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Research Article

Radiation Attitudes in Associate Degree Students

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Abstract:

The radiation that has existed throughout human history is always present in our environment, in our bodies and in space. Radiation has been used in almost every aspect of medicine, science and industry since it was discovered. Technologies that use radiation make people's lives easier, and people's lives are saved through early detection and treatment of diseases, especially in medical applications. With rapidly evolving technology, medical staff are exposed to more radiation doses due to increased radiation use in medicine. Since life without radiation is unlikely, there needs to be a sufficient level of information about radiation to protect against the harmful effects of radiation. In universities, which constitute an important part of education and training, the better the radiation knowledge of the students in the field of health, which will shape the future, the better the transfer of radiation knowledge level to future generations and at the same time to the people they serve since these students will be the health personnel of the future. Health personnel should be able to protect themselves from the harmful effects of radiation, take the necessary precautions during diagnosis and treatment, and increase their level of knowledge in this regard. In this study, it was aimed to evaluate the level of awareness of health services vocational school students, who will be health personnel in the future, towards the concept of radiation and radiation protection.

1. Introduction

Physics is a fundamental science that helps us understand the fundamental structures of nature and discover the laws underlying the events that take place in the universe. Physics studies phenomena at all levels, from the quantum level to cosmic dimensions, and aims to explain natural phenomena with mathematical expressions. Physics enables the understanding of complex concepts such as radiation and the discovery of many phenomena that form the basis of our daily life as well as our technological and scientific progress. "Radiation," an important concept in physics, refers to different forms of energy. In general terms, radiation is the process of emitting and transmitting energy in waves or particles. One of the most remarkable aspects of radiation is radioactive radiation, which radioactive materials emit naturally and artificially. Although the ritual of exposure to radiation has continued since the beginning of the universe, mankind discovered radiation in the last years of the nineteenth century. After its discovery, it began to be used in various fields [1]. Since its discovery, radiation has been employed in a variety of disciplines, including energy generation in power plants, radiological applications in medicine, fundamental scientific research, and industry [2]. After the discovery of X-rays in 1895, ionising radiations have been widely used in many fields from medicine to industry [3]. Radiological applications in medicine have a large share of the areas of use of radiation. In the medical field, radiation is a vital tool in diagnosis and treatment processes. Radiation therapy is a form of cancer treatment that uses radiation to destroy malignant cells [4]. Imaging methods such as X-ray, magnetic resonance imaging (MRI) and computed tomography (CT) are of great help to healthcare personnel in the diagnosis and detection of diseases. Thanks to these methods, it is possible to diagnose diseases early and manage treatment processes more effectively.

Two important types of radiation used in medicine are X and gamma rays. These ionising radiations carry high enough energy to interact inside cells and break down DNA. Thanks to these properties, they are effectively used in the radiotherapy method used in cancer treatment. Ionising radiation from medical applications has the largest share among the artificial radiations to which society is exposed [5]. The most affected by artificial radiation used for medical purposes are the patients exposed to the procedure and the health personnel working in these units [6]. In addition, 95 per cent of radiation exposure is due to diagnostic X-rays [7]. Computed tomography (CT), X-ray and mammography are among the most commonly used diagnostic X-ray devices, especially in Turkey. [8]. It is of vital importance to ensure the radiation safety of those working with all these radiation emitting sources and devices. Occupational doses received by those working with ionising radiation should be continuously monitored and these doses should be minimised [9].

Such targeted and effective use of radiation in medicine aims to minimise damage to healthy tissue while increasing treatment success. In addition, these vital uses of radiation in medicine are of great importance for the progress of humanity and the improvement of the quality of life. However, strict controls, training and guidelines must be followed for the effective and safe use of radiation.

Nowadays, the awareness of individuals working in ionising radiation fields and people in the society exposed to radiation increases its importance as one of the basic conditions for a healthy and safe life. The more comprehensive and accurate the knowledge of students and healthcare professionals, who will be among the shapers of the future, on radiation, the potential damages of radiation in future generations will be significantly reduced. Increasing radiation awareness will raise awareness in all segments of the society and raise the consciousness of individuals to protect their health. Therefore, acting in a conscious manner to minimise the negative effects of radiation should be a fundamental goal. Minimising radiation exposure is of great importance for health and the environment.

