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Research Article

Critical Thinking Skills in Nursing Students: a Comparison Between Freshmen and Senior Students

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Background: Critical thinking is one of the most important concepts in the field of education. Despite studies published on nursing students' critical thinking skills (CTS), some suggest that there is not enough evidence supporting the relationship between content of nursing education programs and nursing students' CTS.

Objectives: Given the existing discrepancies, this study aimed to compare the critical thinking skills of freshmen and senior nursing students.

Patients and Methods: This comparative study was conducted on 150 undergraduate freshmen and senior nursing students in Kashan University of Medical Sciences, during 2012. The students in the first and the last semesters of their study in nursing were entered in the study using the census method. Data were collected using a questionnaire including questions on demographic data and the California Critical Thinking Skills Test, form B. Data analysis was performed using the SPSS v.13 software. Descriptive statistics were calculated. Moreover, independent sample t-test and Spearman and Pearson's correlation coefficients were used in the data analysis.

Results: Both the freshmen and senior nursing students had low CTS. The mean critical thinking scores were 11.79 ± 4.80 and 11.21 ± 3.17 for the freshmen and the senior students, respectively ($P = 0.511$). Moreover, no significant correlation was found between the students' score in CTS and their age, gender, high school grade point average (GPA), rank in university entrance examination (RUEE) and interest in the nursing profession.

Conclusions: The students were low skilled in critical thinking and their CTS did not significantly change during their nursing degree. Thus it may be concluded that the nursing education program did not affect the CTS of its students. Longitudinal studies are suggested for assessing nursing students' critical thinking over time. Moreover, revising the curriculum and preparing nursing educators for implementing innovative and active teaching strategies are suggested.

Keywords: Thinking; Mental Competency; Students; Nursing

1. Background

Critical thinking is one of the most important concepts involved in the field of education. Enabling students to think critically is not only a primary purpose of higher education, but also facilitates the dynamics of academies and universities and helps them survive, develop and promotes scientific societies (1).

Introducing the concept of critical thinking into nursing education is a turning point in the process of professionalization. Despite different definitions for critical thinking, no consensus has yet been reached (2, 3). However, critical thinking is generally defined as "a process of purposeful, interactive reasoning, criticism and judgment about what we believe and do" (4). Some have also defined critical thinking in nursing as "the process of reflective and reasonable thinking about nursing problems without a single solution and is focused on deciding what to believe and do" (5).

In the recent decades, as a result of the rapid advances

in knowledge and technology, dramatic changes have occurred in healthcare organizations. Consequently, people's demand has been increased for higher quality healthcare services, with lower costs and shorter length of hospital stay. Moreover, the aging population, complex disease processes and increased patients' awareness, have evolved modern nursing. Thus, nurses are in need to continually improve their knowledge and competencies, to be able to provide safe and quality care in a context of constantly changing clinical situations (6).

In this changing environment, nurses need to develop their thinking and reasoning skills in order to meet the patients and families' caring needs in collaboration with other healthcare professionals (7). Nurses as healthcare providers should be creative, self-directed and critical thinkers to be able to make appropriate decisions and solve clinical problems (8).

Karadag et al. investigated nurse educators and clinical

nurses' attitudes towards critical thinking and reported that both nurses and nurse educators believed in the crucial role of critical thinking skills (CTS) in the context of increasing complexity in modern healthcare (9). Simpson et al. also stressed that nurses should be skilled in reasoning and critical thinking to be able to appraise new knowledge. Highlighting the vital importance of CTS, the American Nurse Association also emphasizes that the nurses' CTS should be measured as a criterion for validating outcomes of nurse education programs (6).

Several nursing authors have written about teaching methods used to strengthen CTS (4). According to Alfaro (10), there are at least two main reasons for nurses to learn CTS. Firstly, thinking is the key for problem solving; while, nurses without such skills are themselves part of the problem. Secondly, in critical situations, nurses should be able to take major decisions, independently and quickly. Critical thinking skills enable them to identify necessary data and distinguish problems requiring immediate intervention from those that are not life threatening. Thus, they will be able to consider the possible consequences of each action and make the right decision (3).

