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The Formation of System of Knowledge about Oncology Diseases and Their Prevention of Future Biologists

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Abstract

Background. Taking into consideration the current health condition of Ukrainian population, the topicality of oncology diseases and their prevention proficiency is the focus of this article. Oncology diseases are the most spread kind of illnesses that cause rising mortality in Ukraine and in the world. Prevention and early detection of these diseases are possible under the condition of people's awareness about the essence of illness, reasons of its onset, main risks and initial symptoms for the first place. However, it has emerged that non-medical specialty students have superficial knowledge about such kind of diseases and their causes.

The Objective of the article is to prove theoretically and examine the formation effectiveness of knowledge system of oncology diseases and their prevention proficiency of future biologists by applying oncology related course content to biological disciplines.

Methods. The questionnaire on oncology diseases and prevention awareness of students was implemented within the study, the 091 "Biology" course content was also analyzed and complemented by oncology related educational material; the pedagogical experiment was organized to check formation of oncology diseases and their prevention proficiency of students, the validity of results was verified by means of mathematical statistics methods.

I-IV year students studying at the specialty 091 "Biology" were involved in the questionnaire. In total, 161 students have been involved in the experiment. All future specialists were divided into two groups similar in number and the level of proficiency: the control group (81 students) and experimental one (80 students).

Results. During the experiment the studying process in the control group has encompassed traditional methods, whereas educational material of the experimental group has been supplemented by information related to oncology diseases and their prevention.

Students studying at specialty 091 "Biology" underwent a comparing analysis of oncology diseases proficiency level that has been performed before and after the experiment. It has been revealed that after the implementation of oncology elements into various subjects the performance results of experimental group students went up by 31,6%.

Conclusion. The application of oncology oriented material to biology courses' content has a positive effect on the formation of oncology diseases and their prevention proficiency of 091 "Biology" students, which is a predominant condition of future specialists' healthcare competence development.

Keywords: Knowledge system, oncology diseases proficiency, biology subjects, course outline, educational material

1. Introduction

Due to reformation of national education, the traditional focus shifts to competence and practice-oriented training that does not aim to give theoretical knowledge but to provide key competence skills development as well as their practical application in non-routine situations.

2. Literature Review

The healthcare skill is one of the most important competences: it conveys gaining valeological knowledge, formation of healthy lifestyle habits and organization of healthcare activity.

Oncology diseases can be distinguished as the most spread kind of illnesses that are one of the main causes of rising mortality in Ukraine and in the world. According to Ukrainian cancer-register 919100 cancer cases were registered as of January 1, 2017 [12]. Currently more than a million of patients with cancer are estimated in Ukraine and more than 130 thousands of new cancer cases are registered every year (143 thousands of cases in 2017) [7]. Thus, the cancer increasing tendency is observed in our country and in the world.

It is reasonable to accept scholars' opinion that neglecting of oncology diseases is the main problem which should be solved by timely diagnosis for successful cancer treatment [2]. Prevention and early detection of these diseases are possible under the condition of people's awareness about the essence of illness, reasons of its onset, main risks and initial symptoms for the first place.

Practical aspects of teaching oncology in Ukraine have already been covered in the works of B. Bilynskyi [1], H. Bondar, Yu. Dumanskyi, I. Siedakov, O. Popovych, A. Rusyn [2; 3], I. Bondarenko, V. Zavizion [6], A. Shevchenko [10] and others.

None of these scientific researches, however, do not deploy the problem of oncology diseases and prevention measures proficiency of nonmedical specialties students, future biologists particularly.

3. Method

3.1. Participants 3.2. Materials 3.3. Procedure

The Objective of the article is to prove theoretically and examine the formation effectiveness of knowledge system of oncology diseases and their prevention proficiency of future biologists by applying oncology related course content to biological disciplines.

Methods. The questionnaire on oncology diseases and prevention awareness of students was implemented within the study, the 091 "Biology" course content was also analyzed and complemented by oncology related educational material; the pedagogical experiment was organized to check formation of oncology diseases and their prevention proficiency of students, the validity of results was verified by means of mathematical statistics methods.

4. Results

In our society the word "cancer" terrifies people to such extent that they try to avoid oncologists as long as possible. The given situation makes early diagnosis of malignant growth impossible and decreases the chances of successful recovery. Meanwhile a large part of the population does not have enough competence for prevention treatment.