Radiation literacy is an important issue especially for students, health personnel and the public. Studies in this field emphasise the importance of these groups having knowledge about radiation for the future. Therefore, nuclear physics and radiation literacy are important for researchers and many studies have been conducted in this field recently [10-35].

For this reason, the study was planned to analyse the attitudes towards radiation of health services vocational school students, each of whom will be health personnel, in terms of emotion, thought and behaviour dimensions. In line with this plan, it was aimed to reveal whether the attitudes towards radiation differ according to various individual and demographic characteristics in the evaluation of the attitudes of health services vocational school students towards radiation. It is thought that by exposing students' attitudes and levels of knowledge towards radiation, education will be provided for students with a lack of knowledge and misinformation, thus ensuring effective and efficient provision of services for students who are candidates for medical staff. It is thought that the research results will help healthcare vocational school students with the necessary, accurate information on radiation and to properly implement this information when needed.

2. Material and Methods

2.1 Study Area and Population

The population of the study consists of the students of Amasya University Sabuncuoğlu Şerefeddin Vocational School of Health Services in the 2021-2022 academic year. In the 2021-2022 academic year of Sabuncuoğlu Şerefeddin Vocational School of Health Services, 973 students who enrolled in the course and actively continued their education were interviewed from a total of 2594 students studying in the 1st and 2nd grades. The sample was not selected in the study and the whole population was reached.

2.2 Ethical Permission

The study was conducted under the Principles of the Declaration of Helsinki. Before the study, ethical approval was obtained from Amasya University Non-Interventional Clinical Research Ethics Committee (dated 3.06.2022 and numbered E-30640013-050.01.04-73478).

Before starting the study, permission to use the Radiation Attitude Scale and the Radiation Attitude Scale for Healthcare Workers and the Radiation Protection Knowledge Scale for Healthcare Workers in this study was obtained by e-mail from the authors of the Turkish validity and reliability. Also, the participants were informed about the nature of the study.

2.3. Data Collection Tools

The data were collected using the Personal Information Questionnaire, Radiation Attitude Scale, Radiation Attitude Scale for Healthcare Workers and Radiation Protection Knowledge Scale for Healthcare Workers developed by the researcher.

Survey form: Consisting of the first part that evaluates students' sociodemographic and radiation-related identifying information, the first part is followed by radiation attitude scale, radiation attitude scale for healthcare workers, and health workers' radiation protection knowledge scale.

Radiation Attitude Scale: Built in 2011 by Torun, M., Yalçın, P., Yalçın, S. A. to apply to undergraduate level students, its reliability has been tested [34]. A "radiation attitude scale" was used to measure students' awareness of the harmful effects of radiation, which had been used in the case of Erzincan province before. The radiation attitude scale is a 32-question likert-type scale. The cronbach alpha internal coefficiency coefficient of the scale was found to be 0.88.

Radiation Attitude Scale for Health Workers: Radiation attitude scale for healthcare workers developed by Ekinci and Yalcin in 2019 [36]. The cognitive, sensitive and behavioral attitude of healthcare workers towards radiation and the use of RTNT (Radiological Examination and Nuclear Test) is highly important for the employees themselves and the patients receiving healthcare. The study developed a four-factor liquert-type scale with a reliability coefficient (Cronbach's Alpha) and a qualitative data collection tool consisting of eight substances, accounting for 64.5% of the total variance, consisting of 18 substances, to determine healthcare workers' attitude 0,914 radiation. The mixed scale prepared to cover the purpose of the study has been communicated in accordance with ethical guidelines through one-to-one interviews with health workers in health care facilities in Turkey and online, and the scale has been applied to 236 health workers following the scale development phase and the data has been analyzed by statistical programme. Four-factor liquert type scale; by finding that there is a significant difference in the lower dimensions relative to the variables of gender, occupation, department, institution and year of service; data from the eight-item qualitative data collection tool appeared to support results from liquert scale.

