

Evaluation of the attitudes of veterinary students towards cancer in animals using a cancer attitude scale for animals

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Abstract: The aim of this descriptive study was to examine the attitudes of veterinary undergraduate students towards cancer in animals with cognitive, affective, and behavioral dimensions by a new cancer attitude scale for animals approach. Questionnaires, as data collection tools, were applied to 205 students training to be veterinary surgeons at Afyon Kocatepe University, Faculty of Veterinary Medicine, who were selected by systematic random sampling method. Validity-reliability analysis and t-test as well as ANOVA were used in addition to descriptive statistics for the data analysis. The students' general attitudes to cancer were ($\bar{X} = 3.65$) greater than the midscore, 3, according to 5-point Likert-type scale; however, in some issues (surgical intervention and biopsy cause cancer, understanding of treatment options with respect to cancer type, sugar loading during PET-SCAN imaging technique may cause side effects on cancer patients etc.) it was observed that their attitudes differed from the expected level. Moreover, the attitude of the students at cognitive level was more negative than their attitude for the affective and behavioral dimensions. In addition, affective and behavioral attitudes of female students and pet owners (dog or cat) were more positive.

Key words: Cancer, animal, attitude scale, veterinary students, cancer attitude scale for animals

1. Introduction

Cancer is a disease that may afflict all mammals, and is one of the most prevalent and alarming maladies in the world that cause death [1]. Cancer, known for more than a century in the history of veterinary medicine, occupies a significant place among current diseases in animals [2]. Adams et al. [3] emphasized that cancer is a leading cause of death in dogs, accounting for 27% of mortality.

In the historical development of veterinary medicine education, tumors and associated fields have been an exclusive topic of clinical pathology. Veterinary oncology, which is a subdiscipline in pathology and is rapidly developing in recent years, examines tumors as an independent subject and is concerned with the diagnosis and treatment for cancer in animals [4]. Therefore, it is very important for the students in veterinary faculties to obtain necessary information about cancer in animals, i.e. veterinary oncology, during the training process. It is known that education and training on cancer prevention and early diagnosis with treatment options is critical especially for students of higher education [5]. As a matter

of fact, the information that students have about cancer can directly or indirectly affect their attitudes towards cancer.

There are numerous definitions of the concept of attitude one of which is that it comprises feelings, thoughts, and behavior towards something [6–8]. Thurstone [9] defined attitude as the degree of positive or negative effect associated with some psychological object. A psychological object refers to any symbol, expression, slogan, person, institution, ideal or idea which may differ according to positive or negative effects. Attitude scale structurally consists of 3 dimensions as cognitive, affective/emotional, and behavioral. In the literature of psychology, the terms affection and emotion (feeling) are used interchangeably. The cognitive dimension includes some basic knowledge of an individual, the affective dimension manifests the emotional state, and the behavioral dimension contains responses that are manifested through behavior. [10].

There are countless studies regarding attitude in different disciplines (psychology, sociology, education, business, health, etc.). In health sciences, there are

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many studies on the attitudes of different sample groups (doctors, nurses, patients, women, students, etc.) towards cancer in humans [11–18]. However, the number of studies on attitude/perception towards cancer in animals is very limited [19–23]. In all of these studies, the sample groups were animal owners. A literature review on the attitude of veterinary students related to cancer in animals in Turkey has yielded limited results. Thus, the aim of this descriptive research was to examine the attitudes of veterinary undergraduate students towards cancer in animals in cognitive, affective and behavioral dimensions with a new cancer attitude scale for animals.

2. Materials and methods

2.1. Data collection

In this descriptive research, a questionnaire that included a cancer attitude scale for animals was used as data collecting tool. In addition to the literature review, the cancer attitude scale for animals was developed in line with the opinions of 5 professionals from the field. No scale similar to the scale developed in this study or one with the same properties has been encountered in the literature. In this study, three components/dimensions were determined (cognitive, affective, and behavioral) like in similar attitude scale studies [6,10,24]. Initially a focus group study was conducted on students to note their opinions and criticism regarding the questionnaire items. In addition, a pilot study on a group of 40 students was carried out and the final version of the scale was established. The scale composed of 30 items for three dimensions (cognitive, 14; affective, 8; behavioral, 8) was named Cancer Attitude Scale For Animals (CASA).

