sharing in class. Highlight the fact that many scientific studies have shown that poor diets can alter the onset of puberty in one of two ways:

- Some diets can increase the risk of early onset or precocious puberty. Early onset puberty is when signs of puberty appear in girls before the age of eight (rather than between 8-13 years of age) and boys before the age of nine (rather than between 9-14 years of age).[3] Share that this effect has been seen in children

who consume diets rich in fat, sugar, animal proteins, and processed food.[4, 5] Draw students' attention to this line in the textbook: *"Chips and packed or tinned snacks, though very tasty should never replace regular meals as they do not have adequate nutritional value"*.[1] You could also invite them to reread Chapter 3 ('From Tasting to Digesting') of the Grade V Environmental Studies (EVS) textbook (NCERT, 2024-2025). This chapter draws students' attention to Kailash who: *"...does not like to eat homecooked food like dal-rice, vegetables, and roti. The only things he finds tasty are chips, burger, pizzas, and soft drinks from the market"*.[6] Because of these food habits, Kailash: *"...looks older than his age. His body is fat and flabby. He has pain in his legs. He is not very active"*.[6] Invite students to discuss what kinds of diets allow us to consume necessary quantities of fats, carbohydrates, and proteins. You can then share that early onset puberty has also been seen in children whose diets are contaminated with endocrine-disrupting chemicals like Bisphenol A (BPA).[4, 5] Point out that BPA is present in the plastic used in food containers, pesticides, fuels, and other industrial chemicals. Invite students to think of some possible ways in which this chemical can make its way into the food we consume. You can then draw their attention to the effect this chemical has on endocrine glands. Chapter 7 of the Grade VIII textbook tells students that: *"The changes which occur at adolescence are controlled by hormones. Hormones are chemical substances. These are secretions from endocrine glands or the endocrine system. The male hormone or testosterone begins to be released by the testes at the onset of puberty. This causes changes in boys about which you have just learnt, for example, the growth of facial hair. Once puberty is reached in girls, ovaries begin to produce the female hormone or estrogen which makes the breasts develop. Milk secreting glands or mammary glands develop inside the breasts. The production of these hormones is under the control of another hormone secreted from an endocrine gland called pituitary gland"*.[1] Invite students to think of how BPA can cause early-onset puberty: *We know that testosterone and estrogen are released at the onset of puberty. Can you guess or predict what effect BPA is likely to have on the glands producing these hormones? How would you support your prediction? Imagine you are a scientist. Can you think of a way to test your prediction?* You can share newspaper articles that show that paediatricians and gynaecologists from across India are reporting a rise in precocious puberty. But it is important to highlight the fact that the exact numbers of children showing it and the factors responsible for it are not known yet.[7]

- Some diets can delay the onset of puberty. Delayed onset of puberty is when a girl shows no breast development by age 13 and a boy shows no testicular enlargement by age 14.[8] Share that undernutrition (seen as children being underweight and/or showing stunting) and frequent illness in children, especially during critical stages of development, can disrupt their hormonal balance.[9, 10] This can delay the onset of puberty. Here, again, you can ask students: *Can you predict what effect undernutrition has on endocrine glands? How would you support your prediction?* Share with your students that there is evidence that undernutrition can play an important role in the delayed onset of puberty in Indian girls, especially those from rural (and marginalized) communities.[9, 10] Ask students: *Can you think of some reasons why girls from rural areas may not be getting enough or good quality food? Have you seen girls getting less or different food from the boys in their family?* Encourage students to support their responses with observations from their immediate environment. Highlight that midday meals can reduce the risk of delayed onset of puberty by supporting the nutrition of children and adolescents. You could ask students: *Do you get enough food in your midday meals? Do you think these meals are balanced? What would you add to these meals to make them more nutritious?*

Can including eggs in midday meals increase the risk of early-onset puberty? We could not find any study that links egg consumption with early-onset puberty in India. Can including eggs in midday meals reduce the risk of delayed onset of puberty? Rather than answer this question, ask your students why Chapter 7 of the Grade VIII science textbook lists eggs as an example of nutritious

