



## The Performance of Trauma Research Centers of Iran during the Past 10 Years; A Science Monitor Survey

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### ABSTRACT

**Objective:** To compare and evaluation of scores of trauma research center of Shiraz University of Medical Sciences in Iran with other trauma research centers in Iran.

**Methods:** The assessment scores of each center were gathered from Iran medical research and Ministry of Health and Medical Education website. Each score is recorded in helical year which is defined from the 21<sup>th</sup> of March of every year until the 20<sup>th</sup> of March of the next. They are ranked and scored by knowledge production, capacity development, and research projects.

**Results:** The total evaluation scores of the trauma research center of Iran's Universities of Medical Sciences have increased from establishment. The highest increase in assessment scores was related to Tehran Trauma Research Center. An upward trend was observed in the total indicators of knowledge production index of all the trauma research centers from 2001/2002 to 2011/2012. An ascending trend was showed in the published articles score of Shiraz and Kashan Trauma Research Centers through the recent years.

**Conclusion:** The increasing trend in scores of trauma research centers in Iran indicated a significant role in the knowledge production but it is need to find barriers of research and doing interventional projects to promote trauma care and prevention.

**Keywords:** Trauma research center; Evaluation score; Shiraz; Iran.

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### Introduction

Injury is one of the main causes of mortality and disability around the world, resulting in 5.8 million loss of lives annually. This comprises 10% the deaths worldwide [1,2] besides, it is considered as the major reason for loss of lives in most developed countries [3]. Among all the reasons for injury-related deaths, Road Traffic Injuries (RTIs) account for 23% of lives lost and the ninth main cause of the global mortality in 2004 [1]. The importance of this public health issue

is expected to considerably increase; it is believed that RTIs will be the fifth major cause of death by 2030, leading to approximately 2.4 million lives lost. RTIs can affect all regions, but low- and middle-income countries bear the brunt worldwide. [1].

In 1998, nearly 1170 694 individuals died due to road traffic injuries around the world, of which 88% were in low- and middle-income countries [4]. In Iran, road traffic accidents are considered as the second main causes for mortality next to coronary heart disease.

RTIs have continuously increased over recent years. Moreover, the data related to 1995-2000 have shown an 8% annual increase in the mortality associated with road traffic accidents [4]. The risk of injury has been revealed to be related to the social determinants of health, including income and social status, social support networks, education, employment/working conditions, social environments, physical environments, personal health practices and coping skills, healthy child development, biology and genetics endowment, health services, gender, and culture. In spite of the fact that the mechanisms of interaction of these determinants with the risk for injury has not yet been established, the evidence shows that these factors are significantly associated with an individual's risk for most injuries [5].

Each country needs to conduct research to improve their knowledge about prevention and care. In addition, the evaluation of education and outputs of scientists and physicians is essential for academic development [6]. The establishment of research centers, as general policies of the scientific community, promotes the growth and prosperity of societies. One of the missions of the university is organizing and coordinating the activities of the research centers in order to promote and apply scientific research. Research centers as the centers of knowledge production should be carefully evaluated based on the indicators, such as knowledge production, making capacities, and research projects. By evaluation of the universities and research centers, their trend of growth, reduction, or probable disruption in knowledge production can be identified [7,8].

International organizations, such as bureaus for economic co-operation and development or the statistical office of the European Communities, and national agencies, such as the National Science Foundation, have developed a wide range of indexes comparing mapping knowledge, establishing science, and technology performance across the regions worldwide. Nevertheless, although these reports emphasize different issues relating national or regional Science and Technology (S and T) systems, they normally consider the published data according to aggregate absolute numbers and their tendencies over time. World economies mostly rely on knowledge for reaching sustainable development and competitiveness in global markets. Thus, it is not surprising that knowledge production through formal learning processes, including research and development, has significantly increased potentials and considered essential for any economy [9].

Recently, a review of utilization of science in policymaking within the European countries showed that although inclusion of scientific evidence within

policy was a critical input regarding developed legislation and decision making, there were also signs of limitations influencing the application of scientific information [10].