Each item in the CASA was subjected to the Likert [25] style of grading system. The Likert-type scale uses fixed choice response formats designed to measure attitudes or opinions [26]. These ordinal scales accurately measure levels of agreement/ disagreement. In this context, items were answered on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). For some calculations, negative questions were reverse scored (1 = strongly agree; 5 = strongly disagree).

2.2. Participants

The sample group of the study consisted of 205 students selected by systematic random sampling method among the students at Afyon Kocatepe University, Faculty of Veterinary Medicine. There were 521 registered students at this faculty in 2018. The sample size was calculated with the formula $[n = N \cdot s^2 \cdot Z_{\alpha}^2 / ((N-1) \cdot d^2 + s^2 \cdot Z_{\alpha}^2)]$ proposed for small populations ($N < 10.000$) and survey researches [27–28]. As a result of the pilot application on 40 students, populations size $N = 521$, standard deviation $s = 0.9$, effect size $d = 0.1$ and $Z_{0.05} = 1.96$ (for significance

level $\alpha = 0.05$) were used as parameters in the formula and minimum sample size was calculated as 195 students. A total of 225 questionnaires (45 students for each class/year) were applied considering incomplete or incorrect questionnaires, and 205 questionnaires were evaluated for the analysis. In order to calculate the test-retest reliability, the questionnaire was reapplied on 150 students after 15 days. The questionnaire was carried out with decision number 2018 / 66 of Afyon Kocatepe University Scientific Research and Publication Ethics Board.

2.3. Statistical analysis

Exploratory factor analysis (EFA) was performed using varimax rotation to construct validity of the scale. Confirmatory factor analysis (CFA) with a different sample (170 students) was performed to test the factor structure. Cronbach's alpha coefficient and test-retest reliability were calculated for reliability analysis of the scale and subscales. In addition, mean and standard deviation values were calculated for scale, subscales, and items. Furthermore, independent samples t-test and one way ANOVA were used to compare student attitudes according to some individual characteristics. Repeated measures ANOVA for comparison of dimensions were used. Data were analyzed with SPSS 21.0 for Windows (SPSS, Inc., Chicago, USA).

3. Results

EFA and reliability analysis results with some descriptive statistics for the CASA are given in Table 1. According to the results of EFA, Bartlett's test for sphericity and the Kaiser–Meyer–Olkin measure of sampling adequacy verify the factorability of data ($\chi^2 = 2121.7$; $P < 0.01$; $KMO = 0.813$). The CASA, consisting of 30 items, was collected under 3 factors (dimensions) explaining 70.374% of the total variance. The cognitive dimension, which consisted of 14 items, explains the 32.761% of total variance. Affective/emotional and behavioral dimensions followed with variance explanation ratios of 21.953% and 15.660%, respectively. CFA was conducted to test the factor structure obtained by the EFA in this study (Figure). According to the model fit indices, root mean-square error of approximation (RMSEA) = 0.072 and chi-square = 1190.01 ($df = 402$; $P = 0.000$) were calculated. Cronbach's alpha coefficients for reliability analysis were measured as 0.825 for cognitive dimension, 0.802 for affective dimension and 0.795 for behavioral dimension while the overall scale was calculated as 0.819. Test-retest reliability was 0.841.

According to Table 1, means were calculated as 3.65 ± 0.39 ($\bar{X} \pm SD$) for the general scale, 3.35 ± 0.43 for cognitive, 3.94 ± 0.64 for affective, and 3.91 ± 0.70 for behavioral dimensions. These means are greater than the midscore, 3, in the 5-point Likert scoring. Moreover,

Table 1. The results of EFA, reliability analysis, and some descriptive statistics for CASA.

Dimensions	Number of items	Eigen-values	% of variance	Cronbach's alpha	Mean \bar{X}	SD	P
Factor 1: Cognitive	14	9.828	32.761	0.825	3.35 b	0.43	< 0.001
Factor 2: Affective	8	6.586	21.953	0.802	3.94 a	0.64	
Factor 3: Behavioral	8	4.698	15.660	0.795	3.91 a	0.70	
General scale-CASA	30	-	70.374	0.819	3.65	0.39	

KMO = 0.813; Bartlett's test of sphericity: $\chi^2 = 2121.7$; P = 0.001; Test-retest reliability: 0.841

^{a,b} Values within a column with no common superscripts are significantly different (P < 0.05).

