

Effect Of Inhaled Anesthetics Gases On Health Staff Health Status In Al-Najaf City

Ibrahim A. Kadhim Al-Ashour, Diaan K. Abd-Ali, Mansour A. Fallah, Iman Q. Kteo

Abstract: Exposure of workers to waste anaesthetic gases in the operating and recovery rooms of hospitals is of concern because of the reported adverse effects of such gases on the health of personnel in this occupational group. Objectives To determine the effect of inhaled anesthetics gases on health staff health status (headache and dizziness). And to find out the association between the effects of inhaled anesthetics gases on health staff health status and their demographic data and job related data. Methodology, A Case-Control study is carried out in Al-Najaf Health Directorate / Al-Sadder medical city, from June 1st, 2013 to September 1st, 2013. A probability stratified sample of (29) from health staff personnel working in the operative rooms selected as a study group, and (13) from health staff personnel working in the other hospital wards selected as a control group, were included in the study. The data are collected through the use of semi-structured questionnaire, which consists of three parts including, demographic and job related data, data about headache characteristics, and data about the dizziness characteristics. Results and Conclusions The study results indicate that the health staff in operative rooms are more prone to have a headache and dizziness than those who working in other wards. And that there is a significant effect of the work place and the job title on the suffering of headache and dizziness among operative room health staff. Recommendations, The researchers recommend a further studies should be employed to involve a large number of health staff with a national level. An education programs should be focusing on how to manage these gases to reduce its effects on health staff health status.

Key words: effect, anesthesia gases, health status

Introduction

Inhalation anesthetics are substances that are brought into the body via the lungs and are distributed with the blood into the different tissues. The main target of inhalation anesthetics (or so-called volatile anesthetics) is the brain. Inhalation anesthetics act either by amplifying inhibitory function or decreasing excitatory transmission at the nerve endings in the brain. The role of inhalation agents in general anesthesia is changing. Volatile anesthetics are seldom used alone in our days. A combination of inhalation anesthetics and intravenous drugs is called balanced anesthesia. Currently used inhalation anesthetics include enflurane, halothane, isoflurane, sevoflurane, desflurane, and nitrous oxide. Older volatile anesthetics include ether, chloroform, and methoxyflurane (Wenker, 1999). Exposure to high concentrations of anesthetics has been reported to affect health.

Nitrous oxide concentrations as low as 50 ppm caused measurable performance decrements in psychological tests taken by healthy male graduate students. Nitrous oxide may result in hematological change and abuse of nitrous oxide causes peripheral neuropathy. Anesthetic concentrations of halothane may result in acute hepatitis with liver necrosis. Possible chronic effects studied in exposed populations include cancer, and liver and kidney disease, but the findings are inconsistent (Guirguis, et. al., 1990). Exposure to anesthetic gases in the health sector, whether in the operating room, recovery room, or in the context of outpatient clinics, may entail a health risk for the personnel exposed. Although health care workers are exposed to much lower anesthetic concentrations than the patients, this exposure often extends over many years. Personnel often indicate fatigue and headaches, especially when occupational hygiene conditions are inadequate. More serious disorders such as reduced fertility and problems during pregnancy are mentioned. The decisive factors as concerns the adverse health effects of exposure to anesthetic gases are mainly the type of gases used, the length of exposure, and the gas concentrations (International Section on the Prevention of Occupational Risks in Health Services, 2001). Occupational exposure to volatile anesthetic agents may result in various adverse health effects. Anesthetic agents eliminated rapidly from the body due to low solubility in blood and tissues. Genetic material has been shown to be a sensitive target of numerous harmful agents including anesthetic gases. Investigate the genotoxic effect of exposure to volatile anesthetics on leukocytes of exposed operating room personnel [anesthetists, surgeons and nurses], determine the effect of exposure to volatile anesthetics on oxidative stress [super oxide dismutase [SOD] and determine work-related subjective symptoms. Statistically significantly higher frequency of work-related symptoms included dizziness, headache, irritability, decreased concentration, anxiety and easy fatigability were reported among ORP compared to controls (Aal, et. al., 2008).

