

Research Article

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Medical interns' attitudes towards One Health approach

Tıp intörnlerinin “Tek Sağlık” yaklaşımına yönelik tutumları

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Abstract

Objectives: One Health approach to health considers human, animal, and ecosystem health as a whole and advocates cooperation across disciplines to reach the highest level of health. The aim of the study is to determine the attitudes of the medical interns' toward the One Health approach and to evaluate related factors.

Methods: This cross-sectional study targeted all interns of the Faculty of Medicine of 2019–2020 academic year (n=356). Sociodemographic characteristics, health status, habits, and attitudes toward One Health were asked in the questionnaire, which was created by the researchers using the literature. The study data were collected based on self-report during occupational health and safety training, before the COVID-19 pandemic. Chi-square and logistic regression analyses were also performed.

Results: The study group included a fair gender distribution (47.8% female), and the average age was 23.6 ± 1.2 . Out of the 316 participants, 40.2% had not heard the One Health concept before. In total, 85.4% of them declared a positive attitude toward the concept. The probability of high attitude was found to be 5.03 times (95% CI 1.10–23.12) higher in those with above-average success status and 4.08 times (95% CI 1.15–

14.52) higher in those who had kept animals. In students' responses to the attitude questionnaire items, the epidemic sub-dimension had the highest level as 86.1%, and the antibiotic resistance sub-dimension had the lowest level as 77.2%.

Conclusions: The current study revealed that the awareness on One Health concept among medical interns is limited, however, students' attitudes are positive. Recent SARS-CoV 2 pandemic showed us the urgent need for proper implementation of One Health approach in the medical education curriculum. Meanwhile, One Health focused courses should be introduced into the curriculum of final year medicine and related programs.

Keywords: antibiotic resistance; epidemic; medical-education; One Health; zoonosis.

Öz

Amaç: Sağlığa 'tek sağlık' yaklaşımı, insan, hayvan ve ekosistem sağlığını bir bütün olarak ele alır ve en yüksek sağlık düzeyine ulaşmak için disiplinler arası işbirliğini savunur. Çalışmanın amacı, tıp intörnlerinin tek sağlık yaklaşımına yönelik tutumlarını belirlemek ve ilişkili faktörleri değerlendirmektir.

Gereç ve Yöntem: Bu kesitsel çalışma, 2019–2020 eğitim öğretim yılında Tıp Fakültesindeki tüm intörnleri (n=356) hedeflemiştir. Araştırmacılar tarafından literatürden yararlanılarak oluşturulan ankette sosyodemografik özellikler, sağlık durumu, alışkanlıklar ve “tek sağlığa” yönelik tutumlar sorulmuştur. Çalışma verileri, COVID-19 pandemisi öncesi iş sağlığı ve güvenliği eğitimi sırasında öz bildirime dayalı olarak toplanmıştır. Ki-kare ve lojistik regresyon analizleri yapılmıştır.

Bulgular: Çalışma grubu eşit bir cinsiyet dağılımını (%47.8 kadın) içeriyordu ve yaş ortalaması $23,6 \pm 1,2$ idi. 316 katılımcının %40,2'si 'tek sağlık' kavramını daha önce duymamıştı. Toplamda, %85,4'ü konsepte karşı olumlu bir tutum

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bildirmiştir. Yüksek tutum olasılığı, ortalamanın üzerinde başarı durumuna sahip olanlarda 5.03 kat (%95 CI 1.10–23.12) ve hayvan besleyenlerde 4.08 kat (%95 GA 1.15–14.52) daha yüksek bulundu. Öğrencilerin tutum anketi maddelerine verdikleri yanıtlarda en yüksek düzeyi %86,1 ile salgın alt boyutu, en düşük düzeyi ise %77,2 ile antibiyotik direnci alt boyutu almıştır.

Sonuç: Mevcut çalışma, tıp stajyerleri arasında 'tek sağlık' kavramına yönelik farkındalığın sınırlı olduğunu, ancak öğrencilerin tutumlarının olumlu olduğunu ortaya koymuştur. Son zamanlardaki SARS-CoV 2 salgını bize tıp eğitimi müfredatında 'tek sağlık' yaklaşımının uygun şekilde uygulanmasına acil ihtiyaç olduğunu göstermiştir. Bu arada tıp son sınıf müfredatına ve ilgili programlara 'tek sağlık' odaklı dersler eklenmelidir.