Health Workers' Radiation Protection Information Scale: The scale of health workers' radiation protection information was developed by Mahmut Ay in 2021 [37]. The Health Workers' Radiation Protection Information Scale is a 10 "liquert type scale consisting of 33 substances and three sub-dimensions. For scale assessment, for scale reliability when calculating language, scope, and structure transition analyses, the Guttman Split-Half and Cronbach alpha values were calculated under substance analyses, internal consistency. The Radiation Protection Information Scale of Healthcare Workers has been translated and reversed into Turkish for language passage. An opinion was taken from 14 experts for scope passage and it was found that scope-pass index values ranged from 0.83-1.00. Confirmatory Factor Analysis has been conducted to ensure structure validity and three factors discovered have been confirmed. In this analysis, compliance indexes were determined at χ 2/sd = 3.59, RMSEA = 0.08, SRMR = 0.06, IFI = 0.91, and CFI = 0.91 at TLI = 0.90. To assess reliability, the Cronbach alpha reliability coefficient of the scale was looked at and calculated 0.98 for the entire scale. The Guttman Split-Half value of the scale was found to be 0.95. The scale clauses were determined to have matter-total score correlation coefficients r = 0.61 to 0.87.

2.4. Analysis of the Data

The statistical evaluation of the obtained data was performed with SPSS 24.0 package programme in computer environment. Descriptive statistical measures (mean, standard deviation, minimum and maximum values and percentages) were used. Since the variables fulfilled the parametric test assumptions in the evaluation of the data, Student t test was used to determine the difference between the averages of two independent groups, one-way analysis of variance for more than two independent groups (Tukey if homogeneity is provided to determine which group mean is different from the others, If not, Games-Howell test), Pearson correlation analysis to determine the direction and level of the relationship between variables, simple linear regression analysis to evaluate the effect of more than one variable on the continuous dependent variable, Cronbach Alpha test to determine the internal validity level of the scales and the error level was taken as 0. 05 was taken as the error level.

3. Results and Discussions

The distribution of the students participating in the study according to their sociodemographic characteristics is given in Table 1. The average age of the students is 20.71 ± 2.21, with 60.0% (n = 584) in the 20-21 age bracket, 75.8% "in (n = 738) girl, 53.1%" in (n = 517) studying in one of the non-direct health related programs, 70.6% of (n = 687) primary education of her mother's education status, 60.1% "in (n = 585) elementary education of her father, 43.2% (n = 420) living in the city, 58.8%" in (n = 572) resident of the Black Sea Region (Table 1) 13.7% of students (n = 133) worked in the emergency room as part of the course/internship, 75.4% described the radiation of "reputation (n = 734) as" energy event emitted in the form of electromagnetic wave or particle, "93.6% of which (n = 911) was previously associated with radioactive matter or radiation 58.3% (n = 567) did not know enough about radiation protection (table 2). The distribution of the mean scores of the students participating in the study according to their answers to the radiation attitude scale, radiation attitude scale for healthcare workers and radiation protection knowledge scale for healthcare workers is given in Table 3.

Table 1: *Distribution of Students According to Sociodemographic Characteristics (N=973)*

Characteristics	N	%
Age		
18-19 years	196	20.1
20-21 years	584	60.0
22 years and over	193	19.9
Average Age	20.71 ± 2.21 (min:18 – max:40)	
Gender		
Girl	738	75.8
Boy	235	24.2
Learning Program		
Programmes directly related to health	456	46,9
Programmes not directly related to health	517	53.1
Mother's Education Status		
Illiterate	73	7.5
Primary education	687	70.6
High School	182	18.7
University	31	3.2
Father's Education Status		
Illiterate	11	1.1
Primary education	585	60.1
High School	282	29.0
University	95	9.8
Living Place		
Metropolitan	298	30.6
City	420	43.2
The Town	70	7.2
Village	185	19.0
Living Region		
Marmara Region	46	4.7
Ege Region	22	2.3
Central Anatolia Region	185	19.0
Black Sea Region	572	58.8
Mediterranean Region	56	5.8
Eastern Anatolia Region	44	4.5
Southeastern Anatolia Region	48	4.9

