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The most likely infection pathways of *Echinococcus granulosus* and comparison of infection risk among students of different faculties of LSMU

PROGRAMME OF INTEGRATED STUDIES: MEDICINE

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1. SUMMARY (in English)

1.1. OBJECTIVES
1) to analyze the knowledge that students from several faculties of the University of Health Cares Sciences have about the most likely routes and sources of infection of Echinococcus granulosus.
2) to subsequently compare the risk of Echinococcus granulosus infection among students of said faculties.

1.2. DESIGN
A cross-sectional and descriptive study was carried out based on semi-structured anonymous individual interviews associated with a questionnaire survey.

1.3. SCOPE OF STUDY
The study takes place in Kaunas, Lithuania. The selected faculties belong to the LSMU (LUHS) which include six faculties: Medicine, Odontology, Pharmacy, Nursing, Public Health, Veterinary, both with lithuanian and international students.

1.4. SUBJECTS OF STUDY
The questionnaire was carried out by a total of 522 students: 308 lithuanian students and 214 international students.

1.5. INSTRUMENTATION
A questionnaire was created for the students of the different faculties, both in Lithuanian language for lithuanian students, and in English language for international students. Subsequent statistical study to know and compare the relevant factors for the study was based on the answers of these questionnaires.

1.6. RESULTS
After the completion and analysis of the questionnaires, the following results were obtained: the average age is higher in the international students interviewed, with 53.3% over 20 years, in contrast with 35.7% over 20 years of the Lithuanians.

After analysis about who is the main responsible of the dog we have found that in most cases it is the student himself followed by the mother, and then the father (both in lithuanian students and international).
According to the risk behaviors for a possible transmission of the Echinococcus granulosus parasite we have found that the international students allow more often that their dog licks the
face than the Lithuanian students, and that means that if the dog is infected with parasite the chances of human infection transmission increases greatly.

Another example of risky behavior is to allow the dog to be inside the kitchen or to have contact with kitchen utensils and the feeding the dog directly from hand. In the case if the dog is being infected- the risk of human being infected increases considerably too.

It is very important to take into account the contact that the dog can have with the farm animals especially if the are fed with the viscera of infected animals, dead or slaughtered animals. This way the dog becomes a definitive host. It is established that the dogs of the Lithuanian students have more contact possibilities with farm animals than those of the international students.

Examining the problem of washing fruits and vegetables before eating them as an important risk factor of possibilities to be contaminated with *Echinococcus* cysts, we found that Lithuanian students are more aware of that risk and wash fruits and vegetables more often in comparison with international students.

It is very important to measure the knowledge of the students about prophylactic measures which have to be use against infection with *E. granulosus* parasite.

Both Lithuanian and international students are aware of this disease and know the term zoonosis.

International students knowledges are a little bit better than Lithuanians.

Anthelmintics drugs using as prophylactic measures for dogs according to the veterinary doctors recommendations, is better noticed among Lithuanian students than international ones.

So we can conclude that international students should receive more knowledge about the active prophylaxis measures along with deworming their dogs, and Lithuanian students should keep in their mind that there are certain activities that can increase their risks of contagion of their dog and they have to try to decrease those risks.

**SANTRAUKA (lietuvių kalba)**

1.1. TIKSLAI
1) išanalizuoti žinias, kurios Lietuvos Sveikatos mokslų universiteto kelių fakultetų studentams yra žinomos apie labiausiai tikėtinus *Echinococcus granulosus* infekcijos kelius ir šaltinius.
2) palyginti *Echinococcus granulosus* infekcijos riziką tarp minėtų fakultetų studentų.

1.2. DIZAINAS

Atliktas visapusiškas ir apibūdinamasis tyrimas, grindžiamas pusiau struktūrizuotomis anoniminėmis individualiomis testo pobūdžio apklausomis.
1.3. TYRIMO APIMITIS

1.4. STUDIJŲ OBJEKTAS
Klausimyną užpildė 522 studentai: 308 lietuviai ir 214 užsieniečiai.

1.5. METODIKA
Klausimynas buvo sukurtas skirtingų fakultetų studentams lietuvių ir anglų kalbomis. Tolesnis statistinis tyrimas, siekiant sužinoti ir palyginti atitinkamus tyrimo veiksnius, buvo grindžiamas šio klausimynoatsakymais.

1.6. REZULTATAI
Apibendrinus klausimynų duomenis buvo gauti toki rezultatai: vidutinis studentų dalyvavusių apklausoje amžius yra didesnis (t. y. vyresni) iš užsienio atvykusių studentų - 53.3% virš 20 metų amžiaus, palyginti su lietuvių studentais – 35.7% virš 20 metų amžiaus.

Tiriant, kas yra atsakingas už šuns priežiūrą namuose, mes nustatėme, kad daugumoje atvejų pagrindinis gyvūno priežiūrėtojas yra pats studentas, padedamas pirmiausia mamos, ir po to – tėvo (tiekt studentų užsieniečių, tiek lietuvių studentų atvejais).

Atsizvelgiant į gana rizikingą elgesį galinti perduoti *Echinococcus granulosus* parazitą, mes nustatėme, kad studentai užsieniečiai žymiai dažniau leidžia savo šuniui laižyti veidą, negu studentai lietuviai, o tai gali reikšti, kad jeigu šuo yra užkrėstas parazitui, užsikrėtimo galimybė gerokai padidėja.

Kiti rizikingo elgesio pavyzdžiai yra leisti šuniui būti viduje virtuvės arba turėti kontaktą su virtuvės reikmenimis, o taip pat maitinti šunį tiesiai iš rankų. Tuo atveju, jeigu šuo yra užkrėstas – žmogaus užsikrėtimo rizika gerokai padidėja. Šiuo atveju lietuvių studentai rizikuoja daugiau, negu studentai užsieniečiai.

Labai svarbu atsižvelgti į šuns galimą kontaktą su žemės ūkio fermose laikomais gyvūnais, ypač jeigu jie yra maitinami paskerstų ar kritusių užkrėstų gyvūnų atliekomis (vidaus organais). Šuo tokiu būdu tampa galutiniu parazito šeimininku. Nustatyta, kad lietuvių studentų šunys turi didesnes galimybes kontaktuotis su žemės ūkio gyvūnais, negu užsieniečių.

Nagrinėjant vaisių ir daržovių nuplovimo prieš jas valgant problemą, kaip svarbų rizikos faktorių dėl jų galimo užteršimo echinokoko cistomis – lietuvių studentai yra labiau informuoti apie tokią užsikrėtimo riziką ir plaua vaisius bei daržoves prieš valgį dažniau, negu studentai užsieniečiai.
Yra svarbu įvertinti studentų žinias apie profilaktines priemones kurias reikia taikyti prieš užsikrėtimą *E. granulosus* parazitu. Tiek lietuvių, tiek užsienio studentai yra informuoti apie šią ligą ir žino kas tai yra zoonozė. Užsienio studentų žinios yra šiek tiek geresnės, negu lietuvių. Antihelmintinių preparatų kaip profilaktinės priemonės panaudojimas šunims, prisilaikant veterinarijos gydytojų rekomendacijų, yra žymiai labiau stebimas lietuvių studentams, negu užsieniečiams. Taigi mes galime daryti išvadą, kad užsienio studentai turėtų gauti daugiau informacijos apie aktyvias apsaugos nuo užsikrėtimo kirmėlėmis priemones, tuo tarpu lietuviai studentai turėtų turėti omenyje, kad kai kurie veiksmai gali padidinti jų šuns užkrėtimo parazitu riziką, ir stengtis tą riziką sumažinti.

**2. ACKNOLEDGEMENTS**

I would first like to thank my Final Master’s Thesis supervisor Prof. Dr. L. Mickienė, who has been an essential support for the realization of this thesis, always when I had a question about my research she steered me in the right direction, also I want to thank her for her patience, motivation, enthusiasm, and immense knowledge. I would also like to acknowledge Mrs. B. Valero as provided me her knowledge about the statistical part of this thesis, and I am gratefully indebted to her for her valuable comments on this thesis.

Finally, I must express my gratitude to my family, specially to my mother for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing my Final Master’s Thesis. This accomplishment would not have been possible without them. Thank you.

**3. CONFLICTS OF INTEREST**

The author reports no conflicts of interest.

**4. CLEARANCE ISSUED BY THE ETHICS COMMITTEE**

All permissions from the Head of Departments will be added after the Annexes, including the Faculties of Medicine, Odontology, Pharmacy, Veterinary Faculty, and Nursing for lihtuanian and international students.
5. ABBREVIATIONS

CE – cystic echinococcosis
AE – alveolar echinococcosis
E. granulosus – Echinococcus granulosus
E. multilocularis – Echinococcus multilocularis
PAIR – puncture aspiration injection reaspiration
PTA – percutaneous thermal ablation
WHO – World Health Organization
LSMU – Lietuvos Sveikatos Mokslų Universitetas (Lithuanian University of Health Sciences)

6. TERMS

Aberrant (incidental) hosts – not usual or dead-end hosts for the parasite further development to run and complete the full life cycle.
Accidental host – one that accidentally harbors the organism that is not the common parasite for that particular host species.
Brood capsule - a capsule containing a number of protoscolices which float free in fluid within an E. granulosus cyst.
Hydatid cyst – cyst produced inside intermediate host.
Hydatid sand – the scoleces, daughter cysts, hooks, and calcareous corpuscles of E. granulosus tapeworms in the fluid within a hydatid cyst.
Livestock – domesticated farm animals raised in an agricultural setting for labor and to produce commodities such as meat, eggs, milk, fur, leather, and wool.
Oncosphere – the larval form developed inside the eggs of a tapeworm once they have been ingested by an intermediate host; a tapeworm embryo that has six hooks and is the earliest differentiated stage of E. granulosus tapeworm
Protoscolex – the juvenile scolex formed from the geminal layer of a hydatid cyst; parasite larvae stage that develops into adult tapeworm in the definitive host organism.
Ungulates – hoofed mammals – are any members of a diverse group of primarily large mammals such as horses, cattle, pigs, giraffes, camels, deer, and other. Most terrestrial ungulates use the tips of their toes, usually hoofed, to sustain their whole body weight while moving.

7. INTRODUCTION

Echinococcus granulosus is a tapeworm of the order Cyclophyllidae. These tapeworms are the most important cestode parasitising as well in humans and in animals, especially domestic
animals. In the natural cycle of *E. granulosus*, dogs and other canids are typical definitive hosts, because the adult stage of *E. granulosus* develop inside the definitive host’s organism. Ungulates (sheep, goats, pigs, horses, etc.) are intermediate hosts, because the larval stages of the parasite named hydatid cysts harbor inside their organisms. This larval stage can also develop in nature in a broad range of other non-domestic animals, such as marsupials, hares, rabbits, rodents, carnivores, nonhuman primates. Intermediate hosts play a significant role in the parasite development and transmission cycle, or are dead-ends of the development – aberrant hosts [1]. Humans are the aberrant hosts.

The clinical manifestation of *E. granulosus* is the echinococcosis (hydatid disease) which results from the presence of one or more massive cysts, or hydatids, which can develop in any tissue site, including the liver, lungs, heart, brain, kidneys, and long bones [2] of the intermediate host. *E. granulosus* is the example of a zoonosis. At least seven of nine *E. granulosus* genotypes are infective to humans. The global public health impact of human cystic echinococcosis is significant and is caused primarily by the G1 genotype [3] which belongs to the sheep strains. The most common pathway for the infection with echinococcosis are dogs infected with *Echinococcus* spp. tapeworms when they pass eggs of the parasite in their feces, and humans become infected through fecal–oral contact [4], also some certain human activities (e.g., the widespread rural practice of feeding dogs the viscera of home-butchered sheep) facilitate transmission of the infected sheep strain and consequently raise the risk that humans will become infected [5,6].

8. AIM AND OBJECTIVES

Aim: To analyze the knowledge that students have about the most likely routes and sources of infection of *E. granulosus* in the field of five faculties mentioned above of Lithuania University of Health Sciences, together with the subsequent comparison of the risk of infection among students of these faculties. Therefore it will be possible to find which are the faculties with the highest tendency to a possible infection by *E. granulosus* together with its cause, either due to the increase of contact with infected animals, or due to the deficit in the personal prophylactic measures.

8.1. GENERAL OBJECTIVES:

1. Analyze the risk factors of the students of the LSMU faculties for getting infected by *E. granulosus*;
2. Analyze the knowledge that students have about the Echinococcosis disease;
3. Analyze the students answers about the routes and the sources of infection;
4. Analyze the students knowledge about the prophylactic measures to avoid the infection by the parasite;
5. Analyze the subsequent comparison of the risk of infection among the students from different faculties.

**8.2. SPECIFIC OBJECTIVES:**
1. Register the students that have animals at home, with focus on the students that have a dog, and who is the caregiver for the pet.
2. Analyze what types of habits the pet has in the owners home.
3. Study what types of risk behaviors are maintained with the animal.
4. Define what modes of eating habits of the pet can represent a risk for the owner to become infected with parasite.
5. Find out what types of habits when walking the dog that may entail the risk of infection.
6. Know and understand the civic behaviors with respect to the animal.
7. Analyze what knowledge students have about animal-transmitted diseases.
8. Compare the knowledge about Echinococcosis that students from different faculties have.
9. Compare the students knowledge about the personal prophylactic measures and the preparations to take them in everyday life.
10. Measure the degree of knowledge of veterinary students about prophylaxis and hygiene in the Veterinary clinic.

**9. LITERATURE REVIEW**

**9.1. THE PARASITE AND ITS ACTIVITY**
Echinococcosis is a parasitic zoonotic disease caused by the larvae of dog and fox tapeworms (cestodes) of the genus *Echinococcus* (family Taeniidae). The two major species that infect humans are: *E. granulosus* and *E. multilocularis*, which can cause cystic echinococcosis (CE) and alveolar echinococcosis (AE) [7] respectively. These zoonotic diseases are characterised by long term growth of hydatid cysts in humans and other mammalian intermediate hosts.
In my Master’s work I have concentrated on studies of agent that causes cystic echinococcosis (CE) in humans. This agent is *E. granulosus* from the genus *Echinococcus*, family Taeniidae. Until the seventeenth century it was believed that the larval stages of the cestodes, and especially the hydatid cysts, were degenerated tumors or glands. In the nineteenth century Von Siebold (1804-1885) came to understand that hydatid cysts were phases of a future development,
designated the parasite as *Taenia echinococcus* and demonstrated (1852) the development of cestode in dogs infected with sheep hydatid material [8,9].

*E. granulosus* is recognizable by its scolex with four suckers and a double crown of hooks for the purpose to adhere to the mucosa of the small intestine of the dogs and other canids (family Canidae) that are the definitive host. *E. granulosus* helminths have body dimensions that oscillate usually 50 to 70 mm long and they are composed of four to five proglottid segments that have both immature and mature proglottids. Immature proglottids are those which have both male and female sexual organs, so it can fertilize itself and can produce parasite eggs. Mature proglottids are those that have only branched uterus fulfilled with eggs 30 to 40 microns in size containing embryos called oncospheres [10,11]. Inside the definitive host’s organism each adult *E. granulosus* tapeworm can produce thousands of eggs per day. The eggs are expelled in the stool of the definitive host and released to the environment where they are infective to susceptible intermediate hosts and human incidental hosts. The *E. granulosus* eggs are highly resistant and can remain infective for a year in a moist environment at low temperature. This point is of special importance for our research.