- Ibrahim A. Kadhim Al-Ashour, Diaan K. Abd-Ali, Mansour A. Fallah, Iman Q. Kteo
- M.Sc. Nursing, Head of fundamental of Nursing Branch, faculty of Nursing, University of Kufa
- M.Sc. Nursing, Head of Adult Health Nursing Branch, faculty of Nursing, University of Kufa
- M.Sc. Nursing, Head of maternity Nursing Branch, faculty of Nursing, University of Kufa
- B.Sc. Nursing, Adult Health Nursing, College of Nursing, University of Kufa

Methodology

Study Design

A Case Control study is carried out in Al-Najaf Health Directorate / Al-Sadder Medical City, from June 1st, 2013 to September 1st, 2013.

Study Sample

A probability stratified sample of (29) from health staff personnel working in the operative rooms selected as a study group, and (13) from health staff personnel working in the other hospital wards selected as a control group, were included in the study.

Instrument

The data are collected through the use of semi-structured questionnaire, which consists of three parts including, demographic and job related data, data about headache characteristics, and data about the dizziness characteristics.

Data collection

The data are collected through the use of semi-structured questionnaire and by means of interview with the study subjects.

Data Analyses

In order to achieve the early stated objectives, the data of the study were analyzed through the use of statistical package of social sciences (SPSS) version 16 through descriptive and inferential statistical analyses

Results

Table (1) Observed Frequencies and Percentages for the Study Groups Demographic Data

List	Demographic data	Items	Study group		Control group	
			Freq.	%	Freq.	%
1.	Gender	Male	25	86.2	10	76.9
		Female	4	13.8	3	23.1
2.	Age /years	≤20	1	3.4	1	7.7
		21-28	8	27.6	2	15.4
		29-37	10	34.5	5	38.5
		38-45	1	3.4	1	7.7
		46-54	6	20.7	3	23.1
		55+	3	10.3	1	7.7

List	Demographic data	Items	Study group		Control group	
			Freq.	%	Freq.	%
3.	Years of experience	≤1	4	13.8	1	7.7
		2-9	14	48.3	5	38.5
		10-16	5	17.2	4	30.8
		18-24	2	6.9	2	15.4
		25+	4	13.8	1	7.7
4.	Job prescription	Surgeon	1	3.4	0	0
		Surgeon assist.	3	10.3	0	0
		Anesthesiologist	4	13.8	0	0
		Anesthesiologist assist.	21	72.4	0	0
		Physician	0	0	5	38.5
		Nurse	0	0	8	61.5
5.	Number of days spent in work / week	3	2	6.9	0	0
		4	3	10.3	0	0
		5	22	75.9	0	0
		6	2	6.9	13	100
6.	Number of hours spent in work / day	≤4	1	3.4	1	7.7
		5-9	26	89.7	11	84.6
		10-14	1	3.4	1	7.7
		20+	1	3.4	0	0

Freq. (frequency), % (percentage), n (29 study group, and 13 control group)

This table shows that the majority of the study sample were male in both groups (study group and control group), with an estimation of 86% and 76% respectively. Also in regarding to the age groups, the study results indicate that the 34.5% and 38.5% were for the third age group (29-37 years) among study and control groups respectively. In addition to that and in regarding to the years of experience, the study results indicate that the highest percentages 48.3 % and 38.5 were for 2-9 years among the study and control groups respectively. While for the job prescription, the study results indicate that the highest percentage (72.4%), were for the anesthesiologist assistant among study group, while for the control group, the higher percentage were for nurses (61.5%). Another results indicate that the 5 days is the dominant days that the health staff spent in work in a week, while the 6 days is the dominant number of days that the health staff spent in work in a week among the control group, with an estimation of (75.9% and 100%) respectively. Finally in this table, the study results indicate that the health staff spent about 5-9 hours in work daily in both study and control groups and estimated about 89.7% and 84.6% respectively.