Anahtar Kelimeler: Tıp eğitimi; tek sağlık; salgın; zoonoz; antibiyotik direnci.

Introduction

One Health is an approach to health that advocates thinking about human, animal, and ecosystem health as a whole and at the same time cooperation across disciplines to reach the highest level of health [1]. In the 20th century, humanitarian medicine and veterinary medicine started to move apart from the holistic approach and retreat into their own fields [2]. However, the effects of global climate change, rapid urbanization, and industrial development on water and soil resources and all zoonotic diseases that coexist with food security problems have made the One Health concept inevitable [3]. The development of the One Health approach was needed to deal with emerging infectious diseases, such as the avian virus in 1997, SARS in 2009, and pandemic H1N1 [4]. In 2010, the World Health Organization (WHO), the Food and Agriculture Organization of the United Nations (FAO), and the World Organization for Animal Health (OIE) defined the concept of One Health as an approach that can be achieved through interdisciplinary cooperation [2]. The COVID-19 pandemic has reinforced the validity of One Health principles in the global management of infectious diseases, particularly international efforts to prevent and control zoonotic diseases [5].

The One Health topics include zoonotic diseases, antimicrobial resistance, food safety, environmental pollution, as well as many other health threats. All these can benefit from the One Health approach that includes interdisciplinary cooperation, even in mental health, injury, occupational health, and noncommunicable diseases [6]. It is necessary to provide information exchange

and cooperation between disciplines, such as veterinary, medicine, environmental health, geography, agriculture, economics, sociology, behavioral sciences, and epidemiology, for efficient use of healthcare organizations and effective health interventions [7].

However, studies conducted with physicians revealed a low level of awareness about the prevention or treatment of zoonotic diseases [8]. Moreover, the changing disease patterns on a global scale indicate the need for new conceptual models for medical education. Unfortunately, the One Health concept has not yet found the rightful place for itself in the medical education program. At the moment, efforts for One Health education in medical schools are in their infancy and lag behind veterinary schools that have made the One Health concept the center of their curriculum [9].

As a result, One Health approach and the interconnections between people, animals, and their shared environment should be kept in minds of the physicians throughout life. By creating multidisciplinary programs in the field of One Health, collaborative projects can be made to prevent future epidemics, and the need for professionals who can contribute to global health can be met [10]. One Health approach requires interdisciplinary teamwork, and medical doctors are the crucial parts of this team. It is necessary to review the One Health concept and its important common issues throughout the undergraduate medical education and to increase the awareness in medical students.

The aim of this study is to determine the attitudes of the interns of Ege University Faculty of Medicine toward One Health approach and to evaluate related factors.

Methods

The senior students or medical interns (n=356) of Ege University Faculty of Medicine of 2019–2020 academic year constitute the population of this cross-sectional study. The sample selection was not applied, and all senior students who agreed to participate were included in the study.

Creating the One Health attitude questionnaire

As a result of the literature review, no measuring scale related to the subject was found, and therefore, the researchers had created the One Health attitude questionnaire. For questioning the attitude toward One Health approach, the results of the reports of the One Health Initiative Task Force established by the American Veterinary Medical Association and the American Medical Association in 2008, and the OIE & FAO & WHO joint working group reports were evaluated, and four main topics were stated as “zoonoses, epidemics and early warning, food safety, and antibiotic resistance” [2, 11]. The proposals were prepared through OIE, FAO, and WHO's reports describing the

One Health approach in combating zoonotic diseases and food safety after the 2010 avian epidemic, the Global Early Warning System report that they created to unify and coordinate emergency and disease information mechanisms, and the Global Action Plan that was created by WHO with One Health approach in the fight against antimicrobial resistance [2, 12, 13].

In total, 40 statements were prepared for zoonoses (10), epidemics and early warning (10), food safety (10), and antibiotic resistance (10), and the sub-titles were sent to three humanitarian doctors and three veterinarians who are competent in the field of public health. Specialists were asked to rate each statement with a five-point scale between “absolutely no” and “absolutely yes.” A total of 15 statements are approved by specialist assessment (with a median of yes and absolutely yes): four for “zoonoses,” four for “epidemics and early warning,” three for “food safety,” and four for “antibiotic resistance.” A preliminary trial was conducted by applying the questionnaire to 10 medical students who were graduated in the previous term.