Bakalis et al. suggest that it is essential to establish a dialogue between teachers and students to promote CTS among learners (11). Studies have also shown a link between the students' level of CTS and their level of academic education, age and clinical experience (4, 12).

Despite many studies published on nurses and nursing students' CTS, Duchscher suggests that there is no strong evidence supporting the relationship between content of nursing education programs and the nurses or nursing students' CTS (12). Some other authors believe that there is a lack of appropriate tools for assessing nurse's CTS (13, 14). However, Magnussen et al. (15) have reported that traditional teaching methods may hinder the ability of critical thinking while research-based learning, as a teaching method, can increase CTS.

Studies in Iran have shown mixed results in terms of nursing students' critical thinking. Two studies by Rezaei et al. (16) and Eslami et al. (3) reported that nursing students had poor CTS. They found no significant difference between the levels of CTS in freshmen and senior nursing students. However, in two other studies, Khalili et al. (17) and McCarthy et al. (18) reported that the levels of CTS were significantly higher among senior compared to junior nursing students. Therefore, the question is whether CTS differs among nursing students at the start and the end of their nursing studies. The answer of this question would not only be important globally but also at the national level because this answer might help us evaluate the nursing curriculum and nursing educators as the main role models in the process of nursing education.

2. Objectives

Given the importance of CTS in nursing, and discrepan-

cies in previous studies, this study aimed to compare the CTS of freshmen and senior nursing students of Kashan University of Medical Sciences (KAUMS), during year 2012.

3. Patients and Methods

A comparative study was conducted on 150 undergraduate freshmen and senior nursing students at KAUMS. All nursing students in the first and the last semester of their nursing program were entered in this study using the census method. Exclusion criteria were: being a guest student or being transferred from other universities, having an additional academic degree, and having passed some courses on critical thinking.

Data were collected using a two-part questionnaire. The first part of the questionnaire consisted of questions on demographic data (i.e. gender, age, the students' high school grade point average (GPA), the students' rank in university entrance examination (RUEE), and interest in the nursing profession). The second part of the questionnaire was the California Critical Thinking Skills Test, form B (CCTS form B). The CCTS form B is frequently used to assess the students' CTS (3). This scale consists of 34 questions, each with options, which are designed to evaluate critical thinking at the post-secondary level.

The CCTS form B was specifically designed to assess CTS in five areas of interpretation, analysis, evaluation, inductive reasoning and deductive reasoning. Each question is scored either one or zero for each correct or wrong answer, respectively. Thus, the lowest overall score is zero and the highest is 34 (19). The time each student spent to respond to the questionnaire was about 45 minutes.

The CCTS form B was previously translated to the Persian language by Akhoundzadeh et al. (20), and showed appropriate psychometric properties. They also confirmed the instrument's content validity and reliability using the Kuder-Richardson coefficient, which was 0.62. The test was able to distinguish between CTS of nursing and philosophy students (21).

After obtaining permission from the authorities of the university, the instrument was passed to selected students in their breaks between classes. All students were asked to respond to the questionnaires in a private environment and returned their answers back to the researchers (the first or the second authors of this manuscript) or the secretary of the nursing department on the same day.

3.1. Ethical Considerations

Permission for this study was through the ethics committee of KAUMS. Other ethical issues in this study involved the assurance of confidentiality and anonymity of the participants. All participants were informed about the purpose and design of this research, and that their participation was voluntary. Participants signed a written informed consent for their participation.

3.2. Data Analysis

Data analysis was performed using the SPSS v.13 software. Descriptive statistics were calculated. Independent sample t-test was used to examine significant differences between mean quantitative variables of the two groups. Moreover, the Spearman and Pearson's correlation coefficients were used to examine the correlation between the students' scores in CTS and their age, gender, high school GPA, RUEE and interest in the nursing profession. The level of significance was considered less than 0.05.