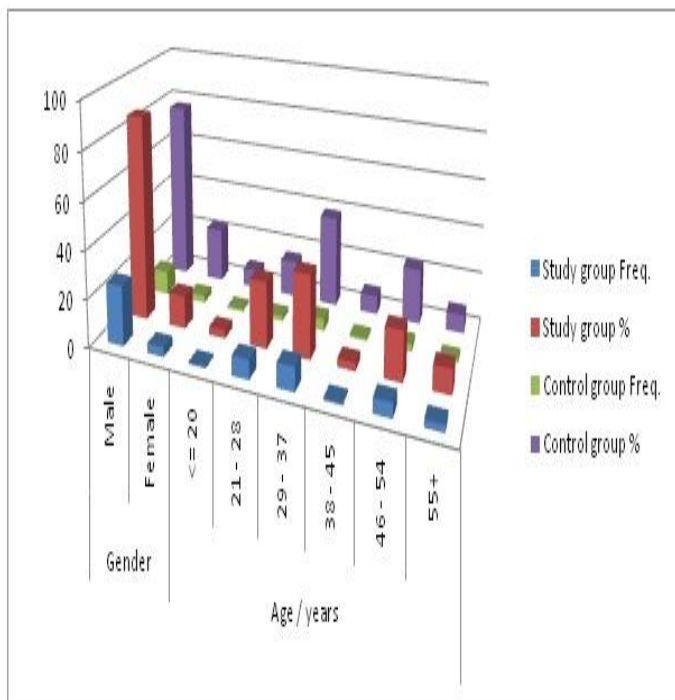


Figure 1.A Observed Frequencies and Percentages for the Study Groups Demographic Data

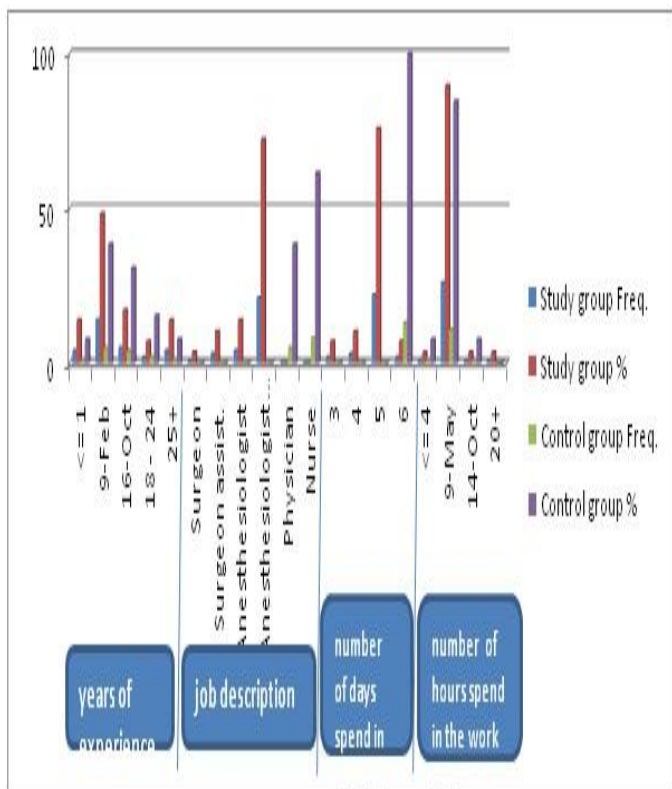


Figure 1.B Observed Frequencies and Percentages for the Study Groups Demographic Data

Table (2) Observed Frequencies and Percentages for the Study Groups Responses in regarding to Headache and its Characteristics

List	Studied variables	Items	Study group		Control group	
			Freq.	%	Freq.	%
1.	headache	yes	16	55.2	0	0
		no	13	44.8	13	100
2.	onset	No specific time	4	13.8	0	0
		After past part time	2	6.9	0	0
		At last working day	10	34.5	0	0
		none	13	44.8	13	100
3.	duration	persist	1	3.4	0	0
		periodic	15	51.7	0	0
4.	Severity**	3	5	17.2	0	0
		4	5	17.2	0	0
		5	2	6.9	0	0
		7	1	3.4	0	0
		8	3	10.3	0	0
		none	13	44.8	13	100
5.	Aggravating factors	Physical stress	6	20.7	0	0
		Psychological stress	2	6.9	0	0
		fatigue	8	27.6	0	0
		none	13	44.8	13	100
6.	Relieving factors	rest	13	44.8	0	0
		drug	2	6.9	0	0
		tea	1	3.4	0	0
		none	13	44.8	13	100
7.	Associated symptoms	drowsiness	7	24.1	0	0
		Loss of concentration	3	10.3	0	0
		Psychological stress	3	10.3	0	0
		irritability	2	6.9	0	0
		other	1	3.4	0	0
		none	13	44.8	13	100

This table shows that (55.2%) are suffering from headache among the study group. While (100%) aren't have headache among the control group. In addition, that (34.5%) from those who are suffering from headache stated that their headache started at the end of their work, periodic headache (51.7%), severity between the 3 and 4 based on visual analogue scale (17.2%), aggravating with a (8) (27.6%), (44.8%) from them are feeling better during the rest, and (24.1%) from them are suffering from (1) as an associated symptoms.

