IN VITRO BIOAVAILABILITY OF PHYTOCHEMICALS OF SELECTED PIGMENTED RICE, VEGETABLES AND FRUITS IN THE PHILIPPINES

Rosario S. Sagum, Ph.D., Aida C. Mallillin, Amster Fei P. Baquiran, and James David S. Alcantara

BACKGROUND
Phytochemicals are naturally occurring compounds that are mainly found in plants. They act as antioxidants which can protect cells from oxidative stress and can help reduce cancer cells through inhibition of free radical formation. Bioavailability, on the other hand, refers to substances obtained from the ingestion of materials that reaches the circulatory/digestive system for further delivery to the designated tissues. However, the bioavailability of phytochemicals by which health benefits depend on are not well understood and investigated.

OBJECTIVE
The study was determined the in vitro availability of phytochemicals in fruits, vegetables and pigmented rice. Specifically, the phytochemicals analyzed for availability were total anthocyanidins, total polyphenols and total flavonoids.

MATERIALS AND METHODS
Various fruits (green mango, mangosteen, santol, soursop, mulberry, avocado, tiesa and Spanish plum), vegetables (raw and steamed eggplant, violet cabbage, violet winged bean, jute and string beans) and pigmented rice (raw and cooked variants of black, red, pink, yellow, and violet rice) were analyzed for phytochemical contents and availability. Total phytochemical content and availability was evaluated using colorimetric methods and in vitro method simulating conditions in the small intestine, respectively.

RESULTS
Among the fruit samples analyzed, avocado (59.9±2.7%), mulberry (68.6±0.7%) and Spanish plum (76.5±0.9%) have the highest bioavailability for anthocyanidins, polyphenols and flavonoids, respectively. For vegetables, anthocyanidin, polyphenol and flavonoid availability were highest for steamed eggplant (76.8±1.7%), steamed jute (97.1±0.3%) and raw violet cabbage (87.5±0.5%), respectively. For the pigmented rice, polyphenol availability was highest in the raw violet rice (52.3±0.6%) and cooked red rice (30.2±1.0%).

CONCLUSION AND RECOMMENDATIONS
For the pigmented rice, only polyphenols were found to be available in vitro while majority of phytochemicals analyzed in vegetables and fruit samples were available for absorption in the small intestine. The results could be affected by various factors such as the plant tissue material of the samples, the processing method introduced (cooking/heating) and the limitations of the in vitro method. Validation studies on the physiological functions of phytochemical content in the selected samples should be pursued.