Future teachers as well as psychological and natural science faculty students (III and IV year of study) of Rivne State University of Humanities underwent the questionnaire in order to estimate oncology diseases and prevention treatment proficiency of nonmedical specialties students. The total number of 334 respondents were involved in the questionnaire. According to the results of our study, it was established that 51,5% of surveyed students have primitive concept of oncology diseases since they have read literature on the given topic or have relatives who faced this problem. Regarding the reasons of illness' onset, every third student could name plausible causes of malignant growth. Only 21,3% of students could answer the question of cancer prevention treatment. 34,4% of respondents could not explain the meaning of the word "carcinogenic", whereas 66,5% of students believed cancer to be incurable disease that leads to human death.

The questionnaire results listed above afford ground to claim that the level of students' cancer awareness is insufficient. Therefore, it defines the necessity for general reconsideration and implementation

of theoretical oncology elements into courses content, biology related ones in particular.

Considering the fact that 091 "Biology" specialty is closely related to medicine, the educational outlines of its professional disciplines were analyzed during this scientific research.

Disciplines as "Genetics", "Immunology", "Gerontology" and "Ecology" are determined to mention oncology diseases. However, this information is covered superficially: an insufficient amount of attention is pied to disclosing of this topic.

Within the following research there were developed changes aimed to form oncology diseases and prevention measures awareness, they were also introduced into studying material of biology subjects.

Pedagogical experiment has been implemented on the base of Department of Biology, Oncology, and medical Physiology of Rivne State University of Humanities over a period of four years (2014–2018). Psychological and experimental sciences faculty students studying at specialty 091 "Biology" (I-IV years of study) were involved in the questionnaire. In total, 161 students have been involved in the experiment. All future specialists were divided into two groups similar in number and the level of proficiency: the control group (81 students) and the experimental one (80 students).

During the experiment the studying process in control group has encompassed traditional methods.

Educational material of the experimental group has been supplemented by information related to oncology diseases and their prevention.

Hence, the content of the "Ecology" course discloses an environment influence on the development of oncology diseases and appearance of new scientific direction on the margin of ecology and experimental oncology – ecological oncology (ecooncology).

As for inorganic and organic chemistry, the particular attention was focused on substances that possess carcinogenic qualities; students were also informed about physical carcinogens within physics related courses.

The content of the "Human anatomy" classes was supplemented by cancer cases of different organs (osteoblastic sarcoma, lung cancer, stomach cancer, pancreatic carcinoma, colon cancer, rectal carcinoma, breast cancer, cervical cancer, ovarian carcinoma, testicular cancer, skin cancer) [8].

While covering the "Blood" topic of the "Human Physiology" courses, the focus is on blood test values that can indicate oncology disease (increase of erythrocyte sedimentation rate, decrease of hemoglobin level, low erythrocyte concentration, expansion in the number of leukocytes, white blood cell abnormality) [1; 3; 10].

The "Biochemistry" course is supplemented by information about blood chemistry value alternation in case of oncology disease. Particularly, glucose escape, increase of bilirubin, enzymes (ALT, AST, LDH), and alkaline phosphatase level, globulin concentration and downregulation of total protein as well as albumin can signify oncology diseases [1; 3; 10].

The "Radiobiology" has sufficient potential for interdisciplinary relations realization. The content of this course includes the "Human radiation carcinogenesis" that discloses the notion of malignant growth and its types, genetically determined elevation of radiation risk and carcinogenesis, radiobiological factor of radiation therapy for people suffering from cancer [5].

During the "Microbiology and virology" course students have been introduced the "Viruses as the reason of neoplastic process" topic that deploys certain cancer causing viruses. To such oncogenic viruses we can classify T-cell leukemia virus, Epstein-Barr herpesvirus (can cause Burkitt's tumor), papillomavirus (can lead to cervical cancer) and others. Students review medical books, giving their own suggestions and examples from particular scientific publications of leading oncologists [3; 10; 11].

Future biology specialists detect main reasons of oncology diseases and basics of prevention treatment on the "Age-specific physiology and healthcare science" course. Regarding the prevention measures, students are highly recommended to avoid smoking, drinking alcohol and visiting solarium, they are also urged to be physically active, watch their weight and have a healthy diet.

Immunotherapy of cancer and its perspectives are revealed to students during the "Immunology" course. The major emphasis is made on the fact that the development of cancer directly depends on the immune system condition, therefore a stimulation of organism's protective mechanisms and immune cells modification with the purpose of cancer cells combating is the objective of immunotherapy [4].

During the course of "Genetics", future biologists deal with the "Genetics of oncological condition" topic, become familiar with genetic researches in the realm of oncology, genetic abnormalities that can lead to malignant growth development. On the practical sessions future specialists discuss the role of hereditary factor in oncology diseases onset.