Following egg ingestion by the intermediate or incidental host, the oncospheres hatch from the eggs, penetrate the intestinal mucosa, enter the blood and/or lymphatic system, and migrate to the liver or other visceral organs. About few days after ingestion, a fluid-filled small vesicle called cyst begins to develop, with subsequent development of multiple layers to become a hydatid cyst. The hydatid cyst has three layers: (1) the outer pericyst; (2) the middle laminated membrane; and (3) the inner germinal layer. Pericyst is made of modified host cells that produce a dense and fibrous protective layer encasing the hydatid cyst. An extremely close interaction exists between this definitive host’s tissue and the parasite. Any degenerative changes of the pericyst would result in hydatid cyst degeneration or rupture. The middle laminated membrane which is acellular, and allows the passage of nutrients into and from the cyst. The inner layer, is called germinal layer, where the scolices (the larval stage of the parasite) and the laminated membrane are produced. The germinative layer gives rise to the hydatid fluid and small secondary cysts (brood capsules), which bud internally from this layer [12,13]. The middle laminated membrane and the germinal layer form the true wall of the cyst, usually referred to as the endocyst, although the acellular laminated membrane is occasionally referred to as the ectocyst [14,15]. After the infection of the intermediate host the endocyst gradually expands and induces a granulomatous host reaction, followed by a fibrous tissue reaction and the formation of a connective tissue layer – pericyst [6,11]. Fragmentation of the germinative layer and brood capsules gives rise to daughter cysts. These may develop within the original cyst or separately.
Protoscolices start to develop within the hydatid cyst from the inner, germinal layer inside the intermediate hosts (usually in sheep, goats) which are the infective forms to the definitive host – the dog. Inside the organism of the definitive host that become infected when fed up with slaughtered intermediate host’s visceral organs containing hydatid cysts. After at least 10 to 12 weeks following infection of the definitive host, protoscolices are produced within the brood capsules. Cysts may contain liters of fluid and thousands of protoscolices – the cysts became fulfilled with large amounts of protoscolices, the protoscolices evaginate, attach to the intestinal mucosa of the host, and further develop into the adult tapeworms. Such development is completing the life cycle of the parasite.

Cysts containing protoscolices are fertile and can produce daughter cysts, whereas cysts without protoscolices are sterile [16].

In the human (incidental) host, cysts may develop in many anatomic sites following oral ingestion of *E. granulosus* eggs. This form of echinococcosis is known as primary CE. Secondary CE, predominantly in the abdominal cavity, results from spontaneous or trauma-induced cyst rupture and the release of protoscoleces and/or small cysts, which can grow to larger cysts.

Infected subjects may remain asymptomatic for months, years or throughout of his whole life. The first manifestations depend on the organ affected, the quantity and size of the cysts and the pressure exerted by the cystic mass on the tissues or adjacent organs [6].

Normally, the prognosis of the cysts is favorable. However, we must not forget the different risks derived from the removal of cysts by surgery, due to complications, due to the cyst location inside host’s organism, or due to rupture of the cysts following release of large amounts of poisonous hydatid fluid.

In the latter case, it could cause anaphylactic shock and secondary disseminated hydatidosis, remaining severely compromised the life of the patient.

### 9.2. HOST AND HIS STATE

*E. granulosus* adult tapeworm usually inhabits in the small intestine of the definitive hosts: domestic dogs (*Canis lupus familiaris*), other canids, and sometimes cats. The adult tapeworms fertilize and start to produce the eggs. The eggs are stored inside the mature proglottid of the tapeworm. The eggs of these cestodes are eliminated in the feces of these carnivorous animals and are the infective form for the intermediate hosts: mammals herbivores or omnivores and humans which are the incidental hosts.

The highest rates of cystic echinococcal endemic disease tend to occur in areas where sheep are raised. Transmission frequently occurs in settings where dogs eat the viscera of slaughtered...
animals. The dogs then excrete infectious eggs in their stool, which are passed on to other animals or humans via fecal-oral transmission. This may occur via environmental contamination of water and cultivated vegetables or contact between infected domestic dogs and humans (especially often the infection by *E. granulosus* is caused in children because of their unsufficient prophylaxis habits) [17]. Therefore among the main risk factors are the frequency and intensity of intestinal infection in dogs, especially pasture dogs; it is very important that they have access to raw slaughtered animals viscera, infected with hydatid cysts, since it is the most frequent form of acquiring parasitosis; it is also considered relevant to allow pasture dogs to roam in places where livestock (sheep, goats) is kept [4].

Humans can acquire primary CE by oral uptake of *E. granulosus* eggs excreted by infected pasture dogs. It has been noted that *E. granulosus* eggs may adhere to the coat of dogs, particularly to the hairs around the anus and on the thighs, muzzles, and paws [18]. The infection may be acquired by handling or petting infected dogs through egg-containing dog’s feces, or egg-contaminated plants or egg-contaminated soil, or egg-contaminated house utensils followed by direct hand-to-mouth transfer. Eggs of parasitic helminth can also be ingested with unwashed or not properly washed fruits, vegetables, salads, and other contaminated plants [19]. Foodstuffs or kitchen utensils surfaces may possibly be secondarily contaminated with *Echinococcus* eggs via wind, beetles (cockroaches), and house flies. Also, during traveling in the nature and using for preparing food or rinking non-boiled, non-filtered wáter from the open wáter sourses, such as rivers, lakes and ponds contaminated with *Echinococcus* eggs is a potential source of infection. Human-to-human transmission of echinococcosis does not occur since two different mammalian species (dog and herbivorous organism) are required for the completion of the parasite life cycle [20]. The manifestations of disease depend on the organ of host organism affected, the number of cysts produced, their size, development regime (activity or inactivity) and the pressure of the cysts exerted on adjacent tissues or organs.

The clinical manifestations are nonspecific, and among the most frequent are: hepatomegaly, pain in right hypochondrium, epigastric, nausea, vomiting, urticaria, abdominal distension, cholestasis, portal hypertension, biliary cirrhosis, ascites and other signs and symptoms associated with the occupational mass. When the cyst breaks down, allergic reactions of varying magnitude may occur, including anaphylactic shock. It is also possible the dissemination of protoscolices, which will lead to a secondary hidatidosis as was commented before.
The diagnosis of CE in individual patients is based on identification of cyst structures by imaging techniques, predominantly ultrasonography, computed tomography, X-ray examinations, and confirmation by detection of specific serum antibodies by immunodiagnostic tests [21].

**9.3. THE SANITARY TREATMENT OF THE ECHINOCOCCOSIS**

In humans:

There are several major options for treatment of CE, including surgery, puncture aspiration injection reaspiration, percutaneous thermal ablation and pharmacological measures. For asymptomatic individuals, a “wait-and-observe” approach may be considered with supervision of the patient.

Surgery: Using various technical approaches [22], has the potential to remove the cysts and lead to complete cure. It can be successfully performed in a high proportion of patients with simple forms of CE (cyst number and organ involvement limited, cysts not in risky locations, disease not too far advanced).

Puncture-aspiration-injection-reapiration:
It is a minimally invasive technique and includes the following steps:

1. Percutaneous puncture of the cyst under ultrasonographic guidance
2. Aspiration of a substantial portion of the cyst fluid
3. Injection of a parasitocidal solution (95% ethanol; approximately an equivalent of one-third of the amount aspirated), and (iv) reaspiration of the fluid content after 5 min [23].

Percutaneous thermal ablation: A new approach of treatment involves percutaneous thermal ablation of the germinal layer in the cyst by using a radiofrequency ablation device [24].

Chemotherapy: with benzimidazoles (albendazole or mebendazole) is indicated for patients with inoperable CE and for those with multiple cysts in two or more organs. Cysts located in bones are less susceptible to chemotherapy. Cysts located in bones are less susceptible to chemotherapy.

According to WHO recommendations, albendazole is given in daily doses of 10 to 15 mg/kg of body weight in two divided doses postprandially for 3 to 6 months. The usual dose of mebendazole is 40 to 50 mg/kg of body weight per day for at least 3 to 6 months. Although the efficacy of chemotherapy is not satisfactory and the costs are high, it is an option of treatment, predominantly for inoperable cases [25].

In animals (dogs):

Pharmacological treatment: praziquantel is used mostly, although it can also be treated with
In the intestine of the canids, *E. granulosus* takes between 30 and 45 days to reach the sexual maturity, at which time the release of eggs begins in the feces.

Because of this, it is recommended to perform periodic treatment with praziquantel every 45 days in the risk animals (shepherd dogs) and every 120 days in the low risk. Having no ovicidal action, the feces must be destroyed during the 72h following deworming [26].

### 9.4. BACKGROUND AND CURRENT STATUS OF THE SUBJECT

In this research we will focus on cystic hydatidosis caused by *E. granulosus*, as a major public health problem in Europe, especially in the Baltic countries, the Middle East and the eastern Mediterranean. The general prevalence of echinococcal infection is underestimated in many areas because systematic population surveys are not conducted in all endemic areas. The number of cases is increasing, however it may be due to a better diagnostics tools.

Epidemiology gives a clue to how this infection is underestimated, it is important to establish the infection routes, prevention and diagnosis methods that play a central role in the early stages of treatment, as well as the knowledge about the life cycle of *E. granulosus*, and the pathological picture of this parasite activities are determinant for a good treatment result. Consequently, a large part of this research has focused on the most likely pathways of infection and the risk of infection due to human incorrect personal everyday life habits and routines why keeping a pet at home, or lack of specific knowledge about the disease. The results of this research will be used to help understand and consider the implications of *E. granulosus* infection.

In Lithuania, during the last decade, as diagnostic techniques improved and the incidence of human CE cases has increased to 13 new cases registered per year in 2005 (0.39 / 100,000 inhabitants per year). Later, the number of human CE cases diagnosed increased to 35 in 2009 (1.11 cases / 100 000 inhabitants per year), remaining at a comparable level until 2013 (1.15 cases / 100 000 inhabitants per year) [27]. The reported cases of CE were recorded only in the University Hospital of Infectious Diseases and Tuberculosis and in the Santara Clinics of the University in Vilnius [28]. The majority of CE cases were recorded in the southeast and northwest areas of Lithuania, with a particularly high number of CE cases registered in the Vilnius district.

As there is no surveillance programs of CE in Lithuania, it can be assumed that the number of reported cases is underestimated in some districts. This increase in the number of cases as mentioned above can be linked to new and better diagnostic tools as was exposed before.
9.5. JUSTIFICATION OF THE STUDY:
There are no previous studies in the LSMU (LUHS) environment, which would provide new information about the chances of becoming infected with the *E. granulosus* parasite due to a series of factors and/or risk behaviors, together with the lack of prophylactic measure. My Master’s thesis is appointed to the study and the data analysis of the LSMU student population risks and ways to be infected with *E. granulosus* tapeworm.

10. RESEARCH METHODOLOGY AND METHODS

10.1. HYPOTHESIS
Prophylaxis knowledge at the student level is very deficient and therefore there is a high risk of increased infections by *E. granulosus*.

10.2. METHODOLOGY

10.2.1 REFERENCE AND STUDY POPULATION
Reference population: Students of five faculties belonging to the Kaunas LSMU (LUHS) were included in the study. The faculties are: Medicine, Odontology, Pharmacy, Nursing and Veterinary Medicine. Study population: 308 Lithuanian students, 214 international students of the different faculties.

10.2.2 INCLUSION AND EXCLUSION CRITERIA
Criteria of inclusion and exclusion: The students of five faculties belonging to the LUSH listed above who study in Kaunas. Regardless of their place of origin.

10.2.3 STUDY DESIGN
A cross-sectional and descriptive study was carried out based on semi-structured individual interviews associated with a questionnaire survey.

10.2.4. DATA COLLECTION AND INFORMATION SOURCES
The data has been collected through the answers to the questionnaire. The questionnaire assesses the age of students, and the faculty from which each student comes, the place of residence of participants, the number of students that have a pet at home, the type of pet, and the conception who is the main owner of the pet. This study is to be focused: i) on the parasite *E. granulosus* whose vector is the dog, ii) on the students whose pet is a dog. So during this study it is analyzed the animal's habits within the home; way of contact with owners, higiene conditions, feeding
rules, the pet care methods and the risk for the animal to become infected with the *E. granulosus* parasite; the student’s – pet owners – knowledge about the echinococciosis disease and the methods of prophylaxis are also evaluated.

The time used for this study has been from January 2017 to January 2018.

### 10.2.6. DATA ANALYSIS

First of all, a descriptive statistical analysis of each of the variables in the database is carried out, for which a frequency table (number of cases and percentages) is calculated for all the qualitative variables and shown as a graphic representation in the mode of the graph of sectors and bar chart.

To see if there are differences between international and Lithuanian students, in the most relevant variables, the Pearson chi-square test has been used. The same methods was used to see the differences between the different variables and the age group.

The level of alpha risk accepted for all hypothesis tests is 0.05 and the contrasts are raised bilaterally. The calculations were made using the statistical package SPSS vs 24.

### 10.2.7. DIFFICULTIES AND LIMITATIONS OF THE STUDY

Limitations of the study had been – the absence of the gender variable as an interesting factor to analyze at the level of gender equality.

Difficulties during the study were caused by the some number of questionnaires not completed or left incompletely by participants. Those questionnaires have not been a relevant factor since we had more than enough number of data and completed questionnaires to achieve our goal.
11. RESULTS, DISCUSSION OF THE RESULTS

The descriptive analysis of the data I started from the international students.

Age

Data of the international students with a total of 214 students analyzed show that:
Among the students who have completed the questionnaire, we obtain that 100 of 214 students are less than 20 years old (<=20 years) that corresponds to a valid percentage of 46.7%, and more than 20 years (> 20 years) have 114 students and corresponds to 53.3%.

Table 1. Distribution of age among international students

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=20 years</td>
<td>100</td>
<td>46.7</td>
</tr>
<tr>
<td>&gt; 20 years</td>
<td>114</td>
<td>53.3</td>
</tr>
<tr>
<td>Total</td>
<td>214</td>
<td>100,0</td>
</tr>
</tbody>
</table>

![Fig. 1. Distribution of age among international students](image)

Faculty

According to the faculty: 65.9% of students correspond to the faculty of medicine, 9.8% to the veterinary medicine, 22.0% to odontology and 2.3% to pharmacy faculties.
The students percentages among courses are 70.1% from the first year, 20.1% from the third, and 9.8% from sixth year.

![Fig. 2. Distribution of faculties among international students](image)

Residence

Most of the international students that had completed the questionnaire are from Lithuania 41.6%, followed by Sweden 16.8%, Germany 12.4%, Israel 8.8%, Spain 5.8%, UK 3.6%,
Cyprus 2.2%, other nationalities account each of them 0.7% are Finland, India, Ireland, Moldova, Saudi Arabia, and South Korea. Here we have to take in account that all the faculties are analized together.

**Animal at home**

The following questions refer to students who have an animal, and among them more specifically we look for those who have a dog, they are asked about the place of residence to find out who has a dog now, who is responsible for taking care of the pet, and other habits inside the home.

