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Research Article

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Eye Problem and Guidelines for the Prevention of Eye Problems for Students in the Gross Anatomy Laboratory Class

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Abstract

Context: *Formaldehyde is a poisonous substance that can cause many health risks.*

Objective: *To evaluate eye issues and generate guideline for participants working in the anatomy laboratory to avoid eye issues.*

Methods: *Analyzed eye problem from the participants in this cross-sectional analysis study 97 students working in the anatomy laboratory at Burapha University. In-depth interview consisted of 1 administer of Faculty of Medicine, 1 administer of Allied Health Sciences, 2 Teachers, 2 Ophthalmologists, 1 Occupational Medicine and 5 students practicing in the anatomy. This research tool is divided into 3 types: questionnaire, interview and form of evaluation of the severity of health with descriptive statistics.*

Results: *Most of them were 72.04 percent woman. Problems with the eyes include burning sensation 46.23 percent, eye irritation 43.01 percent, eye pain 25.81 percent, epiphora 24.73 percent and vision loss 15.05 percent. Assessment of severity of health impacts It was discovered that there was no effect at 55.91 percent with a slight impact of 44.09 percent, according to occupational medicine principles. Guidelines for anatomy-class students; placed in operating glasses, do not use contact lenses, do not stay long in the laboratory and be careful to touch formaldehyde immediately.*

Conclusion: *It was discovered from this studies that from the real anatomical action there was an issue with the eye, but the issue was at a low level of health effect. As a consequence of this issue, guidelines have been created for protecting the eyes in the anatomy class. The guidelines for the prevention of eye issues resulting from this study are based on the assessment of occupational diseases and expert opinion, which is complete in comparison with previous studies. This strategy can therefore serve as a model for the avoidance of both eye diseases and other illnesses.*

Keywords: Eye Problems, Formaldehyde, Gross Anatomy Laboratory, Medical Students

Introduction

Anatomy is a course that studies the shape, structure and elements that are visible to the naked eye. It is one of the most significant fundamental topics in health sciences study. Which in the research of anatomy to comprehend profoundly in relation to studying in theory by reading textbooks and then listening to teacher's lessons in the classroom. It is also essential to know the practice straight from the human body through dissection and carefully study the body structure. Anatomy laboratory by focusing on the principal's body which was the body of the individual who meant to donate the body before he died [1,2]. By the principal, the body will undergo a specific therapy method is the injection of the main therapy into the big artery in the legs. The master conditioner will flow through the blood vessels throughout the body. Then take the body to soak in the therapy of the principal allow the solution to penetrate into each tissue for a period of 1 year. Then brought the student's main body to study. Medical student completes their job, they will use the humidity retaining agent to maintain the main body moisturized at all times to prevent the master professor from drying and can become a mold. There is a significant element, formaldehyde, for the therapy of the principal [3,4]. This is a chemical compound that has many forms at room temperature with a clear, colorless, pungent smell, generally observed in a solution containing water as a solvent using wood building products and furniture such as walls, wardrobes furniture, tissue pattern printing and is commonly used in the disinfection sector. Because it is inexpensive and efficient to maintain tissues well [5-7]. Formaldehyde is a poisonous substance that can cause many health risks [8]. Including harmful to the respiratory system, skin damage, gastrointestinal dangers, and particularly formaldehyde can harm the eyes. In addition, the normal requirements for formaldehyde dosage boundaries in laboratories in Thailand are still greater than the

requirements set by many organizations; World Health Organization (WHO), American conference of Governmental Industrial Hygienists (ACGIH), Occupational Safety, Health Administration (OSHA), National Institute for Occupational Safety and Health (NIOSH). Therefore, in the anatomy laboratory, the investigator required to analyze issues and find methods to avoid eye issues for participants. To study the anatomy practice of learners at the Burapha University to be standard and appropriate. For the participant's extra quality of life.

Methods

Study Design and Participants

This research is a study descriptive of the cross-sectional survey and in-depth interview. The department of ethics has already regarded this study. Research has split the information of the study into two stages.