4. Results

Among all participants, 24.6% (n = 37) were freshmen and 75.4% (n = 113) were senior students. In total, 65.5% of the freshmen students and 65.3% of the seniors were females ($P > 0.05$). The mean age of the students was 20.5 ± 1.73 years and 22.41 ± 1.51 years, for freshmen and senior students, respectively ($P > 0.05$). The mean high school grade point averages of the students were 17.58 ± 1.65 and 18.38 ± 1.03 for the freshmen and seniors, respectively, ($P > 0.05$). The students' mean ranks in the university entrance examination were 5186.6 and 6283.1 for the fresh-

men and seniors, respectively, ($P > 0.05$). Overall, 10.8% of freshmen students reported that they are very interested in the nursing profession, while 10.8% and 78.4% were moderately interested in or uninterested in the profession, respectively. In terms of senior students, 27.4% were very interested in the nursing profession, while 61.1% and 11.5% were moderately interested or uninterested in the profession, respectively.

The mean critical thinking scores were 11.79 ± 4.80 and 11.21 ± 3.17 for freshmen and senior students, respectively ($P = 0.511$). As shown in Table 1, no significant differences were found between freshmen and senior students in terms of their mean scores for the interpretation, analysis, evaluation, inductive reasoning and deductive reasoning subscales. Both freshmen and senior students obtained the highest and the lowest mean scores in deductive reasoning and analysis subscales, respectively.

Using Pearson's correlation coefficient, no significant correlation was found between the students' CTS scores and their age, high school GPA, and RUEE (Table 2). Moreover, using Spearman's correlation coefficient, no significant correlation was found between the students' CTS score and their gender and interest in the nursing profession (Table 2).

Table 1. Comparison of Critical Thinking Scores of Freshmen and Senior Nursing Students ^a

Domains in Critical Thinking Skills	Students		P Value
	Freshmen	Seniors	
Inductive reasoning	5.02 ± 2.90	4.70 ± 1.91	0.44
Deductive reasoning	5.29 ± 2.25	5.26 ± 1.87	0.93
Interpretation	4.18 ± 3.21	3.96 ± 1.80	0.59
Evaluation	4.67 ± 2.17	4.18 ± 1.61	0.14
Analysis	2.72 ± 1.09	3.06 ± 1.58	0.23

^a All values are presented as Mean ± SD.

Table 2. Correlation Between Demographic Data and Critical Thinking Skills

Variables	Domains in Critical Thinking Skills					
	Inductive reasoning	Deductive reasoning	Interpretation	Evaluation	Analysis	Total score
Age	r = -0.137, P = 0.09	r = -0.135, P = 0.09	r = -0.043, P = 0.60	r = -0.238 ^a , P = 0.06	r = -0.074, P = 0.37	r = -0.172, P = 0.06
Gender	r = 0.750, P = 0.87	r = 0.349, P = 0.33	r = 0.125, P = 0.39	r = 0.704, P = 0.36	r = 0.912, P = 0.93	r = 0.478, P = 0.81
High school grade point average	r = -0.077, P = 0.34	r = -0.007, P = 0.93	r = 0.025, P = 0.76	r = -0.108, P = 0.18	r = 0.030, P = 0.71	r = -0.025, P = 0.76
Rank in university entrance examination	r = 0.128, P = 0.11	r = 0.034, P = 0.68	r = 0.003, P = 0.96	r = 0.105, P = 0.20	r = -0.026, P = 0.75	r = 0.043, P = 0.60
Interest in the nursing profession	r = 0.00, P = 0.97	r = -0.094, P = 0.25	r = 0.086, P = 0.29	r = 0.059, P = 0.47	r = -0.055, P = 0.51	r = 0.068, P = 0.40

^a Correlation is significant at the 0.01 level.