It has been revealed that meetings with professional mammologist and oncologist after classes effectively contribute to the formation of oncology diseases and prevention treatment proficiency. On these meetings students have broaden their knowledge about nonmalignant and malignant growths, reasons of cancer onset and prevention measures.

Covering the "Molecular basics of hereditary diseases" topic as the part of the "Human hereditary illnesses" course provides study of oncogenesis molecular mechanism and characteristic of particular genes which take part in carcinogenesis (viral oncogenes, proto-oncogenes, tumor suppressing genes, mutator genes).

Within the "Biotechnology" course, students maintain discussions about the future invention of cancer medication on the basis of "Gene therapy in oncology" topic.

Thanks to the "Gerontology" discipline future specialists pay attention to the fact that seniors suffer from oncology diseases more often. In particular, students study the scientific research about connection between aging and pathology development (notably cancer) processes, implemented by Ukrainian scholar V. Frolkis [9].

Separate knowledge on oncology were gained during other courses. Thus, the whole system of knowledge on oncology diseases was formed.

Before and after the implantation of pedagogical experiment that was based on the application of oncology oriented educational material to students studying at specialty 091 "Biology", the final assessment of control group as well as experimental one has taken place in order to determine the level of students' awareness about oncology diseases and preventive treatment. Future biology specialists responded to the group of questions related to the essence of oncology diseases, kinds and reasons of their onset, cancer symptoms and methods of its diagnosis along with the basics of preventive treatment. The results of final assessment are showed in a Table 1.

Table 1: The observed levels of oncology diseases and their prevention treatment proficiency in control and experimental group of students

Level of proficiency	Control group (n=81)				Experimental group (n=80)			
	Before the experiment		After the experiment		Before the experiment		After the experiment	
Low	29	36%	24	30%	29	36%	10	12%
Middle	31	39%	27	33%	33	42%	27	34%
Satisfactory	16	20%	23	28%	13	16%	33	42%
High	5	6%	7	9%	5	6%	10	12%

Hence, the number of students with high level of oncology diseases and prevention treatment proficiency went up by 6%, the number of students with satisfactory and low levels of knowledge went up by 26% and 24% respectively, whereas the total of students with middle level of cancer awareness went down by 8%.

The control group also reveals shifts; however, they are not that significant. The number of students with high and satisfactory levels went up by 3% and 8%, as for the middle and low levels of proficiency, both of them went down by 6%.

The average increase in knowledge about oncology and prevention treatment in experimental group is 31,6%, whereas in control group – 10,2%, which is three times less than in experimental one.

Regarding the data mentioned above, there are all evidences to claim that during the experiment not the separate elements but the whole system of knowledge about oncology diseases and measures of their

prevention has been formed.

In the given experiment we used statistic criterion χ^2 (Pearson's chi-square test) with 5 per cent significance level (a = 0,05), so the probability level is 95%. for statistics processing of results. According to the results of the experiment in the control and experimental groups, the observed value of the criterion $\chi^2_{cn} = 25{,}97$ is greater than the critical value of the criterion $\chi^2_{кр} = 7{,}82$.

The given data confirms that difference in the results of the control and experimental groups are not accidental; it is caused by the implementation of the methodology aimed to form awareness about oncology diseases and prevention treatment.

Hence, it can be concluded that in comparison with control group, the proficiency level of experimental group students has significantly increased.

The results of the study give grounds for asserting the effectiveness of the experimental methodology aimed at the formation of a knowledge system about cancer diseases and their prevention through the introduction of the relevant educational material in the 091 "Biology" disciplines content.

5. Discussion and Conclusion

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The results of the study give grounds for asserting the effectiveness of the experimental methodology aimed at the formation of a knowledge system about cancer diseases and their prevention through the introduction of the relevant educational material in the 091 "Biology" disciplines content.

Conclusion

The application of oncology oriented material to biology courses' content has a positive effect on the formation of cancer diseases and their prevention proficiency of 091 "Biology" students (the average increase in knowledge is +31,6%), which is a predominant condition of future specialists' healthcare competence development.

Oncology related educational material is also introduced to the students of natural science faculty of Poltava V. G. Korolenko National Pedagogical University and to the future specialists studying at educational and scientific Institute of Health Sciences of National University of Water and Environmental

Engineering.

We see prospects for further research in the development and implementation of educational materials for students of other specialties, in particular, specialties 014 "Secondary education (biology and healthcare)", 227 "Physical therapy, ergotherapy".

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

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