Data collection process

In the questionnaire, which was created by the researchers using the literature, there were 15 statements evaluating the One Health attitude of the students while another 18 statements evaluated sociodemographic characteristics, health status, and habits. The study data were collected based on self-report during occupational health and safety training, before the COVID-19 pandemic, and at the beginning of the 2019–2020 internship training period.

Analysis

SPSS 21.0 package program was used for data analysis. Measurement variables were classified with mean \pm standard deviation, and data were presented in tables with the numbers and percentages. One Health attitude and all propositions for each sub-dimension were scored with a five-point scale between “absolutely no” and “absolutely yes.” Means were evaluated with a cutoff point of 3.5. The

attitude was considered as positive for values above 3.5. The relationship of the independent variable with the dependent variable was evaluated using the Chi-square test, and logistic multivariate regression analysis was used for advanced analysis. Further analysis was carried out for each situation by including gender. The level of significance was accepted as p of less than 0.05, and the confidence interval was evaluated as 95%. The Kaiser-Meyer-Olkin (KMO) value was also determined to ensure that the collected dataset was sufficient for factor analysis. Cronbach's alpha was calculated for internal consistency.

Ethics

Approval was obtained from the Ege University Faculty of Medicine Clinical Research Ethics Committee (28.06.2019-E.193663-334). In addition, prior to the study, the participants were given an informed consent form and necessary explanations about the study.

Results

The study was conducted with 316 (89% of 356) medical interns. The variables related to sociodemographic, health status, and habits of the research group are shown in Table 1. A total of 163 (52.0%) students stated that they had heard about the One Health concept before, and only 3 (1.0%) students stated that they had comprehensive knowledge about One Health. Out of the total participants, 151 (47.8%) were female, and the average age was 23.6 ± 1.2 . The academic success grade of the students who answered the questionnaire was 65.7 ± 9.2 .

The Kaiser-Meyer-Olkin (KMO) value of the propositions used to question about One Health attitude was found to be 0.924 for the whole scale. Cronbach's alpha values for

Table 1: Descriptive characteristics of the participants in relation to socio-demographic variables, health status and habits.

| Feature, n | | Number, n | Percent, % |
|-------------------------------------|--|-----------|------------|
| Gender | Female | 151 | 47.8 |
| | Male | 165 | 52.2 |
| Above average success status (2.24) | Yes | 102 | 45.5 |
| | No | 122 | 55.5 |
| Father's job | Doctor-Veterinarian-Agricultural Engineer- | 34 | 10.8 |
| | Biologist-Farmer | | |
| | Professions not related to one health | 282 | 89.2 |
| Mother's education | Illiterate | 7 | 2.2 |
| | Literate | 15 | 4.5 |
| | Graduation from primary school | 39 | 12.4 |
| | Graduation from secondary school | 30 | 9.5 |
| | Graduation from high school | 82 | 26.0 |
| | Graduation from university | 118 | 37.5 |
| | Graduation master's degree | 25 | 7.9 |

Table 1: (continued)

| Feature, n | | Number, n | Percent, % |
|--|------------------------------------|-----------|------------|
| Pocket money | Always enough | 164 | 52.1 |
| | Sometimes enough and sometimes not | 125 | 39.7 |
| | Not enough | 26 | 8.3 |
| The longest residential period spent in | Countryside | 216 | 68.4 |
| | District | 77 | 24.4 |
| | Village/town | 23 | 7.3 |
| Health condition | Good | 252 | 79.7 |
| | Average | 62 | 19.6 |
| | Bad | 2 | 0.6 |
| Presence of chronic illness | Yes | 55 | 17.4 |
| | No | 261 | 82.6 |
| Having a pet | Yes | 87 | 27.5 |
| | No | 229 | 72.5 |
| Heard about 'one health' concept before | Yes | 163 | 51.5 |
| | No | 153 | 48.5 |
| Had previous education about 'one health' | Yes | 3 | 1.0 |
| | No | 312 | 99 |
| Took part in associations or professional organizations in the field of health | Yes | 60 | 19 |
| | No | 256 | 81 |
| Having a relative working in the field of human health | Yes | 189 | 59.8 |
| | No | 127 | 40.2 |
| Having a relative working in the field of animal health | Yes | 69 | 21.8 |
| | No | 247 | 78.2 |
| Having a relative working in the field of phytosanitary | Yes | 36 | 11.4 |
| | No | 280 | 88.6 |
| Having a relative working in the field of food production/food safety | Yes | 65 | 20.6 |
| | No | 251 | 79.4 |
| Having a relative working in the field of environmental health | Yes | 25 | 7.9 |
| | No | 291 | 92.1 |