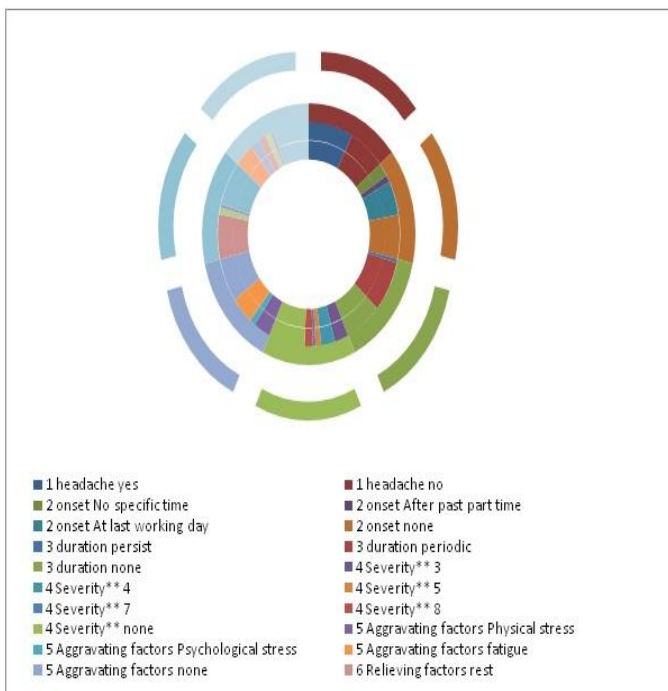


Figure 2. Observed Frequencies and Percentages for the Study Groups Responses in regarding to Headache and its Characteristics

Table (3) Observed Frequencies and Percentages for the Study Groups Responses in regarding to Dizziness and its Characteristics

List	Studied variables	Items	Study group		Control group	
			Freq.	%	Freq.	%
1.	Dizziness	yes	20	69	2	15.4
		no	9	31	11	84.6
2.	Onset	Non specific time	3	10.3	0	0
		At early morning	1	3.4	0	0
		After past part time	5	17.2	1	7.7
		At last working day	11	37.9	1	7.7
		none	9	31	11	84.6
3.	duration	persist	3	10.3	0	0
		periodic	17	58.6	2	15.4
		none	9	31	11	84.6
4.	Aggravating factors	Physical stress	4	13.8	0	0
		fatigue	16	55.2	2	15.4
		none	9	31	11	84.6
5.	Relieving factors	rest	18	62.1	2	15.4
		drug	2	6.9	0	0
		none	9	31	11	84.6
6.	Associated symptoms	drowsiness	12	41.4	2	15.4
		Loss of concentration	2	6.9	0	0
		Loss of appetite	1	3.4	0	0
		Psychological stress	1	3.4	0	0
		irritability	4	13.8	0	0
	none	9	31	11	84.6	

Freq. (frequency), % (percentage), n (29 study group, and 13 control group)

This table shows that (69%) are suffering from dizziness among the study group, while (84.6%) aren't have dizziness among the control group. In addition, that (37.9%) from those who are suffering from dizziness are stated that their dizziness started at the end of their work, periodic dizziness (58.6%), aggravating with a (5) (55.2%), (62.1%) from them are feeling better during the rest, and (41.4%) from them are suffering from (1) as an associated symptoms.