Financial and management planning in research organizations are significant factors in research centers. Moreover, achievement requires annual evaluation of the research activities compared with their output in the previous years. Since upgrading and evaluation of the research activities, especially research centers, greatly contribute to the promotion of the university in countries and across the world, the results can help improve the managers' understanding of the current situation and the past trends and also provides guidelines for planning the research management in the university. They also help identify the shortfalls and take actions to reduce the shortcomings and strengthen the positive aspects in order to develop effective indicators to improve the evaluation processes. There are 5 active trauma research centers (TRCs) in Iran all affiliated with medical universities of Iran ministry of health and medical education. The aim of the present study was to compare the performance of these TRCs during the previous years from a science monitoring point of view.

## Materials and Methods

In this study, all the established TRCs of Islamic Republic of Iran were evaluated in 2013. The data were gathered from the documents approved by the Ministry of Health and Medical Education. The data are archived in medical research data management portal (Iran medical research center) [11], and the Ministry of Health and Medical Education website [12]. Research centers are classified by the Ministry of Health and Medical Education into six groups, characterized by the following: 1) a separate budget with clinical activity, 2) a separate budget with biomedical activities, 3) no independent budget and with more than three years of clinical activities, 4) no independent budget with more than three years' experience in biomedicine, 5) no independent budget with one to three years of clinical activities, and 6) lacking independent budget with one to three years of biomedical activities. In general, all the research centers in Iran ranked and scored by knowledge production, capacity development, and research projects. Each TRC aggregates their gained scores of the above mentioned indexes and enters the related items in Iran medical research portal every year. The evaluation score of each center is recorded from the 21<sup>th</sup> March to the 20<sup>th</sup> March of the next year. These data are checked and confirmed by the experts of the Ministry of Health and Medical Education. The knowledge

production score is computed as the sum of the scores of these from different grades, papers extracted from theses and collecting books and chapters in textbooks, papers presented at international and domestic congresses, citations to published articles, reference to the papers affiliated to the centers in the textbooks, invention, innovation, localization technology, recording gene and microorganism, non-indexed domestic or foreign articles, and the articles indexed in the first (web of science), second (Medline/Pub med), third (Biological Abstract, Embase, Chemical Abstract, Scopus), and fourth types of indexing (in other professional indexes). In addition, the research projects score is calculated as the sum of the scores of the projects funded by foreign sources, projects with at least 30% of their budgets provided by public and private sectors, and intervention projects resulting in a change in policy of management and delivery of health services, health promotion, and clinical guidance. Finally, the capacity development score includes hosting the academic and student research tours, national conference, international conference, the top-ranking in Razi and Kharazmi Festival, and official collaboration with international organizations called collaboration centers (Tables 1, 2 and 3). This study assessed and analyzed the trend of scores and indexes of all the TRCs in Iran using Excel software and descriptive statistics.

## Results

There are six TRCs affiliated with Iranian universities of Medical Sciences in 2013, including Tehran TRC with 11 years of activity, Kashan TRC with 9 years of

activity, Baghiyatallah TRC with 4 years of activity, Shiraz TRC with 4 years of activity, Gilan TRC with 1 year of activity, and the newly established Kashan trauma nursing research center. The results of evaluation of these research centers were available until March 2012. According to Figure 1, the total evaluation scores of the TRC of Iran's universities of Medical Sciences have increased from establishment until 2012. In addition, the highest increase in evaluation scores was related to TRCs of Tehran University of Medical Sciences which ranked topmost among these centers in 2012. Trauma research center of Shiraz University of Medical Sciences is the fourth center after TRC of Tehran, Baghiyatallah, and Kashan universities of Medical Sciences.

