

## Opinion

# Science and Pseudoscience in Traditional Iranian Medicine

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The recent efforts for revitalizing traditional Iranian medicine (TIM) have shaped two main streams: The quackery traditional Iranian medicine (QTIM) and the academic traditional Iranian medicine (ATIM). The QTIM encompasses a wide range of practitioners with various backgrounds who work outside the academic arena and mostly address the public. These practitioners have no solid bases or limited boundaries for their claims. Instead, they rely on making misleading references to the Holy Islamic Scriptures, inducing false hope, claiming miraculous results, appealing to the conspiracy theories, and taking advantage of the public resentment toward some groups of unprofessional healthcare providers. The theories and practices of ATIM, however, can be categorized into two major categories: First, valid and scientific TIM that is aimed to conduct well-designed clinical trials and thereby, supply the evidence-based medicine with new treatments originated in or inspired by TIM. Second, a pseudoscientific part of the current TIM that is based on some obsolete medical theories, especially the medieval humoral medicine, and erroneous accounts of human anatomy, physiology, and physiopathology, mostly adopted from the ancient and medieval medical scripts. TIM has recently established some clinical centers for practicing humoral medicine that is partly pseudoscientific and involves significant risks. This paper suggests that the public health sector has a duty to act against the promulgation of medical superstitions by QTIM and the pseudoscientific medical practices of ATIM, and at the same time, support and promote the valid and potentially beneficial research pursued by ATIM aimed to explore the rich recourses of TIM and thereby enrich the evidence-based medicine.

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**Introduction**

Over the past few decades, revitalization of traditional Iranian medicine (TIM), and its incorporation into the country's health system has been one of the top priorities set by the government authorities for the Iranian health sector. For example, the *Supreme Council for Cultural Revolution*, the highest-ranked policy-making body for culture and higher education in Iran, has issued a national document in support of the revitalization of TIM.<sup>1</sup> Founded in 2007, The School of Traditional Medicine of Tehran University of Medical Science, was the first one of a series of schools founded in medical universities aimed to promote and revitalize TIM.<sup>2</sup> These schools host numerous departments and research centers. The budgets of these centers are mostly provided by the government. In addition to the educational and research sections, these schools host a growing number of clinics called *salamatkadeh* or "house of health" wherein the faculties and students of these schools practice TIM. Also, the graduates of ATIM are allowed to establish their private clinics. Along with the academic stream, another stream of practitioners has emerged and increasingly expanded outside the academic centers. The practitioners who belong to this stream claim to practice TIM (or so-called

Islamic Medicine) and attract large numbers of patients without pursuing any systematic methodology or being accredited under any regulatory supervision.

This article is a critical review of the claims, practices, teachings, developments, and achievements of the contemporary TIM. For a brief overview on the main similarities and differences between TIM and the conventional (modern or evidence-based) medicine, please see Table 1. This paper holds that the TIM has two main streams: The Quackery TIM (QTIM) and the Academic TIM (ATIM). This article also argues that the theories and practices of the ATIM can be categorized into two major categories: First, valid and scientific TIM aimed to supply the evidence-based medicine with new evidence-based treatments originated in or inspired by TIM, and second, a pseudoscientific part of the current TIM that is based on a number of obsolete medical theories and has had many harmful impacts despite its seemingly growing market.

**Two Main Streams**

As mentioned above, over the past decades, in parallel with the rapid growth of academic centers, an increasing number of practitioners with various backgrounds

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**Table 1.** Differences and Similarities Between Academic Traditional Iranian Medicine (ATIM) and Conventional (Modern/Evidence-Based) Medicine (CM).

Comparison	TIM	CM
<b>Differences</b>	Is committed to preserve its identity as Iranian and Traditional medicine by keeping attachment to certain theories and practices	Is just committed to scientific validity and has no theories and practices that are considered essential to its identity
	Uses the classical scripts of TIM as the main and fundamental resources of knowledge and practice	Has no unchangeable resources of theories or practices. Is subject of ongoing and never-ending changes and developments
	Serves mainly as a branch of complementary medicine	Encompasses all the scientifically valid medical theories and practices
<b>Similarities</b>	Have the same aims: promoting health and minimizing suffering	
	Rely on scientific research and evidence-based medicine for evaluating new treatments	
	Train their practitioners through an academic discipline hosted by modern universities	

