Histological Changes in the Alveolar Structure of the Rat Lung after Exposure to Hyperoxia

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SUMMARY

Oxygen therapy is an important powerful tool in the management of critically ill patients; however, it carries the hazards of pulmonary toxicity if not properly monitored. The aim of the present study was to evaluate the effect of acute and subacute exposure to normobaric hyperphysiologic concentrations of oxygen (O_2) on the alveolar structure of rat lung.

Thirty adult male albino rats were used in the present work. They were divided equally into 5 groups. Group I included unexposed rats and was considered a control group, group II included rats exposed to 95% O_2 for 24 hours, group III included rats exposed as in group II and were left for recovery in room air for 2 weeks, group IV included rats exposed to 60% O_2 for two weeks, and group V included rats exposed as in group IV and then left for recovery in room air for another two weeks. The alveolar structure of the rat lung from all groups was examined by light and transmission electron microscopy.

The findings of the present work revealed that exposure to 95% O_2 for 24 hours resulted in severe pulmonary congestion with extravasation of red blood cells, oedema and alteration in the alveolar structure, while recovery in room air for 2 weeks did not result in repair of the distorted alveolar structure. On the other hand, exposure to 60% O_2 for 2 weeks resulted in focal affection of the alveoli with thickened inter-alveolar septa, intense cellular infiltration together with proliferation of type II pneumocyte and deposition of interstitial collagen fibers, while recovery in room air for another 2 weeks was associated with partial improvement in alveolar structure. It was concluded that supplemental O_2 therapy should be serially monitored by continuous assessment of pulmonary functions.

INTRODUCTION

Oxygen (O_2) toxicity remains a ubiquitous problem that has practical and theoretical implications in every field of medicine (Robert and Jackson, 1990).