**When Kaunas is the permanent residence or temporary (studies time) residence.**

Kaunas is the place of permanent or temporary residence (during the time of studies) 5.6% students have responded that they now have a pet; 11.7% of students answered that they had it before but not now, and 82.7% have never had any animals at home nor before, nor now.

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, I have now</td>
<td>12</td>
<td>5.6</td>
</tr>
<tr>
<td>Yes, I had earlier</td>
<td>25</td>
<td>11.7</td>
</tr>
<tr>
<td>No</td>
<td>177</td>
<td>82.7</td>
</tr>
<tr>
<td>Total</td>
<td>214</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**When your permanent residence is elsewhere.**

When the place of residence is in another place (country of origin for example) the students who have dog are currently 22.9%, who have previously had 12.6%, and who have never had 64.5%. As it was previously exposed in the review section of the literature, we know that the final guests of the *E.granulosus* are the dogs [4], therefore all those students who have a dog or have a relationship with these animals, have a risk that the parasite will be transmitted in case the dog is infected.

**If you currently do not have a dog, would you like to get one in the future?**

From the students that do not have a dog about the of them 54.9% they would like to have one, 24.4% would not want to have it in the future, and 20.7% are not sure if they would like or not.
Would your parents/guardians object to this?

When asked if their parents or guardians would allow them to have a pet, 44.9% answered no, 25.2% answered yes, and 29.9% said they were not sure.

What sort of animal would you like to get?

This graphic shows the incidence of the kind of animal that the students would like to have in a future, as we can see a 68.3% of the students wants a dog.

If you keep a dog, who is the principal owner?

We found that the main responsible of the dog is the student in about 39.4%, the mother in 26.8%, following by the father in 14.1% of the cases, the siblings in 8.5% and finally 11.3% of students answered that they are not sure who is the main caregiver.

If you have any dogs, where are they kept?

15.5% of the students answered that their dog is outside the house in a dog house, 4.2% outside the home in a dog enclosure, the majority with 52.1% moving freely inside the house, 7% in a designated area of the house and 19.7% depends on the occasion.
If a dog is kept in your living quarters, does it have its own sleeping place/cot?

When the dog lives inside the house it has its bed / blanket, the majority with 88.9% answered yes, 7.9% answered no, and 3.2% did not know or are not sure.

Is the pet allowed to sleep in your room?

If the dog is allowed to sleep in the room 29.6% answered no, in contrast to 52.1% yes, only 18.3% answered that it depended on the occasion.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>21</td>
</tr>
<tr>
<td>Yes</td>
<td>37</td>
</tr>
<tr>
<td>Depends on the occasion</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
</tr>
</tbody>
</table>

Is the dog allowed to sleep on your bed/pillow/under your sheets?

The dog is not allowed to sleep in bed, pillow and sheets in answers of 52.7% of respondents, 37.1% say yes, while 10% respond that depends on the occasion.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>25</td>
</tr>
<tr>
<td>Yes</td>
<td>37</td>
</tr>
<tr>
<td>Depends on the occasion</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
</tr>
</tbody>
</table>

Do you let the dog allowed to lick your hands/face?

52.1% of students allow the dog to lick their hands or face, 35.2%, and 12.7% depends on the occasion, this is a risk factor for the echinoccosis infection.
Fig. 6. Percentage of students that allow the dog to lick their hands/face

This question is important because people can acquire echinoccosis when they come into contact with the eggs eliminated by the feces. It can happen, for example, when the dog licks the area around the anus, where it will take the eggs to the mouth and the rest of the body. By stroking the dog or playing with him, when the dog licks, the eggs can be keep in the hand or around the face, and from there, move to the mouth, and the person will be infected by the parasite.

**Is the dog allowed to rummage through/lie on your personal belongings (clothes, books, notebooks)?**

60% of students do not let their dog roam near their personal items (clothes, books ...) 28.6% if they allow it, and 11.4% depends on the occasion.

**Are your dog allowed to hang around in the kitchen or sniff kitchen utensils?**

52.1% of students do not allow the dog to be near the kitchen utensils, 38% answered yes, and 9.9% depends on the occasion, this is also a risk factor because the contamination of the utensils can lead to a transmission of the eggs of echinococcus.

Fig. 7. Students that allow their dog to hang around in the kitchen or sniff kitchen utensils

**What food do you give to your dog?**

Infected intermediate hosts carry parasites in their viscera so if they are given to dogs it would be part of the chain of infection that is why it is so important to provide them with the proper food, designated for dogs.
Table 5. Food given to the dog

<table>
<thead>
<tr>
<th>Food given to the dog</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only designated dog food</td>
<td>44.4</td>
<td>55.6</td>
</tr>
<tr>
<td>Designated pet food as well as home-made pet food</td>
<td>71.8</td>
<td>28.2</td>
</tr>
<tr>
<td>Only home-made pet food</td>
<td>97.2</td>
<td>2.8</td>
</tr>
<tr>
<td>Food that we eat ourselves</td>
<td>91.5</td>
<td>8.5</td>
</tr>
<tr>
<td>Raw meat or its leftovers</td>
<td>94.4</td>
<td>5.6</td>
</tr>
<tr>
<td>Raw fish or its leftovers</td>
<td>98.6</td>
<td>1.4</td>
</tr>
<tr>
<td>A mixture of foods</td>
<td>80.3</td>
<td>19.7</td>
</tr>
</tbody>
</table>

Fig. 8. Food given to the dog

**Does the dog have a separate feeding dish?**

11.3% of students do not provide a separate dish for their dog for food, 87.3% yes, and 1.4% say that it depends on the occasion.

Table 6. Students that have a separate feeding dish for the dog

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>8</td>
<td>11.3</td>
</tr>
<tr>
<td>Yes</td>
<td>62</td>
<td>87.3</td>
</tr>
<tr>
<td>Depends on the occasion</td>
<td>1</td>
<td>1.4</td>
</tr>
</tbody>
</table>
Is the pet allowed on the food table?
Most 84.5% do not allow the dog to be at the food table, 11.3% say yes, and 4.2% answered that it depends on the occasion.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>60</td>
</tr>
<tr>
<td>Yes</td>
<td>8</td>
</tr>
<tr>
<td>Depends on the occasion</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
</tr>
</tbody>
</table>

Is the dog allowed to take food from its owner’s plate?
The dog is not allowed to eat food from the owner's plate answered 85.9% of participants, but 8.5% of the students allow it, and that it depends on the occasion answered 5.6% of students.

Do you feed your dog by hand?
33.8% of students do not feed the dog directly with the hand, 38% do so, while 28.2% depend on the occasion, this is an important risk factor if after that the student doesn’t take the necessary hygiene measures, like a correct hands hygiene, and deparasite (deworm) the dog.
Is the dog allowed to roam outside the home unattended (in playgrounds, streets, a park, a forest)?

When asked if the dog is allowed to remain unattended in parks, streets and forests, 51.4% answered no, 35.7% yes, while 12.9% of the students answered that it depended on the occasion.

Does your dog come into contact with other unattended animals (e.g. stray dogs/cats)?

48.6% of students answered that the dog did not come into contact with unattended or abandoned animals, 34.3% answered yes, while the remaining 17.1% depended on the occasion.

If you have your dog in the country, can the dog take any contact with sheep, goat, cattle?

Of the students whose dog was in the field, when asked if the dog had contact with farm animals, 60% answered no, 24.3% answered yes, and 15.7% answered the occasion, this is a pathway of infection of the dog that can eat viscera from an intermediate host contaminated [17].

Table 8. Percentage of student’s dogs that have any contact with sheep, goat or cattle

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>42</td>
</tr>
<tr>
<td>Yes</td>
<td>17</td>
</tr>
<tr>
<td>Depends on the occasion</td>
<td>11</td>
</tr>
</tbody>
</table>

Fig. 11. Percentage of student’s dogs that have any contact with sheep, goat or cattle

Is your dog taken on walks with a leash and muzzle?

In the walks of the dog through paths with leash and mud, 34.3% of the students answered no, 54.3% yes, while 11.4% depended on the occasion, here is important that parasitic protozoan cyst and worm eggs may be stuck to the fur/legs of the dog.
Is your dog registered?
The students answered that in most cases with 91.4% their dog was registered, while 8.6% did not have the dog registration.

Collecting pet droppings
67.1% collect dog droppings for later throwing them in designated bins, 27.1% do not, and 5.7% of students answered that it depends on the occasion.

About the available of articles for the collection of feces of the pets according to the students 21.4% answered that they are not easily available, 62.9% that they are, while 15.7% are not sure.
When asked if the items to collect the depositions of pets are very expensive, 53.6% answered no, 21.7% consider that yes, 24.6% are not sure, and about the area where they live there are bins specially designated for animal depositions, 52.9% answered no, 34.3% said yes, and 12.9% answered that they were not safe.

Does your study program include the subject of Parasitology?
When asked if in the program of studies, the Parasitology subject is compulsory, 94.4% of the students answered yes, 0.9% did not study, and 4.7% did not know (are not sure).

If the answer is Yes, is it obligatory or optional?
Those who answered yes, 98.6% answered that it is mandatory, in contrast to the 1.4% that responded that it was optional.
Table 11. Parasitology subject

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obligatory</td>
<td>205</td>
<td>98,6</td>
</tr>
<tr>
<td>Optional</td>
<td>3</td>
<td>1,4</td>
</tr>
<tr>
<td>Total</td>
<td>208</td>
<td>100,0</td>
</tr>
</tbody>
</table>

If the answer is Yes, in which year do you take the Parasitology subject?
90% of the students answered that it occurs in the 1st year, 0.5% in the second, 2.9% in the third and 6.7% did not know when.

Have you already taken the subject of Parasitology?
A total of 81.8% have already studied parasitology when carrying out this questionnaire, the remaining 18.2% did not.

Fig. 12. Percentage of students that have already studied parasitology

Do you know the meaning of the term zoonosis?
60.7% are familiar with the term zoonosis, 21% of the students answered that they do not know what it means, and vaguely 18.2%.

Table 12. Knowledge about the term zoonosis

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>45</td>
<td>21,0</td>
</tr>
<tr>
<td>Yes</td>
<td>130</td>
<td>60,7</td>
</tr>
<tr>
<td>Vaguely</td>
<td>39</td>
<td>18,2</td>
</tr>
<tr>
<td>Total</td>
<td>214</td>
<td>100,0</td>
</tr>
</tbody>
</table>

Fig. 13. Knowledge about the term zoonosis

Diseases that are transmitted from animals to people are called zoonoses. It should be noted that not always the animal must appear ill to be able to transmit a disease, and sometimes, even if
they are kept in good condition or without direct contact with other animals, they may also acquire certain diseases.

The main zoonoses are produced by parasites (parasitic zoonoses), or by bacteria, viruses and fungi (infectious zoonoses). Knowledge of the forms of transmission of these animal diseases to people deserves special attention in order to prevent them better.

**Do you know the pathways of zoonosis infection?**

On the knowledge of the routes of infection by zoonosis 51.9% of the students answered that if they knew them, 27.1% did not, and 21% vaguely.

<table>
<thead>
<tr>
<th>Table 13. Knowledge about pathways of zoonosis infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Vaguely</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Fig.14. Knowledge about pathways of zoonosis infection

On the knowledge of what diseases can be transmitted by sick animals, 71.5% answered yes, they know them, 5.1% do not know and 23.4% know it vaguely. When asked if students know how infections from sick animals are spread and contaugied, 79% answered that they know it only 4.7% answered that they did not know, and 16.4% know it vaguely.

**Are you aware of an infectious disease called echinococcosis?**

About the awareness of the disease called Echinococcosis, 75.7% of students say they are aware of this disease, 13.6% say not and 10.7% say - vaguely, this fact is relevant because if the students are unaware of the disease they will not be able to take the appropriate prophylactic measures.
Are you aware of the existence of canine (dog-borne) echinococcosis?

63.6% know that there is echinococcosis transmitted by dogs, 20.6% no, and 15.9% vaguely.

Table 14. Aware of the existence of canine (dog-borne) echinococcosis

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>44</td>
<td>20.6</td>
</tr>
<tr>
<td>Yes</td>
<td>136</td>
<td>63.6</td>
</tr>
<tr>
<td>Vaguely</td>
<td>34</td>
<td>15.9</td>
</tr>
<tr>
<td>Total</td>
<td>214</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Do you know how you can get infected with *Echinococcus granulosus* parasites?

57% of students know how to get infected with *E. granulosus* parasites, 23.4% admit that they don’t know how, and 19.6% know it vaguely.

Fig.15. Percentage of students aware of how can get infected with *Echinococcus granulosus* parasites

Pathways for echinococcosis infecting humans. Underline answers that you think are valid pathways.

To measure the degree of knowledge of the students about the possible routes of transmission of the echinococcosis, in the questionnaire different statements were presented, from there we found which students thought they were more valid, washing their hands after touching an infected dog have been chosen as correct in the first place with 70.9% of the students, and the one that was selected by the students as the most incorrect was that of eating sweets and cakes with 91.1%
Is the dog given a bath after taken for a walk?

After taking the dog for a walk, approximately 13.9% of the students bathe the dog daily, 14.9% weekly, 6.3% monthly, occasionally 15.9%, only the legs 16.8% and 32.2% do not wash it at all.

What do you think is the most important purpose of giving the dog a bath/washing its legs?

Table 15. Dog hygiene

<table>
<thead>
<tr>
<th>Purpose</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keeping mud and dirt away from the room</td>
<td>55,5</td>
<td>44,5</td>
</tr>
<tr>
<td>Keeping the carpets and furniture clean</td>
<td>69,2</td>
<td>30,8</td>
</tr>
<tr>
<td>Droppings of other animals (strays, diseased animals) may be stuck to the fur/legs</td>
<td>52,1</td>
<td>47,9</td>
</tr>
<tr>
<td>Parasitic protozoan cyst and worm eggs may be stuck to the fur/legs</td>
<td>36,5</td>
<td>63,5</td>
</tr>
<tr>
<td>Canine ticks and fleas may be stuck to the fur/legs</td>
<td>55,5</td>
<td>44,5</td>
</tr>
</tbody>
</table>

63.5% of students agree that the most important thing is deworming your pet of possible cysts and parasites that may have been trapped in their legs, this answer gives us information about how aware the students are of how their pet and their environment can be infected.

Do you like to stroke a cute little stray dog or kitten that you meet in the street?

About 38% of students do not stroke abandoned animals, 28.6% do so, and 26.3% depend on the occasion. This is a risk factor not only for echinococcosis but also for other diseases al like rabies, toxoplasmosis, toxocariasis, dog heart tapeworm etc.
Do you regularly take your dog to be inspected by a veterinarian?
Veterinary inspections: 41.6% of students carry their dog, 25.9% no, 19.3% depends on the occasion, and the remaining 13.2% are not sure.

Do you give your dog antihelmintic medicines (worm pills)?
44.3% of the students answered that they give antiparasitic pills to their dog, 23.4% not, 16.7% depend on the occasion, and the remaining 15.6% are not sure.

![Fig.17. Administration of dog antihelmintic medicines](image)

Of those students, who answered yes, 5.3% give it less than once a year, 15.2% once a year, 22.2% more than once a year according to the recommendations, 18.1% each 3 months and 39.2% depending on the occasion.