According to Figure 2, an upward trend was observed relative to the total indicators presented in Table 1 of knowledge production index in all the TRCs from 2001/2002 to 2011/2012. Considering the score of published articles as one of the important indicator of knowledge production index presented in Figure 3, the highest score was related to the TRC of Baghiyatallah University of Medical Sciences. Although the TRC of Tehran University of Medical Sciences has the highest score of knowledge production index, the scores of its published articles is lower than those of the TRC of Baghiyatallah University of Medical Sciences. This indicates that the score of knowledge production index of the TRCs of Tehran University of Medical Sciences is largely due to gaining scores from other indicators rather than from the published articles. Moreover, the Figure 3 shows an ascending trend in the published articles score of Shiraz and Kashan TRC

**Table 1.** Criteria for evaluation of the performance of the research centers regarding knowledge production index.

Scoring	Knowledge production index
25 points per writing a chapter	Writing reference book
0.5 points for presenting articles through posters and lectures	Articles presented at national congresses
3 points for presenting articles through lectures and 0.5 points for their presentation through posters	Articles presented at international congresses
2 points per reference	Number of references of the articles published by the research center
25 points per reference	Reference to the center's articles in indexes
Up to 50 points for national invention registration Up to 100 points for international invention patent	Innovation, discovery, patented invention, localization of technology
25 points + 2 (impact factor) for web of science indices 25 points for Medline/Pub med 15 points for chemical abstract, Embase, Scopus, biological abstract	Original articles published by the first or corresponding author by the research center, 70% of the computed score for the second and other authors
10 points for the articles published in indexed journals in other special indexes	For review article: The points multiplied by 1.4 For short communication: The points multiplied by 1.2
5 points for the articles published in reliable foreign non-indexed journals	For Case report: The points multiplied by 1.3
5 points for the articles published in reliable national non-indexed journals	For Letter to editor: The points multiplied by 1.4

**Table2.** Criteria for evaluation of the performance of the research centers regarding research projects axis index.

Scoring	Research project axis
5 points per \$10,000	Projects supported by external resources
13 points per 100 million Rials	Gaining budget from national public or private organizations
100 points	Interventional projects leading to change in policymaking and improvement of society's health and clinical guides

**Table3.** Criteria for evaluation of the performance of the research centers regarding capacity building axis index.

Scoring	Capacity building axis
100 points per case	Holding international congresses
5 points per day	Holding national congresses
100 points for the first rank 70 points for the second rank 50 points for the third rank 50 points for high-rank books	Gaining high ranks in Razi and Kharazmi festivals
50 points per year	Formal cooperation with international organizations, WHO, UNICEF, etc.

through the recent years, while that of Tehran TRC exhibited a descending trend.

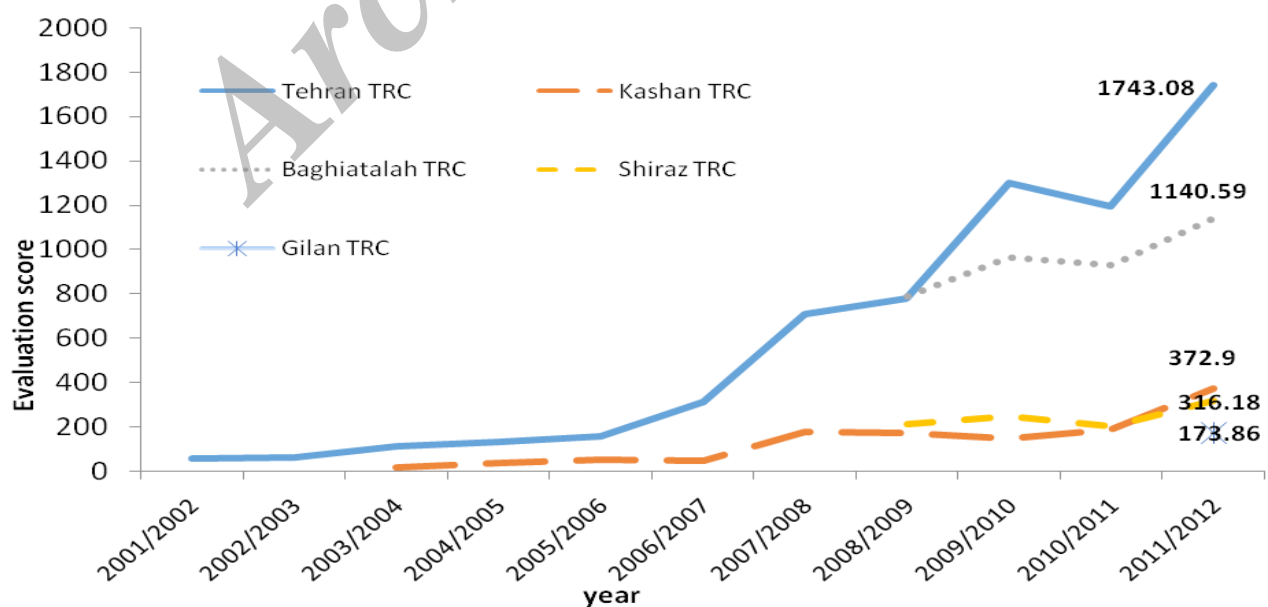
According to the study results and Figure 4, TRCs of Tehran and Kashan universities of Medical Sciences were active regarding the indicators of research projects in 2001-2010; however, these centers did not obtain any scores from research projects in 2011-2012. In this regard, the TRC of Tehran University of Medical Sciences gained the highest score which was 38, in 2001.

