

ABSTRAK

EFEKTIFITAS LARUTAN TURK MODIFIKASI SARI LEMON KEMASAN TERHADAP HITUNG JUMLAH LEUKOSIT

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Pemeriksaan hematologi yang sering dilakukan salah satunya hitung leukosit secara manual dengan menggunakan larutan pengencer. Reagen turk berkomposisi asam asetat glasial, gentian violet dan aquadest. Asetat glasial dengan pH 2,4 termasuk asam lemah untuk melisiskan sel di luar leukosit. Cairan lemon terdiri atas 5% sitrat dan penelitian ini ingin mengetahui konsentrasi efektif larutan turk modifikasi dari sari lemon kemasan terhadap hitung jumlah leukosit. Jenis penelitian *desain quasi eksperimen* dengan rancangan *post test only controlled group*. Digunakan 36 replikasi dari 1 spesimen dan 2 variabel, yaitu larutan turk pabrikan sebagai kontrol dan larutan turk modifikasi 2%, 4% dan 6% sebagai eksperimen. Pada pengukuran pH larutan modifikasi diperoleh pH 2,3. Hasil hitung leukosit turk pabrikan sebagai kontrol memperoleh rata-rata hasil 4.825 sel/mm³ darah. Hasil hitung leukosit menggunakan turk modifikasi konsentrasi 2%, 4% dan 6% masing-masing diperoleh rata-rata hasil 5.283 sel/mm³ darah, 4.390 sel/mm³ darah dan 3.322 sel/mm³ darah. Hasil uji *Anova* diperoleh nilai signifikansi 0,003 (<0,05). Hasil uji *post hoc* terhadap perlakuan konsentrasi 2% terhadap 4% diperoleh nilai Sig= 0,284 yang berarti merupakan konsentrasi efektif untuk hitung jumlah leukosit. Kesimpulan dari penelitian ini larutan turk modifikasi sari lemon kemasan konsentrasi 2% efektif untuk pengganti asam asetat pada larutan turk pabrikan.

Kata Kunci: *Lemon Kemasan, Larutan Turk, Leukosit*

ABSTRACT

EFFECTIVENESS OF PACKAGED LEMON JUICE MODIFIED TURK'S SOLUTION ON LEUKOCYTE COUNT

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Many hematological tests use hematologic diluent solutions which include leukocyte counting in a manual method. Turk's reagent, derived from glacial acetic acid, gentian violet, and distilled water, is a feeble organic acid that has a pH scale of 2.4, which are capable of lysing other than leukocytes cells. Vinegar is a weak acid with 4% acetic acid while lemon juice consists of 5% citric acid and can also lyse blood cells. This research wanted to statistically determine the impact of packed lemon juice and turk's solution on altering leukocyte counts. By employing a quasi-experimental post test only controlled group design, the research was repeated 36 times on the same specimen. Two variables were examined: The manufacturer's Turk solution as the modified solution, which had packaged lemon juice of 2%, 4%, and 6%. The pH level of the modified solution was determined to be 2.3. Using the Turk solution supplied by the manufacturer, the average number of leukocytes in the blood was 4.825 cells/mm³. Counts using modified Turk solution at densities of 2%, 4%, and 6% respectively were 5.283, 4.390 and 3.322 cells/mm³ of blood. Analysing the results of the ANOVA test, we should mention that the value of p was less than 0. 003. The numbers for the percentage score compared to 4% of 2% concentration were significant with a significance value of 0.284, indicating effectiveness. It is therefore concluded that 2% modified Turk solution, with packaged lemon juice can be recommended as a substitute for Acetic Acid.

Keywords: *Packaged Lemon, Turk's Solution, Leukocyte*

RINGKASAN

EFEKTIFITAS LARUTAN TURK MODIFIKASI SARI LEMON KEMASAN TERHADAP HITUNG JUMLAH LEUKOSIT

Pemeriksaan laboratorium yang sering dilakukan adalah pemeriksaan hematologi rutin yang umum dilakukan. Pemeriksaan leukosit menggunakan cara manual dengan kamar hitung dan otomatis menggunakan alat. Pada manual dilakukan pengenceran darah dengan campuran asam asetat glasial, gentian violet dan aquadest untuk diamati melalui mikroskop (Salman, *et al.*, 2021).

Asam sitrat termasuk asam lemah yang melisis sel darah selain leukosit, seperti halnya: buah lemon, jeruk nipis dan limau kuit yang bisa menjadi pengganti komposisi larutan turk (Amalia, *et al.*, 2022). Cairan dari buah lemon terdiri atas 5% asam sitrat dengan rasa asam dan pH lemon berada sekitar angka 2 (Widowati, *et al.*, 2022). Sari dari buah lemon bisa didapatkan dengan memeras langsung.

Penelitian ini bertujuan pada mengetahui pada konsentrasi berapa turk modifikasi sari lemon kemasan efektif terhadap hitung jumlah leukosit. Penelitian ini dilakukan pada bulan April 2024 pada Laboratorium Patologi Klinik Universitas Borneo Lestari. Langkah yang dilakukan setelah mendapatkan sari lemon kemasan yaitu menyaring air sari lemon kemasan menggunakan kertas saring. Dalam penelitian, pengukuran pH menggunakan alat meter pada larutan modifikasi sari lemon kemasan yaitu 2,3. Sedangkan pH pada larutan turk pabrikan yaitu 2,4 (Suba'iyah, *et al.*, 2019). Kedua hasil pengukuran tersebut menunjukkan larutan tersebut bersifat asam ($\text{pH} < 7$).