It is very important to make regularly the deworming of the dog to avoid contagion to humans, so it is recommended to perform a deparasitization of a pet every 120 days approximately if the dog does not have the risk factors with praziquantel [26].

Do you wash fruits, berries and vegetables that you have bought in a shop, or brought from a wood, garden or orchard before eating them?
When asked if they wash the fruit, and vegetables before eating them, 5.1% of the students answered no, compared to 86% who answered yes, the remaining 8.9% say it depends on the occasion. The most common mode of transmission parasites to humans is by the accidental consumption of soil, water, or food that has been contaminated by the fecal matter of an infected dog. *E. granulosus* eggs that have been deposited in soil can stay viable for up to a year.
Table 16. Washing fruits, berries and vegetables

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>11</td>
<td>5,1</td>
</tr>
<tr>
<td>Yes</td>
<td>184</td>
<td>86,0</td>
</tr>
<tr>
<td>Depends on the occasion</td>
<td>19</td>
<td>8,9</td>
</tr>
<tr>
<td>Total</td>
<td>214</td>
<td>100,0</td>
</tr>
</tbody>
</table>

Do you think your knowledges of dog handling, care and echinococcosis prophylaxis – both for your pet and for your family members – are sufficient?

46.9% of students believe that their knowledge of the measures necessary to avoid contagion by *E. granulosus* are sufficient for their environment, while 27.2% admitted that no, and 25.8% are not sure.

![Fig.18. Percentage of sufficient degree of prophylaxis against echinococcosis](image)

In your opinion, how could you gain/improve your knowledge regarding pathways of echinococcosis infection and methods of prophylaxis?

![Fig.19. Acquisition of knowledge regarding pathways of echinococcosis infection and methods of prophylaxis](image)
We can conclude that the majority of students agree that to improve knowledge should be done from the education and health sector, followed by the media, this information is important to know where it would be interesting to influence when it comes to providing more knowledge to the population.

**What type of methods of prophylaxis do you suppose to use to prevent to be infected from the sick animals in the veterinary clinics?**

Table 17. Methods of prophylaxis in the veterinary clinics

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examining the patient animal always use special gloves</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>Use disposable medical tools and equipment</td>
<td>35</td>
<td>65</td>
</tr>
<tr>
<td>Wash hands thoroughly after each examining of patient animal</td>
<td>10</td>
<td>90</td>
</tr>
<tr>
<td>Regular Veterinary clinics desinfection</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>Regular personal health examination in the general doctor’s clinics</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>Healthy style of life and a healthy diet</td>
<td>70</td>
<td>30</td>
</tr>
</tbody>
</table>

This question was answered specifically by the students of the faculty of veterinary to know what were the prophylactic measures that students saw correct to perform in veterinary clinics, the majority coincides with 90% in which washing hands after examining each animal is part essential of prophylaxis, to what less importance as a prophylactic measure they provide is to hospital reviews and lead a healthy lifestyle.
Now we will study the variations in the answers of the Lithuanian students, to describe these variations and then proceed to their comparative analysis.

**Age**

Data of the Lithuanian students with a total of 308 students were analyzed. Among the students who have completed the questionnaire, we obtained that 198 of 308 students are less than 20 years old (≤20 years) that corresponds to a valid percentage of 64.3%, and more than 20 years (> 20 years) have 110 students and corresponds to 35.7%.

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤20 years</td>
<td>198</td>
<td>64.3</td>
</tr>
<tr>
<td>&gt;20 years</td>
<td>110</td>
<td>35.7</td>
</tr>
<tr>
<td>Total</td>
<td>308</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 18. Distribution of age among international students

![Fig.20. Distribution of age among international students](image)

**Faculty**

According to the faculty, most of the students surveyed belong to the Veterinary Medicine with 32.1%, followed by Odontology with 23.7%, Medical Faculty represents 13.6%, as well as Pharmacy with another 13.6%, the Faculty of Nursing 9.7%, and Public Health with 7.1%

The students percentages among the courses are 63.6% from the first year, 13% from the second, and 23.4% from the third year.

![Fig. 21. Distribution of faculties among Lithuanian students](image)

**Residence**

48.4% of the students reside in Kaunas, while the other 51.6% are from other parts of Lithuania.
Animal at home
As specified above, the objective of the results is the same as that of international students, after we analyze and describe the data obtained.

When Kaunas is the permanent residence or temporary (studies time) residence.
With this question we want to find out how many students have pets now in Kaunas either as a temporary residence for studies or permanent, 30.8% of the students answered yes, they have a dog at home, 9.5% have had previously but no longer, and 59.7% have never had.

Table 19. Number of students having a pet at home

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, I have now</td>
<td>91</td>
</tr>
<tr>
<td>Yes, I had earlier</td>
<td>28</td>
</tr>
<tr>
<td>No</td>
<td>176</td>
</tr>
<tr>
<td>Total</td>
<td>295</td>
</tr>
</tbody>
</table>

When your permanent residence is elsewhere.
If the place of residence is in another place, 43.4% have a dog, 15.5% have had it before, and 41.1% have never had.

If you currently do not have a dog, would you like to get one in the future?
Of the students who do not have a dog, the majority of those interviewed with 76.3% would like to have one in the future, 13.4% reject this option, and 10.2% are not sure.

Would your parents/guardians object to this?
If the parents or guardians of the students would have any objection to have a dog at home as a pet, 57.5% answered no, 13.9% - yes, and the remaining 28.6% - do not know or are not sure.
What sort of animal would you like to get?

![Graph showing the percentage of students who want different types of animals.]

Fig. 22. Sort of animal students would like to get

This graphic shows the incidence of the kind of animal that the students would like to have in the future, as we can see a 66.6% of the students want a dog, followed by a cat with 30.5%

If you keep a dog, who is the principal owner?

Students who have a dog as a pet, when asked who made the maintenance of the pet, 31.2% answered that the responsible is the mother, the father 25.8%, the siblings 4.5%, the own student in 35.5% of the cases and 3.2% are not sure who gets the responsibilities on the pet.

![Bar chart showing the percentage of students who think the dog is the mother, father, siblings, me, or not sure.]

Fig. 23. Main responsible of the dog

If you have any dogs, where are they kept?

19.9% of students answered that their dog is outside the house in a dog house, 9.5% outside the home in a dog enclosure, the majority with 62.9% - dog moving freely inside the house, 2.3% in a designated area of the house and 5% - depends on the occasion.
If a dog is kept in your living quarters, does it have its own sleeping place/cot?
When the dog is in the rooms, it has its own bed/blanket to sleep 78.3% of the students answered yes, 18% no, and 3.7% are not sure.

Is the pet allowed to sleep in your room?
47.9% of the students answered that yes, that the dog was allowed to sleep in his owner’s room, 11.9% answered that it depended on the occasion, while 40.2% directly do not allow it.

Table 20. Incidence of students that allow the dog to sleep in their rooms

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>88</td>
</tr>
<tr>
<td>Yes</td>
<td>105</td>
</tr>
<tr>
<td>Depends on the occasion</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>219</td>
</tr>
</tbody>
</table>

Is the dog allowed to sleep on your bed/pillow/under your sheets?
If the dog is allowed to sleep in the room 44.5% participants answered no, in contrast to 45.5% who answered yes, only 10% answered that it depended on the occasion.

This behavior implies a major risk factor since the dog can carry parasite cysts and worm eggs in the fur, paws, besides the saliva. When the dog lies on the sheets or bed, small particles can be detached, including those cited above that are a source of infection if the person then comes in direct contact with the material.
Do you let the dog allowed to lick your hands/face?
46.8% of students allow the dog to lick their hands or face, while 29.1% do not, 24.1% depends on the occasion.

Table 21. Percentage of students that allow the dog to lick their hands/face

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>64</td>
<td>29,1</td>
</tr>
<tr>
<td>Yes</td>
<td>103</td>
<td>46,8</td>
</tr>
<tr>
<td>Depends on the occasion</td>
<td>53</td>
<td>24,1</td>
</tr>
<tr>
<td>Total</td>
<td>220</td>
<td>100,0</td>
</tr>
</tbody>
</table>

Fig. 25. Percentage of students that allow the dog to lick their hands/face

Is the dog allowed to rummage through/lie on your personal belongings (clothes, books, notebooks)?
63.6% of students keep the dog away from their personal belongings, 26.8% allow them to hover near them, and 9.5% answered that this depends on the occasion.

Are your dog allowed to hang around in the kitchen or sniff kitchen utensils?
67.5% of the students do not allow the dog to be near the kitchen utensils, 21.7% answered yes, and 10.8% depends on the occasion.

Fig. 26. Students that allow their dog to hang around in the kitchen or sniff kitchen utensils
**What food do you give to your dog?**

Table 22. Food given to the dog

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only designated dog food</td>
<td>11,1</td>
<td>88,9</td>
</tr>
<tr>
<td>Designated pet food as well as</td>
<td>4</td>
<td>96</td>
</tr>
<tr>
<td>home-made pet food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only home-made pet food</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>Food that we eat ourselves</td>
<td>35,3</td>
<td>64,7</td>
</tr>
<tr>
<td>Raw meat or its leftovers</td>
<td>42,9</td>
<td>57,1</td>
</tr>
<tr>
<td>Raw fish or its leftovers</td>
<td>66,7</td>
<td>33,3</td>
</tr>
<tr>
<td>A mixture of foods</td>
<td>15,2</td>
<td>84,8</td>
</tr>
</tbody>
</table>

![Fig. 27. Food given to the dog](image)

**Does the dog have a separate feeding dish?**

At the time of feeding the dog the vast majority of students with 97.2% have an exclusive dish, separate to feed the dog, while 2.8% do not have it.

Table 23. Students that have a separate feeding dish for the dog

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>6</td>
<td>2,8</td>
</tr>
<tr>
<td>Yes</td>
<td>212</td>
<td>97,2</td>
</tr>
<tr>
<td>Total</td>
<td>218</td>
<td>100,0</td>
</tr>
</tbody>
</table>
Is the pet allowed on the food table?
The majority of students with 91.4% do not allow the dog to be at the table where they and their family eat, 5.4% said yes, they allow the dog to seat at the table, and 3.2% - depends on the occasion.

Table 24. Students that allow the dog on the food table

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>202</td>
<td>91,4</td>
</tr>
<tr>
<td>Yes</td>
<td>12</td>
<td>5,4</td>
</tr>
<tr>
<td>Depends on the occasion</td>
<td>7</td>
<td>3,2</td>
</tr>
<tr>
<td>Total</td>
<td>221</td>
<td>100,0</td>
</tr>
</tbody>
</table>

Is the dog allowed to take food from its owner’s plate?
78.3% of the students don’t let the dog to eat from the owner's plate, 16.3% said - yes, and 5.4% - that it depend on the occasion. It is obvious that allowing the pet to eat from the same dish together with the owner is a bad habit, but there are people who have no serious attitude to this issue, that such mode of behaviour is a source of contagion by possible parasites and bacteria that the dog carries in the mouth.

![Fig. 28. Percentage of students that allow the dog to take food from the owner’s plate](image)

Do you feed your dog by hand?
21.3% of the students answered that they did not feed the dog by hand, while 59.3% said yes, and 19.5% answers were that it depends on the occasion

![Fig. 29. Percentage of students that feed by hand their dogs](image)
Is the dog allowed to roam outside the home unattended (in playgrounds, streets, a park, a forest)?

54.8% of the students answered that they did not leave their dog unattended in parks, streets and forests, 32.1% said yes, they let their pet to roam outside the home freely, while 13.1% of the remaining students answered that it depended on the occasion.

Does your dog come into contact with other unattended animals (e.g. stray dogs/cats)?

57.3% of students answered that they don’t allow their dog to come into contact with unattended or abandoned animals, 22% answered yes, they allow, while the remaining 20.6% depend on the occasion.

If you have your dog in the country, can the dog take any contact with sheep, goat, cattle?

The students whose dog was in the countryside, when asked if their dogs had contact with cattle, sheep and goats, 29.9% answered no, 46.2% said yes, and 24% depended on the occasion.

Table 25. Percentage of student’s dogs that have any contact with sheep, goat or cattle

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>66</td>
<td>29,9</td>
</tr>
<tr>
<td>Yes</td>
<td>102</td>
<td>46,2</td>
</tr>
<tr>
<td>Depends on the occasion</td>
<td>53</td>
<td>24,0</td>
</tr>
<tr>
<td>Total</td>
<td>221</td>
<td>100,0</td>
</tr>
</tbody>
</table>

Fig. 30. Percentage of student’s dogs that have any contact with sheep, goat or cattle

Is your dog taken on walks with a leash and muzzle?

35.6% of the students answered that they did not take their dog for a walk through leash and muzzle walks, 61.6% yes, while 2.7% depended on the occasion.
Table 26. Percentage of student’s dogs that take walks with leash ad muzzle

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>78</td>
<td>35.6</td>
</tr>
<tr>
<td>Yes</td>
<td>135</td>
<td>61.6</td>
</tr>
<tr>
<td>Depends on the occasion</td>
<td>6</td>
<td>2.7</td>
</tr>
<tr>
<td>Total</td>
<td>219</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Is your dog registered?**
The students answered that in 57.9% their dog was registered, while 42.1% answered that did not.

**Collecting pet droppings**
64.3% of students collect dog droppings for later throwing them into designated bins, 15.8% of respondents do not collect, and 19.9% of students answered that it depends on the occasion.
To the question about the availability of items for the collection of feces of the pets according to the students 51.8% answered that they are not easily available, 39.4% that they are, while 8.7% are not sure.
When asked if the items to collect the depositions of pets are very expensive, 70% answered no, 14.1% consider that yes, 16% are not sure, and to the questions about the area where they live if there are bins specially designated for animal depositions, 79.7% respondents said yes, 12.1% respondents answered no, and 8.2% answered that the amount of them is not sufficient in that area.
These questions are related to a health problem that is due to the fact that there are still few people who are aware of collecting excrements that, especially dogs, usually leave on public roads.
In the feces you can find the eggs of parasitic tapeworms like *E. granulosus*, and therefore, they are a source of contagion for other animals and/or people who walk through the streets, gardens and parks.
People will acquire the diseases caused by these parasites when they come into contact with the eggs released by the dog’s feces.

**Does your study program include the subject of Parasitology?**
The 84.7% of the students answered that the subject of parasitology is compulsory in the study program, and the remaining 15.3% answered that they did not studied this subject.
Table 26. Study program include the subject of Parasitology

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>47</td>
<td>15,3</td>
</tr>
<tr>
<td>Yes</td>
<td>261</td>
<td>84,7</td>
</tr>
<tr>
<td>Total</td>
<td>308</td>
<td>100,0</td>
</tr>
</tbody>
</table>

If the answer is **Yes, is it obligatory or optional?**
Those who answered yes, 91.2% answered that it is mandatory, in contrast to the 8.8% that responded that it was optional.

