

**KOMBINASI SPEKTROFOTOMETRI UV DAN KALIBRASI
MULTIVARIAT UNTUK ANALISIS PARASETAMOL, ASETOSAL, DAN
KAFEIN DALAM SEDIAAN TABLET**

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INTISARI

Analisis senyawa multikomponen dalam suatu sediaan kebanyakan dilakukan dengan metode kromatografi yang memerlukan biaya besar dan waktu yang lama, sehingga metode ini kurang cocok digunakan untuk kontrol kualitas rutin suatu sediaan obat. Spektrofotometri UV yang dikombinasikan dengan kalibrasi multivariat merupakan suatu pengembangan metode yang lebih sederhana dan ekonomis untuk analisis senyawa multikomponen tanpa tahap pemisahan. Penelitian ini bertujuan untuk mengevaluasi kemampuan metode spektrofotometri UV dikombinasikan dengan kalibrasi multivariat *partial least square* (PLS) untuk analisis parasetamol, asetosal, dan kafein pada sediaan tablet.

Penggunaan metode spektrofotometri UV-PLS untuk analisis multikomponen dilakukan dalam tiga tahap, yaitu kalibrasi, validasi, dan penetapan kadar sampel. Evaluasi model kalibrasi dan validasi didasarkan pada nilai koefisien determinasi (R^2) untuk akurasi dan *root mean square error of calibration* (RMSEC), *root mean square error of cross validation* (RMSECV), *root mean square error of prediction* (RMSEP) untuk presisi.

Nilai R^2 pada hubungan antara nilai prediksi dan nilai aktual untuk parasetamol, asetosal dan kafein $< 0,99$. Nilai RMSEC untuk parasetamol, asetosal dan kafein masing-masing 0,107 $\mu\text{g/mL}$, 0,210 $\mu\text{g/mL}$ dan 0,040 $\mu\text{g/mL}$. Nilai RMSECV 0,615 $\mu\text{g/mL}$, 0,721 $\mu\text{g/mL}$ dan 0,145 $\mu\text{g/mL}$ untuk parasetamol, asetosal, dan kafein, serta nilai RMSEP 2,084 $\mu\text{g/mL}$, 0,877 $\mu\text{g/mL}$ dan 0,207 $\mu\text{g/mL}$ untuk masing-masing. Akurasi dan presisi yang kurang baik menunjukkan hasil penelitian spektrofotometri UV-kalibrasi multivariat PLS kurang sukses digunakan untuk analisis kuantitatif campuran parasetamol, asetosal, dan kafein dalam sediaan tablet. Perlu dilakukan penelitian lebih lanjut mengenai faktor-faktor yang mempengaruhi ketidaksuksesan ini.

Kata kunci: Spektrofotometri UV, multikomponen, kalibrasi multivariat, *partial least square*

ABSTRACT

An analysis of multicomponent compound in a dosage is mostly conducted using chromatographic method which requires huge costs and takes a long time. Thus, this method is less suitable for routine quality control of a pharmaceutical dosage. UV spectrophotometry which is combined with multivariate calibration is a development method which is simpler and more economical for the analysis of multicomponent compound without any separation phase. This study aimed to evaluate the ability of UV spectrophotometric method which is combined with multivariate calibration partial least square (PLS) for the analysis of paracetamol, asetosal, and caffeine in a tablet dosage form.

The use of UV-PLS spectrophotometric method for multicomponent analysis was conducted in three stages. They were calibration, validation, and samples assay. The evaluation of the calibration and validation model were based on the value of the determination coefficient (R^2) for the accuracy and root mean square error of calibration (RMSEC), root mean square error of cross validation (RMSECV), root mean square error of prediction (RMSEP) for the precision.

R^2 value on the relationship between the prediction value and the actual value for paracetamol, asetosal, and caffeine were < 0.99 . RMSEC value for paracetamol, asetosal, and caffeine were 0,107 $\mu\text{g/mL}$, 0,210 $\mu\text{g/mL}$ and 0,040 $\mu\text{g/mL}$. RMSECV value for those compounds were 0,615 $\mu\text{g/mL}$, 0,721 $\mu\text{g/mL}$ and 0,145 $\mu\text{g/mL}$. Besides, RMSEP value for the same compounds were 2,084 $\mu\text{g/mL}$, 0,877 $\mu\text{g/mL}$ dan 0,207 $\mu\text{g/mL}$. The accuracy and precision which were less good showed that the result of UV spectrophotometric method which is combined with multivariate calibration PLS research less successfully used for the quantitative analysis of paracetamol, asetosal, and caffeine mixture in the tablet dosage. There is a need to do the further research on the influential factors of this lack of success.

Keywords: UV spectrophotometry, multicomponent, multivariate calibration, partial least square