According to Figure 5, during 2002-2012, all the TRCs of Iran's universities of Medical Sciences were active and gained scores in capacity development. This score in Baghiyatallah TRC and Shiraz TRC

was higher than that of Tehran TRC in 2011. Besides, Kashan TRC had no scores in this area for three consecutive years (2009-2012).

As shown in Figure 6, considering 4 years of activity, the TRC of Baghiyatallah University of Medical Sciences has the highest score, whereas the TRC of Kashan University of Medical Sciences with 9 years of activity has the lowest score.

According to the table 4, the highest and lowest proportions of published papers scores to total score were related to TRC of Shiraz University of Medical Sciences and TRC of Tehran University of Medical Sciences, respectively.



**Fig. 1.** The total assessment scores of all TRCs according to the documentation of the Ministry of Health and Medical Education from 2001/2002 to 2011/2012.

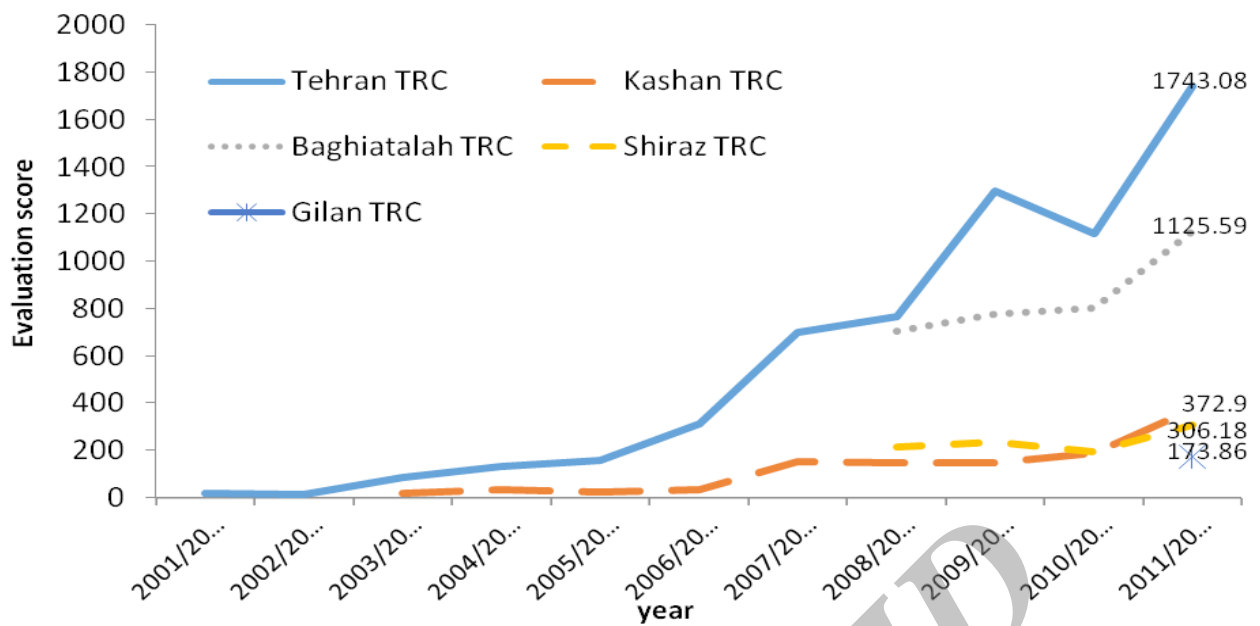


Fig. 2. The assessment scores of all the TRCs regarding knowledge production according to the documentation of the Ministry of Health and Medical Education from 2001/2002 to 2011/2012.