Note: Frequency and percentage calculations were used, Programmes Directly Related to Health: First and Emergency Aid, Medical Laboratory Techniques, Disabled Care and Rehabilitation, Physiotherapy, Aged Care. Programmes Not Directly Related to Health: Child Development, Medical Documentation and Secretariat, Opticianry

Table 2: *Distribution of Students by Internship, Radiation Definition, and Knowledge of Radiation Protection by Status (N = 973)*

Features	N	%
Unit Studied Under Course/Internship		
Internal Units	34	3.5
Surgical Units	16	1.6
Operating room	13	1.3
Emergency Services	133	13.7
Intensive Care	34	3.5
Outpatient Services	59	6.1
Other	684	70.3
Radiation		
Energy coming from underground	18	1.8
Electricity Based Energy Event	84	8.6
Energy Event Emitted in Electromagnetic Wave or Particle Form	734	75.4
It Is the Energy Event That Causes Environmental Pollution	60	6.2
Energy Event Emitted From Nuclear Power Plants	77	7.9
Previous experience in any work that can be considered related to radioactive material or radiation		
Yes	62	6.4
No	911	93.6
The Status of Thinking That They Have Sufficient Knowledge About Radiation Protection		
Yes	406	41.7
No	567	58.3

Note: Frequency and percentile calculations used

Table 3: *Distribution of Mean Scores of Radiation Attitude Scale, Radiation Attitude Scale for Healthcare Workers, Radiation Protection Knowledge Scale for Healthcare Workers (N=973)*

Scales	$\bar{X}$	SS	min	max	Cronbach alpha
RAS	74.60	16.79	32	160	0.87
RASHW	32.28	11.14	18	90	0.94
Radiation Knowledge	12.48	4.59	7	35	0.89
Radiation Sensitivity	7.16	2.74	4	20	0.90
Patient Sensitivity	7.36	2.76	4	20	0.91
Informing the Patient	5.64	2.24	3	15	0.95
RPKSHW	106.94	56.93	33	321	0.97

Note: RAS: Radiation Attitude Scale, RASHW: Radiation Attitude Scale for Healthcare Workers, RPKSHW: Radiation Protection Knowledge Scale for Healthcare Workers

The mean total score of RAS was 74.60±16.79; the mean total score of RASHW was 32.28±11.14; the mean radiation knowledge sub-dimension was 12.48±4.59; the mean radiation sensitivity sub-dimension was 7.16±2.74; the mean patient sensitivity sub-dimension was 7.36±2.76; the mean patient information sub-dimension was 5.64±2.24;

and the mean total score of RPKSHW was 106.94±56.93. According to these results, it was determined that the students' knowledge of radiation protection was below the average. Considering the mean total score of the "radiation attitude" scale, it was determined that the students' awareness of the harmful effects of radiation was not at a sufficient level.

When the reliability levels of the internal validity coefficients of the scales used in the study were analysed, it was determined that the general reliability levels of the RAS, RASHW and RPKSHW were highly reliable (0.80<α<1.00) [38].

Table 4: *Comparison of the Sociodemographic Characteristics of the Students with the Total Scores of RAS, RASHW and RPKSHW*