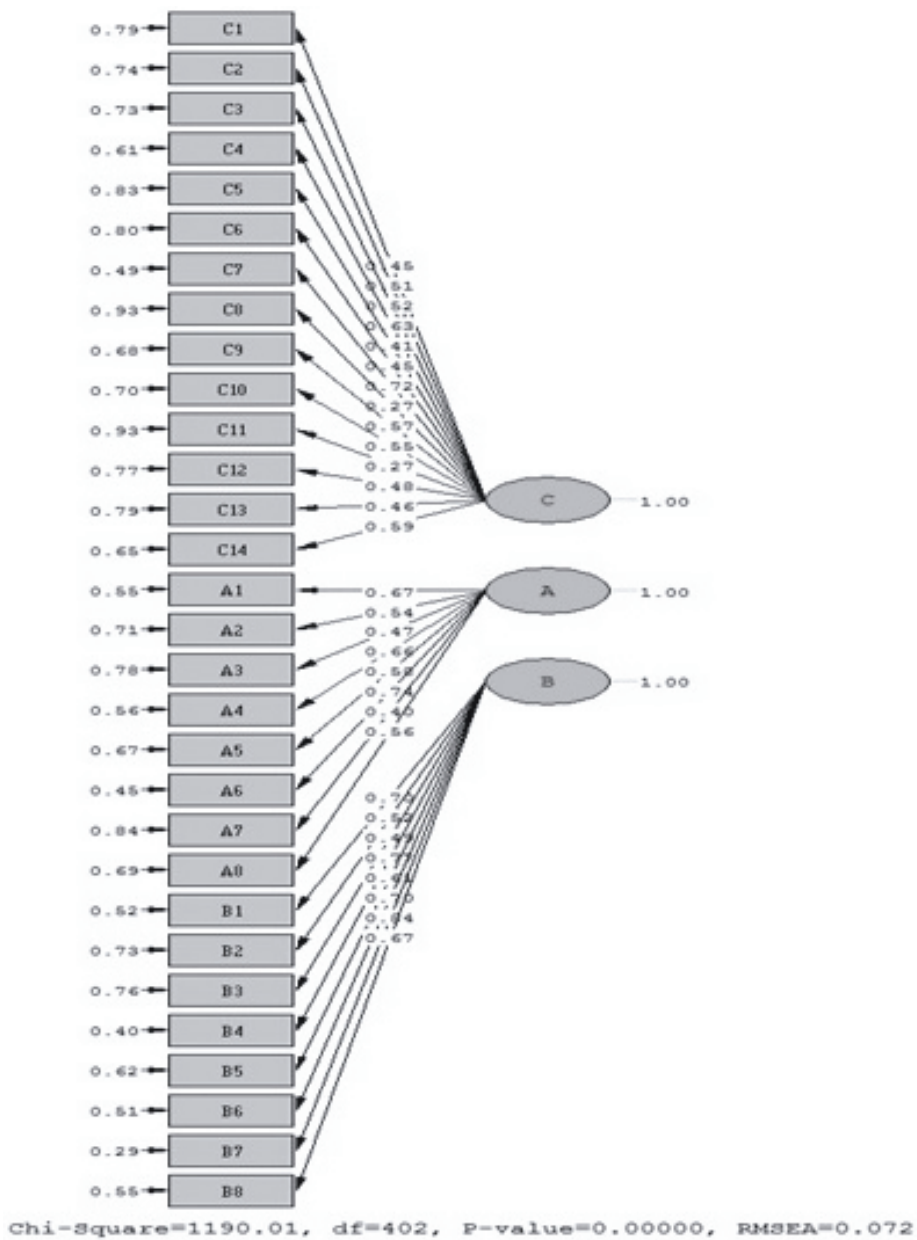


Figure. CFA for CASA (C = Cognitive, A = Affective, B = Behavioral).

repeated measures ANOVA results showed that there were significant differences between the dimensions ($P < 0.05$). It was observed that student attitudes in cognitive dimension were more negative than those in affective and behavioral dimensions.