Table 27. Parasitology subject

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obligatory</td>
<td>238</td>
<td>91,2</td>
</tr>
<tr>
<td>Optional</td>
<td>23</td>
<td>8,8</td>
</tr>
<tr>
<td>Total</td>
<td>261</td>
<td>100,0</td>
</tr>
</tbody>
</table>

If the answer is **Yes, in which year do you take the Parasitology subject?**
60% of the students answered that it occurs in the 1st year, 15.2% in the second year, 10.8% in the third year and the remaining 14% in the fourth year.

**Have you already taken the subject of Parasitology?**
A total part of 44.5% of students has already given parasitology when performing this questionnaire; the remaining 55.5% of students did not.

![Fig. 31. Percentage of students that have already studied parasitology](image)

**Do you know the meaning of the term zoonosis?**
48.1% of students are familiar with the term zoonosis, 34.4% of the students answered that they do not know what it means, and vaguely – 17.5%.
Table 28. Knowledge about the term zoonosis

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>106</td>
<td>34.4</td>
</tr>
<tr>
<td>Yes</td>
<td>148</td>
<td>48.1</td>
</tr>
<tr>
<td>Vaguely</td>
<td>54</td>
<td>17.5</td>
</tr>
<tr>
<td>Total</td>
<td>308</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Fig. 32. Knowledge about the term zoonosis

**Do you know the pathways of zoonosis infection?**

On the knowledge of the pathways of zoonosis infection, 46.4% of the students answered that they knew them, 36.7% did not, and 16.9% vaguely.

Table 29. Knowledge about pathways of zoonosis infection

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>113</td>
<td>36.7</td>
</tr>
<tr>
<td>Yes</td>
<td>143</td>
<td>46.4</td>
</tr>
<tr>
<td>Vaguely</td>
<td>52</td>
<td>16.9</td>
</tr>
<tr>
<td>Total</td>
<td>308</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Fig. 33. Knowledge about pathways of zoonosis infection

When asked the question about the student’s knowledge of what diseases can be transmitted to human by sick animals, 66.6% participants answered yes, they know the names of diseases, 7.1% do not know and 26.3% know it vaguely. When students were asked if they know how infectious
agents from sick animals can be transmitted to the human, 86% of participants answered that they know it, only 5.2% of them answered that they did not know, and 8.8% know it vaguely.

**Are you aware of an infectious disease called echinococcosis?**

When asked about the disease called Echinococcosis, 69.5% of students answered they are aware of this disease, 17.2% are not, and 13.3% vaguely.

![Fig.34. Aware of echinococcosis](image)

**Are you aware of the existence of canine (dog-borne) echinococcosis?**

57.5% of students answered they know that there is disease called echinococcosis and that it is transmitted by dogs, 19.9% answered no, and 22.5% know it vaguely.

Table 29. Aware of the existence of canine (dog-borne) echinococcosis

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>61</td>
<td>19,9</td>
</tr>
<tr>
<td>Yes</td>
<td>176</td>
<td>57,5</td>
</tr>
<tr>
<td>Vaguely</td>
<td>69</td>
<td>22,5</td>
</tr>
<tr>
<td>Total</td>
<td>306</td>
<td>100,0</td>
</tr>
</tbody>
</table>

**Do you know how you can get infected with* Echinococcus granulosus *parasites?**

50% of students answer that they know how to get infected with *E. granulosus* parasites, 23.8% admit that they don’t know how, and 26.2% know it vaguely.

![Fig.35. Percentage of students aware of how can get infected with *Echinococcus granulosus* parasites](image)
Is the dog given a bath after taken for a walk?

After removing the dog from a walk, 6.5% of respondents answered that they bathe the dog daily, 10.3% respondents bathe it weekly, 10.3% - monthly, 13.7% - from time to time, 26.5% - only the legs of the dog and 32.6% respondents answered that they do not wash the dog after the walk.

Pathways for echinococcosis infecting humans. Underline answers that you think are valid pathways.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes (%)</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Through not washing your hands before a meal</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Failing to wash hands before a meal</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Stroking and feeding household animals: horses, cats, rabbits</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Stroking and feeding pet birds: canaries, parrots, etc.</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Failing to wash hands before a meal: for adults</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Failing to wash hands after stroking your dog you</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Failing to wash hands after stroking an infected</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Eating sweets, cookies, pastries</td>
<td>23.5%</td>
<td>76.5%</td>
</tr>
<tr>
<td>Drinking unboiled, unfiltered water, soft drinks</td>
<td>77.7%</td>
<td>22.3%</td>
</tr>
<tr>
<td>Eating insufficiently thermally treated milk and cheese</td>
<td>10.8%</td>
<td>89.2%</td>
</tr>
<tr>
<td>Eating insufficiently thermally treated fish and caviar</td>
<td>6.9%</td>
<td>93.1%</td>
</tr>
<tr>
<td>Eating insufficiently thermally treated eggs</td>
<td>11.9%</td>
<td>88.1%</td>
</tr>
<tr>
<td>Eating insufficiently thermally treated meat (pork, chicken, fish)</td>
<td>5%</td>
<td>95%</td>
</tr>
<tr>
<td>Eating unwashed fruits, berries and vegetables</td>
<td>23%</td>
<td>77%</td>
</tr>
</tbody>
</table>

Fig.36. Possible routes of infection by echinococcosis

The following statements were given to the students about the possible routes of infection by echinococcosis, we found that the majority with 99.6% of the students agree that a valid route of this transmission is to touch an infected animal, it is also important to point out that a large number of students have marked as correct the poor hygiene of fruits and vegetables (97.7%) as previously indicated in the literature review as an important risk factor.

What do you think is the most important purpose of giving the dog a bath/washing its legs?

The hygiene of the dog is essential to avoid a possible parasitic infection and this is reflected in the responses of the students, most agree that it is important to clean the legs and furs to avoid not only droppings but cysts and worm eggs remain in their extremities.
Table 30. Dog hygiene

<table>
<thead>
<tr>
<th>Keeping mud and dirt away from the room</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>13.4</td>
<td>86.6</td>
</tr>
<tr>
<td>Keeping the carpets and furniture clean</td>
<td>17.8</td>
<td>82.2</td>
</tr>
<tr>
<td>Droppings of other animals (strays, diseased animals) may be stuck to the fur/legs</td>
<td>4.5</td>
<td>95.5</td>
</tr>
<tr>
<td>Parasitic protozoan cyst and worm eggs may be stuck to the fur/legs</td>
<td>4.7</td>
<td>95.3</td>
</tr>
<tr>
<td>Canine ticks and fleas may be stuck to the fur/legs</td>
<td>9.5</td>
<td>90.5</td>
</tr>
</tbody>
</table>

Do you like to stroke a cute little stray dog or kitten that you meet in the street?  
About 55.7% of students do not stroke abandoned animals, 18.1% do so, and 21.1% say it depend on the occasion. As was explained before this is a risk factor not only for echinococcosis but for other diseases too like rabies, toxocariasis, toxoplasmosis etc.

Do you regularly take your dog to be inspected by a veterinarian doctor?  
Veterinary inspections: 46.7% of students carry their dog, 24.6% no, 23.9% depends on the occasion, and the remaining 4.8% are not sure.

Do you give your dog antihelmintic medicines (worm pills)?  
71.5% of the students answered that yes, they give antiparasitic pills to their dog, 11.5% do not, 13.5% depend on the occasion, and the remaining 3.5% are not sure.

![Fig.37. Administration of dog antihelmintic medicines](image)

And of those respondents who answered yes, 34% give the antiparasitic pills according to the veterinary doctor’s recommendations, 20.7% do that each 3 months, 14% - once a year, 7.7% of respondents give the antiparasitic pills to their dog less than once a year, and 23.5% - do it depending on the occasion.
Do you wash fruits, berries and vegetables that you have bought in a shop, or brought from a wood, garden or orchard before eating them?

As was mentioned before people can also get infected by eating salads that have not been washed properly and that have been contaminated previously, so when the students were asked if they wash the fruits and vegetables before eating it, 2.7% of the students answered no, compared to 95.2% who answered yes, the remaining 4.8% say it depends on the occasion.

Table 31. Washing fruits, berries and vegetables

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>8</td>
<td>2,7</td>
</tr>
<tr>
<td>Yes</td>
<td>271</td>
<td>92,5</td>
</tr>
<tr>
<td>Depends on the occasion</td>
<td>14</td>
<td>4,8</td>
</tr>
<tr>
<td>Total</td>
<td>293</td>
<td>100,0</td>
</tr>
</tbody>
</table>

Do you think your knowledges of dog handling, care and echinococcosis prophylaxis – both for your pet and your family members – are sufficient?

28.2% of students believe that their knowledge of the measures necessary to avoid contagion by *E. granulosus* are sufficient for their environment, while 44.5% admitted that no, and 27.3% are not sure.

![Fig.38. Percentage of sufficient degree of prophylaxis against echinococcosis](image)

The students agree that the necessary prevention measures are not taken against this disease or are not sufficient, this could be do to the lack of information and have influence with the lack of hygienic measures and more risk behaviors that increase the probabilities of infection considerably.
In your opinion, how could you gain/improve your knowledge regarding pathways of echinococcosis infection and methods of prophylaxis?

![Fig.39. Acquisition of knowledge regarding pathways of echinococcosis infection and methods of prophylaxis](image)

**What type of methods of prophylaxis do you suppose to use to prevent to be infected from the sick animals in the veterinary clinics?**

<table>
<thead>
<tr>
<th>Table 32. Methods of prophylaxis in the veterinary clinics</th>
</tr>
</thead>
<tbody>
<tr>
<td>In school or university, from teachers, lectures, guest</td>
</tr>
<tr>
<td>lecturers, doctors, public health specialists</td>
</tr>
<tr>
<td>Examining the patient animal always use special gloves</td>
</tr>
<tr>
<td>Use disposable medical tools and equipment</td>
</tr>
<tr>
<td>Wash hands thoroughly after each examining of patient animal</td>
</tr>
<tr>
<td>Regular Veterinary clinics desinfection</td>
</tr>
<tr>
<td>Regular personal health examination in the general doctor’s clinics</td>
</tr>
</tbody>
</table>

As international students, Lithuanians students specifically those belonging to the veterinary faculty were asked a question about prophylaxis in veterinary clinics to prevent infection from sick animals, which responded that: examining the animal with gloves and the use of disposable medical equipment as well as hand washing is essential, and what they think is less necessary are regular personal health examination in the general doctor’s clinics, and the disinfection of the clinics.
The next step in my work is to compare and to analyze the differences in the knowledge about the infection pathways of \textit{Echinococcus granulosus}, the methods of prophylaxis, and the sources of information about the echinococcosis among the students from different faculties and among the Lithuanian and international students.

\textbf{International students:}

\textbf{Knowledge by the study subjects of the term echinococcosis}

Table 33. Knowing the term echinococcosis.

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Knowing the term echinococcosis</th>
<th>No</th>
<th>Yes-Vaguely</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicine</td>
<td></td>
<td>6</td>
<td>135</td>
<td>141</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4,3%</td>
<td>95,7%</td>
<td>100,0%</td>
</tr>
<tr>
<td>Veterinary</td>
<td></td>
<td>15</td>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>71,4%</td>
<td>28,6%</td>
<td>100,0%</td>
</tr>
<tr>
<td>Odontology</td>
<td></td>
<td>7</td>
<td>40</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14,9%</td>
<td>85,1%</td>
<td>100,0%</td>
</tr>
<tr>
<td>Pharmacy</td>
<td></td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20,0%</td>
<td>80,0%</td>
<td>100,0%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>29</td>
<td>185</td>
<td>214</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13,6%</td>
<td>86,4%</td>
<td>100,0%</td>
</tr>
</tbody>
</table>

We found that medical students have more knowledge about echinococcosis than the rest of the faculties, followed by odontology, pharmacy and ultimately veterinary, as well as the knowledge of echinococcosis transmitted by the vector dog.

\textbf{Do you know how you can get infected with \textit{Echinococcus granulosus} parasites?}

Table 34. Awareness of infection ways due to age

<table>
<thead>
<tr>
<th>Age</th>
<th>Awareness of infection ways due to age</th>
<th>No</th>
<th>Yes</th>
<th>Vaguely</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=20 years</td>
<td></td>
<td>20</td>
<td>66</td>
<td>14</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20,0%</td>
<td>66,0%</td>
<td>14,0%</td>
<td>100,0%</td>
</tr>
<tr>
<td>&gt; 20 years</td>
<td></td>
<td>30</td>
<td>56</td>
<td>28</td>
<td>114</td>
</tr>
<tr>
<td></td>
<td></td>
<td>26,3%</td>
<td>49,1%</td>
<td>24,6%</td>
<td>100,0%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>50</td>
<td>122</td>
<td>42</td>
<td>214</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23,4%</td>
<td>57,0%</td>
<td>19,6%</td>
<td>100,0%</td>
</tr>
</tbody>
</table>
P_value = 0.037.

Most students of <20 years and > 20 years are aware of how to get an infection by *E. granulosus*, those who have more knowledge are those of <20 years.

Fig. 40. Awareness of infection ways according different faculties

Due to the question on how the echinococcosis disease is transmitted we have found that students who have more knowledge or are more aware of the method of transmission are those pertaining to the medicine faculty, followed by students of odontology, pharmacy and veterinary medicine faculties.

We calculate the influence of student’s age into the better knowledge about how people can be infected with *E. granulosus* parasite.

**Do you know the meaning of the term “zoonosis”?**

<table>
<thead>
<tr>
<th>Age</th>
<th>No (&lt;=20 years)</th>
<th>Yes (&lt;=20 years)</th>
<th>Vaguely (&lt;=20 years)</th>
<th>Total (&lt;=20 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=20 years</td>
<td>15</td>
<td>70</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>15,0%</td>
<td>70,0%</td>
<td>15,0%</td>
<td>100,0%</td>
</tr>
<tr>
<td>&gt; 20 years</td>
<td>30</td>
<td>60</td>
<td>24</td>
<td>114</td>
</tr>
<tr>
<td></td>
<td>26,3%</td>
<td>52,6%</td>
<td>21,1%</td>
<td>100,0%</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>130</td>
<td>39</td>
<td>214</td>
</tr>
<tr>
<td></td>
<td>21,0%</td>
<td>60,7%</td>
<td>18,2%</td>
<td>100,0%</td>
</tr>
</tbody>
</table>

P_value = 0.031.
We have found that students of <20 years have more knowledge about the meaning of the term “zoonosis” with result 70%, while the result of those over 20 years - 52.6% show that they know the term.