**Discussion**

Since trauma is one of the main causes of death in Iran, new research centers in the field of trauma have been established in our country. This study evaluated the activities of TRCs in terms of three indices of knowledge production, capacity development, and research projects. The increasing trend of the scores of TRCs in Iran (Figure 1) showed their significant roles in the production of science and publication of articles by these centers in the fields of trauma and accidents. Among these centers, the TRC of Tehran University of Medical Sciences held the highest scores in 2011 compared to 2001. Furthermore, among

the centers with at least 4 years of activity, the TRC of Shiraz University of Medical Sciences ranked fourth, indicative of its decline over the past year. The trend of knowledge production scores (Figure 2) and comparison of Figures 1 and 2 showed that the scores gained by research centers attributed mainly to knowledge production index, and total scores, as demonstrated in histograms and indices related to knowledge production, are compatible with each other. The highest score in the index of knowledge production belonged to publication and citation of papers. As the reference to paper is an effective indicator of knowledge production index, the obvious

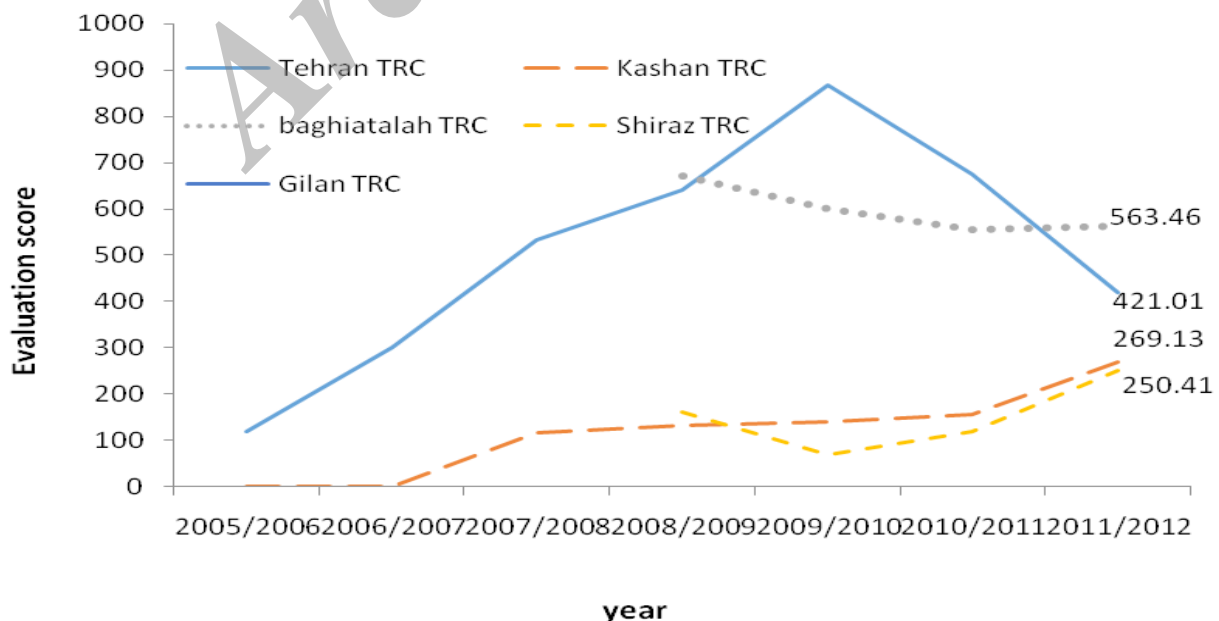


Fig. 3. Evaluation of the centers' scores based on the articles published by the centers from 2005/2006 until 2011/2012.