Some descriptive statistics related with the attitudes of veterinary students towards cancer in animals are given in Table 2. The items that the students had the most negative attitudes in cognitive dimension were; “I know the treatment options according to the type of cancer” ($\bar{X} = 2.31$), “Sugar

Table 2. Descriptive statistics of CASA.

Dim.	Items	Agreement level					\bar{X}	SD
		1	2	3	4	5		
		%	%	%	%	%		
Cognitive	1. Animals get cancer	9.8	4.9	28.8	19.0	37.6	3.70	1.29
	2. Cancer is definitely an infectious disease	51.7	20.5	12.7	4.9	10.2	3.99	1.33
	3. Only aged animals get cancer	49.3	26.3	20.5	2.4	1.5	3.20	0.95
	4. Surgical intervention may cause metastasis	16.1	20.5	42.0	10.2	11.2	2.80	1.17
	5. Biopsy may cause metastasis	14.1	25.9	39.0	10.2	10.7	2.78	1.15
	6. Cancer is only a hereditary disease	38.5	29.3	19.0	4.9	8.3	3.85	1.23
	7. Radiation causes cancer	11.2	10.7	17.6	28.3	32.2	3.60	1.33
	8. <i>Helicobacter pylori</i> bacteria causes cancer	17.6	16.6	34.6	18.0	13.2	2.92	1.26
	9. Pesticide-applied lawns may cause cancer for animals playing on them	13.7	19.5	37.1	19.5	10.2	2.93	1.16
	10. Malnutrition may cause cancer	10.7	15.6	33.7	27.8	12.2	3.15	1.16
	11. I know the treatment options according to the type of cancer	33.7	26.3	21.5	12.7	5.9	2.31	1.22
	12. Cancer is not an early diagnosable disease	43.4	20.5	24.9	7.8	3.4	3.93	1.14
	13. Sugar loading during PET-SCAN imaging technique may cause side effects in cancerous animals	18.0	21.5	37.6	13.7	9.3	2.75	1.18
	14. Late intervention affects treatment negatively	6.8	5.4	11.7	31.2	44.9	4.02	1.18
Affective	1. The feeling of being able to treat an animal suffering from cancer excites me	5.4	4.4	16.1	32.7	41.5	4.00	1.11
	2. An animal with cancer makes me to think negative thoughts	30.2	31.2	25.9	6.8	5.9	3.73	1.14
	3. I react normally to “animals can catch cancer” as I do with human beings and I do not get affected	14.6	13.7	19.5	22.9	29.3	3.39	1.41
	4. I do not want to own an animal because of fear of cancer	74.1	10.2	5.4	6.8	3.4	4.45	1.09
	5. Seeing an animal with cancer encourages me to get much information about cancer	5.9	3.9	17.6	34.1	38.5	3.96	1.12
	6. Treating an animal suffering from cancer and their healthy life motivates me	1.5	2.4	6.8	31.2	58.0	4.42	0.84
	7. An animal suffering from cancer encourages me to help materially and morally to cancer organizations	13.7	11.7	31.7	22.9	20.0	3.24	1.28
	8. The thought that an animal can suffer from cancer scares and disinclines me	72.7	9.3	4.9	7.8	5.4	4.36	1.20
Behavioral	1. I definitely take an interest in animals with cancer	10.2	7.8	29.8	25.4	26.8	3.51	1.25
	2. I tell the owner of an animal suffering from cancer that they are incurring redundant and unnecessary expenses	61.0	19.5	11.2	3.4	4.9	4.28	1.11
	3. I do not touch animals that may have cancer	68.3	14.1	7.8	4.4	5.4	4.36	1.14
	4. I apply to relevant/necessary organizations for the treatment of animals with cancer	5.9	5.9	13.7	25.9	48.8	4.06	1.18
	5. I get information about cancer in animals from the social media	5.4	10.7	29.3	23.4	31.2	3.64	1.18
	6. I follow daily and scientific approaches about cancer	3.9	10.2	26.8	27.3	31.7	3.73	1.13
	7. I reassure the owners of animals with cancer	2.4	9.8	15.6	30.2	42.0	4.00	1.09
	8. I always get information from academicians	5.9	10.2	24.4	24.4	35.1	3.73	1.21