four sub-dimensions were between 0.662 and 0.797 (zoonosis: 0.771, epidemic: 0.797, food safety: 0.6662, and antibiotic resistance: 0.737) and 0.915 in total. When the correlation of the items in the scale with their dimensions was evaluated, it was seen that each item showed a higher correlation with its own dimension.

The distribution of the students' answers to the items of the scale in One Health and sub-dimensions is shown in Figure 1.

Table 2 shows the general One Health attitude and the factors related to the attitude toward sub-dimensions (zoonosis, epidemic, food safety, and antibiotic resistance). The presence of a positive One Health attitude in students was 5.03 times (95% CI 1.10–23.12) higher for those who had above average success status, 2.80 times (95% CI 1.24–6.35) higher for those who had enough pocket money, 4.08 times (95% CI 1.15–14.52) higher for those who kept animals.

Discussion

Although integrated medical thinking is not an entirely new practise, the current study revealed that almost half of the medical interns had not heard of One Health concept before. However, students' attitude towards One Health concept was positive and this was related to individual factors such as academic success, pocket money and animal feeding. The inclusion of One Health approach in medical education curricula in our country is limited and nonsystematic, which leads to students' lack of knowledge about the subject and may cause their attitudes toward the One Health concept to be limited to individual factors. It is the duty of medical educators to raise awareness for the One Health concept, encouraging interdisciplinary thinking towards complex health issues in the next generation of health professionals.

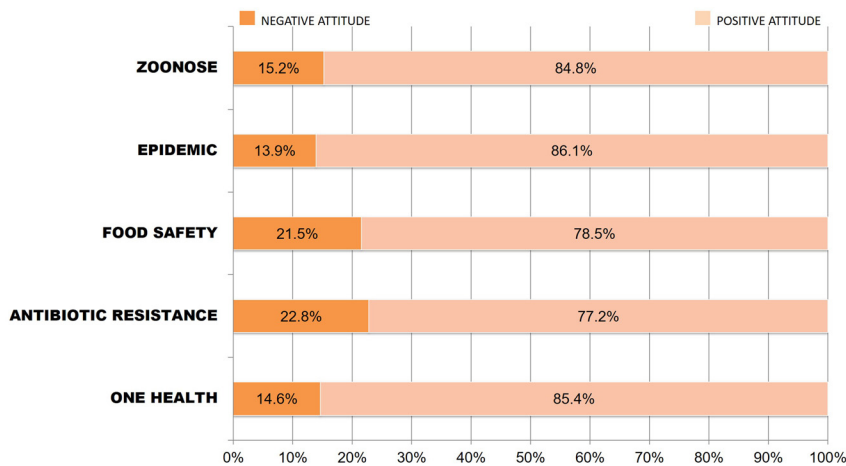


Figure 1: Distribution of the students' answers to the items in One Health and sub-dimensions.

Several factors may be attributed for the low level of awareness in One Health concept for our students. It is expected that medical students who have disease treatment-based clinical education within the scope of medical education are distant from the One Health approach that prioritizes preventive medicine [11]. The fragmentation of health service delivery may also be one of the obstacles that makes medical students' perception of One Health education difficult in the clinical education process [14]. It should also be taken into account that if the academicians involved in the education process do not come from an interdisciplinary education background, this will also create difficulties in One Health training which requires a multidisciplinary educational environment [15].

In this study, the highest attitude toward One Health was observed about "zoonoses." It was remarkable that students who kept animals at home and whose relatives worked in the field of animal health had high attitude scores in the zoonoses sub-dimension. Studies have shown that both veterinarians and medical doctors agree that working in collaboration with One Health approach can be beneficial in the diagnosis and treatment of zoonoses [16, 17]. In a study conducted in the USA, medical students stated that the One Health approach should be included in their education (83%) [18]. Programs that bring together medical and veterinary specialists will contribute to the development of knowledge and skills applicable to human health [19]. In this context, Harvard Medical School provides for its senior students with a one-month rotation about One Health in cooperation with the Zoo New England, with an exemplary program that cares about human and animal health together [20].