5. Discussion

This study aimed to compare the CTS of freshmen and senior nursing students to determine if the current nursing education program is effective on its students CTS. Results showed that the mean critical thinking scores of freshmen and senior nursing students were at a low level. Moreover, no significant difference was observed between the mean critical thinking scores of freshmen and senior nursing students. In addition, no significant association was found between the students' scores in CTS and variables such as gender, high school GPA, RUEE and level of interest in the nursing profession. These findings are consistent with the results of previous studies (22). Previous studies on the assessment of Iranian nursing students and nurses' CTS have reported that the majority of nursing students and nurses in Iran have poor CTS (3, 23-25). Consistent with this study, other studies have also found no significant difference between freshmen and senior nursing students' CTS (3, 26). However, Khalili et al. (17), Babamohamadi and Khalili (23) have reported significant differences between the critical thinking scores of freshmen and senior nursing students, which is not in line with the results of the present study. These inconsistencies might not only be attributed to probable differences in learning styles of students (27) but also to the relatively different teaching styles of different nursing schools.

The results of this study showed no statistically significant positive correlations between demographic data and CTS. While Zhang and Lambert (27) and Noohi et al. (28) reported that a number of positive and negative correlations exist between demographic data and critical thinking skills. The lack of correlation between demographic data and CTS in the present study might be attributed to the characteristics of universities and their students; Mahmoodabad et al. (29), in a study from Iran, reported that students attending larger universities are somewhat different considering their GPA and RUEE, and this may affect their CTS. Another probably reason is that many of the senior students in Kashan are employed as part time nurses in healthcare centers. Therefore, as Bitencourt and Crossetti (30) have reported, students that work part time have less time to spend on intellectual activities. It seems that when students are employed in clinical settings, they spend more time in performing nursing techniques and following the routines instead of using the scientific knowledge they learned at the university. Working according to the routines usually does not need much thinking skills, and nurses simply follow the doctors' orders. Working in this manner, would gradually affect the nurses cognitive, critical thinking and humanistic skills such as communication skills.

Furthermore, studies have reported that not only the content of education but also the teaching-learning methods at all levels of the education system in Iran (i.e. elementary, secondary and university) basically concentrate on transferring theoretical knowledge and do not focus

on development of critical thinking and problem-solving skills in learners (4). Amini et al. (31) reported that this is a global problem in nursing education, and several studies indicate a lack of critical thinking and problem solving skills in undergraduate nursing programs. It has also been reported that although basic skills of critical thinking are taught to nursing students, they cannot apply them in solving problems they commonly encounter, and this may be considered as a sign of failure in nursing education systems (32). Moreover, overuse of lectures and multiple choice questions, and overlooking the nursing process in education may be among other possible reasons for the lack of CTS in Iranian nursing students (23, 33).

It seems that nursing students have less opportunity to apply CTS in clinical settings. While techniques, such as questioning, Socratic method, learning in small groups, discussions and debates, writing diaries, problem based teaching and learning, use of case studies and other types of participative learning, have been shown to be effective in developing CTS (20, 34). Previous studies have shown that the nursing curriculum in Iran contains a considerable amount of theoretical, redundant, unnecessary and inapplicable knowledge and nurse educators are under pressure to teach a large content in a limited time (4, 35). Thus, making a balance between the course content and time available may be the first step in preparing the context for educators to assign more time for the development of the students' CTS. Moreover, as Moattari et al. (35) reported, nurse educators should be prepared to implement active, student-centered, collaborative and problem-focused teaching strategies to foster the students' CTS.

The results showed that nursing students had low CTS and these skills did not significantly change during their studies in nursing. Therefore, it may be concluded that the studied nursing education program did not affect its students' CTS. However, the low critical thinking scores of the participants in the present study and other studies conducted in Iran may be attributed to the instruments used by these studies. Most of these studies used instruments such as CCTS Form B, and as mentioned previously, some nursing researchers believe that this instrument is not appropriate for assessing nurses or nursing students' CTS. Thus, appropriate indigenous instruments should be developed for assessment of critical thinking in nurses. In addition, we tested our participants only one time. It is better to evaluate the evolution of critical thinking over time. Longitudinal studies are suggested for assessing the nursing students' critical thinking over time. Moreover, revising the curriculum and preparing nurse educators for implementation of innovative and active teaching strategies are suggested. Then, the effects of such interventions can be assessed.

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Authors' Contributions

All authors contributed equally in this study.

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