1 = Strongly Disagree.....5 = Strongly Agree

loading during PET-SCAN imaging technique may cause side effects on cancerous animals" ($\bar{X} = 2.75$), "Biopsy may cause metastasis" ($\bar{X} = 2.78$), "Surgical intervention may cause metastasis" ($\bar{X} = 2.80$), "Helicobacter pylori bacteria causes cancer" ($\bar{X} = 2.92$), and "Pesticide-medicated lawns may cause cancer for animals playing on them" ($\bar{X} = 2.93$), respectively. Especially, for the item "I know the treatment options according to the type of cancer" while 60% of the students had negative attitudes with the choices "strongly disagree" and "disagree", only 18.6% had positive attitudes with the choices of "agree" and "strongly agree".

The items that the students showed the most negative attitudes about in the affective dimension were "An animal suffering from cancer encourages me to help materially and morally to cancer organizations" ($\bar{X} = 3.24$) and "I react normally to "animals can catch cancer" as do human beings and I do not get affected" ($\bar{X} = 3.39$). On the other hand, the items that the students had the most positive attitudes about were "I do not want to own an animal because of cancer fear" ($\bar{X} = 4.45$), "A treated animal suffering from cancer and their healthy life motivates me" ($\bar{X} = 4.42$) and "The thought of an animal suffering from cancer scares and discourages me" ($\bar{X} = 4.36$), respectively. In the behavioral dimension, the items that the students had the most negative attitudes about were; "I definitely take an interest in animals with cancer" ($\bar{X} = 3.51$), "I get information about cancer in animals from the social media" ($\bar{X} = 3.64$), "I always get information from academicians" ($\bar{X} = 3.72$), and "I follow daily and scientific approaches about cancer" ($\bar{X} = 3.73$), respectively. On the other hand, it was determined that students do not fear touching animals suffering from cancer ($\bar{X} = 4.36$) (Table 2).

In this study, the attitudes of veterinary students to cancer in animals were compared according to their individual characteristics. There were no significant differences according to variables such as class, housing,

income, parental education, smoking and alcohol use ($P > 0.05$). However, as shown in Table 3, there were significant differences according to sex and pet ownership for the attitudes of students towards cancer in animals in affective and behavioral dimensions ($P < 0.05$). The means showed that the female students' attitudes were more positive than those of the males in affective and behavioral dimensions. Similarly, the attitudes of pet owners (dogs or cats) were more positive than those of nonowners.

4. Discussion

The term attitude is used very commonly in daily life, and different meanings, concepts and definitions have been attributed to the term in various fields. Thurstone [29] defines attitude as "the sum total of man's inclination and feelings, prejudice and bias, preconceived notions, ideas, fears, threats and convictions about any specified topic". Laforgia [30] state that attitudes of people have been measured by using different techniques like interviews, projective techniques, open-ended questionnaires, closed-item questionnaires, and preference rankings. In our study, a new scale (CASA) consisting of 30 items pertaining to 3 dimensions—based on the ABCs [10] (Affective, Behavioral, Cognitive) of attitudes—was developed to determine the attitudes of veterinary faculty students towards cancer in animals. The cognitive dimension contains items that express ideas of individuals and also include some basic knowledge. The affective dimension comprises items measuring emotional vision (feeling, happiness, fear, anxiety, etc.) of individuals [10]. The behavioral dimension comprises items regarding behavioral responses related to cancer in animals. In this study, according to the results of EFA, three dimensions related to the CASA consisting of 30 items explained more than 2 out of 3 of the total variance. The factor structure obtained from EFA in the study was confirmed with CFA

Table 3. Comparison of student attitudes according to gender and pet ownership

Dimensions	Sex	n	\bar{X}	SD	Pet ownership	n	\bar{X}	SD
Cognitive	Female	76	3.34	0.38	No	96	3.30	0.44
	Male	129	3.35	0.46	Yes	109	3.39	0.41
	P	0.795			P	0.122		
Affective	Female	76	4.10	0.67	No	96	3.82	0.66
	Male	129	3.84	0.61	Yes	109	4.04	0.61
	P	0.007*			P	0.013*		
Behavioral	Female	76	4.23	0.63	No	96	3.79	0.64
	Male	129	3.72	0.67	Yes	109	3.92	0.75
	P	0.000*			P	0.023*		