Incorrect taking food habits: eating unwashed fruits, berries and vegetables

![Chart showing eating unwashed fruits, berries and vegetables]

Fig.41. Eating unwashed fruits, berries and vegetables

When asking participants about taking food hygiene when washing fruits, vegetables, etc. before eating is a significant reduction to be infected with *E. granulosus* eggs as a one of the main sources of parasitic infection by *E. granulosus*, we find that a large percentage of students from all faculties are unaware that it is indeed an important risk factor for the infection. The first ones to become aware of this as a possible risk factor for this infection are the veterinary students, followed by those of medicine, pharmacy and odontology.
Lithuanian students

Knowledge by the study subjects of the term echinococcosis

Table 36. Knowing the term echinococcosis

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Knowing the term echinococcosis</th>
<th>No</th>
<th>Yes</th>
<th>Vaguely</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicine</td>
<td></td>
<td>1</td>
<td>41</td>
<td>2,4%</td>
<td>100,0%</td>
</tr>
<tr>
<td>Veterinary</td>
<td></td>
<td>24</td>
<td>75</td>
<td>24,2%</td>
<td>100,0%</td>
</tr>
<tr>
<td>Public Health</td>
<td></td>
<td>1</td>
<td>21</td>
<td>4,5%</td>
<td>100,0%</td>
</tr>
<tr>
<td>Odontology</td>
<td></td>
<td>1</td>
<td>72</td>
<td>1,4%</td>
<td>100,0%</td>
</tr>
<tr>
<td>Nursing</td>
<td></td>
<td>21</td>
<td>9</td>
<td>70,0%</td>
<td>100,0%</td>
</tr>
<tr>
<td>Pharmacy</td>
<td></td>
<td>5</td>
<td>37</td>
<td>11,9%</td>
<td>100,0%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>53</td>
<td>255</td>
<td>17,2%</td>
<td>100,0%</td>
</tr>
</tbody>
</table>

We have found that the variations between the faculties of the Lithuanian students on the knowledge of the term echinococcosis is that the odontology students are at a similar level like the students of medicine and public health. They produce > 90% of all of the students who answered that they knew what it meant or they had some knowledge about that. The pharmacy students then followed with the veterinary students, while those who had less knowledge were those of nursing.

Is the knowledge about echinococcosis disease which can be transmitted by dog dependent by participant’s age?

Table 37. Awareness of infection ways due to age

<table>
<thead>
<tr>
<th>Age</th>
<th>Awareness of infection ways due to age</th>
<th>No</th>
<th>Yes</th>
<th>Vaguely</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= 20 years</td>
<td></td>
<td>43</td>
<td>119</td>
<td>35</td>
<td>197</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21,8%</td>
<td>60,4%</td>
<td>17,8%</td>
<td>100,0%</td>
</tr>
<tr>
<td>&gt; 20 years</td>
<td></td>
<td>18</td>
<td>57</td>
<td>34</td>
<td>109</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16,5%</td>
<td>52,3%</td>
<td>31,2%</td>
<td>100,0%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>61</td>
<td>176</td>
<td>69</td>
<td>306</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19,9%</td>
<td>57,5%</td>
<td>22,5%</td>
<td>100,0%</td>
</tr>
</tbody>
</table>

P_value = 0.025.
Students who are less than 20 years old know of the existence of echinococcosis that is transmitted by dogs and show 60.4%, while those older than 20 years represent 52.3%.

Participants in the study are aware of the method of transmission of the disease.

**Do you know how you can get infected with *Echinococcus granulosus* parasites?**

![Diagram showing knowledge of infection with *Echinococcus granulosus* parasites](Fig.42)

On how the disease is transmitted we found that students who have more knowledge or are more aware of the method of transmission are those pertaining to the odontology, public health, medicine, pharmacy, veterinary and nursing faculty.

**Eating unwashed fruits, berries and vegetables**

![Diagram showing eating unwashed fruits, berries and vegetables](Fig.43)

Fig.43. Eating unwashed fruits, berries and vegetables
Students who think that human can be infected with echinococcosis by *E. granulosus* eggs which can be eaten with contaminated unwashed fruits, berries and vegetables are in 100% of cases those belonging to veterinary, public health, nursing (all show 100%), followed by dentistry (97.1%), medicine (95.2%). %) and pharmacy (93.3%).
Analysis between nationality and the rest of most relevant variables

Age
Table 38. Age distribution of the students participating in the study

<table>
<thead>
<tr>
<th>Nationality of students</th>
<th>Age</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;=20 years</td>
<td>&gt; 20 years</td>
<td></td>
</tr>
<tr>
<td>International</td>
<td>100</td>
<td>114</td>
<td>214</td>
</tr>
</tbody>
</table>
|                         | 46.7%          | 53.3%          | 100.0%
| Lithuanian              | 198            | 110            | 308   |
|                         | 64.3%          | 35.7%          | 100.0%
| Total                   | 298            | 224            | 522   |
|                         | 57.1%          | 42.9%          | 100.0%

Of the students participating in the study, we found that among those of international group, although there is not much variation, 53.3% are older than 20 years old, the other participants (46.7%) are under 20 years old, in contrast to the Lithuanian students that 64.3% are younger than 20, and 35.7% older.

Main dog caretaker at home

Fig.44. Age distribution of the students participating in the study

Fig.45. Main dog caretaker at home
P-value = 0.158.

When we see who is the main caretaker of the dog, both the international students and the lithuanians who are mainly concerned with the pet are the participant (student), then the mother, the father and the siblings. It is interesting to see how the weight of the maintenance of the pet usually falls on the mother, instead of sharing the responsibility of the animal among the whole family.

**Participants who have a dog**

Table 39. Students that own a dog.

<table>
<thead>
<tr>
<th>Nationality of student</th>
<th>Have a dog</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>International</td>
<td>9</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>12.7%</td>
<td>87.3%</td>
</tr>
<tr>
<td>Lithuanian</td>
<td>106</td>
<td>202</td>
</tr>
<tr>
<td></td>
<td>34.4%</td>
<td>65.6%</td>
</tr>
<tr>
<td>Total</td>
<td>115</td>
<td>264</td>
</tr>
<tr>
<td></td>
<td>30.3%</td>
<td>69.7%</td>
</tr>
</tbody>
</table>

P-value = 0.001.

87.3% of interviewed international students have a dog as a pet, while 65.6% of lithuanian students have a dog as a pet.

**Can the dog lick the face of the owner?**

Fig 46. Dog lick the face of the owner

We see that international students let the dog lick their faces in a greater proportion than lithuanians.
Accessibility of the dog to the kitchen

P-value = 0.023.

We find that international students are more permissive when letting the dog to enter the kitchen and possibly to establish contact with kitchen utensils.

Feeding the dog from hand

P-value = 0.007.

In this case, Lithuanian students are more likely to feed their dog by hand, which is an important risk factor if a subsequent hygiene is not carried out.
Dog contact with farm animals

Fig.49. Dog contact with farm animals

P-value <0.001.

The dog is more likely to catch the infection and transmit it to human when in contact with farm animals (sheep, goat, cattle) that are infected with *E. granulosus* parasite. 46.2% of Lithuanian students answered that their dog came into contact with farm animals, in contrast to 24.3% of international students.

Cleaning the dog's waste and stool

Table 40. Cleaning the dog’s waste and stool

<table>
<thead>
<tr>
<th>Nationality of students</th>
<th>No</th>
<th>Yes</th>
<th>Depends on occasion</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>International</td>
<td>19</td>
<td>47</td>
<td>4</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>27.1%</td>
<td>67.1%</td>
<td>5.7%</td>
<td>100%</td>
</tr>
<tr>
<td>Lithuanian</td>
<td>35</td>
<td>142</td>
<td>44</td>
<td>221</td>
</tr>
<tr>
<td></td>
<td>15.8%</td>
<td>64.3%</td>
<td>19.9%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>54</td>
<td>189</td>
<td>48</td>
<td>291</td>
</tr>
<tr>
<td></td>
<td>18.6%</td>
<td>64.9%</td>
<td>16.5%</td>
<td>100%</td>
</tr>
</tbody>
</table>

P-value = 0.006.

67.1% of international students collect their dog excrement as well as 64.3% of lithuanian students. Analyzing the data we have found that it is relatively high number of participants of each group who do not collect dog’s stool. So it would be necessary to work organizing the special courses about the ways of infection with parasites to the various groups of population on trying to increase the number of students aware of the cleaning of their dog’s feces.
Knowledge by the study subjects of the term zoonoses and their transmission routes.

Do you know the meaning of the term zoonosis?

48.1\% of the interviewed Lithuanian students are familiar with the term zoonosis, the international students' knowledge level is about 60.7\%.

Eating unwashed fruits, berries and vegetables

Washing fruits and vegetables before consuming them, the majority of Lithuanian students interviewed do so by 97.7\%, in contrast to international students, who only do so at 41.6\%. This is an important risk factor to consider.
Do you think that parasitic protozoan cyst and worm eggs may be stuck to the fur/legs of your pet and it would be a reason for bath the dog?

Table 41. Knowledge of the transmission via parasitic protozoan cyst and worm eggs stuck to the fur/legs of the dog

<table>
<thead>
<tr>
<th>Nationality of students</th>
<th>Bathing the dog</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
<td>Total</td>
</tr>
<tr>
<td>International</td>
<td>77</td>
<td>134</td>
<td>211</td>
</tr>
<tr>
<td></td>
<td>36.5%</td>
<td>63.5%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Lithuanian</td>
<td>11</td>
<td>224</td>
<td>235</td>
</tr>
<tr>
<td></td>
<td>4.7%</td>
<td>95.3%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>358</td>
<td>446</td>
</tr>
<tr>
<td></td>
<td>19.7%</td>
<td>80.3%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

P-value <0.001.

When the dog is taken out for a walk, not only dirt on the soil but also parasitic protozoan cyst and parasitic worm eggs may be stuck to the fur/legs of the dog. This is why it is important to consider the hygiene of the dog after the walk, and when international students wash the dog, 63.5% of them believe it is necessary to do it for this reason, compared to Lithuanian students who believe it in 95.3%.

**Management and frequency of taking of antihelmintics and intestinal deworming of the dog.**

![Graph showing the frequency of antihelmintics and intestinal deworming](image)

Fig. 52. Prophylaxis measures: Antihelmintics and intestinal deworming of the dog

P-value <0.001.

Several cestodicides (e.g., praziquantel, eipsiprantel, bunamidine) are effective for the treatment of infected dogs. They are usually available in the form of tablets or other formulations for oral administration, and should be part of the routine prophylaxis of pets, the fact of not giving antiparasitic to dogs is an increased risk of infection especially in endemic areas.

We found that 71.5% of Lithuanian students give anthelmintics to their dog, while 44.3% of international students do it too.
CONCLUSIONS

Echinococcosis is a parasitic disease caused by cestodes of the genus Echinococcus. It is related, above all, to rural or wild environments, which is why it occurs less frequently in developed countries. Several herbivorous and omnivorous animals are intermediate hosts of Echinococcus. They become infected by ingesting parasite eggs present in contaminated food and water, and then the parasite evolves into larval stages.

Carnivores act as final hosts of the parasite, become infected through the consumption of viscera from intermediate hosts that contain the parasite, and harbor mature tapeworms in their intestines.

Humans act as incidental intermediate hosts, therefore humans become infected by ingesting *E. granulosus* parasite eggs presented in contaminated food, water or soil, or by direct contact with definitive host animals – especially dogs.

According our study we can conclude:

1) The most important risk factors for accidental infection in humans are those in which a more intimate contact with the pet is made without adequate prophylaxis and deworming; risk activities include: allowing the dog to sleep in bed, pillow and under the sheets (international students do it by 37.1%, and lithuanian students by 45.5%); allowing the dog to lick your hands and face (international students allow it in 52.1%, and lithuanian students in 46.8%). Student’s answers show that the results are worrying because they indicate a possible high risk of infection.

2) Allowing the dog to be close to the kitchen and kitchen utensils 38% of international students allow it and 21.7% of lithuanian students too. 8.5% and 16.3% of the international and lithuanian students respectively allow the dog to eat from the owner’s plate, though it is a minority percentage, but even so, a very serious professional explanatory work should be done to raise awareness of the lack of personal hygiene and the possible infection focus that assumes this action.

Feeding the dog by hand, 38% of international students and 59.3% of lithuanian students do it without the subsequent hand washing, not having in mind that this is an important risk factor.

Due to possible infection of the dog with viscera and other animal wastes, as discussed above, rates of cystic echinococcosis (CE) in humans are increased in areas of rural populations in developing countries that live in close contact with domestic pasture dogs. Among the students who have the dog in the field, 24.3% of international students and 46.2% of lithuanian students admit that their dog has contact with livestock.
Picking up the dog stool is very important because leaving it in the streets in the parks, in the yards, etc. is a source of contagion for other dogs and the subsequent transmission to their owners, the international students pick it up in 67.1% and the lithuanians in a 64.3%. As we can see from these numbers given, there is only >70% of the students who are collecting dog stool and putting them into the special dog faeces collection boxes. So it is a good illustration about the lack of information and awareness of the risks - that these risks could be caused not only because of the lack of civic education and responsibility when it comes to keeping streets and parks clean, but as a possible source of parasitic disease transmission.

Another important factor is the knowledge of the infection ways to put the necessary preventive measures: 75.7% and 69.5% of the international and lithuanian students respectively know the echinoccosis as a disease that can be transmitted by animals to humans.

The measures of prophylaxis are essential to avoid the contagion by the parasite, it is essential to deworm both outside (pasture) and inside (living in home) pets, so when asked if students give anthelmintic tablets to their dogs we find that 44.3% of international and 71.5% of lithuanian students give the anthelmintic medicines to their pets. These proportions are an important variation of one group with respect to the other, so in the future it should raise awareness about the importance of this, with special incidence in the population of international students.

Another important source of contagion is the lack of personal hygiene when it comes to washing the fruits and vegetables consumed, 86% of international students do it and 95.2% of Lithuanians do it also. The best control measure is to interrupt the parasite's natural biological development cycle. In the case of *E. granulosus* it is necessary to: - prevent dogs from approaching the corpses and viscera of, sheep, goats, cows and pigs in large farms, small household, slaughterhouses and butcher shops; - administer an anthelmintic (praziquantel) to dogs to eliminate adult worms; - detect cysts in the sanitary inspection of meat, in particular in the case of farms and infected communities, and - vaccinate the sheep (or other breeding animals) to prevent the development of larvae of *E. granulosus*. 
13. REFERENCES


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https://www.researchgate.net/publication/8917903_Biological_Epidemiological_and_Clinical_Aspects_of_Echinococcosis_a_Zoonosis_of_Increasing_Concern


16. ANNEXES
PRAŠYMAS

2017.01.09
Kaunas


Aplausu bus vykdoma šiuose padaliniuose:
1. LSMU Biologinių sistemų ir genetinių tyrimų institute

Studijų programa: Medicina, vienetasios studijos

Moksline darbo pavadinimas: Tikėtinius užsikrėtimo Echinococcus granulosus kelių nustatymas ir užsikrėtimo rizikos palūkanimas tarp skirtingų LSMU fakulteto studentų.


Aplausos dalyvių konfidiencialumas bus užtikrintas, nės anketa anoniminė, nebus klausyti aplausų asmeninės, pavarų, vardo, adreso, o tyrimo rezultatai bus skelbiami tik apibendrinti.

Nuria Molina Osorio

(Aplausos vykdytojo vardas, pavardė, parašas)

Suderinta su moksline darbo vadovu:

Zina Mikasienė

(Vadovo vardas, pavardė, parašas)

Suderinta su Tarptautinių ryšių ir studijų

skyriaus Medicinos fakulteto Dekanui

(Dekano vardas, pavardė, parašas)
Lietuvos sveikatos mokslų universiteto
Farmacijos fakulteto Dekanui
Prof. V. Briedžiui

Lietuvos sveikatos mokslų universiteto Medicinos fakulteto 5 kursų studentės
Nuria Molina Osorio
El. p. nuriamolina94@gmail.com

**PRAŠYMAS**

2017.05.01
Kaunas

Pradavau mokymo ir tiriamasis tikslais leisti vykdyti apklausą tarp Lietuvos sveikatos mokslų universiteto
Farmacijos fakulteto I–II kurso studentų. Apklausą planuojama pradėti vykdyti 2017-05-06 mėn. Planuojama
apklausti LSMU FF I-II kurso studentų: 50.

