The effect of sample collection and statistical evaluation on the study conclusion

Örneklerin elde edilme süreci ve istatistiksel değerlendirmenin çalışma sonucuna etkisi

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To the Editor,
I read with great interest the study of Kozacı et al. on the comparison of test results obtained from blood gas analyzer and automated laboratory analyzers [1]. They found that there is significant positive correlation between venous blood sodium, potassium, chloride, hemoglobin and hematocrit values of blood gas analyzer and automated laboratory analyzer, and closeness of the desired performance is provided.

In addition, I would like to note a few points for readers and the authors about sample collection and statistical evaluation.

In the study, sodium levels obtained from blood gas analyzer have been found higher than those of automated laboratory analyzer. Conversely, in previous studies [2,3], sodium levels have been underestimated by blood gas analyzers compared to automated biochemistry analyzer. Kozacı et al. obtained venous blood samples using syringes washed sodium heparin. The choice of sodium heparin as anticoagulants for blood gas analysis can falsely elevates sodium levels [4]. This might be reason why sodium levels measured on blood gas analyzer was higher than those of automated biochemistry analyzer in the study. For electrolyte analysis, the use of lyophilized lithium heparin is recommended [4].

During statistical evaluation of difference among results, the authors used correlation analysis, linear regression analysis and Bland-Altman plots. By considering the results of correlation analysis, they concluded that there is sufficient agreement between blood gas analyzer and automated laboratory analyzers for sodium, potassium, chloride, hemoglobin and hematocrit values. However; it is suggested that the correlation between methods is always misleading and should not be used for assessing the method comparability. Bland-Altman plots are considered the best statistical test comparing if two different measuring devices can be used interchangeably [5]. The authors provided 95% limits of agreement for measured tests in the study. However; these limits does not say whether there is agreement among results yielded by different methods or not. To determine compatibility, it must be investigated whether the upper and lower limits of agreement are within the acceptable limits defined based on clinical necessity, biological consideration and other goals. This has not been unfortunately done in the study. The difference of 0.5 mmol/L in potassium levels, and 4 mmol/L in sodium levels are acceptable for the Clinical Laboratory Improvement Amendments (CLIA). When compared against CLIA total allowable error limits, 95% limits of agreement for Na and K is observed as exceeded limits.

In conclusion, the preanalytical phase and the selection of statistical methods for method comparison can affect directly the study conclusion. In this context, laboratory specialist should be included in research studies to prevent mistakes during sample collection and statistical evaluation.

Conflict of Interest: The authors have no conflict of interest.

References

[2] Budak YU, Huysal K, Polat M. Use of a blood gas analyzer and a laboratory autoanalyzer in routine practice to measure...
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