



**EFFECTS OF DELAYED PROCESS ON CYTOMORPHOLOGICAL  
CHANGES AND CELL COUNT IN SPUTUM SAMPLES AT ROOM  
TEMPERATURE**

By

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## DECLARATION

“I hereby declare that this thesis is based on my original work. I also declare that this thesis has not previously or concurrently submitted by any other degree student at UiTM or other institutions.”



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## TABLE OF CONTENTS

	<b>Page</b>
<b>TITLE PAGE</b>	
<b>DECLARATION</b>	ii
<b>ACKNOWLEDGEMENTS</b>	iii
<b>TABLE OF CONTENTS</b>	iv
<b>LIST OF TABLE</b>	vi
<b>LIST OF FIGURES</b>	vii
<b>LIST OF ABBREVIATIONS</b>	viii
<b>ABSTRACT</b>	ix
 <b>CHAPTER 1</b>	
<b>1 INTRODUCTION</b>	
1.1 Background of study	1
1.2 Problem statement	2
1.3 Significant of study	2
1.4 Objective	3
1.4.1 General Objective	3
1.4.2 Specific Objective	3
1.5 Hypothesis	3
 <b>2 LITERATURE REVIEW</b>	
2.1 Delayed process	4
2.2 Sputum	6
2.3 Sputum cytology	7
2.4 Sputum cell cellularity using total cell count	10
2.5 Papanicolaou stain	13
2.6 May - Grunwald Giemsa stain	17
2.7 Gram stain	20
 <b>3 MATERIALS AND METHODS</b>	
3.1 Materials and equipments	23
3.1.1 Sample processing	23
3.1.2 Papanicolaou stain	23
3.1.3 May-Grunwald Giemsa stain	23
3.1.4 Gram stain	24
3.2 Sample collection	24
3.3 Staining method	25
3.3.1 Papanicolaou stain	25
3.3.2 May-Grunwald Giemsa stain	27
3.3.3 Gram stain	27
3.3.4 Neubauer Counting Chamber	28
3.4 Microscopic examination	29
3.5 Statistical analysis	29

## ABSTRACT

### EFFECTS OF DELAYED PROCESS ON CYTOMORPHOLOGICAL CHANGES AND CELL COUNT IN SPUTUM SAMPLES AT ROOM TEMPERATURE

**Background:** Cytomorphological changes caused by delaying processing under room temperature (25°C) in sputum samples might contribute to pitfall diagnosis in respiratory tract cytology. Therefore, this study is conducted to determine the effects of delayed processing on cytomorphological changes in sputum samples.

**Methods:** 6 sputum samples were selected from healthy students of Universiti Teknologi MARA Puncak Alam campus through the deep cough method. After samples collection, slides were prepared for Cell count, Papanicolaou stain, May-grunwald giemsa stain (MGG) and Gram stain from samples in room temperature (25°C) for 0 hour (control), 2 hours, 4 hours and 8 hours and were evaluated for the cytomorphological changes, cell count and bacterial invasion. The findings were observed for nuclear alterations, changes in cytoplasm, bacterial invasion and cell count. Images were captured by using Leica DM 750 microscope equipped with an ICC 50HD camera.

**Results and Discussion:** From 2 hours onwards, morphological changes were observed on both nuclear and cytoplasmic. The results of total cell count for delayed processing time in room temperature in sputum samples showed a significant reduction ( $p < 0.05$ ) in number of cells, together with the increased in number of bacterial invasion. These provide evidence for the impact of processing time for delay process in room temperature on the quality of sputum samples for cytology.

**Conclusion:** Cytomorphological changes were observed in sputum samples that were delayed in processing time at room temperature. This can impact the laboratory results and lead to misdiagnosis. Based on this finding, the study suggested that sputum samples for cytology should be immediately process after collection without delay.

**Key words:** delayed process, cell count, cytomorphological changes, sputum sample, misinterpretation

# CHAPTER 1

## INTRODUCTION

### 1.1 Background of study

Sputum cytology is a routine screening test for lung cancer, which account as the most commonly diagnosed cancer leading cause of death estimated expenditure 68% of male and 40% of female in worldwide (Torre et al., 2015). Most of the previous study stated that, the detection of the lung cancer regarding the symptoms is very poor, where the patients have overall 5 years of survival rate. Hence, the treatment is very costly since the disease start to diagnose until the death occurs. (Brambilla et al., 2003; Jemal et al., 2008; Jensen, Mainz, & Overgaard, 2002). In 2005, Raab *et. al.*, disclosed 2-9% error rate in gynae and 5-12% of non-gynaecological cases were missed diagnosed.

According to McWilliams, Lam, & Sutedja, 2009, cytomorphological analysis of sputum samples can be used as a tool in order to detect an early stage of lung cancer as it consist of exfoliated airways epithelial cells in respiratory tract. Moreover, sputum samples are frequently recommended by the most clinicians as it are the only non-invasive, valid, cheap and simple method of choice in mostly diagnosis to detect the malignancies which are approximately 84.4% and 31% sensitivity that can lead to high in mortality (Wu, Wang, Li, Fu, & Han, 2009). However, some other says that, mishandling and improper technique during sample processing might also lead to inadequate sputum sample that result in low sensitivity during interpretation (McWilliams et al., 2009).