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LIST OF ABBREVIATIONS AND SYMBOLS

ALI	Acute lung injury
APTA	American physical therapy association
ARDS	Acute respiratory distress syndrome
BPD	Bronchopulmonary dysphasia
CAT	Catalase
CLD	Chronic lung diseases
CPT	Chest Physical Therapy
CV	Coefficient of variation
dl	deciliter
DTNB	Dithionitobenzoic acid
$E^{\bullet}$	Alpha-tocopherol radical
ELF	Epithelial lung fluid
ELISA	Enzyme linked-immunsorbance assay
GP	Glutathione peroxidase
GSH	Reduced Glutathione
GSSG	Oxidized Glutathione
HA	Hyaluronic acid
H_2O_2	Hydrogen peroxide
$HOO^{\bullet}$	Perhydroxyl radicals
HPLC	High performance liquid chromatography
IRDS	Idiopathic respiratory distress syndrome
L	liter
LIS	Lung injury score
$LOO^{\bullet}$	Lipid peroxyl radical

LH	Lipid molecules
MDA	Malondialdehyde
MDI	Metered dose inhaler
mg	miligram
mmH_2O	millmetre water
NADPH	Nicotinamide adenine dinucleotide phosphate
ng	nanogram
nM	nanomolar
$^1O_2$	single oxygen
$OH^•$	hydroxyl radical
O_2^-	Superoxide radical
PaO_2/FiO_2	arterial oxygen tension to fractional concentration of inspirated oxygen
PEEP	Positive end-expiratory pressure
PUFAs	Polyunsaturated fatty acid
RCV	Routine condition variation
RDS	Respiratory distress syndrome
$ROO^•$	Peroxyl radical
SE.	Standard Error
SOD	superoxide dismutase
TBA	Thiobarbituric acid
TBARs	Thiobarbituric acid reaction substrate
UA	Uric acid
μM	micromolar
Vit E	Alpha-tocopherol
W/V	Weight per volume

INTRODUCTION

The morbidity and mortality rates of neonatal patients in the hospital have been shown very high. Pneumonia is still being a common disease in the report at the acute care unit, Maharaj Nakon Chiang Mai hospital. Data from January, 1997 to November, 1999, have shown that 207 neonate patients who were admitted in acute care unit, died with lung infection.

Lung infection is either upper respiratory tract or lower respiratory tract infection from virus or bacteria induce the poor lung function and structural changes. In the biochemical theory and some evidents show that free radicals cause of lung tissue damage. Free radicals such as superoxide radical (O_2^-), hydroxyl radical ($OH^\bullet$), hydrogen peroxide (H_2O_2), peroxyl radical, and hypochlous acid , are produced from macrophage, neutrophil activity and catabolic cellular metabolism. Higher amount of free radicals can both directly and indirectly destroy the protein and lipid structures with the oxidation and peroxidation processes respectively. The results of reaction can be detected with various substrate products, such as lipid peroxide; malondialdehyde (MDA), degraded extracellular matrix; hyaluronic acid (HA) in the blood. The protection of the free radicals can be performed by antioxidants which are divided into two classes, enzyme group and non-enzyme group. In both, antioxidant groups, reduction of free radical-induced toxicity by the coupling of free radical with specific antioxidant. Alpha-tocopherol (vit E) and glutathione (GSH) are very interesting antioxidant in that protect parenchyma cell. The common complication of lung infection and pneumonia that commonly occurs in patients are their secretion accumulation and atelectasis. The main source of recurrent lung infection with bacteria is the accumulating secretion. It can be treated

by many methods such as suction with sterile technique, and antibiotic. Important solutions which have been performed for a long time is chest physical therapy with specific techniques, such as postural drainage, percussion, vibration, suction and aerosal therapy.

Free radicals activity can be detected with the end product of lipid peroxidation; MDA, or proteoglycan degraded product; HA. Whereas antioxidants such as GSH and Vit E are detected for the balanced control of free radicals. A few data show the relationship between the lung injury with other substances, especially MDA concentration in the blood. The evaluated methods for these substances are still on the blood, being performed in animal experiments and in the incubated patients. For tracheal aspirate (TA) is an interested sample for evaluation free radicals and antioxidants, because it is easily collected. Only a few studies use TA samples for detecting asthma patients.

Therefore, this study plans to determine the effects of two chest physical therapy programs which use to release the secretion accumulation and atelectasis of patients with lung injury. The biochemical compounds, such as MDA, HA, GSH, and Vit E under the interventions for six days consecutively and aimed to reduce the secretion accumulation and atelectasis. All substances are determined in blood and TA samples, and show the correlation among them.