- Phase 1 explore this issue by the group was 97 students working in the anatomy laboratory at Burapha University (48 students of Medical Faculty and 49 students of Allied Health Sciences Faculty).
- Phase 2 is an in-depth interview; consisted of 1 administer of Faculty of Medicine, 1 administer of Allied Health Sciences, 2 Teachers, 2 Ophthalmologists, 1 Occupational Medicine Specialist, 5 students practicing in the anatomy laboratory.

This research tool is divided into 3 types: questionnaire, interview and form of evaluation of the severity of health. Statistical analysis uses both descriptive statistics and inferential statistics.

Inclusion Criteria

1. Students working in the anatomy laboratory (students of Medical Faculty and Allied Health Sciences Faculty), administer of Faculty of Medicine, administer of Allied Health Sciences, Teachers, Ophthalmologists and Occupational Medicine Specialist
2. Q&A can understand Thai language
3. Complete consciousness by evaluating with critical judgment
4. Willing to participate in the research project throughout the study

Exclusion Criteria

1. History of eye disease and eye surgery
2. Refuse to participate in the research program during the study
3. Cannot participate in the research project throughout the study

Data Collection

This research implement is questionnaire, interview and form of evaluation of the severity of health. By checking the quality of the implements utilized in the research, checking the content validity and reliability.

1. Content validity used IOC (≥0.5)
2. Reliability used Cronbach's Alpha Coefficient: α coefficient) ≥ 0.7

The questionnaire consists of 3 parts:

1. Part 1 is a general question
2. Part 2 is a question for assessing the eye issue
3. Part 3 is a question for assessing severity of health impacts

Evaluation of the severity of health effects according to the principles of occupational medicine. Divided into 5 levels as follows [9].
Level 0 mean no sequence of effects, no permanent health effects; no treatment is required, no sick leave
Level 1 mean little sequence of effects, little health impact, can disappear but may have a sequel, no treatment is required. There is usually no sickness to leave.
Level 2 mean severe health effects that can be recovered but must be treated so it will disappear often have an absence or sick leave.
Level 3 mean very severe, permanent health effects, cannot be cured Must be adapted to live a new life.
Level 4 mean effects of health hazards / acute life, death or disability or illness without self-help.

Results

1. Demographic Data

From the demographic data research, it was discovered that the bulk of the study group were females, with 72 percent, mean age = 19.65, contact lens used = 18.28 percent and history of eye surgery 1.08. The demographic data are presented in Table 1.

Table 1: Demographic Data of Students in the Gross Anatomy Laboratory Class

Data		No. of participants	Percentage
Gender			
Male		26	27.96
Female		67	72.04
Age(mean)	19.65 years		
Contact lens used			
Yes		17	18.28
No		76	81.72
History of eye disease/surgery			
Yes		4	4.12
No		93	95.88

2. Eye Issues in the Anatomy Laboratory

Exclude 4 participants with eye issues and eye surgery. Problems with the eyes include burning sensation 46.23 percent, eye irritation 43.01 percent, eye pain 25.81 percent, epiphora 24.73 percent and vision loss 15.05 percent. According to Table 2 and Figure 1

Table 2: Eye Problem in the Anatomy Laboratory

Eye Problem	No. of participants	Percentage
1.Burning sensation	43	46.23
2.Eye irritation	40	43.01
3.Eye pain	24	25.81
4.Epiphora	23	24.73
5.Vision loss	14	15.05

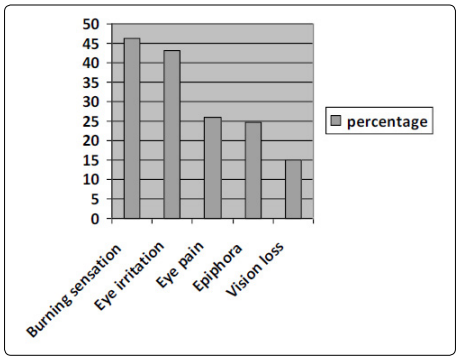

Figure 1: Eye problem in the anatomy laboratory

3. Evaluation of the Severity of Health Effects According to the Principles of Occupational Medicine

It was discovered that there was no effect at 55.91 percent with a slight impact of 44.09 percent. According to Table 3

Table 3: Severity of Health Impacts*

Level	No. of participants	Percentage
0	52	55.91
1	41	44.09
2	0	0.00
3	0	0.00
4	0	0.00

* Bandhukul A. Textbook of occupational medicine

4. Recommendations from Associated Parties

Associated parties gave an opinion on eye protection issues in participants practicing in the Table 4.