Features	**RAS**	**RASHW**	**RPKSHW**
	$\bar{X} \pm SS$	$\bar{X} \pm SS$	$\bar{X} \pm SS$
Age			
18-19 years	76.93±14.98	33.66±11.00	105.89±52.53
20-21 years	73.81±17.51	32.10±11.24	105.39±57.76
22 years and over	74.61±16.14	31.44±10.92	112.68±58.59
F / p*	2.54 / 0.07	2.13 / 0.11	1.23 / 0.29
Gender			
Girl	74.29±15.83	31.68±10.56	03.96±56.07
Boy	75.56±19.51	34.17±12.62	116.29±58.68
t / p*	-0.90 / 0.36	***-2.73 / 0.00***	***-2.90 / 0.00***
Learning Program			
Programmes directly related to health	74.98±17.69	31.62±11.55	112.70±55.39
Programmes not directly related to health	74.26±15.96	32.86±10.75	101.85±57.82
t / p*	0.66 / 0.50	-1.73 / 0.08	***2.97 / 0.00***
Mother's Education Status			
Illiterate	71.45±16.72	31.58±10.30	107.99±50.75
Primary education	74.81±16.63	32.25±11.05	105.31±57.66
High School	74.55±17.83	32.34±12.06	110.35±55.90
University	77.45±13.57	34.29±9.55	120.52±60.09
F / p*	1.19 / 0.31	0.43 / 0.72	1.00 / 0.39
Father's Education Status			
Illiterate	70.82±16.06	27.55±6.83	120.27±48.84
Primary education	74.34±16.91	32.12±10.82	105.16±56.02
High School	74.79±15.78	32.43±10.90	105.91±57.95
University	76.00±19.04	33.35±13.84	119.41±59.30
F / p*	0.46 / 0.70	1.00 / 0.38	1.94 / 0.12
Living Place			
Metropolitan City	74.39±18.31	32.52±12.44	106.31±59.20
The Town	74.66±15.37	31.88±9.98	108.69±57.23
Village	73.71±15.83	30.70±11.80	107.67±53.79
	75.10±17.77	33.41±11.15	103.69±53.86
F / p*	0.13 / 0.93	1.33 / 0.26	0.34 / 0.79
Living Region			
Marmara Region (1)	76.74±15.91	33.70±9.82	107.54±59.35
Ege Region (2)	70.68±27.30	32.95±14.87	115.05±70.56
Central Anatolia Region (3)	71.19±17.73	31.44±10.96	110.41±59.83
Black Sea Region (4)	76.67±15.63	32.94±11.36	102.79±55.13
Mediterranean Region (5)	70.45±16.37	29.39±10.07	122.38±58.26
Eastern Anatolia Region (6)	68.66±18.31	30.73±10.13	112.84±45.95
Southeastern Anatolia Region (7)	73.00±16.45	30.77±10.00	115.21±62.52
F / p*	***4.70 / 0.00***	1.57 / 0.15	1.63 / 0.13
Significant Difference	**3-4, 4-6**	-	-

*Notes: *One-way analysis of variance, **Student t test, RAS: Radiation Attitude Scale, RASHW: Radiation Attitude Scale for Healthcare Workers, RPKSHW: Radiation Protection Knowledge Scale for Healthcare Workers*

In Table 4, in which the sociodemographic characteristics of the students and the mean total scores of the scale were compared, it was found that the students who were 18-19 years old, boy, studying in programmes directly related to health, whose parents were university graduates, residing in the village and living in the Marmara Region had higher mean scores on the radiation attitude scale, and there was a significant difference between the total score of the RAS and the region of residence variables ($p < 0.05$). It was determined that the students who were 20-21 years old, boy, studying in programmes not directly related to health, whose parents were university graduates, residing in the village, and living in the Marmara Region had higher mean scores on the radiation attitude scale for health workers, and there was a significant difference between the total score of the RASHW and the gender variable ($p < 0.05$). It was determined that students who were older than 22 years, boy, studying in programmes directly related to health, whose mothers were university graduates, whose fathers were illiterate, who resided in the city and who lived in the Mediterranean Region had higher mean scores on the RPKSHW, and there was a significant difference between the total score of the RPKSHW and gender and the programme of study ($p < 0.05$). In Table 5, in which the students' place of internship, definition of radiation and m

***Table 5:** Comparison of Students' Internship Placement, Knowledge of Radiation Definition and Radiation Protection with the Mean Total Scores of RAS, RASHW and RPKSHW*