(mostly without any academic education in the field of healthcare) started or expanded their practices that they claim to be Traditional or Islamic Medicine. Despite the academic stream that follows the methodologies of the classical TIM, the non-academic practitioners usually recognize no limits for their claims and no obligation to adhere to any consistent methodologies. Their claims to be a part of medicine, traditional medicine, and Islamic medicine, has been consistently denounced by the authorities in the field of academic medicine, academic traditional medicine, and some Islamic religious authorities. They don't have any genuine relation to academic traditional medicine or Islamic thoughts being taught in the seminaries. In fact, they mostly sell quackery medicine. Therefore, it can be argued that over the recent years, TIM has been practiced by two main streams: The main differences and similarities between ATIM and

QTIM are listed in Table 2.

The ATIM is the stream developed and grown within and by academic centers. Most of the practitioners of ATIM are medical doctors who have received a PhD in traditional medicine from an academic center in Iran or other countries such as China. They use systematic and academic methods in analyzing and interpreting the classical texts of TIM. In their clinical practice, the practitioners of ATIM work along with the practitioners of conventional medicine and don't advise their patients to abandon standard treatments.<sup>3</sup> The QTIM, however, mostly encompasses a wide range of practitioners with various backgrounds (e.g. medicine, theology, literature, Islamic jurisprudence, etc. even in some cases, illiterate people who claim to practice based on personal experience and the training received from the old-school masters). The practitioners of QTIM mostly

**Table 2.** Differences and Similarities Between Academic Traditional Iranian Medicine (ATIM) and Quackery Iranian (or So-called Islamic) Traditional Medicine (QTIM)

Comparison	ATIM	QTIM
<b>Differences</b>	Enjoys the budgetary and administrative support of the Ministry of Health. The practitioners hold degrees in medicine and PhDs in TIM	Has had problems with health authorities. In some cases, their offices have been forcefully closed by the Ministry of Health. Many of the practitioners have not had any formal training in healthcare, some of them are clerics
	In theory, they limit themselves to a methodological interpretation of the classical manuscripts/textbooks.	They don't have any boundary conditions. Make excessive and unrealistic claims.
	In practice, they claim to be loyal to the complementary nature of their practice. They don't prevent their patients from seeking modern/evidence-based treatments and don't make accusations against well-proved and necessary healthcare interventions such as vaccination.	They argue that they are the only valid paradigm of medicine and the modern/allopathic medicine is harmful and the product of conspiracies of the world powers. They prevent their patients from seeking modern/evidence-based treatments and argue against well-established healthcare interventions and practices such as vaccination and tooth-brushing.
	They conduct research with abundance to the scientific methodology and publish the results in peer-reviewed journals	They rely on anecdotes and publish and broadcast their claims in the mass media and social networks
<b>Similarities</b>	Enjoy the strong support of some high-ranked religious and governmental authorities*	
	Have generous access to governmental media, including the national TV	
	Rely on obsolete, unfounded, and pseudo-scientific theories such as four-element and four-humor theories	
	In their practice, almost always provide treatments and remedies that are not evidence-based, but are adopted from medieval manuscripts	

\*The Ministry of Health has taken regulatory and disciplinary actions against the practitioners of QTIM, although the consistency of these actions could be questionable. At the same time, the QTIM has had some proponents and advocates among high-ranked governmental officials, especially at the time of the presidency of Mahmood Ahmadinejad. Also, a decreasing number of religious authorities support QTIM, either completely or partially.

work outside the academic stream and directly address the public. The practitioners who belong to this category have no solid basis or limited boundaries for their claims. For instance, here are some claims made by some of the most well-known figures of QTIM:

- 1- “The Foreigner powers have planned to include vaccinate poultry in the dietary regime of Iranians to decrease the size of penises of the Iranian youth. In the other words, eating the vaccinated poultry leads to a decrease in the penile size of the children and this is plotted by the foreigners.” (Dr. Hossein Ravazadeh, one of the most famous practitioners of QTIM).<sup>4</sup>
- 2- Child immunization is a practice promoted by the colonialist medicine. Parents must avoid vaccination and use wet-cupping and feed their children with cooked garlic and sea salt and olive oil [...] instead of vaccination. (Quoted from Sheikh Abbas Tabrizian, another well-known figure of so-called Islamic traditional medicine).<sup>5</sup>
- 3- (In a live program in the national TV, in response to a phone call from a patient who says that her white blood cell and platelet counts are low) “Cook two camel brains and one sheep brain, mix them with honey, and eat the mixture, a spoon a day, so your white blood cell and platelet counts will rise.” (Hossein Kheirandish, one of the most famous practitioners of the QTIM).<sup>6</sup>
- 4- Another instance of the countless cases of ungrounded prescriptions for life-threatening diseases by the practitioners of the QTIM, another figure (Seyyed Hassan Ziyai) who frequently appears on the mass media prescribes Calendula flower and turnip as a cure for leukemia.<sup>7</sup>

As it is discernable by the above instances (picked from the countless number of similar claims made by the practitioners of QTIM in the mass and social media), this group has no valid scientific methodology, reliable and available resources, or boundary conditions. Instead, they rely on misleading references to the Holy Islamic Scriptures, inducing false hope, claiming miraculous results, appealing to the conspiracy theories, and taking advantage of the public resentment toward some groups of healthcare providers who are greedy and unprofessional and the health system that sometimes shows degrees of corruption.

The claims made by the practitioners of QTIM, as exemplified by the above mentioned quotations, are in clear contrast with scientific facts and evidence-based established practices and clearly endanger patient health and well-being. Their claims and practices are mostly either pseudoscientific or superstitious. It is noteworthy that even the practitioners of the ATIM have frequently

condemned the claims and activities of the QTIM.

The ATIM enjoys the generous budgetary and administrative support of the Iranian Ministry of Health and Medical Education (MOHME). However, the MOHME rightfully accuses the practitioners of QTIM to establishing and continuing illegal and harmful practices under the title of TIM and has tried to ban and limit their activities. However, the MOHME has had limited success in tethering the current ever-increasing tendency of the public toward QTIM, partly because the proponents and sellers of the QTIM take advantage of the social and public media, the support of some religious and governmental authorities, and their regular presence in the National TV. Consequently, they successfully tried to expand their market by appealing to superstitious beliefs and conspiracy theories without having any valid scientific basis. This group has also been denounced by many the practitioners of ATIM.

Despite the current popularity of QTIM, there is increasing attention being paid to the potential risks of these sorts of practices for the public health. Therefore, it is expected that the MOHME will increase its regulatory and law-enforcing efforts for confining their activities. However, like other branches of superstition, it is expected that the suppliers of QTIM will continue their claims and aggressive marketing to gain public attention and will keep having degrees of success in terms of absorbing desperate patients and acquisition of financial gain. This paper is not aimed to address the QTIM in more detail. Instead, the following parts of this paper are focused on the ATIM since this stream is the one that is supported by the government, has its established place in academia, enjoys an increasing market, and claims to be scientific and academic.

In fact, there are some practitioners who are the faculties or graduates of the academic centers of ATIM whose practices are more inclined toward QTIM than ATIM and there are some practitioners who have not entered the academic centers of ATIM and know and practice the TIM in a classical way (to which the ATIM aspires). Therefore, this article, in its following parts, uses the title of TIM to encompass both the practitioners of ATIM and this small group who follow the classical methods in reading and interpreting the sources of TIM.

### **Pseudoscience and TIM**

TIM claims to be a branch of science. However, in many of its theories and practices, it deviates from the valid biomedical science and sometimes follows pseudoscientific patterns. By pseudoscientific, this article means a biomedical theory, explanation, or practice that claims to be scientific, however, it clearly defies the consensual principles, facts, standards, methods, or

premises of the biomedical science as agreed upon by the scientific community. In other words, pseudoscience pretends to be good science, however, it is nothing but fraudulent and fake science.<sup>8</sup> Focusing on the spiritual righteousness of the old figures of TIM, regardless of its disputed correctness, not only does not add to the scientific validity of TIM, but it also shows an opinionated attitude toward appraisal of the efficacy and safety of the medical interventions suggested by an old school of medicine.<sup>9</sup>

The concerns about the pseudoscientific claims of the so-called Complementary and Alternative medicine, even when they work adjacent to and along with the centers of conventional medicine, has been raised globally since the practitioners of such medicines frequently make untested and unproven claims based on the pseudoscientific backgrounds, impose financial burdens on their patients to provide untested treatments, and even in some cases, the patients who trust these treatments forgo the evidence-based treatments resulting in serious harm. These injurious consequences have convinced some countries such as Australia and England to improve their regulations in this regard.<sup>10</sup>