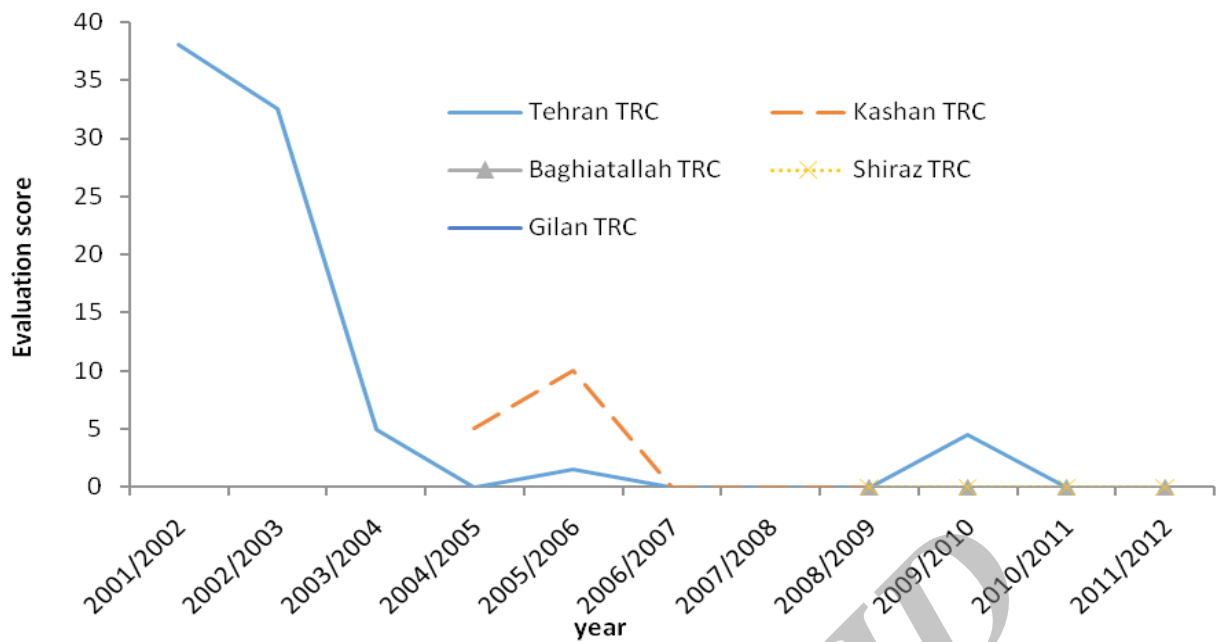


Fig. 4. The assessment scores of the research projects index of all TRCs according to the documentation of the Ministry of Health and Medical Education from 2001/2002 to 2011/2012.

downward trend in published articles (Figure 3) in Tehran TRC will impact the knowledge production index in this center in coming years.

Lack of scores in the index of capacity development and research projects in all TRCs reveals the need for holding international congresses, the country's formal cooperation with international organizations and overseas funding bureaus, and implementation of interventional projects to change the policy and health promotion. According to Figure 5, considering the years of activities of the TRCs, the center of Baghiyatallah University of Medical Sciences has obtained the highest scores based on the years of

activity. According to Figure 2 and comparison of the number of articles of the TRCs, the center of Baghiyatallah University of Medical Sciences had the largest number of published articles in 2011. However, its scores of knowledge production were lower than those of the TRC of Tehran University of Medical Sciences. In fact, most of the scores of the TRC of Tehran University of Medical Sciences in the knowledge production index are related to citation of articles which is proportionate to the years of activity. Inequality in the scores of the TRCs of Iranian University of Medical Sciences based on the years of activity might be due to unequal financial support and

