

ABSTRACT

Background : Bilirubin is an important parameter in evaluating liver function and diagnosing hemolytic diseases. However, bilirubin is unstable and easily degrades when exposed to light and temperature, especially if there is a delay in blood sample processing. Delays in the pre-analytical phase, such as centrifugation, may affect the accuracy of total bilirubin levels in serum.

Objective : This study aims to determine the effect of centrifugation delay time variation using Serum Separator Tubes (SST) on total bilirubin levels.

Research Methods : This research was a pre-experimental study with a one-group pretest-posttest design. Venous blood samples from 8 respondents were analyzed for total bilirubin levels immediately (as control), and after delayed centrifugation for 1 hour, 2 hours, and 4 hours. The examination was conducted using the Jendrassik-Grof method with a spectrophotometer. Data normality was assessed using the Shapiro-Wilk test, and differences between groups were analyzed using Repeated Measures ANOVA.

Result : The average total bilirubin levels decreased progressively with longer centrifugation delays, from 1.1900 mg/dL (immediate), to 1.1325 mg/dL (1 hour), 1.0812 mg/dL (2 hours), and 0.9825 mg/dL (4 hours). The most significant decrease occurred after a 4-hour delay, with a difference of 0.2075 mg/dL or 17.44%. Statistical analysis showed a significant difference in total bilirubin levels across the delay intervals ($p < 0.05$).

Conclusion : There is a significant effect of centrifugation delay time variation on total bilirubin levels. A delay of more than 1 hour leads to a notable decrease, which may affect the accuracy of laboratory test results. It is recommended that blood samples for bilirubin analysis be centrifuged as soon as possible, preferably within 1 hour after collection.

Keywords : Total bilirubin, centrifugation delay, SST, pre-analytical phase, serum stability

ABSTRAK

Latar Belakang : Bilirubin merupakan parameter penting dalam evaluasi fungsi hati dan diagnosis penyakit hemolitik. Namun, bilirubin bersifat tidak stabil dan mudah terdegradasi oleh cahaya dan suhu apabila terdapat keterlambatan dalam pengolahan sampel darah. Penundaan dalam tahap pra-analitik seperti sentrifugasi dapat memengaruhi akurasi kadar bilirubin total dalam serum.

Tujuan Penelitian : Penelitian ini bertujuan untuk mengetahui pengaruh variasi waktu penundaan sentrifugasi pada tabung *Serum Separator Tube* (SST) terhadap kadar bilirubin total.

Metode : Penelitian ini merupakan pre-eksperimen dengan desain *one group pretest-posttest*. Sampel darah vena dari 8 responden diperiksa kadar bilirubin totalnya secara segera (kontrol), serta setelah penundaan sentrifugasi selama 1 jam, 2 jam, dan 4 jam. Pemeriksaan dilakukan menggunakan metode *Jendrassik-Groff* dengan spektrofotometer. Data diuji normalitas dengan uji *Shapiro-Wilk* dan dianalisis menggunakan uji *Repeated Measure ANOVA*.

Hasil : Rata-rata kadar bilirubin total mengalami penurunan bertahap seiring bertambahnya waktu penundaan, dari 1,1900 mg/dL (segera), menjadi 1,1325 mg/dL (1 jam), 1,0812 mg/dL (2 jam), dan 0,9825 mg/dL (4 jam). Penurunan tertinggi terjadi pada penundaan 4 jam dengan selisih 0,2075 mg/dL atau sebesar 17,44%. Hasil uji statistik menunjukkan adanya perbedaan yang signifikan antara waktu penundaan terhadap kadar bilirubin total ($p < 0,05$).

Kesimpulan : Terdapat pengaruh signifikan variasi waktu penundaan sentrifugasi terhadap kadar bilirubin total. Penundaan lebih dari 1 jam menyebabkan penurunan kadar yang bermakna dan dapat memengaruhi akurasi hasil pemeriksaan laboratorium. Disarankan agar proses sentrifugasi dilakukan sesegera mungkin setelah pengambilan darah, maksimal dalam waktu 1 jam.

Kata Kunci : Bilirubin total, waktu penundaan, sentrifugasi, SST, pra-analitik