The same concerns exist about the current practice of TIM within the academic institutions (or in the private clinics established by the graduates of these academic programs) in Iran. Although most of the practitioners and all the graduates of these centers (i.e. Ph.D. holders of TIM) also hold an M.D., some of their theories and practices are profoundly pseudoscientific and in contrast with the principles and facts that they were taught in medical schools. The following part of this paper portrays some major aspects of dominance and infiltration of pseudoscience in TIM as is currently practiced by the academic centers of TIM or their loyal graduates.

### **Pseudoscientific Physiology and Pathophysiology**

The main pseudoscientific feature of the TIM is its reliance on some obsolete theoretical accounts. This pseudoscientific reliance starts with the most fundamental theories of TIM: the four elements, or as it is called in the TIM texts, the *arkan* or fundamentals.<sup>11</sup> This basic premise of TIM is rooted in the ancient Greece cosmology and chemistry that believed that all the material world is composed of four basic and indivisible elements: fire, water, air, and earth. This theory was adopted by Muslim scientists, physicians, and philosophers, such as Ibn Sina (Also known as Avicenna; 980–1037 AD), in the Medieval ages. All other theories of the humoral medicine are built upon this very basic presumption. According to the current knowledge of chemistry, however, this four-element theory is undeniably incorrect and obsolete. The practitioners of TIM, however, argue that these

elements are just symbolic concepts that explain the quality of things, not real indivisible elements in nature.<sup>11</sup> This claim is partly true, because even the ancient and medieval creators and followers of the four-element theory held that they were unable to show any of these elements in a purified form in the real world. However, they argued that this was because of the existence of some mixtures of various elements in every object in the real world. However, they did not have any alternative theory to understand and explain the basic elements of the material world. The modern science does have a valid alternative theory as is presented in the elements of the Mendeleev periodic table. However, the proponents of TIM still base their theories upon such an obsolete account of chemistry and basic elements that had been abandoned by the scientists in the fields of chemistry and physics long time ago (unless somebody starts to create a Traditional Iranian or Unani Chemistry or Physics!) and there are no reliable evidences to support it. There is a clear reason behind their insistence on this obsolete theory. All the other major parts of humoral medicine that is the main theoretical part of the TIM are just built upon this obsolete and groundless theory. The pseudoscience, therefore, starts and swells due to the conserving obsolete theories to preserve the “traditional” identity of the discipline (an identity that is defined by loyalty to a historical heritage not to the scientific truth-seeking and genuineness) even when there is no evidence or reason so support them.

Science is rooted in critical thinking and openness to critical appraisal of every claim, theory, or evidence. How can a branch of knowledge call itself scientific and at the same time keep an obligation to preserve a bunch of premises and prejudices about the material world and human body to safeguard its identity? This is the inherent conflict of TIM or any other branch of knowledge that would like to be included in the realm of science while preserving a huge load of presuppositions to maintain an identity.

It is not surprising, therefore, that the same problem as explained about the four-element theory exists regarding the humoral theory that holds that the human body is made of four basic humors (*akhlāt*), namely blood (*dam*), phlegm (*balqam*), yellow bile (*safra*), and black bile (*sawda*). The four elements and four humors have qualities that are described in terms of the four temperaments (*mezaj*): hot, cold, dry, and wet. These humors and the temperaments are the cornerstones of the physiology and pathophysiology in TIM. For instance, health is defined as a state of balance among these humors and temperaments.<sup>11</sup> These theories have been adopted by medieval Muslim physician-philosophers from the ancient Greece and Persian physicians and philosophers,

just like the four-elements theory. However, this time, the TIM does not afford to deny the reality of the humors and temperaments; because, in practice, they form the foundations of almost all the treatment and therapeutic interventions of TIM. Therefore, in their books they simply maintain that the digested food turns into four humors in the liver and goes to other parts of the human body. Then, in their consolidated form, they take shape to the organs (*a'zā*), and in their diluted form, they turn into the human soul (*arvah*).<sup>11</sup> This explanation is in direct contrast with all the current and valid understandings of human anatomy and physiology. In fact, even the reality and existence of some humors such as phlegm or black bile in the human body is a myth and has no place in the scientific understanding of human body and its physiology. Why TIM insist on keeping these theories while there is no evidence in favor of them? The answer is simple: Because TIM gives priority to the preserving the “traditional” identity over trusty and honest adherence to the scientific facts. This is what deters it from the creek of valid science and leads it toward the swamp of pseudoscience and superstition.