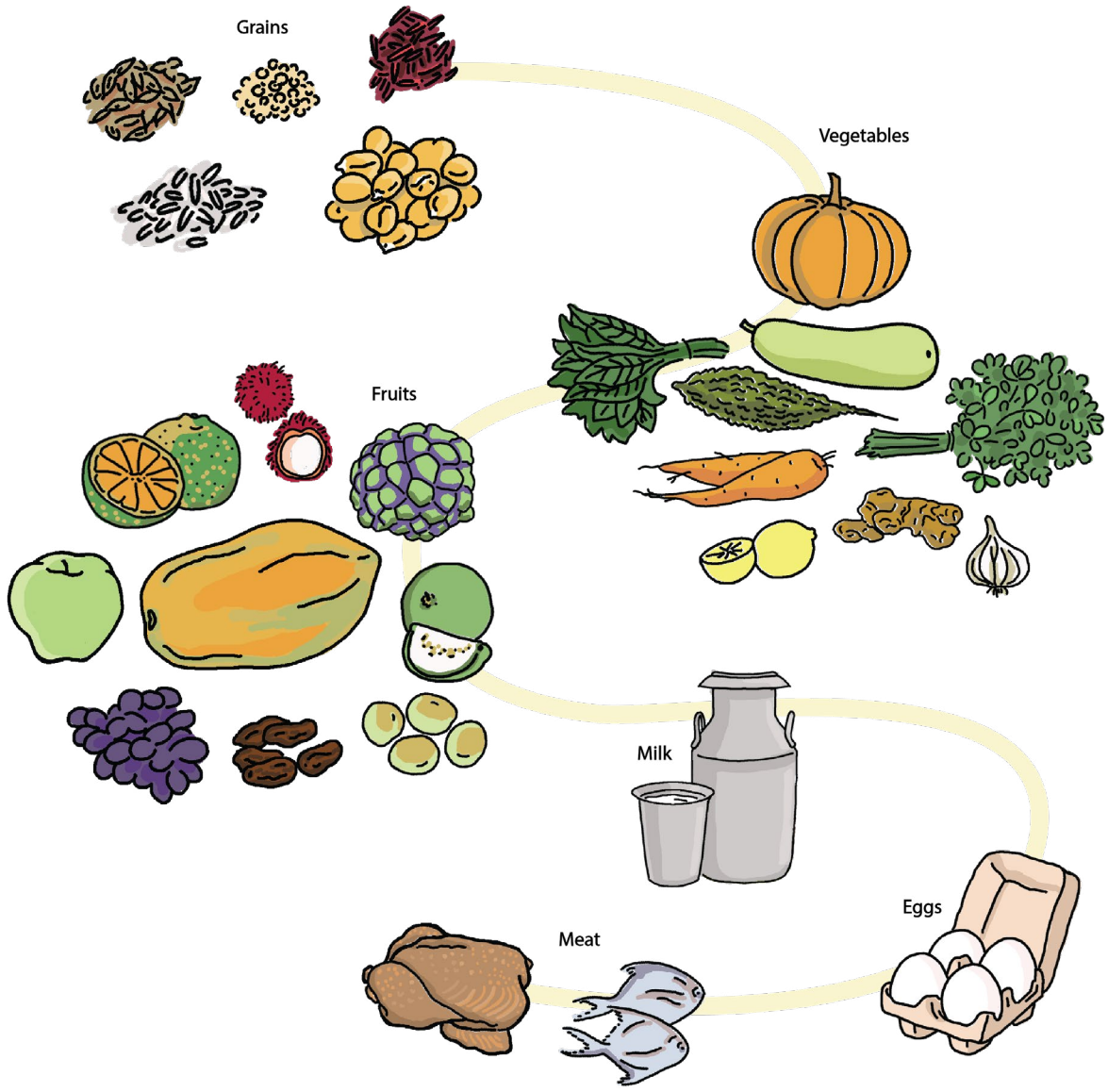

Fig. 1. Examples of foods that support the nutritional needs of adolescents. These are listed (on page 87) in Chapter 7 ('Reaching the Age of Adolescence') of the Grade VIII science textbook (NCERT, 2024-2025).
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food for adolescents (see **Fig. 1**). Encourage students to respond to this question by connecting it to what they have learnt about the different components of a nutritious and balanced diet in Chapter 3 ('Mindful Eating: A Path to a Healthy Body') of the Grade VI science textbook (NCERT, 2024-2025).[11]

You could end this discussion by drawing your students' attention to Activity 7.5 in Chapter 7 of the Grade VIII science textbook (NCERT, 2024-2025). This activity invites students to: *"Prepare charts or posters and paste them in the class so that you are aware of the diet for adolescents. You may use your creative ideas and present it like an advertisement"*.[1] Encourage students to work in groups and display their charts and posters in class.

Curricular connections:

Activities and discussions around this question can help meet the following curricular goals listed in the National Curriculum Framework for School Education (NCF-SE) 2023 for middle-stage science:

- CG-4: [The student] understands the components of health, hygiene, and wellbeing. Specifically, it can help students develop the competency to: (a) C-4.1: *"Undertake a nutrition-based analysis of food components with special reference to Indian culinary practices and modern understanding of nutrition, and explain the effect of nutrition on health"*; (b) C-4.2: *"Examine different dimensions of diversity of food—sources, nutrients, climatic conditions, diets"*; and (c) C-4.3: *"Describe biological changes (growth, hormonal) during adolescence and measures to ensure overall well-being"*.
- CG-7: [The student] communicates questions, observations, and conclusions related to science. Specifically, it can help students develop the competency (C-7.1) to: *"Use scientific vocabulary to communicate science accurately in oral and written form, and through visual representation"*.[12]

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