Features	RAS $\bar{X} \pm SS$	RASHW $\bar{X} \pm SS$	RPKSHW $\bar{X} \pm SS$
Unit Studied Under Course/Internship			
Internal Units (1)	71.62±15.64	32.68±7.72	127.53±48.93
Surgical Units (2)	79.19±18.67	30.56±12.16	97.88±51.60
Operating room (3)	71.85±23.02	29.23±10.83	153.00±68.04
Emergency Services (4)	75.41±21.74	31.80±13.27	113.18±54.68
Intensive Care (5)	80.32±13.25	35.26±11.47	103.65±50.94
Outpatient Services (6)	73.98±18.30	32.66±12.32	133.12±57.85
Other (7)	74.30±15.53	32.27±10.69	101.94±56.68
F / p*	1.19 / 0.30	0.69 / 0.65	***5.62 / 0.00***
Significant Difference	-	-	**3-7, 6-7**
Radiation			
Energy coming from underground (1)	63.44±18.46	33.17±10.57	132.78±69.34
Electricity Based Energy Event (2)	76.88±17.88	35.87±11.92	105.70±61.10
Energy Event Emitted in Electromagnetic Wave or Particle Form (3)	74.53±16.31	31.68±10.58	108.10±56.42
It Is the Energy Event That Causes Environmental Pollution (4)	71.90±16.68	34.98±14.29	103.25±55.80
Energy Event Emitted From Nuclear Power Plants (5)	77.45±18.67	31.81±12.07	94.03±53.07
F / p*	***3.35 / 0.01***	***3.70 / 0.00***	2.07 / 0.08
Significant Difference	**1-2, 2-3, 1-5**	**2-3**	-
Previous experience in any work that can be considered related to radioactive material or radiation			
Yes	72.03±17.04	32.63±11.87	132.31±56.14
No	74.77±16.77	32.26±11.10	105.21±56.60
t / p*	-1.24 / 0.21	0.25 / 0.79	***3.64 / 0.00***
The Status of Thinking That They Have Sufficient Knowledge About Radiation Protection			
Yes	73.67±18.06	32.13±11.73	122.20±58.21
No	75.26±15.80	32.39±10.71	96.01±53.42
t / p*	-1.45 / 0.14	-0.36 /0.71	***7.26 / 0.00***

*Notes: *One-way analysis of variance, **Student t test, RAS: Radiation Attitude Scale, RASHW: Radiation Attitude Scale for Healthcare Workers, RPKSHW: Radiation Protection Knowledge Scale for Healthcare Workers*

knowledge about radiation protection were compared with the mean scores of the scale, it was determined that the mean score of the RAS was higher in those who worked in the intensive care unit within the scope of the course/internship, defined radiation as "the energy emitted fronuclear power plants", had not previously worked in any study that could be considered related to radioactive material or radiation, and did not think that they had enough information about radiation protection, and there was a significant relationship between the definition of radiation and the total score of the RAS ($p < 0.05$). It was found that those who worked in the intensive care unit within the scope of course/internship, defined radiation as "electricity-based energy event", had previously worked in any study that could be considered related to radioactive material or radiation, and did not think that they had enough information about radiation protection had a higher mean score on the RASHW, and there was a significant relationship between the definition of radiation and the total score of the RASHW ($p<0.05$). Those who worked in the operating room within the scope of course/internship, defined radiation as "an energy event coming from underground", had previously worked in any study that could be considered related to radioactive material or radiation, and thought that they had enough information about radiation protection had a higher mean score on the RPKSHW, it was found that there was a significant correlation between the unit of study within the scope of the course/internship, the status of being involved in any study that can be considered related to radioactive material or radiation before, and the status of thinking that they had enough knowledge about radiation protection and the total score of the

RPKSHW (p<0. 05). According to Table 6, which evaluates the total score of the scales used in the study and the relationship between the scales, it was found that there was a moderate, positive, significant relationship between the total score of the RAS and the total score of the

Table 6: *Correlation of Students' Total RAS, Total and Sub-dimension of RASHW and RPKSHW Total Scores*

	$\bar{X}$	SS	1	2	3	4	5	6	7
1-RAS total	74.60	16.79	1						
2-RASHW total	32.28	11.14	0.482*	1					
3-Radiation information	12.48	4.59	0.421*	0.925*	1				
4-Radiation sensitivity	7.16	2.74	0.427*	0.903*	0.788*	1			
5-Sensitivity to the patient	7.36	2.76	0.421*	0.885*	0.719*	0.744*	1		
6-Informing the patient	5.64	2.24	0.468*	0.834*	0.662*	0.693*	0.734*	1	
7-RPKSHW total	106.94	56.93	0.082**	0.018	0.009	0.037	0.015	0.008	1