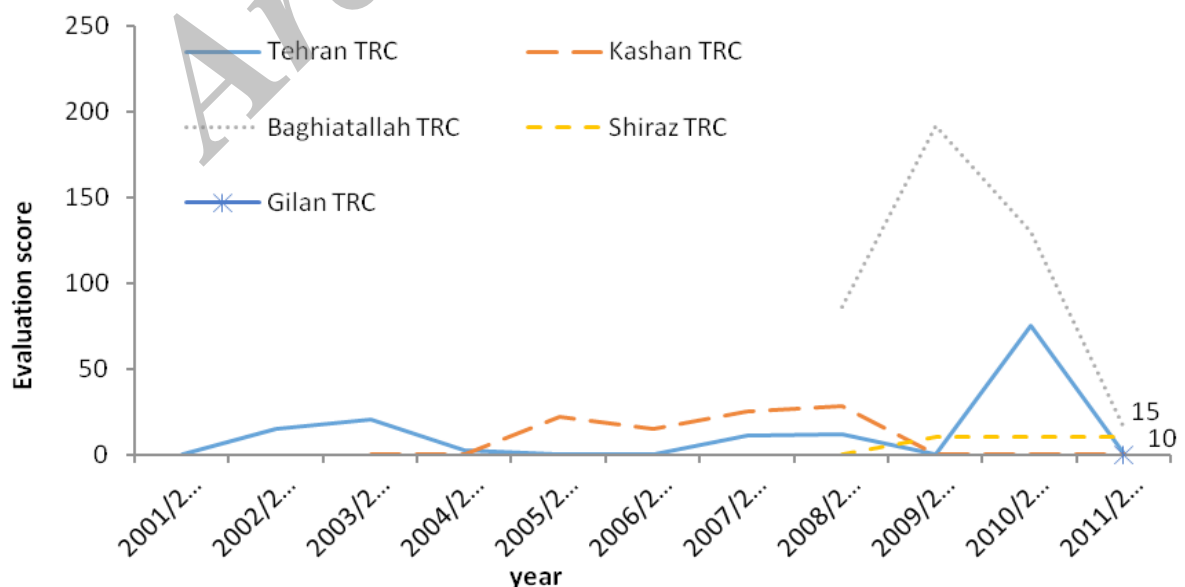


Fig. 5. The assessment scores of capacity development of all the TRCs according to the evaluation of the Ministry of Health and Medical Education from 2001/2002 to 2011/2012.

