An aide diagnosis system based on k-means for insulin resistance assessment in elderly people from the Ecuadorian highlands

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Abstract:
The lack of standardized cut-off values for the surrogate methods to diagnose insulin resistance (IR) and the fact that the sensitivity of these methods have been studied in specific populations have limited their use in clinical routine. We developed a system that could aid to diagnosis IR in elderly people, analyzing four surrogate methods of IR estimation using a k-means clustering algorithm. Study subjects included 119 nondiabetic participants over 65 year old from Ecuadorian highlands. Blood tests included a two-point oral glucose test tolerance. The k-means clustering algorithm, was applied in one-dimensional experiments for the Homa-IR, Quicki, Avignon and Matsuda. The population was divided into three clusters: C with normal values, C with IR and C with values in between. The number of individuals classified in each C was very different according to each method. With the cut-off values obtained, for each method, the system for the evaluation of IR in elderly people was developed. Our work is intended to aid physicians in the early detection of IR by using information from diverse methods.

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I. Introduction
The proportion of elderly people in Ecuador and around the world has increased considerably. In Latin America it is expected that by 2030, 30% of the population will be composed of seniors aged 65 years and over. The Ecuadorian population has improved their life expectancy from 48.3 years in 1950-55 to 75.6 years in 2010-15 [1]. This allowed many Ecuadorians to reach older ages, but this increase in age is also accompanied by an increase in chronic diseases like diabetes that affects the quality of life [2].