FRUIT FLESH EXTRACT AS A CYTOLOGICAL STAIN FOR BUCCAL CELLS

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DECLARATION

I declare that the task done in this thesis was executed in conformity with the regulations of Universiti Teknologi MARA. It is authentic and the outcomes are done myself, unless otherwise declared or recognised as referenced work. This thesis has not been submitted previously or currently to any other academic institution or non-academic institution for any degree or qualification.

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ABSTRACT

Background: The usage of natural dyes for the staining of various human cells will decrease the cost for acquiring synthetic dyes and hence, slow down their effects on humans and the environment. Therefore, the objective of this research was to determine the abilities of *Fragaria x ananassa* (strawberry), *Hylocereus polyrhizus* (red dragon fruit), *Morus rubra* (red mulberry), *Rubus idaeus* (raspberry), and *Vaccinium corymbosum* (blueberry) to stain the cytoplasm of buccal mucosal cells.

Methods: Papanicolaou, a gold standard stain, was used with a slight modification. Aqueous extraction of the fruit flesh was performed, and two types of natural dyes were prepared – a pure one and a mordanted one – for each fruit. All the extracted dyes had their pH measured and their concentrations determined spectrophotometrically. Their staining abilities were determined microscopically and the results were analysed by the weighted kappa test. One-way ANOVA was used to determine the differences in pH, concentrations, and staining intensities among the dyes and Papanicolaou stain.

Results: The results showed that pure extracts of *Fragaria x ananassa* (kappa = 0.176), *Hylocereus polyrhizus* (kappa = 0.073), *Morus rubra* (kappa = 0.138), *Rubus idaeus* (kappa = 0.138) and *Vaccinium corymbosum* (kappa = 0.133) demonstrated a poor correlation with the gold standard. Mordanted extracts of *Fragaria x ananassa* (kappa = 0.392), *Morus rubra* (kappa = 0.345) and *Vaccinium corymbosum* (kappa = 0.367) showed a fair correlation while *Hylocereus polyrhizus* (kappa = 0.473) and *Rubus idaeus* (kappa = 0.483) moderate correlation. The pH, concentrations, and staining intensities of the extracted dyes were significantly lower than those of Papanicolaou stain. Addition of the mordant significantly reduced the pH values of the extracted dyes and increased their concentrations and staining intensities as compared to the pure extracts.

Conclusion: All the fruit flesh extracts could stain the cytoplasm of buccal cells, but their colour intensities were incomparable with that of Papanicolaou stain as the gold standard.

Keywords: Natural dye, fruit flesh extract, buccal cell, stain, Malaysia