



IS THERE REALLY A NEED OF VACUUM TUBES IN BLOOD SPECIMEN COLLECTION?

Dr.Kanchan K Sonone*

Assistant Professor, Biochemistry dept, Grant Govt Medical College Mumbai
*Corresponding Author

Dr. Santosh G Varma

Professor and Head, Biochemistry dept , B.J Medical College Pune

Dr. Vaishnavi Salunkhe

JR-III, Biochemistry dept Grant Govt Medical College Mumbai

Dr. L.G Abichandani

Professor, Biochemistry dept Grant Govt Medical College Mumbai

ABSTRACT **Introduction** - Pre-analytical phase consists of large proportion of laboratory errors. Proper blood collection and timely processing are critical and first pre-analytical steps required for integrity of laboratory results. The influence of blood collection devices on laboratory tests is often overlooked. In this review, we aim to study the effect of blood collection devices on biochemistry test results.

Materials and method - All samples examined were collected from patients that had been referred to laboratories for various clinical chemistry assays. In total 100 patient's samples were monitored at our institute.

Venous blood samples were collected of the same patient using two different modes

1) In vacuum tubes 2) In non-vacuum tubes

Parameters analysed were LFT (SGOT, SGPT, ALP, Bilirubin) KFT (urea, creatinine) in plain tubes and Blood Glucose in fluoride tubes.

Results and Conclusion - It was observed that there was no significant difference in the results of biochemical parameters analysed from vacuum and non-vacuum tubes. The p-value was not significant. ($p > 0.05$). Thus although incidence of hemolysis, contamination etc. are less in vacuum tubes, non-vacuum tubes have their own advantage of being cost-effective which can be favourable for a government setup where patient load is huge.

KEYWORDS : Vacuum tubes, Non-Vacuum tubes

Introduction -

Pre-analytical phase consists of large proportion of laboratory errors. Almost 70% errors are pre-analytical errors.⁽¹⁾ Therefore, in order to achieve total quality it is important to focus on all phases of quality control.^(2,3) Pre-analytical variables can be divided into - physiological, specimen collection, influence or interference factor.⁽⁴⁾ Proper blood collection and timely processing are critical and first pre-analytical steps required for integrity of laboratory results.

Highly sophisticated testing technology cannot produce a good result from a poor specimen. The influence of blood collection devices on laboratory tests is often overlooked. The CLSI has given certain guidelines for diagnostic specimen collection. These steps are not mandatory in India.⁽⁵⁾ There is large diversity in blood collection procedure. Use of proper collection devices can give an accurate result. Many laboratorians do not carefully evaluate the suitability of new devices or monitor ongoing performance. In this review, we aim to study the effect of blood collection devices on biochemistry test results.

Aims and objectives-

To study the effect of vacuum and non-vacuum tubes on biochemical parameters in blood.

Materials-

- Source of data - All samples examined were collected from patients that had been referred to laboratory for various clinical chemistry assays
- 100 patient's specimen - were monitored during two months study
- Method of collection - According to our institute's policy, blood specimen collection done

Venous blood samples were collected of the same patient using two different modes

- 1) In vacuum tubes
- 2) In non-vacuum tubes

- Specimens mixed by complete inversions for 8-10 times immediately after draw

- Specimens collected kept at room temperature for 30 mins before centrifugation
- All samples analysed within time

Inclusion criteria -

Vacuum tubes with vacuum syringes
Non-vacuum tubes with needle and syringes

Exclusion criteria -

Glass vials

Methods -

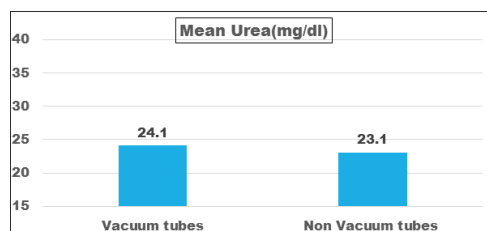
Parameters analysed -
Samples were analysed in both the tubes by kit based methods on fully automated autoanalyzers. (Advia 1800)