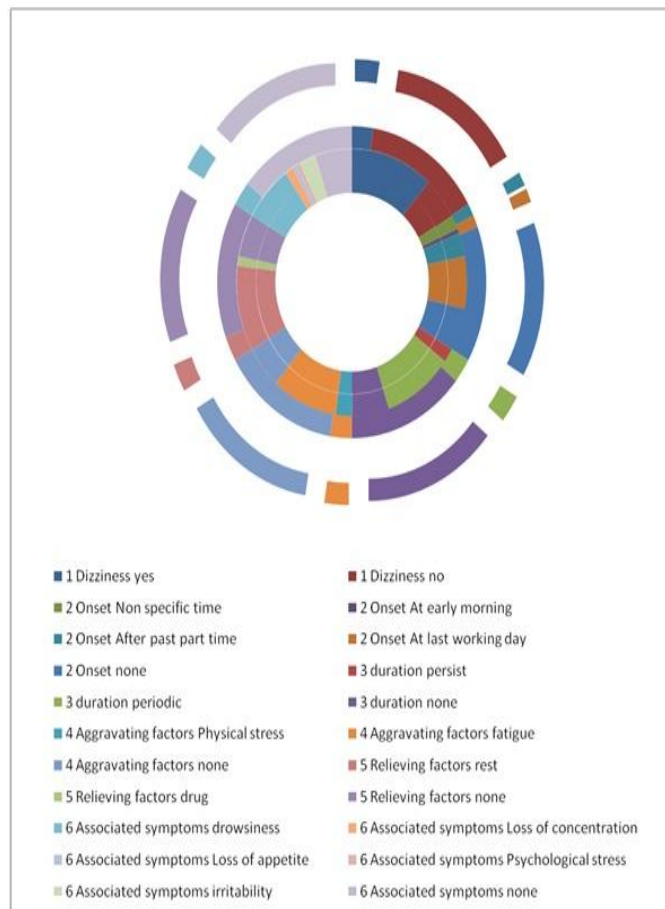


Figure 3. Observed Frequencies and Percentages for the Study Groups Responses in regarding to Dizziness and its Characteristics

Table (4) Observed Mean Differences between the Study and Control Group in Regarding to the suffering of Headache and Dizziness with Comparison t-value and the Level of Significance

List	variables	group	n	Mean	Std. Deviation	Std. Error Mean	t value	Sig.
1.	Headache	study group	29	1.45	.506	.094	3.904	0.000
		control group	13	2.00	.000	.000		
2.	Dizziness	study group	29	1.31	.471	.087	3.612	0.001
		control group	13	1.85	.376	.104		

This table shows that there is a significant differences between the study group and the control group in regarding

to the suffering from headache and dizziness, with a significant differences less than 0.05.

Table (5) association between the suffering of Headache and different demographic data

List	Demographic data	Items	Headache		Sig.
			Yes	No	
1.	Gender	Male	13	22	χ^2 (0.081) p-value (0.776)
		Female	3	4	
		Total	16	26	
2.	Age / years	20 =>	0	2	C.C. (27.3) p-value (0.038)
		28 - 21	6	4	
		37 - 29	5	10	
		45 - 38	0	2	
		54 - 46	3	6	
		+55	2	2	
		Total	16	26	
3.	Years of experience	1 =>	3	2	C.C. (7.968) p-value (0.093)
		9 - 2	9	10	
		16 - 10	1	8	
		24 - 18	0	4	
		+25	3	2	
		Total	16	26	
4.	Job prescription	Surgeon	0	1	χ^2 (16.2) p-value (0.000)
		Surgeon Assist.	1	2	
		Anesthesiologist	1	3	
		Anesthesiologist Assist.	14	7	
		Physician	0	5	
		Nurse	0	8	
Total	16	26			

This table shows that there is a significant association between the age groups and the job prescription and the suffering of headache, at p-value less than 0.05. while there is a non significant association between the health staff gender and their years of experience and the suffering from headache at p-value more than 0.05.

Table (6) association between the suffering of dizziness and different demographic data

List	Demographic data	Items	Dizziness		Sig.
			Yes	No	
1.	Gender	Male	18	17	χ^2 (0.076) d.f. (1) p-value (0.078)
		Female	4	3	
		Total	22	20	
2.	Age / years	20 =>	1	1	χ^2 (7.923) d.f. (5) p-value (0.161)
		28 - 21	6	4	
		37 - 29	6	9	
		45 - 38	2	0	
		54 - 46	3	6	
		+55	4	0	
		Total	22	20	
3.	Years of experience	1 =>	3	2	χ^2 (.470) d.f. (4) p-value (0.976)
		9 - 2	10	9	
		16 - 10	4	5	
		24 - 18	2	2	
		+25	3	2	
		Total	22	20	
4.	Job prescription	Surgeon	0	1	χ^2 (15.52) d.f. (5) p-value (0.008)
		Surgeon Assist.	1	2	
		Anesthesiologist	2	2	
		Anesthesiologist Assist.	17	4	
		Physician	1	4	
		Nurse	1	7	
Total	22	20			

This table shows that there is a non-significant association between the suffering of dizziness and all the demographic data, at p-value more than 0.05, except with the job

prescription, the study results indicate that there is a significant association, at p-value less than 0.05.

Table (7) association between the suffering of dizziness and suffering of headache

Demographic data	Items	Dizziness		Sig.
		Yes	No	
Headache	Yes	15	1	χ^2 (17.73) d.f. (1) p-value (0.000)
	No	7	19	
	Total	22	20	

This table shows that there is a highly significant association between the suffering of dizziness and the headache, at p-value less than 0.05.