### Erroneous Anatomy

In addition to the obsolete scientific foundations, the TIM relies on some old textbooks (mainly manuscripts), as its main references, that contain very erroneous and inaccurate depictions of human anatomy and anatomophysiology. The main textbooks of TIM, i.e. the ones authored by Ibn Sina and Mohammad Zakariya Razi (865–925 AD), obtained their anatomical understanding from the books of Galen (130–210 AD). There is no evidence that shows that the medieval Muslim physicians practiced dissection of the dead bodies of improving their knowledge on human anatomy. Instead, they mostly echoed the anatomical parts of Galen’s manuscripts (their Arabic translations, of course) and in some cases, improved and updated them according to their clinical experience.<sup>12</sup> Their achievements at that time were astonishing and praiseworthy, for example, Razi compiled the second volume of his encyclopedic book, *Al-Havi* on ophthalmology and his descriptions and attention to the details are admirable.<sup>13,14</sup> However, their knowledge on human anatomy is not but obsolete and erroneous when it is compared with the current and modern anatomical sciences. The examples are countless, however, considering 3 chambers for heart, having no idea of the systemic circulation, considering 7 pairs of cerebral nerves (instead of 12), and erroneous descriptions of urogenital anatomy are among the obvious examples in the main books such as *Canon in Medicine* and *Mizan Al-Hikmah*.<sup>12</sup> It was after the modern era and establishment of modern academic institutions in Iran

that the modern and valid description of the system of blood circulation was learned by Iranian physicians. However, the textbooks of the TIM that are currently being taught in the schools of TIM to the students who hold medical doctorates surprisingly maintain that the humors (*akhlāt*), including blood, are produced in the liver and transferred to other parts of the body to be consumed!<sup>11</sup>

In some cases, the advocates of TIM have tried to attribute some miraculous and advanced understandings of human anatomy to the medieval physicians. For example, it has been claimed that Ibn Nafis Damashqi (1210–1285 AD), a medieval Muslim physician, described the systemic circulation, centuries before William Harvey (1578–1657 AD). The historical fact is, however, that although Ibn Nafis discovered the pulmonary circulation, his discovery neither included the systemic circulation, nor was echoed among other Muslim scientists and physicians at that time.<sup>15,16</sup> As another example, in an article, a group of authors tried to find various phrases in different manuscripts of TIM to claim that their medieval authors have depicted a modern description of the female genital anatomy.<sup>17</sup> In fact, each of their referred manuscripts provides just an erroneous depiction of the anatomy, however, by putting many pieces together, the authors have tried to attribute a very advanced anatomical knowledge to the medieval physician/authors of those manuscripts. This method of interpreting scientific textbooks and manuscripts had been named “focusing on the noise instead of the signal” and has been introduced as a risk factor for pseudoscience.<sup>18</sup>

The terrible fact is that some of the most common therapeutic interventions of the TIM that are being prescribed for many patients in their clinics are based on just these flawed anatomical accounts. A notorious example is wet-cupping (*Hejamat* or *al-hijama*) that is based on the obsolete accounts of blood circulation (or non-circulation) described above. It is not unanticipated that the empirical studies have not shown any significant benefits for wet-cupping other than tentative positive effects on pain that can be attributed to the placebo effect.<sup>19</sup> While this obsolete practice still is one of the main interventions prescribed even by ATIM in academic centers.<sup>11</sup>

There is no problem with having a less accurate or flawed account of anatomy in the textbooks and manuscripts inherited from the medieval ages. The problem arises when the schools of TIM teach the same books and the treatments based on those obsolete accounts of anatomy and humoral physiology to their students and prescribe these treatments in their everyday practices for the patients while the patients think that they are medical doctors first and foremost and never

prescribe anything in contrast with the current and valid biomedical knowledge.