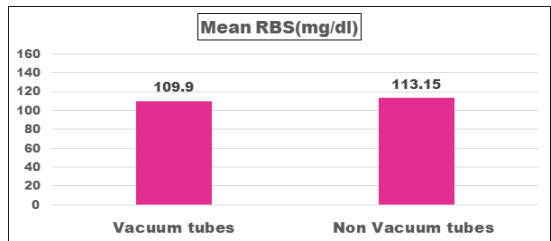
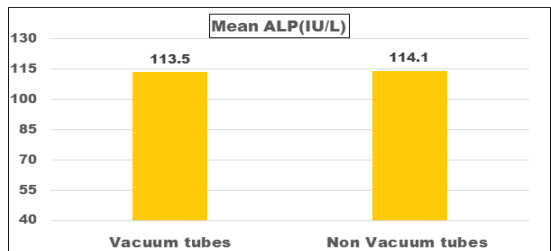
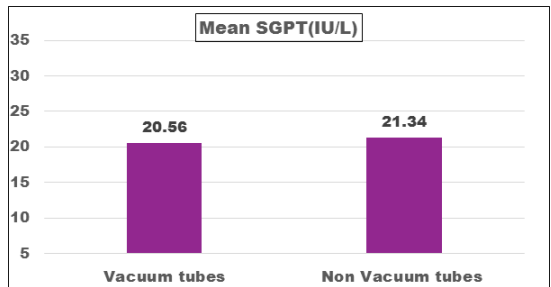
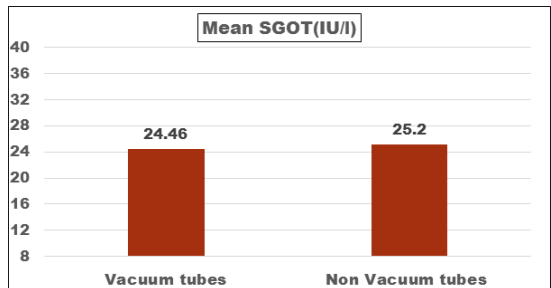
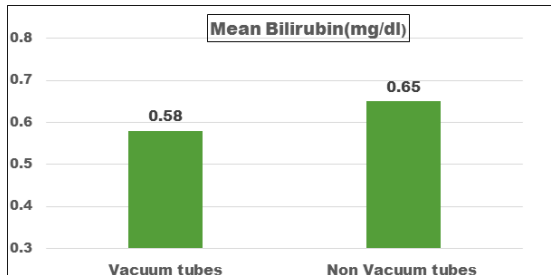
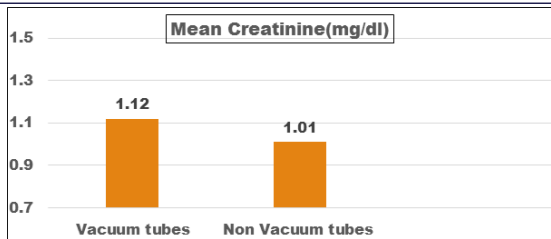
Parameters analysed were LFT (SGOT, SGPT, ALP, Bilirubin) KFT (urea, creatinine) in plain tubes and Blood Glucose in fluoride tubes.

Results-

100 patient's blood specimen examined. Blood collected in two different modes. Unpaired t-test applied to the data. p-value was not significant ($p > 0.05$). There was no significant difference in the results of biochemical parameters analysed from vacuum and non-vacuum tubes.

The graphical representation of the results of various parameters (Mean values) are as follows-





Discussion-

There is “no difference in results of parameters” measured in vacuum and non-vacuum tubes. Vacuum tubes have less chances of hemolysis and contamination. Non vacuum tubes have their own advantage of cost-effectiveness. For collection in vacuum tubes, vacutainer syringes are required, but; if collected in needle and syringes and then pushed in vacuum tubes then there are more chances of hemolysis. Sometimes it may revert back. These practical obstacles can be avoided in non-vacuum without any change in final result of patients.

Conclusion-

Vacuum tubes and non-vacuum tubes give equally efficient results. It was observed that there was no significant difference in the results of biochemical parameters analysed from vacuum and non-vacuum tubes. The p-value was not significant. ($p > 0.05$). Thus although incidence of hemolysis, contamination etc. are less in vacuum tubes, non-vacuum tubes have their own advantage of being cost-effective which can be favourable for a government setup where patient load is huge. Depending on resources of institute one can decide the mode of collection. Both vacuum and non-vacuum tubes serve the purpose.

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