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The Effect of Halothane on SGOT and SGPT of Operating Room Personnel

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Abstract: In this study, liver damage induced by occupational exposure of the anesthetic agent to operating room staff was investigated. A total of 70 persons who employed with more than one year in operation room were investigated. Controls were 70 personnel of the same hospitals with similar conditions who were not working in operation room. Serum levels of alanine aminotransferase (SGPT) and aspartate aminotransferase (SGOT) were measured. Serum SGOT activity was significantly increased in the anesthesiology staff compared to controls. But elevated SGPT in cases was no significant compared to non-exposure group. In this study, although raised aminotransferases enzymes were observed in anesthesiology staff but the serum activity of these enzymes were in the normal range and not observed any abnormality in SGOT and SGPT in staff employed in the operation room. In order to take more care of personnel-health, air concentration of anesthetic gases should be kept as low as possible by help of sufficient room ventilation avoiding unnecessary emissions.

Key words: Halothane, anesthesia staff, liver, disease

INTRODUCTION

Halothane has been used widely as a volatile anesthetic agent in clinical practice since 1957 (Belge *et al.,* 2000; Topal *et al.,* 2003). It is well established that halothane is metabolized in the liver as a lipophilic xenobiotic to hepatotoxic intermediates by monooxygenases through the cytochrome P450 system (Spracklin *et al.,* 1996; Minoda and Kharasch, 2001). Many reports of hepatoxicosis associated with halothane administration have been published (Kharasch and Hankins, 1996; Ray and Drummond, 1991; Rodes and Bruguera, 2001). In people, server hepatic necrosis develops following halothane anesthesia in one of every 6000-35000 patients and is fatal in 75% of these patients. The association between hepatic necrosis and halothane anesthesia is responsible for the decrease in use of this anesthetic in patients (McEven *et al.*, 2000). Halothane can spread in the air apace of operation room when it uses in clinical practice. Inhalation of such contaminated air with halothane by anesthesiology staff may cause liver dysfunction. Although the liver dysfunction induced by halothane in patients is well documented in many reports, but there is a little reports to assess liver damage in anesthesiology staff. In this line, this study was undertaken to evaluate the effect of volatile anesthetic drugs on liver function in personnel that working in operation room, particularly with measuring of serum alanine aminotransferase (ALT or SGPT) and aspartate aminotransferase (AST or SGOT) values which are the most frequently determined indicators of possible liver diseases.

MATERIALS AND METHODS

After approval from the hospital research committee and written informed consent this study was carried out on personals employed in hospitals. A total of 70 persons who employed with more than one year in operation room in medical hospitals of Mazandarn University were entered onto in this study. This study was done in Mazandarn Province between 2002 and 2003. Halothane is the mainly inhalation anesthetic drug in the selected hospitals. The personals have not any history of liver disease or other systemic diseases and under medication treatment. Controls were 70 personnel of the same hospitals with similar conditions who were not working in operating room. The case and control groups were relatively matched for age and the work experience. Three milliliter of blood was drown from each person and transferred to tube. After centrifuge of sample blood, the serum SGOT and SGPT activity values were determined

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by using transaminase kits (Shimizist Co, Iran) with colorimetric assay. Ethical approval for this study was granted by the scientific and ethical committee of Mazandaran University of Medical Sciences.

The data are presented as mean± SD. Differences in SGPT and SGOT activity were analyzed by using student's t-test.

RESULTS AND DISCUSSION

In the present research studied randomly selected 70 anesthesiology staff and 70 control people in this study (Table 1). They had not history of liver diseases. The results of the Table 2 shows that controls have a mean 19.9±3.4 and 13.5±4.9 U L^{-1} of SGOT and SGPT titer respectively.

Elevated SGOT and SGPT activity values were observed in the exposed workers. The mean values of SGOT and SGPT were 21.7±6 and 14.6±7.6 U L^{-1} in anesthesiology staff. There is statistically difference SGOT activity in cases compared to controls ($p<0.01$) (Table 2). Although elevation of SGPT activity was observed in cases but it is not significantly difference compared to controls. There is not any difference in SGOT and SGPT values between male and female in each group and not see any difference in the sex-dependent in the values in SGOT and SGPT. Abnormal liver enzyme levels may be a signal of liver damage or alteration in bile flow. Liver enzyme alteration may be either the accompanying biochemical picture in a patient with symptoms of signs suggestive of liver disease. Injury to the liver, whether acute or chronic, eventually results in an increase in serum concentrations of aminotransferases AST and ALT. Routine chemistry liver function panels usually consist of AST and ALT. The magnitude of aminotransferase alteration can be classified as "mild" (<5 times the upper reference limit), "moderate" (5-10 times the upper reference limit) or "marked" (>10 times the upper reference limit) (Giannini *et al.,* 2005). The normal level of these liver enzymes is to 40 U L^{-1} (Knight, 2005). In this study, the serum activities of SGOT and SGPT were in normal range in anesthesiology staff. In this study abnormality of SGOT and SGPT values were not observed in personals that working in operation room. Halogenated volatile anesthetics have been associated with liver injury. Most reported cases have been linked to hepatitis induced by halothane in patients (Hasan, 1998; Daghfous *et al.,* 2003). Halothane is extensively (approximately 50%) metabolized in humans and undergoes both oxidative and reductive cytochrom P450-catalyzed hepatic biotransformation (Minoda and Kharasch, 2001). Halothane anesthesia induces an elevation of serum activities of liver enzymes SGOT and SGPT in patients after anesthesia with halothane (Cho *et al.,* 1989).

Table 1: Demographic details of personals

Characteristic	Exposed workers (cases)	Control
Randomized (N)	70	70
Male	40 (57%)	50 (71%)
Female	30 (43%)	20 (29%)
Mean age (year)	32±8	30±10
Age range	22-49	20-51
Mean occupation (year)	6±3.6	8±4.4
Occupation range	2-12	3-14

Table 2: Mean activity levels of serum enzymes SGOT and SGPT (U L^{-1}) in anesthesiology staff (case) (N = 70) and control (N = 70)

Sample	SGOT			SGPT		
	Male	Female	Total	Male	Female	Total
Case	21.9±5.5	22.3±6.2	21.7±6	14.8±6.8	13.9±6.5	14.6±7.6
Control	19.2±4.5	19±5	19.9±3.4	14±5.2	13.6±4.7	13.5±4.9

The results of this study showed that the inhalation of halothane present in the air of operation room would cause increase in the titer of SGOT of the liver but not more than normal level. Elioh *et al.* (1993) and Neuberger and William (1988) showed that in more than 20% there is mean increase in the transaminase activity in patients and occasionally jaundice by using anesthetic agents.

Epidemiological studies based on data obtained in the prescavenging era indicated an increased risk of spontaneous abortion in maternal occupational exposure to anesthetic gases (Bovin, 1997).

This research showed that considering the spreading of small amount halothane in the operation room, which is in continuous exposure to operation room staff. Although working in operation room may increase slightly enzymes titer in liver of personals but it has not cause increasing in the liver enzymes activity more than normal range.

In order to take more care of personnel-health, air concentration of anesthetic gases should be kept as low as possible by help of sufficient room ventilation avoiding unnecessary emissions.

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