Discussion

The study results indicate that more of the operative room health staff personnel are suffering from headache and dizziness more than those staff who are working in another hospital units. That mean that the operative room health staff are more prone to exposure anesthesia gases, as well as they more attend to having a headache or dizziness. This results is supported with Vohra,1994. Munday et al ,1995 . Dashfield et al ,1997 . berg et al, 1998 . Apfel et al ,2002. Reichle and Conzen ,2003; Johnson et. al., 2008. They mentioned that the operative room health staff anesthetics it causes early but not delayed post-operative vomiting, airways irritation during induction of anesthesia, retching, headache and restlessness, and dizziness. In addition the study results indicate that a significant effect of the operative rooms health staff age groups and the job prescription on their perception of pain and dizziness. This result is supported with Gao, 2011, their results indicate that there is a significant effect of the operative rooms workers and their degree of headache. Also a highly significant effect of the suffering of dizziness on the headache perception. This result is supported with Brantberg, et. al. (2005), they mentioned that there is an association between the dizziness and headache perception.

Conclusions and Recommendations:

The researcher concluded that the health staff in operative rooms is more prone to have a headache and dizziness than those who working in other wards. And that there is a significant effect of the age, and the job title on the suffering of headache and dizziness among operative rooms health staff. Recommendations, The researchers recommend further studies should be employed to involve a large number of health staff with a national level. An education programs should be focusing on how to manage these gases to reduce its effects on health staff health status.

References:

- [1] Aal, B.; Galal A.; Manal A.: GENOTOXIC AND OXIDATIVE STRESS EFFECTS DUE TO OCCUPATIONAL EXPOSURE TO ANESTHETIC GASES AMONG OPERATING ROOM PERSONNEL , Menoufiya Medical Journal, Vol.21 No.1 Jan 2008.

- [2] Apfel, K.; Papenfuss, R.; and Heineck, G.: Volatile anaesthetics may be the main cause of early but not delayed postoperative vomiting: a randomized controlled trial of factorial design. *B.J.A.* 88(5):659-668. 2002
- [3] Berg, V.; Honjol, M.; Rozario J.: Vomiting, retching, headache and restlessness after halothane-, isoflurane-, and enflurane-based anaesthesia. *Acta-Anaesthesiol-Scand.*42(6):658_63. 1998
- [4] Brantberg, K: Natalie T.; & Robert W.: Migraine-associated vertigo, *ActaOto-Laryngologica*, 2005; 125: 276_279
- [5] Dashfield, B.; Weiss, L.; Langton, B.: The site of airway irritation during induction of anaesthesia. *Anaesthesia* 52(11):1106-10. 1997.
- [6] Johnson, A.: JOB SATISFACTION IN THE OPERATING ROOM: AN ANALYSIS OF THE CULTURAL COMPETENCE OF NURSES, Dissertation, Capella University, 2008, (1-109)
- [7] Guirguis, S.; Pelmeur, M .; Wong L.: Health effects associated with exposure to anaesthetic gases in Ontario hospital personnel, *British Journal of Industrial Medicine* 1990;47:490-497
- [8] JingkeGao: An Investigation of the Impact of Operating Room Occupational Hazards on Intraoperative Nurses, Bachelor's Thesis, 2011, School of Health and Social Studies, City of Jyväskylä, Central Finland Central Hospital (1-59)
- [9] Munday I., Stoddart P., Jones R., Lytle J. and Cross M. Serum fluoride concentration and urine osmolality after Enflurane and Sevoflurane anaesthesia in male volunteers. *Anaesth. Analg.* 81:353-359. 1995
- [10] Reichle, F.; Conzen P.: Halogenated inhalational anaesthetics. *Best practice and Research Clinical Anaesthesiology.*17,29_49. 2003
- [11] Vohra, B.: Convulsions after Enflurane in a schizophrenic patient receiving neuroleptics. *Can. J. Anaesth.* 41(5 pt 1) 420-2. 1994
- [12] Wenker O.C.: Review Of Currently Used Inhalation Anesthetics: Part I. *The Internet Journal of Anesthesiology.* 1999 Volume 3 Number 2. DOI: 10.5580/1137 - See more at: <http://archive.ispub.com/journal/the-internet-journal-of-anesthesiology/volume-3-number-2/review-of-currently-used-inhalation-anesthetics-part-i.html#sthash.VhIWfOXD.dpuf>