Note: p<0.01, p<0.05**, Pearson Correlation Analysis was used, RAS: Radiation Attitude Scale, RASHW: Radiation Attitude Scale for Healthcare Workers, RPKSHW: Radiation Protection Knowledge Scale for Healthcare Workers*

RASHW; there was a very low, negative, significant relationship between the total score of the RAS and the total score of the RPKSHW; and there was a positive, very weak, insignificant relationship between the total score of the RASHW and the total score of the RPKSHW. It was determined that as one unit of RAS score increased, the score of RASHW, radiation knowledge, radiation sensitivity, sensitivity to patient, sensitivity to patient, informing patient increased and the score of RPKSHW decreased; as one unit of RASHW score increased, the score of radiation knowledge, radiation sensitivity, sensitivity to patient, sensitivity to patient, informing patient increased; as one unit of RPKSHW score increased, the score of RAS score decreased.

Table 7. *Regression Analysis of Radiation Attitude Scale Total Score of Students Studying in Programmes Directly Related to Health*

Independent Variables	**Regression coefficients**	***t***	***p***
RASHW	0.06	0.73	0.46
Radiation information	***0.21***	***2.73***	***0.00***
Radiation sensitivity	0.00	0.10	0.91
Sensitivity to the patient	0.06	0.78	0.43
Informing the patient	***0.28***	***4.22***	***0.00***
RPKSHW	-0.05	-1.37	0.17
R = 0.53	R^2 = 0.27		
F =35.10	p = 0.00		

Note: Simple linear regression analysis was used, RASHW: Radiation Attitude Scale for Healthcare Workers, RPKSHW: Radiation Protection Knowledge Scale for Healthcare Workers

As a result of the simple linear regression analysis performed to reveal how the variables thought to have an effect on the radiation attitude scale of students studying in programmes directly related to health predicted the total score of the radiation attitude scale, it was observed that these predictor variables exhibited a significant relationship ($R=0.53$; $R^2 = 0.00$) with radiation attitude ($F=35.10$, $p<0.05$). When the significance tests of the regression coefficients were considered, it was found that radiation knowledge and patient information variables were significant predictors of radiation attitude ($p<0.05$) (Table 7) and (Figure 1). As a result of the simple linear regression analysis performed to reveal how the variables thought to have an effect on the radiation attitude of students studying in programmes not directly related to health predicted the radiation attitude scale score, it was seen that these predictor variables exhibited a significant relationship ($R=0.49$; $R^2 = 0.23$) with radiation attitude ($F=32.60$, $p<0.05$). When the significance tests of the regression coefficients were considered, it was found that the independent variables of radiation sensitivity, patient sensitivity and patient information were significant predictors of radiation attitude ($p<0.05$) (Table 8) and (Figure 2).

4. Conclusions

Considering the total scores of the participants' "Radiation Attitude Scale (RAS)", "Radiation Attitude Scale for Healthcare Workers (RASHW)", "Radiation Protection Knowledge Scale for Healthcare Workers (RPKSHW)", it is interpreted

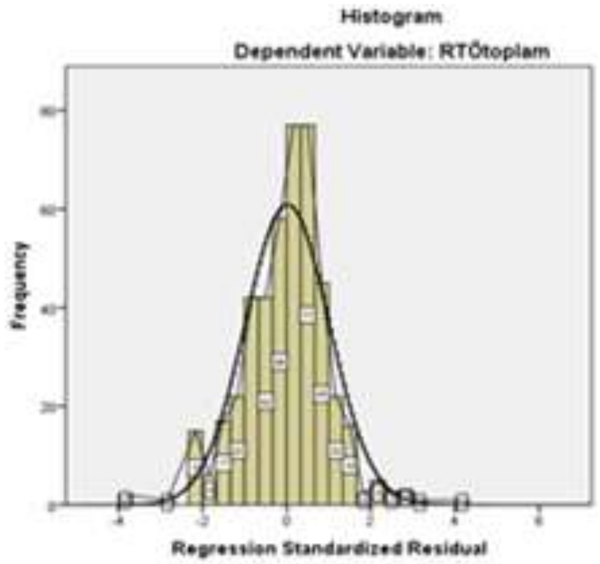

Figure 1. *Graph of Radiation Attitude Scale Total Score of Students Studying in Programs Directly Related to Health*