Table 4: Recommendations from Related Parties

Associated parties	Detail
Administer of Faculty of Medicine	All medical students should be given adequate care when working in the anatomy room.
Administer of Allied Health Sciences	In the anatomy laboratory, all participants receive adequate care. By adequately promoting the budget
Teacher of Anatomy laboratory	Explained the correct care in the anatomy laboratory to all participants
Ophthalmologist	Suggest participants studying in the anatomy laboratory avoid wearing contact lenses while working, in working glasses, do not remain in the laboratory for lengthy periods
Occupational Medicine Specialist	Suggest that participants studying in the anatomy laboratory avoid formalin while working Organize the compliance space to fulfill the requirements.
Students practicing in the anatomy laboratory	Eye problems can be discovered while performing anatomy. But the symptoms will decrease from the laboratory

5. Guidelines for the Prevention of Eye Problems for Students in the Gross Anatomy Laboratory Class

Guidelines for the prevention of eye issues for participants working in anatomical laboratories are created into two forms: leaflets and posters. Guidelines content; placed in operating glasses, do not use contact lenses, do not stay long in the laboratory and be careful to touch formaldehyde immediately, lab uniform and What should be performed when formaldehyde enters the eye? Displayed in Figure 2.

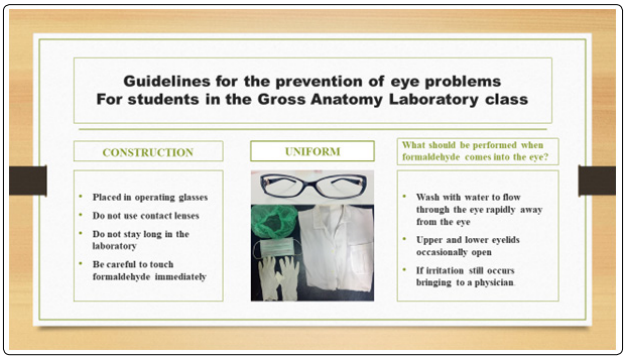

Figure 2: Guidelines for the prevention of eye issues for learners

Discussions

Formaldehyde is a widely used chemical that can be used in numerous environments. Formaldehyde can be used to synthesize industrial apps, act as a disinfectant, produce fertilizers, and can be placed into glues that keep wooden cabinetry together. It is also widely used in anatomical laboratories, funeral homes, and morgues for embalming fluid due to the capacity of formaldehyde to maintain tissues. Formaldehyde at room temperature is an odorless, colorless gas with a distinct scent. It is infinitely soluble in water, enabling it to absorb easily in the upper respiratory tract, and is flammable as both a liquid and a gas. Formaldehyde is a sensitizing agent capable of causing an immune system reaction upon first exposure to the chemical. Formaldehyde may affect four organs, including skin, eye, respiratory and gastro-intestinal [10-11]. Many organizations have established boundaries; American Conference of Governmental Industrial Hygienists (ACGIH), Occupational Safety and Health Administration (OSHA) and the National Institute of Occupational Safety and Health (NIOSH). With a 3-type restriction; Time weighted average (TWA), Short term exposure limit (STEL)