### Ignoring the Crucial Advancements of Science

In addition to the erroneous and obsolete anatomy and physiology, the main resources of TIM were authored by the physicians who, obviously, had no knowledge of some of the most crucial discoveries in biomedicine that were made after their time. An obvious example is the germ theory of disease. Nowadays, even a high-schooler knows that the infectious disease, such as Plague, Influenza, Cholera, and Typhus are caused and transmitted by microorganisms. This important knowledge, however, was absent at the time of the main figures of TIM. The proponents and advocates of TIM should explain that how they rely on the theories and practices of physicians who did not know anything about these crucial theories and tried to treat the infectious diseases based on attributing hot or cold temperament to them. The result of this ignorance is nothing but an anachronistic version of medicine.

### Harmful and Futile Interventions

As explained about wet-cupping above in this article, TIM, like other medieval medical traditions, is a rich source of harmful, obsolete, and futile interventions that are based on obsolete and erroneous accounts of human anatomy and physiology. There are countless examples. In the beginning of the twentieth century, before the establishment of modern academic institutions in Iran, the only available medicine for the people was TIM. There are many reports of the treacherous, injurious, and pointless treatments imposed by the practitioners of TIM to their patients. In his book, *Public Health in Qajar Iran*, Willem Floor portrays some of the practices of these TIM practitioners. For example, at the time of the Cholera outbreak, believing that Cholera has a warm temperament, they prescribed immersion and plummeting the patients into the chilling cold water. This treatment killed some patients who could have survived the disease itself.<sup>20</sup>

In the contemporary TIM, also, various kinds of purging, venesection, leech therapy, wet-cupping, etc. are being performed, mostly without any scientific supporting evidences and based on the medieval understandings of human physiology and pathophysiology. Another example of such practices is leech therapy for treating varicocele (pathological enlargement of the veins within the scrotum that should be treated by surgery).<sup>21,22</sup>

The sad reality is that recruiting medical doctors as the students of the PhD courses of TIM has not lived up to this expectation that they appraise the safety and efficacy of the interventions with the knowledge and

wisdom of the graduates of modern medical schools. Although it was claimed that the medical knowledge of the students and practitioners would guarantee the safety of their methods,<sup>23</sup> in the real world, many of them have simply succumbed to the attractiveness of selling risky pseudoscientific and untested methods of TIM.

### The World Health Organization and TIM

The advocates of TIM frequently appeal to the World Health Organization (WHO) publications, including the Executive Board and World Health Assembly Resolutions and the *WHO traditional medicine strategy: 2014–2023* to argue that the validity and worth of the traditional medicine is approved and supported by the highest-ranked international governing organization in the field of public health.<sup>24</sup> This argument, however, ignores some crucial points: (1) A general recommendation or plan by an organization cannot be appealed in an academic debate, unless the grounding arguments and evidences has been evaluated and appraised. Therefore, instead of emphasizing on what the WHO stated, it should be sought that what arguments and evidences support that statement or policy. (2) International organizations are not always unbiased academic institutions. Sometimes, they are venues for political lobbying and pursuing special or national interests. Influential countries that gain huge amounts of profit by selling their Traditional Medicine products do their best to promote such practices in the international institutions. A typical example is China. It is not surprising to see these lines as the acknowledgment part on page 5 of the *WHO Traditional Medicine Strategy: 2014–2023*: “The government of the People’s Republic of China kindly provided financial support for the development of the document. The government of Hong Kong SAR, the People’s Republic of China and WHO Collaborating Center for Traditional Medicine in Hong Kong provided technical, financial and logistical support for the meetings of three working groups, the development and the printing of the document.”<sup>25</sup> (3) One of the main goals of the *WHO Traditional Medicine Strategy: 2014–2023*, as specified in its executive summary, is: “promoting the safe and effective use of TM (Traditional Medicine) by regulating, researching and integrating TM products, practitioners and practice into health systems, where appropriate.”<sup>25</sup>

The question is that how the health systems and their authorities can verify the safety and effectiveness of the treatments attributed to TM? The only valid and reliable way to achieve this purpose is designing and conducting good clinical research and producing scientific evidences to approve or reject the safety and effectiveness of each treatment based on the standards of evidence-based medicine. This is the only ethically justified approach

to TM, or any other sources of therapeutic hypotheses, in medicine. The next part of this article explains this approach.

### Science and the TIM

Although there are many controversies on the exact meaning and boundaries of the science, except a tiny gray zone, the boundaries of biomedical science are consensually obvious. In the realm of clinical medicine, for example, the scientific medicine is embodied in the evidence-based medicine (EBM).