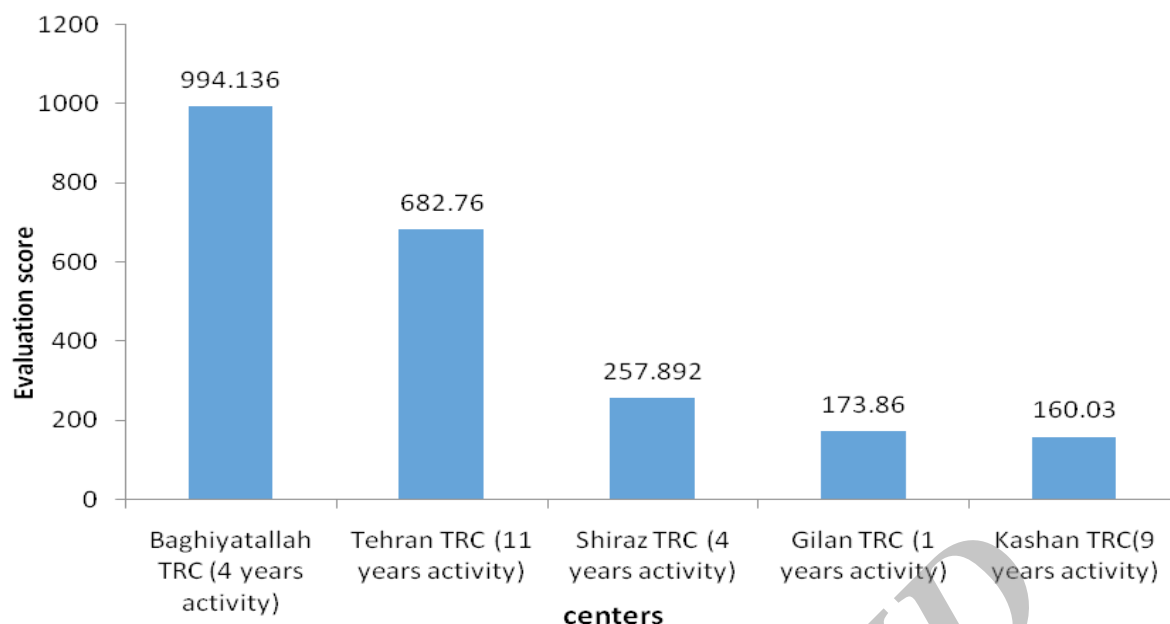


Fig. 6. The evaluation scale based on the years of activity of the TRCs of Iran University of Medical Sciences

the number of academics in these centers. However, the score of Shiraz TRC based on the years of activity was lower than that of Baghiyatallah and Tehran TRCs. Nevertheless, the increasing trend of the scores of the published papers by Shiraz TRC is a positive point for the center's score gain in future.

Although the increasing trend in the evaluation of scores of TRCs is evident in our country, lack of equipments and research facilities are considered as the most important barriers to research in Iran [13-17]. These problems are intended in other developing countries due to economic restrictions and financial barriers [18,15].

Shiraz TRC is located in Rajaiee hospital, a 200-bed governmental academic adult trauma establishment, affiliated with Shiraz University of Medical Sciences. This hospital has comprehensive experience, substructure, and adequate government funding to sustain a high level of intensive care for severely injured trauma patients, and provides the best

opportunity for conducting research and promotes trauma prevention and care. The evaluation of the TRC of Shiraz University of Medical Sciences shows that this center has declined in rank, hence the attention of its members are drawn to the following:

- 1- Trying to publish more article in high index journals
- 2- Presentation of articles at national and international congresses
- 3- Designing interventional projects to promote trauma care and prevention
- 4- Acquisition of funding from governmental and foreign agencies and arranging formal cooperation with international organizations

This survey suffers some limitation, which is due to the fact that all TRCs were not comparable in terms of allocated budget, financial support, and the number of academics. Therefore, further studies are recommended to compare the centers with respect to the allocated budget, financial support, and faculty

Table 4. The proportion of the scores gained from the published papers to the total score in national TRCs in 2005-2012.

Year	2005/2006 Paper/total (%)	2006/2007 Paper/total (%)	2007/2008 Paper/total (%)	2008/2009 Paper/total (%)	2009/2010 Paper/total (%)	2010/2011 Paper/total (%)	2011/2012 Paper/total (%)
Tehran	119.5/159.03 (75.14)	301.13/313.3 (96.16)	534.1/710.8 (75.14)	642.3/780.1 (82.23)	868.3/1301.8 (66.69)	421.01/174.0 (24.15)	675/1194.5 (56.50)
Kashan			117/177 (66.10)	132.3/176.3 (75.04)	139/148.5 (93.60)	155.3/159.03 (75.14)	269.13/372 (72)
Baghiyatallah				672.7/790.2 (85.13)	600.6/967.1 (62.1)	554.2/932.2 (59.345)	563.46/1140.5 (49.40)
Shiraz				161.9/210.5 (76.9)	69.3/244.6 (28.33)	120.4/202 (59.60)	250.41/316 (79.19)
Gilan							90.17/173.8 (51.86)

members.

Overall, since the organizational barriers and lack of adequate supporting managers were considered as the research impediments [19,20], the results of this study can help the managers and policymakers to explore the current status and the previous trends of these centers. This study provided insights into the planning a university research management system to identify and address the deficiencies, enhance the positive aspects, reinforce the indicators for more efficient evaluation of each center, and to conduct appropriate investigations to discover research

barriers, and methods to solve the existing problems.

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