Our study revealed that one-third of the interns had low attitude scores toward One Health approach for antibiotic resistance. Published literature have previously

discussed zoonoses and epidemics with regard to One Health, however we were not able to detect any studies discussing One Health approach on antibiotic resistance. On the other side, there are studies showing that medical students lack basic knowledge on antibiotic resistance without discussing the relevance of this challenge to One Health [21]. Many interventions to reduce the problem of antibiotic resistance target hospitals and physicians, but unfortunately, large gaps in the medical curriculum are ignored [22].

In this study, the presence of One Health attitude in food safety sub-dimension was found higher in those who had enough pocket money and whose relatives had worked in the field of animal health. The presence of a relative working in the field of animal health may be a clue to a multidisciplinary activity in accessing information. Solutions to specific food safety problems dictate new approaches. Within the framework of One Health approach, new examples have emerged in which the interdisciplinary approach of specialists from various fields, such as food engineers, agriculturalists, veterinarians, epidemiologists, public health professionals, and microbiologists, has been included [23].

In this study, the students gave the highest positive response to the epidemic sub-dimension (86.1%). The One Health attitude in this sub-dimension was higher in female students who had enough pocket money. This interesting finding gives us clues how gender might be playing an important role in shaping the infectious disease epidemic. Access to resources also affects exposure to humans and animals and the risk of contracting diseases. The interest of female students in this field can be explained by their interest in this disadvantaged situation during their education [24].

It is a positive situation that the attitudes of medical students who have clinical-based education come to the

Table 2: Factors associated with the attitude towards 'One Health' and its sub-dimensions.

| ONE HEALTH | | | | | | | | | |
|---|------------|-----|------|----------|--------|-------|---------|--------|-------|
| Feature | | n | % | Crude OR | %95 CI | | Adj. OR | %95 CI | |
| Gender | Female | 135 | 89.4 | 1.88 | 0.98 | 3.60 | 1.78 | 0.79 | 4.02 |
| | Male | 135 | 81.8 | 1.00 | | | 1.00 | | |
| School success | High | 146 | 77.2 | 4.86 | 1.12 | 21.08 | 5.03 | 1.10 | 23.12 |
| | Low | 43 | 22.8 | 1.00 | | | 1.00 | | |
| Pocket money | Enough | 149 | 90.9 | 2.46 | 1.27 | 4.79 | 2.80 | 1.24 | 6.35 |
| | Not enough | 121 | 80.5 | 1.00 | | | 1.00 | | |
| Chronic illness | Yes | 53 | 96.4 | 5.37 | 1.26 | 22.87 | 2.61 | 0.57 | 12.05 |
| | No | 217 | 83.1 | 1.00 | | | 1.00 | | |
| Keeping a pet | Yes | 82 | 94.3 | 3.58 | 1.36 | 9.38 | 4.08 | 1.15 | 14.52 |
| | No | 188 | 82.1 | 1.00 | | | 1.00 | | |
| Having a relative working in the field of human health | Yes | 169 | 89.4 | 2.10 | 1.11 | 3.97 | 1.99 | 0.89 | 4.48 |
| | No | 101 | 79.5 | 1.00 | | | 1.00 | | |
| ZOO NOSE | | | | | | | | | |
| Feature | | n | % | Crude OR | %95 CI | | Adj. OR | %95 CI | |
| Gender | Female | 132 | 87.4 | 1.48 | 0.79 | 2.77 | 1.76 | 0.91 | 3.39 |
| | Male | 136 | 82.4 | 1.00 | | | 1.00 | | |
| Pocket money | Enough | 146 | 89.0 | 2.01 | 1.07 | 3.78 | 2.13 | 1.10 | 4.11 |
| | Not enough | 121 | 80.1 | 1.00 | | | 1.00 | | |
| Chronic illness | Yes | 53 | 96.4 | 5.67 | 1.33 | 24.11 | 4.92 | 1.13 | 21.33 |
| | No | 215 | 82.4 | 1.00 | | | 1.00 | | |
| Keeping a pet | Yes | 80 | 92.0 | 2.49 | 1.07 | 5.79 | 2.38 | 1.00 | 5.73 |
| | No | 188 | 82.1 | 1.00 | | | 1.00 | | |
| Having a relative working in the field of animal health | Yes | 65 | 94.2 | 6.21 | 1.46 | 26.37 | 6.05 | 1.40 | 26.24 |
| | No | 203 | 82.2 | 1.00 | | | 1.00 | | |
| FOOD SAFETY | | | | | | | | | |
| Feature | | n | % | Crude OR | %95 CI | | Adj. OR | %95 CI | |
| Gender | Female | 125 | 82.8 | 1.64 | 0.95 | 2.84 | 1.64 | 0.93 | 2.89 |
| | Male | 123 | 74.5 | 1.00 | | | 1.00 | | |
| Pocket money | Enough | 137 | 83.5 | 1.83 | 1.06 | 3.17 | 1.87 | 1.07 | 3.28 |
| | Not enough | 111 | 73.5 | 1.00 | | | 1.00 | | |
| Having a relative working in the field of human health | Yes | 156 | 82.5 | 1.86 | 1.08 | 3.20 | 1.48 | 0.83 | 2.64 |
| | No | 92 | 72.4 | 1.00 | | | 1.00 | | |
| Having a relative working in the field of animal health | Yes | 62 | 89.9 | 3.51 | 1.34 | 9.15 | 3.19 | 1.17 | 8.66 |
| | No | 186 | 75.3 | 1.00 | | | 1.00 | | |
| EPIDEMIC | | | | | | | | | |
| Feature | Feature | | % | Crude OR | %95 CI | | Adj. OR | %95 CI | |
| Gender | Female | 139 | 92.1 | 2.79 | 1.38 | 5.64 | 2.67 | 1.29 | 5.52 |
| | Male | 133 | 80.6 | 1.00 | | | 1.00 | | |
| Pocket money | Enough | 153 | 93.3 | 3.74 | 1.81 | 7.73 | 3.89 | 1.86 | 8.14 |
| | Not enough | 119 | 78.8 | 1.00 | | | 1.00 | | |
| Having a relative working in the field of human health | Yes | 169 | 89.4 | 1.91 | 1.00 | 3.66 | 1.9 | 0.96 | 3.76 |
| | No | 103 | 81.8 | 1.00 | | | 1.00 | | |