In Iran, like other countries with a regulatory system for medications and medical interventions, it is consensually accepted and demanded by the law that each new treatment must be evaluated through the methods and mechanisms of the EBM and only the ones with proven safety and efficiency are eligible to be marketed and to be prescribed by the healthcare providers. This consensual rule is the result of a bitter history of countless tragic harms imposed by the fraudulent and untested treatments who made exaggerated and boundless claims and after a while and after imposing serious harms to many people, proved to be false and deceitful. In the EBM, each valuable medical hypothesis (e.g. a new formulation or herbal species that is supposed or assumed to be useful for treatment of certain conditions) must be assessed by a series of valid scientific methods (e.g. Blinded and Controlled Clinical Trials) before being introduced as a useful and safe treatment.

The heritage of TIM (encompassing medical manuscripts and the health-related beliefs and practices of the public and local sages) is a great resource of valuable hypotheses about new remedies and treatments. There are many potentially beneficial treatments described in these manuscripts or used by the practitioners or even local healers and sages over a long history until now. Many of these treatments use local plants and natural products that in some cases, are unique to the local environment. Nobody can claim that all the treatments included in this rich heritage are useless or each of them is useful. They are just hypotheses. This rich resource and medical hypotheses should be explored and examined by the researches who know the TIM very well and are experts in biomedical research and evidence-based medicine as well. If each of these potential treatments prove to be efficient and safe through the clinical trials, it will be included in the arsenal of the modern and evidence-based medicine. As a matter of fact, this was the main and reasonable logic behind establishment of the academic institutions for TIM, including the schools and research centers. These centers were (and are) supposed to be exploring the resources of TIM and find reasonable medical hypotheses and design and conduct clinical trials

to examine them and introduce new evidence-based treatments, rooted in TIM, to the world of biomedicine. That is why these schools has been allowed to recruit PhD students (not clinical residents).

It has also been claimed that some pharmaceutical companies have been used the herbal resources and medical heritage of the countries and communities of the global South without sharing these countries and communities in the achieved benefits. A phenomenon that had been called "bio-piracy".<sup>26</sup> TIM can prevent the bio-piracy by taking precedence in finding, testing, and patenting the potentially useful herbal remedies.

The academic departments and centers of TIM, however, has not been successful in presenting such medications yet, despite their initial premises and promises that the TIM is a treasure of uncovered ideas and forgotten natural medications. Although they have conducted some research projects and published some articles to show some beneficial effects of certain herbal remedies, however, there has been no instance of a medication founded and tested by TIM that is superior to its current counterpart in modern medicine for treating a significant ailment. There are, however, still hopes that with further research, there will be some noteworthy achievements in the future, similar to the ones previously provided by some other branches of traditional medicine in other countries.<sup>27</sup>

In fact, the academic institutions of ATIM has taken a very different path from what they were legitimately supposed to. Since the very beginning, they have started training their PhD students like clinical residents. In the words, they have focused on training practitioners of TIM to practice it as a branch of alternative medicine in their clinics of private offices. However, in the field of research, they have not introduced even a single new treatment that has been proved to work better that its current counterpart in modern medicine yet.

Therefore, one can reasonably claim that the ATIM has been unsuccessful and forgetful in the terms of its main mission that is research on the resources of TIM and introduce new treatments through valid research. Instead, has put most of its efforts in training practitioners who practice based on a bunch of obsolete and pseudoscientific theories (humoral medicine) and use untested remedies and treatments. In addition, in some cases, the proponents and practitioners of TIM have tried to argue that the meaning and methodology of clinical experiment in TIM is different from allopathic medicine and the process of production and appraisal of evidences in TIM is unique.<sup>28</sup> Obviously, these claims are false and are only made to find a way out of the demanding process of valid and scientific research and evidence-based medicine.

