

UNIVERSITI TEKNOLOGI MARA

**EFFICACY OF PHOSPHOTUNGSTIC ACID AND
FERROUS SULPHATE IN ASSESSMENT FRUIT
SKIN AQUEOUS EXTRACT FROM PRUNUS
DOMESTICA (EUROPEAN PLUM) AND PUNICA
GRANATUM (POMEGRANATE) AS
ALTERNATIVE DYES IN CYTOLOGICAL
STAINING**

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Project submitted in fulfilment of the requirements for the degree of
Bachelor in Medical Laboratory Technology (Hons.)

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AUTHOR DECLARATION

Project entitled “Efficacy of Phosphotungstic Acid and Ferrous Sulphate in Assessment of Fruit Skin Aqueous Extract from *Prunus domestica* (European plum) and *Punica granatum* (pomegranate) as Alternative Dyes in Cytological Staining” is a presentation of my original research work. Whenever contributions of others are involved, every effort is made to indicate this clearly, with due reference to literature, and acknowledgement of collaborative research and discussions. The project was done under the guidance of Project Supervisor, Mohd Nazri bin Abu. It has been submitted to the Faculty of Health Sciences in partial fulfilment of the requirement for the Degree of Bachelor in Medical Laboratory Technology (Hons).

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In the name of Allah, The Most Gracious, The Most Merciful.

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ABSTRACT

EFFICACY OF PHOSPHOTUNGSTIC ACID AND FERROUS SULPHATE IN ASSESSMENT OF FRUIT SKIN AQUEOUS EXTRACT FROM *PRUNUS DOMESTICA* (EUROPEAN PLUM) AND *PUNICA GRANATUM* (POMEGRANATE) AS ALTERNATIVE DYES IN CYTOLOGICAL STAINING

In cytology, staining is used to demonstrate the colour and characteristics of the nucleus and cytoplasm based on the acidophilic and basophilic components. The Papanicolaou stain uses hematoxylin to stain the nuclear components however the sources of hematoxylin have undergone shortages and are now limited. Natural dyes such as *Prunus domestica* and *Punica granatum* can be used for dyeing. Natural dyes can be enhanced through the addition of mordants as previous studies have shown its effectiveness on the colour strength of the natural dyes. This study is to determine the ability and quality of the staining using fruit skin dyes extract by identifying the types of mordant that enhance the staining of the extracted dyes as compared to the Papanicolaou stain. Therefore, this study needs to be undertaken in order to improve natural dyes and to overcome the problem of conventional dyes which are now limited in supply. Firstly, washed fruit skin were cut into smaller pieces and boiled at 55°C in the shaker incubator for 60 minutes. The fruit skin dye extracts were concentrated for 24 hours at 37°C. The smears were stained using the regressive method by substitution of fruit skin dye extracts with and without phosphotungstic acid and ferrous sulphate mordant. Pap stain was used as the controlled variable or the constant. The staining quality and intensity were recorded and the data were analyzed by using One-Way ANOVA and Weighted kappa test. The result showed that both the *P.domestica* and *P.granatum* possess the ability to stain the buccal cells. However, they are still incomparable to the Papanicolaou stain which was the gold standard. Statistical analysis revealed $p<0.05$ showed significant difference on the colour intensity of both extracted dyes while the Weighted kappa value showed good correlation with the controlled dye and the pure dye and the dye added with ferrous sulphate mordant. In conclusion, ferrous sulphate has the ability to enhance the fruit skin extracts in the staining of buccal cells but the colour produced is still not comparable to the Papanicolaou stain. These findings need to be improvised with better modification in order to be used as a third alternative in the cytological staining.

Keywords: *Prunus domestica* (European plum), *Punica granatum* (pomegranate), phosphotungstic acid, ferrous sulphate, mordant.