

PROPOSAL ABSTRACT:

Background: Adolescence is a critical developmental period of life and presents a window of opportunity to ensure a successful transition to adulthood. Puberty onset is associated with obesity, and metabolic and mental health risks, among other conditions. Thus, it is relevant to identify modifiable risk factors of early puberty. Dietary and lifestyle factors are major modifiable determinants of obesity, and some dietary factors (i.e., intake of dairy, vegetal proteins, soft drinks, isoflavones) have been linked with the timing of puberty. However, studies have mainly been focused on specific nutrients or food groups and led in girls measuring age at menarche. Even when findings between dietary factors and puberty align with current nutritional guidelines that favor healthy and quality diets over highly processed and energy-dense diets, it is unknown whether the diet quality is associated with puberty onset in girls and boys.

Hypothesize and objectives: We hypothesize that: 1. *girls with higher diet quality have a puberty onset and age at menarche later than those with lower diet quality, and 2. boys with higher diet quality have a puberty onset later than those with lower diet quality.* We propose **two objectives.** **First, we will validate a new tool to collect dietary data named Dietary Quality Questionary (DQQ), which is easy and quick to use.** We will use DQQ, and to estimate diet quality according to a new index based on the Global Dietary Recommendation (GDR) that considers current nutritional recommendations according to the World Health Organization's (i.e., recommended amounts for intake of fruits and vegetables, legumes, fiber, total fat, saturated and unsaturated fats, salt, free sugars, processed meat, unprocessed red meat). **Second, in a sample of Chilean pre-adolescents, we will associate diet quality in girls and boys with the timing of puberty.**

Methods: We will test our hypothesis building up on a longitudinal study initiated in 2016, which consisted of 962 preschoolers at baseline from low-and middle-income families in the urban area of Southeast Santiago. Participants have been followed up annually with anthropometric and dietary assessment, along with pubertal development using physical examination. For the current study, we will include children with available dietary (at least one 24-hour recall (24HR) per participant), pubertal markers (onset puberty=Tanner stage 2 genital (G2) or breast (B2) development; and puberty completion age at menarche) and anthropometric information collected in two-time points: 1) 6-9 y (2018-2019), 10-13 y (2022-2023). For the data collection funded by the current proposal, we will collect the same data at the age of 12-15 y (2024-2025). Dietary data have been and will continue to be collected using 24HR by trained dietitians using the software SER-24H. We also propose to add a new dietary tool for evaluating dietary quality: the DQQ. The DQQ comprises binary (yes/no) questions about foods consumed (using amounts >15g) on the previous day or night. Nutrition Experts have adapted DQQ for the Chilean population. DQQ can estimate indicators of dietary quality, such as GDR scores (composed of 2 subcomponents: GDR-Healthy indicates the recommendations on "healthy" foods such as fruits and vegetables, beans and other legumes, nuts and seeds, whole grains, and dietary fiber, whereas GDR-Limit is an indicator of the recommendations on dietary components to limit such as total fat, saturated fat, dietary sodium, free sugars, processed meat, and unprocessed red meat). Before applying DQQ, we will validate it using previously collected dietary data from 24HR (2018-2019) and test its ability to evaluate dietary quality using GDR.

For testing our hypothesis, we will use Cox proportional hazard regression models to investigate the prospective relevance of diet quality at baseline and changes during puberty according to GDR score and its subcomponents with pubertal markers (i.e., age at which they reach B2, G2 and age at menarche). Hazard ratios and 95% confidence intervals will be estimated to compare the moderate and higher diet quality second and third tertiles of GDR score, respectively) with the lower diet quality (first tertile of GDR score) in these models. To determine if weight status is a modifier of the association under study, we will test an interaction with weight status categories (normal weight and excess weight) before B2/G2 and during puberty (age at menarche). We will compare the mean value of the outcomes (age in Breast 2/Genital 2 and age at menarche) by weight status. All analyses will be performed with the significance level at $P < 0.05$, except for the interactions, where $P < 0.1$ will be considered significant. All correlations and regression models will be conducted in STATA v.17.0 (StataCorp).

Understanding the effects of the overall diet and diet quality in pubertal development could aid in generating hypotheses about specific dietary factors mediating puberty. Lastly, it emphasizes the need for initiatives to improve dietary quality in children to translate into improved dietary quality in adolescence and adulthood. Besides, this study will provide a validated easy-to-apply dietary tool for the Chilean context, which could be used for dietary monitoring in primary care settings.