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**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.1476938>Available online at: <http://www.iajps.com>**Research Article****ASSESSMENT OF CRITICAL THINKING IN PH.D.
CANDIDATES OF PERSIAN MEDICINE****Fateme Ashrafzade and Mohammad al-Attar**Faculty of Psychology and Social Science, Islamic Azad University Central Tehran Branch,
Tehran, Iran**Abstract:**

Thinking and decision making abilities are one of the most important skills for clinicians in general or special practice; but many studies result showed a gap between the ideal and the real, which lead to medical errors or inappropriate judgment in complex situations. Since traditional, alternative or complementary medical schools are still in the beginning road with various deficiencies in scientific structure or evidence-based instructions for clinicians, critical thinking is central proficiency for practitioners in this field. The purpose of this study is measure the critical thinking in Ph.D. candidates of Persian medicine.

To conduct the research the California Critical Thinking Skills Test (form B) was used and the participation was voluntary, CCTST questionnaire sent online to Ph.D. candidates in Iranian medical universities, 18 persons responded to the test.

The results showed that Ph.D. candidates of Persian Medicine are weak in all critical thinking skills include Analysis, Interpretation, Evaluation, Explanation, Deductive reasoning, Inductive reasoning. Also, female's scored higher than males in all areas of critical thinking, except the deductive reasoning that earned the same score. The findings of this study showed that critical thinking is an important challenge in the Ph.D. of Persian medicine education and it is recommended as one of the most fundamental educational outcomes in the Ph.D. curriculum of Persian Medicine.

Keywords: *Critical thinking, medical education, thinking Skill, Oriental medicine, Arabic Medicine*

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INTRODUCTION:

Thinking is one of the most important abilities of human beings that make them superior to other creatures. One of the main causes of human capacity to adapt to the environment lies in the enjoyment of the power of thought; that has always been one of the favorite topics of philosophers and scientists. They have long understood that thinking is not a single dimension, but there are different ways of thinking. So, thinking from different perspectives was studied; As Benjamin Bloom has divided thinking based on Types of thinking skills, Sternberg explained thought based on variety of thinking styles and different dimensions of thinking have been presented by various scholars. For instance, Guilford has proposed divergent and convergent thinking and Stanovich and Richard West explained fast and slow thinking (1–4).

Learning skills of thinking is becoming increasingly important. In the meantime, critical thinking, which includes the concepts of interpretation, evaluation, inference, analysis, explanation and Self-Regulation, is a skill that is necessary to learn(5).

Ease of access to information raises a major issue in education and learning. Learners do not have to maintain content and theories as before. Now, the basic issue in teaching is how to identify the right information from the wrong one and how to use this information to make a proper and successful decision. So how to learn and how to think about constantly growing information are the core skills of the 21st century while the lack of these skills will have catastrophic consequences. Isaac Asimov by one survey showed that 20 percent of the 2,000 students believe the sun is moving around the globe! This report shows even today, access of information is not affliction and difficult like the past; But the huge amount of information and lack of skill in their correct use has led students to be unaware of the foundations that the scientific community has agreed more than 400 years. (6)

Therefore, teaching and learning critical thinking skills in all fields of education is important to develop individuals with the ability to recognize, analyze and evaluate information. This is especially emphasized on medical education because physicians are always in position of inference and decision making. Among various medical disciplines, teaching critical thinking skills to Persian medicine candidates is very important; because this discipline suffers from a number of problems; such as: many claims in this field with different levels of evidence (Over thousands of years and whole of the ancient world)

are not evaluated and lack the unifying fundamental research.

Due to the importance of teaching and acquiring critical thinking skills in traditional medicine assistants; in this article we will investigate critical thinking among Ph.D. candidates of Persian medicine.

Definition of critical thinking

The study of the foundations of critical thinking shows that there are many definitions of this kind of thinking. Different definitions of critical thinking are due to the various viewpoints of scholars and Scientists; because they consider different aspects of critical thinking according to their point of view. Some of these definitions include: Ennis: “Deciding which action to take or what to believe to be done using thoughtful thinking and reasoning”. Stahl & Stahl: “Critical thinking is the training of accurate and logical reasoning”. Halpern: “Use of cognitive skills or strategies that increase the likelihood of creating an optimal process. Moore and Parker: “A purposeful decision to accept, reject or suspend a Judgment. Dewey: “Suspense judgment or intact doubt.(7)

Huffman, Vernoy and Williams have considered critical thinking in three dimensions. Actually they believe that the elements of critical thinking are divided into three main categories: Cognitive Components (thinking processes), Emotional components (Emotional Features Involved in Critical Thinking) and Behavioral components (Activities for critical thinking). (8)

Due to the variety of definitions provided for critical thinking; to obtain a comprehensive definition of critical thinking, Facione and colleagues in collaboration with the Philosophical Society and several United States universities, conducted the Delphi method based on the views of 46 critical thinking thinkers in 1989-90. According to it critical thinking is defined as: “*The process of purposeful, self-regulatory judgment. This process gives reasoned consideration to evidence, context, conceptualizations, methods, and criteria*” (9-10).