Table 8. *Regression Analysis of Radiation Attitude Scale Total Score of Students Studying in Programmes Not Directly Related to Health*

Independent Variables	**Regression coefficients**	***t***	***p****
RASHW	0.07	1.23	0.18
Radiation information	0.04	0.68	0.49
Radiation sensitivity	***0.18***	***2.83***	***0.00***
Sensitivity to the patient	0.06	1.05	0.29
Informing the patient	***0.25***	***4.46***	***0.00***
RPKSHW	***-0.12***	***-3.25***	***0.00***
R = 0.49	R^2 = 0.23		
F = 32.60	p = 0.00		

Note: Simple linear regression analysis was used, RASHW: Radiation Attitude Scale for Healthcare Workers, RPKSHW: Radiation Protection Knowledge Scale for Healthcare Workers

that the students' awareness of radiation and radiation protection is not at an adequate level. Specifically, differences were observed in the programme and gender categories. We can say that the reason for the difference in attitudes at the level of knowledge in the programme variables is that the radiation safety course education that the students studying in these programmes received at the university was effective. However, it is thought that it would be useful to expand the curriculum of this course by reflecting it to other programmes. As

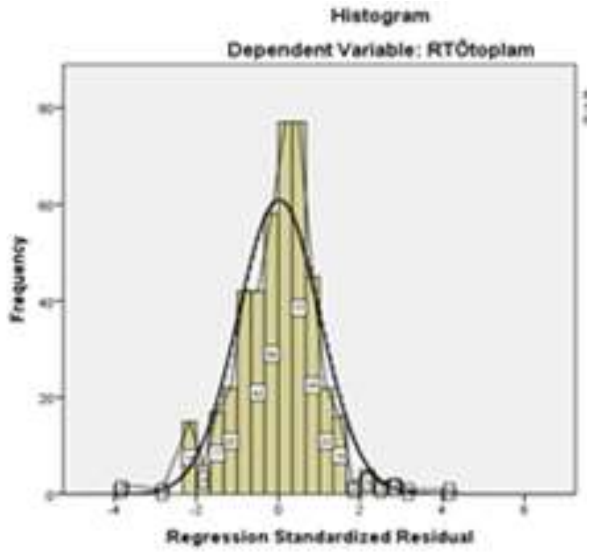

Figure 2. *Radiation Attitude Scale Total Score Graph of Students Studying in Programs Not Directly Related to Health*

Palacı [39] reported in her study, radiation safety and protection education in Turkish universities was found to be lower than the European Union standards. A significant difference was determined between the gender variable and the total score of the RASHW. It was observed that girl participants had more positive and higher attitudes in cognitive and behavioural dimensions compared to boy participants. The culture in which an individual lives shapes how men and women behave, think and act. This is the basis of women being more emotional, more cautious and more sensitive [40]. It is thought that the fact that girl participants in the study had more positive and higher attitudes towards radiation and radiation protection is based on this situation.

Radiation is a serious danger that concerns not only a certain part of the society but everyone. Accordingly, it would be more beneficial for the future to include the knowledge of radiation and how to protect against radiation to the students who shape the future at all levels of education in our country (pre-school education, primary education, secondary education, higher education). As stated by Palacı [39] in his study, there is inadequacy of the education on radiation and protection in the associate degree programme training health personnel. An individual's lack of knowledge or misinformation about radiation and its effects on health allows the necessary cognitive attitude about radiation not to be formed. The deficiency in cognitive attitude is reflected in affective and behavioural attitudes and affects them negatively.

It is important to provide radiation-related education to students who are studying in health sciences and other health fields to be future health personnel and educators in order to prevent fear and anxiety caused by incorrect and incomplete information. Cognitive attitude can be provided with accurate and complete knowledge about radiation and this situation is indirectly reflected on affective and behavioural attitudes. In this context, it is recommended that the existing curricula in universities be revised in the light of this situation.

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