and Ceiling limit (C). TWA is the maximum amount of substance that can be received by humans on average upon receipt of the drug, on average 8-10 hours a day and 40 hours a week. STEL is a substance's highest value that beings can accept in the brief term is 15 minutes and not more than 4 sessions per day: each interval has to be at least 60 minutes apart. C is the maximum value of a substance that human beings can accept at any time [12-14]. The amount of concentration enrolled in Thailand with a higher limit than other organizations. Effects on the eyes causing eye irritation if direct eye contact results from burning, eyes, distorted vision and vision loss. Formaldehyde acts as a mucous-membrane irritant to cause conjunctivitis and lacrimation. Eye irritation is a common complaint and has been reported at airborne concentrations of 0.3-0.9 ppm in industrial workers. Severe eye irritation can develop in the range of 4-20 ppm. Controlled human exposures indicated that the group threshold for eye irritation was 1.2 ppm, and for eye-blinking rate was 1.7 ppm. The eye blinking rate was doubled in 33% of the subjects exposed at 2.1 ppm and in 11% of those exposed at 0.5 ppm. A linear relationship was found for eye irritation in exposed subjects, from a group response of no irritation at 0.03 ppm to some irritation at 3.2 ppm. Tolerance to eye irritation was reported after exposure at 13.8 ppm for 10 min in Sim and Pattle study. A complete visual-test battery and ophthalmologic examination of workers exposed at 1.5 ppm revealed no effects of formaldehyde on the eyes (USDHEW). However, Schuck, et al. found a linear relationship between eye irritation and formaldehyde concentration over a range of 0.3-1 ppm; these responses ranged from light to severe irritation. The authors determined that formaldehyde and peroxyacetyl nitrate accounted for 80% and 20%, respectively, of the eye irritation associated with photochemical air pollution. Weber-Tschopp, et al. study in 33 subjects were exposed to formaldehyde at 0.03-3.2 ppm for a total of 35 min, and 48 others were exposed at 0.03-4 ppm for 1.5 min Several responses were measured, such as eye, nose, and throat irritation, odor, "desire to leave the room," and eye-blinking rate. Schuck, et al. study in the eye-irritation response to exposures to formaldehyde for 5 min at 0.01 to 1.0 ppm was investigated in 12 subjects [12,13]. From this research it was discovered burning sensation 46.23%, eye irritation 43.01%, eye pain 25.81%, epiphora 24.73% and vision loss 15.05%. Evaluation of the severity of health effects according to the principles of occupational medicine. It was discovered that there was no effect at 55.91% and a slight impact of 44.09%.

Standard anatomy laboratory room consists of efficient formalin vapor management, space distribution, water source and drainage plumbing, electrical requirements, fluid management. To ensure that participants are safe from laboratory work, instructions must therefore be provided for the procedure [15]. Recommendations from related parties; all students should be given adequate care when working in the anatomy room, all participants receive adequate care. By adequately promoting the budget, explained the correct care in the anatomy laboratory to all participants, avoid wearing contact lenses while working, in working glasses, do not remain in the laboratory for lengthy periods, avoid formalin while working, organize the compliance space to fulfill the requirements.

No past studies have used occupational medicine assessments for eye disease in anatomical room. But I saw the significance and therefore studied this problem. I prepared directions based on these information guidelines in two ways to avoid eye problems for participants working in anatomical laboratories: brochures and posters. Content of guidelines; construction; placed in working glasses, do not use contact lenses, do not remain in the laboratory for lengthy periods and be careful to immediately touch formaldehyde, laboratory uniform and what to do when formaldehyde enters the eye. Uniform composed of disposable hat, operating glass, disposable mask, white gown and disposable groves for laboratory anatomy room. When formaldehyde goes into the eye; wash with water to flow through the eye rapidly away from the eye at least 15 min, upper and lower eyelids occasionally open, if irritation still occurs bringing to a physician.

Conclusion

It was discovered from this studies that from the real anatomical action there was an issue with the eye, but the issue was at a low level of health effect. As a consequence of this issue, guidelines have been created for protecting the eyes in the anatomy class. The guidelines for the prevention of eye issues resulting from this study are based on the assessment of occupational diseases and expert opinion, which is complete in comparison with previous studies. This strategy can therefore serve as a model for the avoidance of both eye diseases and other illnesses.

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