Critical Thinking in ancient Literature

Critical thinking as a high cognitive process; is an important topic that has long been considered in education, assessment and judgments. When the Sophists tried to mix the right and wrong with misleading statements; The Greek philosophers, such as “Socrates”, “Plato” and “Aristotle” began to

formulate the right ways of thinking by systematizing concepts. In fact, they tried to develop the right ways of thinking with logic. Aristotle formulated "formal logic" to facilitate the possibility of achieving the correct argument with minimal error. Therefore, logic was considered as a philosophical framework of the entire curriculum. Aristotle's logic and the principles of the meanings of expression were considered as essential for education of young people who wanted to study in the fields of theology, teacher education, medicine and law. Although the term "critical thinking" was not common at that time; Aristotelian logic, argumentation, logical analogy and propositional argument, which were at the core of the teaching at that time, actually developed critical thinking. (11)

It seems Critical thinking has been particularly noticeable in training of physicians. As the entry of individuals into the medical field was based on specific indicators of internal and external talent. Internal talents, such as: "interest" and "intelligence", were among the key indicators for entering the medical profession. "Galen" believed that in the medical profession those would be prominent individuals who had sufficient "will" and "power". He writes about this: "I know that success of people in everything lies in identification with their will and power" (13).

In addition; Logic was the prerequisite for the medical profession; as Galen emphasized someone who wants to be treated like "Hippocrates" and argue in treatment; should have austerity in logic. In fact, he gives importance to the ability of a physician to choose the right path, endurance and logic (12).

Afterwards in the era of Arabic civilization, several books were written in which physicians criticized each other by following the modes of critical thinking. For example "Rasis" Has written in the Introduction of the book "Al-Shukk Ala Jalinus": "In the medical and philosophical profession, you should not be subordinate to the elders and accept their idea (without reason) and should not neglect the scientific pursuit and philosophers do not like their students just to be imitators" (12).

Critical Thinking in Iranian medical community
The study of critical thinking in Iranian Medical science students only contains 5 articles. The study of critical thinking in Isfahan medical students in basic sciences (Medicine, Dentistry and Pharmacy) showed that they did not use critical thinking in dealing with texts that had serious mistakes and only 8.6% of them paid attention to some errors.(14)

Also, the results of a study that focused on tendency to critical thinking in Rafsanjan medical students showed that the average score of critical thinking in students' is higher than some other universities students in Iran. But the grades of the students studied in the highest level of education were lower than other students.(15).

In addition; The results of a study on medical students in Mazandaran University of Medical Sciences showed that Critical thinking had not been developed during the years of study at the university (16).

Furthermore; The study of critical thinking in Isfahan Universities showed that there were no significant differences between critical thinking scores of students in Medical Sciences and other fields; and in all the students, the scores of the second stage showed a significant decrease in all areas, including: inference, deductive reasoning and total score of California critical thinking skills test (B Form) except for the evaluation component that increased in the second stage. The findings of this study showed that critical thinking is a serious challenge to Iran's higher education(17).

Eventually; a study on 357 students of Mashhad University of Medical Sciences showed that there was a significant correlation between mental health and critical thinking and among the components of mental health, anxiety showed the highest correlation and depression showed the least correlation (18).

Although it is important for Graduates of Medical Sciences to have critical thinking that improves decision-making and judgmental skills; unfortunately, the number of studies on critical thinking assessment in medical students in Iran is low, which indicates a lack of attention to the issue of critical thinking in medical education.

Critical Thinking Measuring Tools

Several instruments have been designed to assess critical thinking. Some of these tools measure the tendency to critical thinking, such as: "Ricketts critical thinking disposition scale"(19) while others are dedicated to assessing critical thinking skills; for example: "Watson Glaser Critical Thinking Test"(20), "Cornell Critical Thinking Tests", "Ennis-Weir Critical thinking Essay Test" (21) and the "California Critical Thinking Skills Test" (In different forms) (22).

Different forms of California Critical Thinking Skills

Test (CCTST) are designed to measure high-stacks reasoning and decision-making process. The item pool of the test has been improved for over 40 years and has evolved on the basis of new studies. The Delphi method was used to aggregate the definitions of critical thinking and to refine the item pool. Subsequently, various forms of this tool were created and implemented at varied levels of education and in different disciplines (10).