Adj OR: adjusted according to gender and other associated factors.

forefront about epidemics. Studies conducted during the SARS-CoV-2 pandemic have shown that the pandemic has a positive contribution to students for understanding the importance of multidisciplinary communication, environmental and animal events, as well as the relationship between socioeconomic status and the pandemic [19].

This study also has some limitations. The cross-sectional nature of the study limits the cause-effect relationship between variables related to One Health attitude. In the evaluation of the One Health attitude, we constructed a new scale based on the existing literature. Thus, the use of a scale which lacks a previous reliability study may have caused some limitations and bias due to recall may be in question. Nevertheless, we were able to show some critical baseline data that can be applied to larger implementation studies. Studies in which the opinions of faculty members as well as students will be taken can move the ground of this study forward.

Although the emphasis on the One Health concept increases day by day, the interest in medical education in this field remains limited. This findings of this study may be important as we think of ways of creating curriculums that are multidisciplinary and have One Health approach in the center.

Conclusion

Although the One Health attitude was found to be positive in this study, it is seen that the awareness of the One Health concept is low. Among the sub-dimensions, the attitude was lower for antibiotic resistance and in general a positive attitude toward One Health was associated with individual factors, such as school success, pocket money, and petting.

Lessons learned from recent epidemics, such as SARS-CoV-2, have shown that proper education and training on One Health approach, which acknowledges the interdependence of the health of humans, animals, and the environment, is extremely important to improve the global preparation and responses to diseases. Therefore, there is an urgent need to review the current situation, discover the changing demand for global health, and recognize innovative teaching strategies to tackle with this need. One Health concept and training may serve as an ideal platform to develop a problem-focused curriculum that encourages teamwork in which many specialties can be involved. The results of this study can contribute to the proper implementation of One Health approach in the medical education curriculum. Meanwhile, One Health focused courses should

be introduced into the curriculum of final year medicine and related programs.

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Informed consent: Prior to the study, the participants were given an informed consent form and necessary explanations were made about the study.

Ethical approval: Approval was obtained from the Ege University Faculty of Medicine Clinical Research Ethics Committee (28.06.2019-E.193663-334).

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