**Apklausa bus vykdoma šiuose padalinuose:**
1. LSMU Biologinių sistemų ir genetinių tyrimų institute

**Studijų programa:** Farmacija, vientisosios studijos

**Mokslių darbo pavadinimas:** Tikėtinausią užsikrėtimo Echinococcus granulosus keliių nustatymas ir
užsikrėtimo rizikos palyginimas tarp skirtingų LSMU fakultetų studentų.

**Tikslos ir uždaviniai:** Tikslas: nustatyti tikėtinausius užsikrėtimo echinokokose kelių tarp besimokančio
jaunimo, bei jų žinių apie echinokokosės plitimą lygį. Uždaviniai: palyginti skirtingas besimokančių LSMU
studentų grupes tarpusavio jų rizikos užsikrėstė echinokokose atžvilgiu. Bus atliekama apklausa apie
studentų asmeninę ir naminių gyvūnų higieną bei požiūrį į gyvūnų laikymą. Ją apklausa įeis klausimai rizikos
faktoriams įvertinti.

Apklausos dalyvių konfidencialumas bus užtikrintas, nes anketa anoniminė, nebus klausiana apklausiamųjų
vardų, pavardžių, adreso, o tyrimo rezultatai bus skelbiami tik apibendrinti.

**Suderinta su mokslių darbo vadovu:**

**Suderinta su FF dekanu:**

Nuria Molina Osorio

Nūria Molina Osorio

Verga Mickiūnienė

Verga Mickiūnienė

(Biapklausos vykdytojo vardas, pavardė, pareigas)

(Biovado vardas, pavardė, pareigas)

(Dokano vardas, pavardė, pareigas)
Lietuvos sveikatos mokslų universiteto
Slaugos fakulteto Dekanui
Prof. J. Maciauskienei

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El. p. nuriamolina94@gmail.com

PRAŠYMAS

2017.01.09
Kaunas

Prašau mokymo ir tiriamaisiais tikslais leisti vykdyti apklausą tarp Lietuvos sveikatos mokslų universiteto Slaugos fakulteto Kineziterapijos ir Ergoterapijos studijų programų I kurso studentų.


Apklausa bus vykdoma šiuose padaliniuose:
1. LSMU Biologinių sistemų ir genetinių tyrimų institute

Studijų programa: Kineziterapija, Ergoterapija, vientisiosios studijos

Mokslo darbo pavadinimas: Tikėtiniausių užsikrėtimo Echinonoccus granulosus kelių nustatymas ir užsikrėtimo rizikos palyginimas tarp skirtinų LSMU fakultetų studentų.


Apklausos dalyvių konfidencialumas bus užtikrintas, nes anketa anoniminė, nebus klausiana apklausiamųjų vardų, pavardžių, adresų, o tyrimo rezultatai bus skelbiami tik apibendrinti.

(Apklausos vykdytojo vardas, pavardė, parašas)

Suderinta su mokslo darbo vadovu:

(Vadovo vardas, pavardė, parašas)

Suderinta su SF Dekanu:

(Dekano vardas, pavardė, parašas)
PRAŠYMAS
2017.02.01
Kaunas


Apklausa bus vykdoma šiuose padaliniuose:
1. LSMU biologinių sistemų ir genetinių tyrimų institute

Studijų programa: Veterinarinė medicina, vientisiosios studijos

Moksline darbo pavadinimas: Tikėtiniausiai užsikrėtimo Echinococcus granulosus kelijų nustatymas ir užsikrėtimo rizikos palyginimas tarp skirtingų LSMU fakultetų studentų.


Apklausos dalyvių konfidencialumas bus užtikrintas, nes anketa anoniminė, nebus klausima apklausamųjų vardų, pavaržių, adresų, o tyrimo rezultatai bus skelbiami tik apibendrinti.

Nuria Molina Osorio
El. p. nuriamolina94@ymail.com

Apklauso vadovas: Vita Šliūškienė
(Vadovo vardas, pavardė, parašas)

Suderinta su moksline darbo vadovu:

Vadovo vardas, pavardė, parašas

(Dekano vardas, pavardė, parašas)
PRAŠMAS

2017.01.09
Kaunas

Prašau mokymo ir tiriamaisiais tikslais leisti vykdyti aplašią tarp Lietuvos sveikatos mokslų universiteto Odontologijos fakulteto Odontologijos ir Burnos higienos I-II kurso studentų. Aplausą planuojama pradėti vykdyti 2017-05-06 m. Planuojama aplašti LSMU OF ir BH I-II kurso studentų: 50.

Apklausa bus vykdoma šiuose padaliniose:
1. LSMU Biologinių sistemų ir genetinių tyrimų institute

Studijų programa: Odontologija ir Burnos higiena, vientisinosios studijos

Mokslinio darbo pavadinimas: Tikėtinausiuju užsikrėtimo Echinococcus granulosus kelių nustatymas ir užsikrėtimo rizikos palyginimas tarp skirtųjų LSMU fakultetų studentų.


Apklausos dalyvių konfidencialumas bus užtikrintas, nes anketa anoniminė, nebus klausiana aplausiamųjų vardų, pavardžių, adresų, o tyrimo rezultatai bus skelbiami tik apibendrinti.

![Signature](Nuria Molina Osorio)

(Applauso sukūrimo vardas, pavardė, parašas)

![Signature](Lina Nokšienė)
(suderinto su mokslinio darbo vadovu)

(Vadovo vardas, pavardė, parašas)

![Signature](Odontologijos fakulteto dekanas)

(suderinta su OF dekanu)

(Dekano vardas, pavardė, parašas)
Lietuvos sveikatos mokslų universiteto
Medicinos fakulteto Dekanui
Prof. A. Tamelui

Lietuvos sveikatos mokslų universiteto Medicinos fakulteto 5 kurse studentės
Nuria Molina Osorio
El. p. nuriamolina94@gmail.com

**PRAŠYMAS**

2017.01.09
Kaunas

Prašau mokymo ir tiriamaisiais tikslais leisti vykdyti apklausą tarp Lietuvos sveikatos mokslų universiteto Medicinos fakulteto I-III kursų studentų. Apklausą planuojama pradėti vykdyti 2017-01-02 mën.
Planuojama apklausti LSMU MF I-III kurso studentų: 200

**Apklausa bus vykdoma šiuos padaliniose:**

1. LSMU Biologinių sistemų ir genetinių tyrimų institute

**Studijų programos:** Medicīna, vientīsīgos studijos

**Mokslo darbo pavadinimas:** Tikintiniausiu užsikrėtimo *Echinococcus granulosus* kelio nustatymas ir užsikrėtimo rizikos palyginimas tarp skirtingų LSMU fakultetų studentų.


Apklausos dalyvių konfidenčialumas bus užtikrintas, nes anketa anonimine, nebus klausiana apklausiamųjų vardų, pavardžių, adresų, o tyrimo rezultatai bus skelbiami tik apibendrinti.

**Suderinta su mokslo darbo vadovu:**

Nuria Molina Osorio

**Vadovas:**

Sudėtingai su MF fakulteto Dekanu:

Medicina fakulteto dekanas
Prof. A. Tamelis

73
QUESTIONNAIRE (in English)

Hello,
My name is Nuria Molina Osorio. I am a sixth-year student at the Medicine Faculty of the Lithuanian University of Health Sciences. I am conducting a research to identify: The most likely infection pathways of *Echinococcus granulosus* and comparison of infection risk between students of different faculties of LSMU.
I would be very grateful if you could participate in this research and answer the following questions.
Your answers will help understand attitudes towards: the arrangements of keeping pets in the home, the handling of pets, the importance of personal hygiene, the probability and pathways of animal-borne infectious disease such as echinococcosis and others, and the importance of the prophylaxis of such diseases.
The questionnaire should take 10-15 minutes to complete.
This questionnaire is anonymous. The data collected will be processed and presented in summary form only. The answers in this questionnaire will not be made available to the public.

1. Your age: ________ (write number)
2. You are an LSMU student:
   - o Medicine Academy student
     Faculty ____________________________
     Studies program ______________________
     Course (year) ________________________
   - o Veterinary Academy student
     Faculty ______________________________
     Studies program ______________________
     Course (year) ________________________
3. Is Kaunas your main place of residence?
   - o Yes
   - o No (write where is your main place of residence) __________________
4. Do you have, or used to keep a dog at home?
   4.1 When Kaunas is the permanent residence or temporary (studies time) residence
      - o Yes, I have now
      - o Yes, I had earlier
      - o No
   4.2 When your permanent residence is elsewhere
      - o Yes, I have now
      - o Yes, I had earlier
      - o No
5. If you currently do not have a dog, would you like to get one in the future?
   - o Yes
   - o No
   - o Not sure
6. Would your parents/guardians object to this?
   - o Yes
   - o No
   - o Not sure
7. What sort of animal would you like to get (please underline)?
   Squirrel, hamster, dog, cat, reptile, bird, spider, fox, rabbit, snake, other ______________
If you have **NEVER** kept an animal in your home, please skip to question 31

8. What animal(s) do you keep (please underline)?
   - Squirrel, hamster, dog, cat, reptile, bird, spider, fox, rabbit, snake, other______________

9. If you do keep a dog, who is the principal owner?
   - Father
   - Mother
   - Siblings
   - Me
   - Not sure

10. If you have any dogs, where are they kept?
    - Outside the home in a dog house
    - Outside the home in a dog enclosure
    - Freely moving inside the home
    - In a designated area inside the home
    - Depends on the occasion
    - No fixed abode

11. If a dog is kept in your living quarters, does it have its own sleeping place/cot?
    - Yes
    - No
    - Not sure

12. Is the pet allowed to sleep in your room?
    - Yes
    - No
    - Depends on the occasion

13. Is the dog allowed to sleep on your bed/pillow/under your sheets?
    - Yes
    - No
    - Depends on the occasion

14. Is the dog allowed to lick your hands/face?
    - Yes
    - No
    - Depends on the occasion

15. Is the dog allowed to rummage through/lie on your personal belongings (clothes, books, notebooks)?
    - Yes
    - No
    - Depends on the occasion

**Pet Feeding**

16. Are your dog allowed to hang around in the kitchen or sniff kitchen utensils?
    - Yes
    - No
    - Depends on the occasion

17. What food do you give to your dog?
    - Only designated pet food
    - Designated pet food as well as home-made pet food
    - Only home-made pet food
    - Food that we eat ourselves
    - Raw meat or its leftovers
    - Raw fish or its leftovers
    - A mixture of foods

18. Does your dog have a separate feeding dish?
    - Yes
19. Is the dog allowed on the food table?
   - Yes
   - No
   - Depends on occasion

20. Is the dog allowed to take food from its owner’s plate?
   - Yes
   - No
   - Depends on occasion

21. Do you feed your dog by hand?
   - Yes
   - No
   - Depends on occasion

**Taking the pet for a walk/outside the home**

22. Is your dog allowed to roam outside the home unattended (in playgrounds, streets, a park, a forest)?
   - Yes
   - No
   - Depends on the occasion

23. Does your dog come into contact with other unattended animals (e.g. stray dogs/cats)?
   - Yes
   - No
   - Depends on occasion

24. If you have your dog in the country, can the dog take any contact with sheep, goat, cattle?
   - Yes
   - No
   - Depends on occasion

25. Is your dog taken on walks with a leash and muzzle?
   - Yes
   - No
   - Depends on occasion

26. Is your dog registered?
   - Yes
   - No

27. Are the droppings of your dog collected into special bags/dumped into designated bins?
   - Yes
   - No
   - Depends on the occasion

28. Are items for collecting pet droppings (bags, scoops) easily available to you?
   - Yes
   - No
   - Not sure

29. Are items for collecting pet droppings very expensive?
   - Yes
   - No
   - Not sure

30. Does the area you live in have designated bins for animal droppings?
   - Yes
   - No
   - Not sure
General awareness and infection pathways

31. Does your study program include the subject of Parasitology?
   - Yes
   - No
   - Not sure

32. If the answer is Yes, is it obligatory or optional?
   - Obligatory
   - Optional

33. If the answer is Yes, in which year do you take the Parasitology subject?
   - (Please write a year (course)_________________________

34. Have you already taken the subject of Parasitology?
   - Yes
   - No

35. Do you know the meaning of the term zoonosis?
   - Yes
   - Vaguely
   - No

36. Do you know of the pathways of zoonosis infection?
   - Yes
   - Vaguely
   - No

37. Do you know how you can get infectious diseases from sick animals?
   - Yes
   - Vaguely
   - No

38. Do you know what diseases you can get from sick animals?
   - Yes
   - Vaguely
   - No

39. Are you aware of an infectious disease called echinococcosis?
   - Yes
   - Vaguely
   - No

40. Are you aware of the existence of canine (dog-borne) echinococcosis?
   - Yes
   - Vaguely
   - No

41. Do you know how you can get infected with Echinococcus granulosus parasites?
   - Yes
   - Vaguely
   - No

42. Pathways for echinococcosis infecting humans. Underline answers that you think are valid pathways.
   - Eating unwashed fruits, berries and vegetables
   - Eating insufficiently thermally treated meat (pork, beef, rabbit, poultry)
   - Eating insufficiently thermally treated eggs
   - Eating insufficiently thermally treated fish and caviar
   - Eating insufficiently thermally treated milk and milk products
   - Drinking unboiled, unfiltered water, soft drinks
   - Eating sweets, cookies, pastries
   - Failing to wash hands after stroking an infected stray (homeless) dog
   - Failing to wash hands after stroking your dog you have taken back from a walk
Failing to wash hands before a meal: for adults, after working in a garden or orchard, for children, after playing in a sandbox outdoors

Stroking and feeding pet birds: canaries, parrots, etc.

Stroking and feeding pet animals: cats, rabbits, hamsters, etc.

Stroking and feeding household animals: horses, cows, sheep, goats, etc.