The items of CCTST are designed to make differentiation between powerful and poor persons in critical thinking skills and its results are helpful for helping educators focus on curricula, educational opportunities to address weaknesses in participants. Different forms of this instrument are designed to provide both an overall score of critical thinking and a score for each area. The total of items provides the overall score and each component has a separate score. The test usually takes 45-50 minutes. It can be applied in both individuals and groups. The areas that are emphasized in the various forms of this test include:

- Analysis: Ability to identify and investigate assumptions, reasons and claims and how they interact in the arguments.
- Interpretation: Ability to determine the exact meaning and importance of a message. Inference: Ability to draw conclusions from evidence.
- Evaluation: Ability to assess the credibility of information resources and claims.
- Explanation: Ability to describe the evidence, reasons, methods, hypotheses and standards before making a final decision on what to believe or what to do.
- Deductive reasoning: Ability to make decisions in situations where terms, operating conditions, key beliefs, principles, and procedures are precisely defined
- Inductive reasoning : Ability to make decisions in non-deterministic fields whose inferences on what we think are based on previous experiments, statistical analyzes and hypotheses (10). Various forms of the CCTST to measure critical thinking skills in different professions and disciplines include: Business (BCTST); Military Science

(MDCTI); Legal Studies (LSRP) and the Health Sciences (HSRT). Also, various forms for measuring critical thinking skills at different levels of education and age include: secondary school students, community and technical college students, and testing the adult general public. Various forms of CCTST have so far been translated into more than 12 languages (10).

Previous studies in Iran show that the California Critical Thinking Skills Test (form B); has been used more than other tools to assess critical thinking. This test consists of 34 multiple choice items that only one of them is correct. The California Test Form B measures five areas of critical thinking, contains: Analysis, Evaluation, Inferring, Inductive argument and Deductive reasoning. For each correct question, a score is given to an individual and the total score is the sum of the correct test questions. The psychometric properties of the California Critical Thinking Skills Test (form B) were investigated on 405 BSN nursing students in Iran. The results of the study showed that the tool has sufficient validity and reliability (9).

METHODS:

This study was conducted on Iranian Ph.D. candidates and graduates of Persian Medicine. The California Critical Thinking Skills Test (form B) was a research tool. Test was provided online and via social media app from March 2017 for one year; from 370 individuals, 18 persons responded to the test voluntarily.

RESULTS:

The subjects studied in this study included 18 Ph.D. candidates in traditional medicine among who 10 were female and 8 were male. Their average age was 41.39 with a minimum age of 32 years and a maximum of 50 years. Descriptive analysis of the data showed that Ph.D. candidates of Persian Medicine are weak in all critical thinking skills. Also, female's scores higher than male were in all areas of critical thinking, except the deductive reasoning that earned the same score (Table1).

Table 1: Descriptive analysis of data in each domain

| domains | gender | Lowest score | Highest score | MD±SD | Highest score of domain |
|---------------------|--------|--------------|---------------|------------|-------------------------|
| analysis | man | 1 | 7 | 4.13±1.727 | 9 |
| | female | 3 | 6 | 4.40±1.174 | |
| evaluation | man | 4 | 9 | 5.88±1.553 | 14 |
| | female | 5 | 8 | 5.80±1.033 | |
| inference | man | 1 | 9 | 4.38±2.615 | 11 |
| | female | 3 | 9 | 5.80±1.932 | |
| Inductive argument | man | 3 | 13 | 6.13±1.356 | 16 |
| | female | 4 | 10 | 6.80±1.549 | |
| Deductive reasoning | man | 4 | 8 | 7.00±3.207 | 14 |
| | female | 4 | 9 | 7.50±2.273 | |

CONCLUSION:

Critical thinking is one of the most important areas of education, so that by the year 2000, learning and acquiring critical thinking skills was one of the main goals of education. Especially today, with a lot of information, critical thinking that includes the skills of reasoning, inferring, interpreting and evaluating is very important. Although teaching critical thinking in all disciplines and specializations is essential and inevitable, in medical sciences because of the importance of judgments and decisions, this kind of thinking has a special place. However, studies show that the medical education system in Iran suffers from a lack of critical thinking. The current study also shows that Iranian students in the Ph.D. of Persian medicine lack critical thinking ability.

The main weakness in this study is the lack of participants, however it is enough to illuminate the importance of critical thinking in Persian medicine education in Iran, which is one of the pillars of the Ph.D. program, be considered as one of the conditions for entry of students. Also, strengthening and improvement of this skill is recommended as one of the most fundamental educational outcomes in the Persian medicines curriculum.

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