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Explore the effect of fist clenching during blood collection in the measurement of serum calcium

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Background: In clinical laboratory, calcium is the most routinely tested analyte, because it plays an important role in body homeostasis. Repeated fist clenching and maintaining either with or without the application of a tourniquet is one of the pre-analytical errors resulting insignificant bias and can notably influence patient care.

Objective: The study aimed to explore the effect of fist clenching during blood collection in the measurement of serum calcium of healthy individuals at the Faculty of Allied Health Sciences, University of Jaffna.

Methods & Materials: A total of 56 paired blood samples were collected from healthy individuals at the Faculty of Allied Health Sciences, University of Jaffna. A volume of 2.5 ml blood was collected each from an arm without and with fist clenching within 5 minutes from the same vein. Serum total calcium concentration was measured by Arsenazo III method and data was analyzed using paired t-test.

Results: Among the total population, 32 were females and 24 were males. Serum calcium level of total participants without and with fist clenching ranged between 7.84- 12.86 [9.55 (±1.1)] mg/dl and 9.84- 14.96 [11.46 (±1.1)] mg/dl respectively. The mean of serum calcium level of male participants without and with fist clenching were 9.73 (±1.3) mg/dl and 11.74 (±1.1) mg/dl respectively. The mean of serum calcium level of female participants without and with fist clenching were 9.43 (±0.9) mg/dl and 11.26 (±1.0) mg/dl respectively. The mean percentage difference was 16.67% and it was statistically significant ($p<0.001$).

Conclusion: This study findings supports the fist clenching and maintaining it during the blood collection led to falsely elevated levels in serum calcium. Therefore its maintenance should be avoided during the collection of blood specimens by venipuncture in order to obtain accurate and clinically reliable serum calcium levels.