Failing to wash hands before a meal after working in the garden or playing in the sandbox

Trough not washing your hands before a meal after working with a computer/speaking on the phone

Through eating insufficiently thermally treated meat, fish, eggs, milk

Allowing your dog to eat from dishes meant for human food

Others (please write in)__________________________________________________________________

__________________________________________________________________

43. List the names of diseases you know that humans can catch from sick dogs:

________________________________________________________________________

Prophylaxis (Prevention)

44. Is the dog given a bath after being taken for a walk?
   o Yes, daily
   o Yes, weekly
   o Yes, monthly
   o Yes, from time to time
   o No, only the legs are washed
   o No

45. What do you think is the most important purposes of giving the dog a bath/washing its legs?
   o Keeping mud and dirt away from the room
   o Keeping the carpets and furniture clean
   o Droppings of other animals (strays, diseased animals) may be stuck to the fur/legs
   o Parasitic protozoan cysts and worm eggs may be stuck to the fur/legs
   o Canine ticks and fleas may be stuck to the fur/legs

46. Do you like to stroke a cute little stray dog or kitten that you meet in the street?
   o Yes
   o No
   o Depends on the occasion
   o Not sure

47. Do you regularly take your dog to be inspected by a veterinarian?
   o Yes
   o No
   o Depends on occasion
   o Not sure

48. Do you give your dog anthelmintic medicines (worm pills)?
   o Yes
   o No
   o Depends on occasion
   o Not sure

49. If yes, how often?
   o Less than once a year
   o Yearly
   o More than once a year according to recommendations
50. Do you wash fruits, berries and vegetables that you have bought in a shop, or brought from a wood, garden or orchard before eating them?
- Yes
- No
- Depends on the occasion

51. When do you usually wash your hands?
- After using the bathroom
- Before preparing food and before a meal
- After cleaning the cat’s litter tray
- After playing with your pet at home
- After taking your dog outside for a walk
- After work outside, in the garden or orchard
- When they are dirty
- Other:___________________________________________________________

52. You think your knowledge of dog handling, care and echinococcosis prophylaxis – both for your pet and your family members – are sufficient?
- Yes
- No
- Not sure

53. In your opinion, how could you gain/improve your knowledge regarding pathways of echinococcosis infection and methods of prophylaxis?
- In school or university, from teachers, lecturers, guest lecturers, doctors, public health specialists
- In the home, from parents, grandparents, siblings or other relatives
- In the street, from friends and neighbours
- In the media, through the Internet, TV, radio shows, newspapers, leaflets
- Other:_______________________________________________

Additional questions for Veterinary Faculty Students
What type of methods of prophylaxis do you suppose to use to prevent to be infected from the sick animals in the veterinary clinics?
- Examining the patient animal always use special gloves
- Use disposable medical tools and equipment
- Wash hands thoroughly after each examining of patient animal
- Regular Veterinary clinics disinfection
- Regular personal health examination in the general doctor’s clinics
- Healthy style of life and a healthy diet
- Other (please to write)______________________________________________

Thank you very much for your answers and your time
Respectfully,
Nuria Molina Osorio
Medical Faculty Sixth-year student in the Lithuanian University of Health Sciences
Esu Nuria Molina Osorio, Lietuvos sveikatos mokslų universiteto Medicinos fakulteto VI kurso studentė. Šiuo metu atlieku mokslinį tyrimą, siekiantį nustatyti jaunimo užsikrėtimo Echinococcus granulosus kelius ir palyginti užsikrėtimo riziką tarp skirtingų LSMU fakultetų studentų. Būčiau dėkinga, jei dalyvautumėte šiame tyроме iratsakytumėte į klausimus.

1. Jūsų amžius (įrašyti skaičių) ____________________
2. Jūs esate LSMU studentas:
   o Medicinos akademijos studentas (-ė)
     fakultetas_________________________
     specialybė_________________________
     kursas___________________________
   o Veterinarijos akademijos studentas (-ė)
     fakultetas_________________________
     specialybė_________________________
     kursas___________________________
3. Jūsų pagrindinė gyvenamoji vieta Kaunas?
   o Taip
   o Tik studijų metu, nes yra kita nuolatinė gyvenamoji vieta (įrašyti)_____________
   Gvūnas namuose
4. Ar namuose yra/buvo laikomas šuo
   4.1 Jei Jūsų nuolatinė arba laikina (studijų metu) gyvenamoji vieta yra Kaunas
      o Taip, yra laikomas
      o Taip, buvo laikomas
      o Ne
   4.2 Jei Jūsų nuolatinė gyvenamoji vieta yra kitur
      o Taip, yra laikomas
      o Taip, buvo laikomas
      o Ne
5. Jeigu šiuo metu šuns namuose nelaikau, ar norėčiau turėti šunį ateityje?
   o Taip
   o Ne
   o Nežinau
6. Ar tėvai/globėjai/namiškiai prieštarautų?
   o Taip
   o Ne
   o Nežinau
7. Kokio gyvūno norėčiau? (pabraukite)
   Voverės, žiurkėno, šuns, katės, ropilio, paukščio, voro, lapės, triušio, gyvatės, kita__________
Jeigu namuose **NEKADA** nebuvo laikomas joks gyvūnas – pereikite prie 30 klausimo

8. Jeigu gyvūnas namuose yra/buvo – koks jis? (pabraukite)
   Voverė, žiurkėnas, šuo, katė, driežas, paukštis, voras, lapė, triušis, gyvatė, kita

9. Jeigu namie yra/buvo šuo – kas jo pagrindinis šeimininkas?
   o Tėtis
   o Mama
   o Vyresni/jaunesni broliai, seserys
   o Aš
   o Nežinau

10. Kur šuo laikomas?
    o Lauke voljere su būda
    o Lauke priirištas prie būdos
    o Namuose bendrose su šeimininkais gyvenamose patalpose
    o Namuose specialiai parengtose patalpose
    o Įvairiai
    o Neturi pastovios vietos

11. Jei šuo gyvena gyvenamosiose patalpose - ar turi savo atskirą gultą?
    o Taip
    o Ne
    o Nežinau

12. Ar šuo miega Jūsų kambaryje?
    o Taip
    o Ne
    o Įvairiai

13. Ar leidžiama šuniui miegoti ant Jūsų lovos, gultis ant Jūsų pagalvės, įsitaisyti po antklode?
    o Taip
    o Ne
    o Įvairiai

14. Ar leidžiate šuniui laižyti savo rankas, veidą?
    o Taip
    o Ne
    o Įvairiai

15. Ar leidžiama šuniui raustis po Jūsų daiktus, gultis ant Jūsų rūbų, knygų, sąsiuvinių?
    o Taip
    o Ne
    o Įvairiai

**Gyvūno maitinimas**

16. Ar šuniui leidžiama sukinėtis virtuvėje, uostyti maisto gaminimo priemones ir įrankius?
    o Taip
    o Ne
    o Įvairiai

17. Kokiu maistu maitinate savo šunį?
    o Tik specialių šunims skirtu maistu
    o Ir specialių maistu, ir namie pagamintu skirtu šuniui
    o Tik pagamintu namie skirtu šuniui
    o Tokiu pat kokį valgome mes patys
    o Žalia mėsa pirkta maisto prekių parduotuvių ar turguje bei mėsos atliekomis
    o Žalia žuvimi ir jos atliekomis
    o Mišriaι
18. Ar šuo turi atskirą savo indą maistui?
   o Taip
   o Ne
   o Įvairiai
19. Ar leidžiama šuniui lipti su kojom ant stalo?
   o Taip
   o Ne
   o Įvairiai
20. Ar leidžiama šuniui kartais ragauti maistą iš šeimininko lėkštės?
   o Taip
   o Ne
   o Įvairiai
21. Ar maitinate gyvūną iš rankų?
   o Taip
   o Ne
   o Įvairiai

Gyvūno vedžiojimas/buvimas išorinėje aplinkoje
22. Ar leidžiama šuniui laisvai be priežiūros lakstyti lauke: vaikų žaidimo aikštelėse prie namų, gatvėje, parke, miške?
   o Taip
   o Ne
   o Įvairiai
23. Ar Jūsų šuo susiduria tiesiogiai su kitais palaidais gyvūnais, pvz. benamiais šunimis/katėmis?
   o Taip
   o Ne
   o Įvairiai
24. Ar šuo vedžiojamas su pavadėliu ir antsnukiu?
   o Taip
   o Ne
   o Įvairiai
25. Ar šuo yra registruotas?
   o Taip
   o Ne
26. Ar surenkamos šuns išmatos į spec. maišelius ir išmetamos į tam skirtas specialiu ženklu pažymetas dėžes?
   o Taip
   o Ne
   o Įvairiai
27. Ar yra lengvai prieinamos įsigyti specialios gyvūnėlių išmatų surinkimo priemonės: maišeliai, semtuvėliai?
   o Taip
   o Ne
   o Nežinau
28. Ar Jūsų gyvenamajame rajone yra įrengtos specialiu ženklu pažymėtos dėžes šunų išmatų surinkimui?
   o Taip
   o Ne
   o Nežinau
29. Ar, Jūsų manymu, tų dėžių yra pakankamas kiekis?
   o Taip
   o Ne
   o Nežinau
Bendros žinios ir užsikrėtimo keliai
30. Ar Jūsų studijų programoje yra įtrauktas Parazitologijos dalykas?
   o Taip
   o Ne
   o Nežinau
31. Jei taip, koks jis yra?
   o Privalomas
   o Pasirenkamas
32. Kuriame kurse numatytos (jeigu yra) Parazitologijos dalyko studijos?
   o Įrašyti____________________
33. Ar jau esate studijavę Parazitologijos dalyką?
   o Taip
   o Ne
34. Ar žinote, ką reiškia terminas “zoonozė”?
   o Taip
   o Kažką girdėjau
   o Ne
35. Ar žinote apie užsikrėtimo zoonozėmis kelius?
   o Taip
   o Kažką girdėjau
   o Ne
36. Ar žinote, kad galima susirgti užkrečiamosiomis ligomis nuo sergančių gyvūnų?
   o Taip,
   o Kažką girdėjau
   o Ne
37. Ar žinote, kokiomis ligomis galima užsikrėsti nuo sergančių gyvūnų?
   o Taip
   o Kažką girdėjau
   o Ne
38. Ar girdėtas užkrečiamosios ligos pavadinimas “Echinokokozė”?
   o Taip
   o Kažką girdėjau
   o Ne
39. Ar žinote, kad yra ir šuninė echinokokozė?
   o Taip
   o Kažką girdėjau
   o Ne
40. Ar žinote, kaip galima užsikrėsti echinokokozė?
   o Taip
   o Kažką girdėjau
   o Ne
41. Žmogaus užsikrėtimo echinokokoze keliai. Pabraukite, Jūsų manymu, teisingus atsakymus.
   o Valgant neplautus vaisius, uogas, daržoves
   o Valgant nepakankamai gerai termiškai apdorotą mėsą (kiaulieną, jautieną, triušieną, paukštieną)
   o Valgant nepakankamai gerai termiškai apdorotus kiaušinius
   o Valgant nepakankamai gerai termiškai apdorotą kiaušinius ir ikrus
   o Valgant nepakankamai gerai termiškai apdorotą pieną ir pieno produktus
   o Geriant nevirintą, nefiltruotą vandenį, gaiviuosius gėrimus
   o Valgant saldainius, sausainius, pyragaičius,
   o Glostant benamį sergantį šunį ir nenusiplovus rankų
   o Glostant bei šeriant namuose auginančius paukščius: papūgas, kanarėles
Glostant bei šeriant namuos 
e auginamus gyvūnus: kates, triušius, žiurkėnus ir kt.
Glostant bei šeriant namų ūkyje auginamus gyvūnus: arklius, karves, avis, ožkas ir kt.
Glostant parsivestą po pasivaikščiojimo (gatvėje, kieme, miške ir pan.) šunį ir
nenusiplovus rankų
Prieš valgį nenusiplovus rankų: suaugę po dirbo darže, sode, vaikai po žaidimo lauke
smėlio dėžėje
Leidžiant šuniui ėsti iš žmonių maistui skirtų indų
Kita (įrašyti)____________________________________________
________________________________________

Profilaktika
42. Surašykite Jums žinomus pavadinimus ligų, kuriomis žmogus gali užsikrėsti nuo sergančių
šunų:
__________________________________________________________________________
__________________________________________________________________________

43. Ar grižus iš pasivaikščiojimo šuo yra maudomas?
 o Taip, kasdien
 o Taip, kartą į savaitę
 o Taip, kartą į mėnesį
 o Taip, kartais
 o Ne, nuplaunamos tik jo kojos
 o Ne

44. Kaip manote, kokia šuns maudymo/kojų plovimo prasmė?
 o Neprineša purvo ir žemių į kambarius
 o Neištepa kilimų, baldų
 o Ant kailio ir kojų gali būti prilipę kitų gyvūnų (benamių, sergančių) ekskrementų
 o Ant kailio ir kojų gali būti prilipę parazitinių pirmuonių cistų ir kirmėlių kiaušinėlių
 o Ant kailio ir odos gali būti prisitvirtinę šuninių blusų ir šuninių erkių

45. Ar mėgstate paglostyti sutiktą gatvėje, kieme mažą gražų neturintį namų (benamį) šuniuką?
 o Taip
 o Ne
 o Šaltai

46. Ar reguliariai vedate savo augintinį atlikti veterinarinę patikrą?
 o Taip
 o Ne
 o Šaltai

47. Ar duodate savo augintiniui antihelmintinių vaistų (vaistų nuo kirmėlių)?
 o Taip
 o Ne
 o Šaltai

48. Jeigu taip – kaip dažnai?
 o Rečiau, nei kartą per metus
 o Kartą metuose
 o Du kartus metuose, atsižvelgiant į rekomendacijas
 o Kas 3 mėnesiui
 o Šaltai

49. Ar plaunate pirkus parduotuvėje/turguje ar parsinešus iš miško, sodo, daržo vaisius, uogas,
daržoves prieš valgant?
 o Taip
 o Ne
 o Šaltai
50. Kada Jūs įprastai plaunate rankas?
- Pasinaudojus tualetu
- Prieš gaminat maistą ir prieš valgant
- Po žaidimų namie su savo augintiniu
- Po pasivaikščiojimų su šuniu lauke
- Po darbo lauke, darže, sode
- Kada jos yra nešvarios
- Kita

51. Kaip Jūs manote, ar Jūsų žinios apie naminių gyvūnų laikymo, priežiūros ir profilaktikos nuo užsikrėtimo echinokokoze – tiek Jūsų ir kitų šeimos narių, tiek naminių gyvūnų – yra pakankamos?
- Taip
- Ne
- Nežinau

52. Kokiu būdu, Jūsų manymu, žinias apie užsikrėtimo echinokokoze kelius ir profilaktiką nuo užsikrėtimo šia liga galima įgyti ar pagerinti jau esamas?
- Mokykloje, gimnazijoje, universitete – iš mokytojų, dėstytojų, kviestinių lektorų, medikų, visuomenės sveikatos specialistų
- Namuose – iš tėvų, senelių, brolių, seserų, kitų giminaicių
- Kieme – iš draugų, kaimynų
- Iš žiniasklaidos priemonių: interneto, televizijos, radijo laidų, laikraščių, reklaminių skraujučių
- Kita (įrašyti) _____________________________________________

Papildomi klausimai Veterinarijos specialybės studentams
Kokius taikote (taikysite) profilaktikos metodus tikslu neužsikrėsti nuo tiriamų sergančių gyvūnų?
- Tiriant šunį veterinarijos klinikoje visada mūvimos (naudojamos) vienkartinės spec. pirštės
- Naudojami vienkartiniai medicininiai įrankiai ir kt. priemonės
- Kruopščiai plaunamos rankos po kiekvieno šuns tyrimo
- Reguliari patalpų dezinfekcija veterinarijos klinikoje
- Reguliari asmeninė sveikatos patikra pas šeimos gydytoją
- Sveika gyvensena ir sveika mityba
- Kita (įrašyti) _____________________________________________

Dėkoju už Jūsų skirtą laiką ir atsakymus.
Pagarbiai
Nuria Molina Osorio
Lietuvos sveikatos mokslų universiteto Medicinos fakulteto VI kurso studentė