### Ethical Issues in Research on TIM

Regardless of the level of success and productivity, the TIM research has also raised some major ethical concerns. For instance, science validity is one of the basic prerequisites for any research project, especially the clinical research, to be considered ethical and receive Institutional Review Board (IRB) clearance.<sup>29,30</sup> It has been argued that the political support for pseudoscientific accounts of medicine, has sometimes eroded the ethical bases of health research, especially in the Global South.<sup>31</sup> Each therapeutic hypothesis should be scientifically valid to be tested on the human subjects. The proponents of TIM argue that the interventions that have been described in the classical textbooks of TIM all entail valid research hypotheses. Therefore, the current regulations in Iran, has exempted the treatments described in such books from a number of requirements of EBM, including the animal phase of research and Phase I of clinical trial!<sup>32</sup> These regulations are unfounded and potentially dangerous since many of these treatments might be a mistaken copy of the older Greek manuscripts.<sup>12</sup> Therefore no discrimination in favor of TIM (or any other sources of hypotheses) is justified in clinical research.<sup>29</sup>

The false claims such as playing with words to name the obsolete humoral medicine as a kind of personalized medicine<sup>33</sup> won't be beneficial for TIM in the long term. The only bright way ahead of TIM is complete adherence to the scientific and ethical criteria and standards of EBM that equates designing and conducting good research in order to introduce new treatments to EBM out of the rich resources of TIM. Searching shortcuts and rationalizing any bypasses of EBM will only deviate ATM into its quackery and pseudoscientific stream.

### Conclusions

TIM is a term that belongs to the history of science and refers to the achievements (and failures) of Persian physicians and medical scientists over the ancient and medieval era. However, it does not refer to a currently valid and legitimate school of medicine that serves as an alternative for the evidence-based medicine. As a matter of fact, medicine, just like physics, biology, chemistry, astronomy, and other branches of science, in their valid and modern accounts, are global and cannot be divided into Western, Iranian, Chinese, Indian, or other branches. These terms and categories are only useful in depicting the historical developments of scientific ideas, theories, and practices. Preserving some theories – such as the obsolete theory of humors and temperaments – at any cost to keep the “traditional” identity of a branch of medicine is clearly unscientific. No theories or premises can be kept out of scientific scrutiny just to safeguard an identity. This is the main problem that deviates ATIM

from scientific methodology and ethics.

At the same time, TIM, like other branches of traditional medicine all over the world, is a rich resource for hypothetical treatments, mostly herbal remedies that can be studied, and if seemed safe and effective, can be tested through clinical trials, and if proven safe and effective, can be presented to the market. In this case, the newly presented remedy, regardless of its origin, will be a part of the current and valid EBM. EBM, because of using the best yet achieved scientific methods for examining the safety and efficacy of its treatments, is the only valid and ethically justified medicine to be taught in medical schools as the foundation of prescriptions made by healthcare professionals.

This paper suggests that the governing bodies of the Iranian public health sector, especially the MOHME as the main governmental body, have the following duties to safeguarded public health and ensure valid and legitimate medical practice in the country: (1) taking serious regulatory and disciplinary actions against the various kinds of medical superstitions promulgated by QTIM. The proponents of QTIM have every legal right to take advantage of freedom of speech and to write and talk about their ideas. However, illegitimate interference in medical practice, establishing private offices and clinics, prescribing untested, unfounded, and harmful treatments for patients, and deceitfully depriving patients from their needed treatments, must be banned. In addition, this paper suggests MOHME to take more serious steps in providing public education regarding quackery medicine and promoting scientific literacy. (2) The institutions of ATIM should be directed toward their original mission that is research on TIM and enrich the EBM by presenting new remedies and treatments originated from the rich resources of TIM. This kind of research is considered very valuable. This paper suggests that research institutions should take serious steps toward strengthening the scientific validity and methodological integrity of their TIM research projects to actualize every hidden potential of TIM in introducing safe and effective treatments to EBM. (3) At the same time, practicing based on the pseudoscientific and obsolete accounts of medicine and erroneous medieval knowledge on human anatomy and pathophysiology should be ceased in favor of public health and safety. Practicing medicine based on the medieval knowledge and standards, even by the graduates of allopathic medical schools, is potentially harmful and a serious waste of resources. Therefore, this paper suggests that the activities of houses of health and other offices and clinics that provide healthcare based on TIM under the approval and endorsement of medical universities to be ceased since it is a misuse of the authority and legitimacy of allopathic medicine while



the patients have no idea regarding the great differences between the valid and evidence-based medical practice and the practice based on the medieval obsolete understandings of human body and biomedical science.

#### Conflict of Interest Disclosures

None.

#### Ethical Statement

Not applicable.

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