

Biphasic Glucose Curve Morphology Reflects Better Glucose Tolerance and Substrate Utilization

JEHU N. APAFLO, JOSHUA LABADAH, ALI MOSSAYEBI, VICTORIA ROCHA, & SUDIP BAJPEYI

Metabolic, Nutrition, and Exercise Research Laboratory; College of Health Sciences; The University of Texas at El Paso; El Paso, TX

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Advisor / Mentor: Bajpeyi, Sudip (sbajpeyi@utep.edu)

ABSTRACT

The shape of glucose curve during an oral glucose tolerance test is a plausible risk factor for insulin resistance and other metabolic disorders and could be a potential biomarker for predicting risk for developing diabetes. **PURPOSE:** This study aimed to compare the glucose tolerance and substrate utilization between monophasic and biphasic glucose curve morphologies. **METHODS:** A total of 50 subjects (33/17 male/female; Age: 27 ± 7.74 years; BMI: 27.7 ± 4.97 kg/m²) without diabetes were tested for a two-hour oral glucose tolerance after ingesting 75g of glucose drink. Blood glucose levels were measured at time points 0, 15, 30, 60, 90, and 120 min. Based on the shape of glucose response curve, subjects were classified as either monophasic (when blood glucose level peaks and is followed by a decline in blood glucose level ≥ 4.5 mg/dL within the 120min test) or biphasic (when blood glucose level rises a second time within the 120min test, with both the initial decline and second rise in glucose levels being ≥ 4.5 mg/dL). Substrate utilization, body composition, and physical activity level were assessed using a metabolic cart, dual x-ray absorptiometry, and an activity monitor respectively. **RESULTS:** There were no significant differences in age, BMI, fasting blood glucose, fasting respiratory quotient, and body fat percentage between monophasic and biphasic glucose groups ($p > 0.05$). The biphasic group were more glucose tolerant compared to the monophasic group as indicated by a lower glucose level at 60min post glucose ingestion (141.02 ± 25.90 vs 173.04 ± 37.64 mg/dL; $p = 0.001$), and glucose area under the curve after 120min (272.09 ± 39.61 vs 304.80 ± 49.32 AU; $p = 0.014$). There was no significant difference in metabolic flexibility between groups ($p > 0.05$); however, glucose/insulin stimulated respiratory quotient was comparatively higher among the biphasic group (0.82 ± 0.07 vs 0.78 ± 0.05 ; $p = 0.027$). Additionally, biphasic group were more physically active than the monophasic group (1.28 ± 0.03 vs 1.25 ± 0.02 ; $p = 0.012$). **CONCLUSION:** Monophasic glucose curve morphology is an indicative biomarker of a lesser carbohydrate metabolism and glucose intolerance; hence, glucose curve morphology should be considered as an important feature to the conventional oral glucose tolerance test for medical screening.