* $P < 0.05$

using data from a different sample group of 170 students. The value of chi-square divided by degrees of freedom (1190 / 402) is 2.96, where any ratio less than 3 indicates an excellent fit [31] and RMSEA = 0.072 indicates acceptable fit ($0.05 < RMSEA \leq 0.08$) [32,33]. Cronbach's alpha coefficients for the scale and subscales were calculated over the critical value of 0.70 [34]. The data generated here confirmed the validity and reliability of CASA.

The results of the study showed that the students' attitudes towards cancer in animals were greater than the midscore, 3 (which can be considered positive). However, the scores obtained for the cognitive dimension were lower than for the affective and behavioral dimensions. Thus, this result showed that veterinary faculty students did not have sufficient knowledge about cancer in animals. MahmoodAbad et al. [35] evaluated the knowledge, attitude, and performance of university students regarding skin cancer in Iran and concluded that students did not have appropriate or satisfactory knowledge and performance levels about this disease and that the knowledge, attitude, and performance of nonmedical students was poorer than those of medical students.

We observed that the students' cognitive levels related to cancer were low, especially in some issues (knowledge regarding the treatment options according to cancer type; surgical intervention, biopsy, *H. pylori*, pesticide-applied lawns may cause cancer; sugar loading during PET-SCAN imaging technique may cause side effects on cancer patients etc.). On the other hand, it was determined that students' attitudes were not at the expected level for some issues in the affective dimensions (support for cancer organizations, normal reaction to cancer afflicted animals as in human beings) and behavioral dimensions (dealing with animals suffering from cancer, getting information about cancer in animals from the social media, getting information about cancer from academicians, and following scientific and daily approaches about cancer in animals). This may be due to the limited number of lectures, courses, activities, and programs related with cancer in the process of education. Knighting et al. [5] reported that improved cancer education programs in faculties may positively contribute to the attitude of students towards cancer.

We also showed that attitudes to cancer of female students and pet owners (dogs or cats) were more positive in affective and behavioral dimensions. However, there was no significant difference in the cognitive dimension. The animal owners' emotional and behavioral attitudes

to cancer being more positive than that of the other students (nonowner) was an expected result because they live together with a cat or dog. Many previous studies have shown that women are more sensitive to animals and animal related welfare issues than men, moreover there is extensive evidence indicating that women are more empathetic toward animals [36–40]. Maria [41] stated that women have more animal-centered thoughts than men. Women are also more sensitive to the ethical treatment of animals than men; men are more attracted to traditional practices such as using animals for survival purposes [42–43]. On the other hand, human beings may display different attitudes to cancer in humans. In a study examining knowledge and attitudes of students towards cancer in humans, the results in the affective dimension indicated that female students had stronger negative thoughts and emotions about cancer than males [44]. In addition, in the same study, Yıldırım [44] concluded that there was no statistically significant difference between females and males in terms of cancer knowledge level (in the cognitive dimension) and risk factors in general. According to a study by Heuckmann and Asshoff [45], female students had more negative emotions toward cancer than males, and females exhibited more proactive behavior in terms of cancer than males in the behavioral dimension. Tempark et al. [46] has reported similar results. Kyle et al. [47] showed that men's knowledge about cancer symptoms in humans was less than that of women.

A striking result attained in this study was that the attitude of students towards cancer was not statistically different according to the attended year (i.e. between first year and final year students), whereas a significant increase or development of knowledge and attitudes of students can be expected the more advanced their level of education is. This result proves that the education policy is unsatisfactory regarding cancer issues.

The levels obtained for cognitive dimension containing knowledge were particularly low in this study. For this reason, it is necessary to renew the course programs, review the curriculum, and increase the lectures for cancer at faculties and especially in medical and health education. Thus, students' professional competences will increase and attitudes will be positively affected in the field of cancer. On the other hand, establishing a separate oncology discipline in Turkish veterinary schools is a highly crucial part of undergraduate education curriculum which is a common practice in developed countries.

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