Hitung jumlah leukosit dengan turk pabrikan sebagai kontrol dan larutan turk modifikasi sari lemon kemasan dengan masing-masing dikerjakan sebanyak 9 kali pengulangan dengan satu spesimen yang sama. Hasil perhitungan jumlah leukosit menggunakan larutan turk pabrikan berkisar antara 3.600 sel/mm³ darah hingga 5.900 sel/mm³ darah. Hasil dari hitung leukosit menggunakan turk modifikasi konsentrasi 2% diperoleh hasil berkisar antara 3.352 sel/mm³ darah hingga 7.750 sel/mm³ darah. Hasil hitung leukosit dengan turk modifikasi 4% diperoleh hasil berkisar antara 3.200 sel/mm³ darah hingga 7.000 sel/mm³ darah dan hasil hitung leukosit dengan turk modifikasi 6% diperoleh hasil berkisar antara 2.450 sel/mm³ darah hingga 4.050 sel/mm³ darah.

Hasil uji normalitas terhadap larutan turk pabrikan (kontrol) diperoleh nilai signifikansi sebesar 0,322 dan larutan turk modifikasi konsentrasi 2%, 4% dan 6% diperoleh masing-masing sebesar 0,888, 0,120, dan 0,536. Hasil uji homogenitas diperoleh nilai signifikansi sebesar 0,122. Hasil uji beda (*Anova*) diperoleh nilai signifikansi sebesar 0,003, hasil tersebut berada dibawah nilai taraf signifikansi 0,05 yang berarti terdapat perbedaan yang bermakna sehingga dilanjutkan dengan uji *Post Hoc*. Hasil uji *Post Hoc* dengan larutan modifikasi 2% terhadap 4% diperoleh nilai signifikansi sebesar 0,284. Berdasarkan uji tersebut dapat diketahui bahwa konsentrasi yang efektif terhadap larutan turk pabrikan (kontrol) dalam hitung jumlah leukosit yaitu konsentrasi 2%. Sehingga, sari lemon kemasan dapat digunakan sebagai pengganti komposisi asam asetat yang terkandung dalam larutan turk karena memiliki kandungan asam sitrat.

SUMMARY

EFFECTIVENESS OF PACKAGED LEMON JUICE MODIFIED TURK'S SOLUTION ON LEUKOCYTE COUNT

Various lab tests may typically be conducted depending on the case and common tests may include hematological tests that involve the counting of blood cells including leukocytes by using a counting chamber or automated methods. A more laborious, but equally traditional method of examination includes dilution of blood with Turk's reagent that includes glacial acetic acid, gentian violet, and distilled water to follow its analysis through a microscope (Salman, et al., 2021).

Citric acid is another kind of weak acid that is capable of lysing blood cells as long as they are not leukocytes, lemon, lime, and other types of citrus fruits contain this kind of acid therefore can be the substitute for Turk's solution (Amalia, et al., 2022). Lemon juice contains a 5% amount of citric acid that is responsible for making it acidic and has a pH of around 2 (Widowati, et al., 2022). Lemon juice can be freshly squeezed, resulting directly from the prepared fruit juices.

The purpose of this present study is to know the impact of packaged lemon juice modified Turk's solution on the leukocyte count at its most productive mixed concentration. This study done in April 2024 at Clinical Pathology Laboratory in Borneo Lestari University. Packed lemon juice was obtained, and as an initial step in making the fresh lemon juice, the prepared juice was filtered through the filter paper. The pH of the modified solution was observed by means of a pH meter which resulted in a specification of 2.3, the pH of Turk's solution prepared from the manufacturer was 2.4 (Suba'iyah, et al., 2019). Both depended – as the pH value suggest on the reaction of acidic solutions ($\text{pH} < 7$).

This was carried out using Turk's solution produced by the manufacturer and packaged lemon juice modified Turk's solution with the process repeated 9 times using the same specimen. The leukocyte count as prepared using the manufacturer's Turk's solution was between the 3,600-5,900 cells of blood. The level of leukocytes in blood samples using the 2% concentration modified Turk's solution was between 3,352 cells per milliliters of blood and 7,750 cells per milliliters of blood. Concerning the 4% modified Turk's solution count, the count was between 3,200 and 7000 cells/ mm^3 of blood while for the 6% modified Turk's solution the count was between 2,450 and 4,050 cells/ mm^3 of blood.

Conducting normality tests, significance values of 0.322 for the manufacturer's Turk's solution (control) and 0.888, 0.120, and 0.536 for the 2%, 4%, and 6% concentration modified Turk's solutions in turn. Homogeneity tests' results gave a significance value of 0.122. The analysis of variance or ANOVA yielded a significance value of 0.003, which suggest there is a significant difference, and therefore the study proceeded with post hoc tests. Hence, the post hoc test for the 2% modified solution in comparison to 4% had a significance value of 0.284. In a similar manner leukocyte count was estimated by using Turk's solution at its effective concentration of 2%. Hence, it is clear that packaged lemon juice should be used to replace acetic acid in Turk's solution since it contains citric.