The structure of the pharmaceutical market in Iran using concentration indices

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Abstract

Background and objective: The efficiency and function of the pharmaceutical sector, as a vital portion of the health system, have a significant effect on intermediate and final indices of health. In this research, the structure of the pharmaceutical market in Iran was examined through the calculation of concentration indices in 2011.
Methods: In this cross-sectional study, the needed data was gathered from the Food and Drug Administration in the year 2011. Data were analyzed using SPSS software version 20 and Microsoft Office Excel software. Finally, two common measures of market concentration, the Concentration Ratio and the Herfindahl-Hirschman Index, were calculated.
Results: The largest and the smallest shares of the industry were 5.57% and 0.01%, respectively. The average industry share was 1.09%. The share range was calculated to be 5.56%. The Herfindahl-Hirschman Index was 248.5, which indicates a very low concentration of the pharmaceutical market in Iran. Also, based on the Concentration Ratio of 4 companies (18.39%), the concentration of the pharmaceutical market has been too low.
Conclusion: The pharmaceutical market in Iran has a very low concentration and it does not have an exclusive mode in terms of market structure. Therefore, it can be attributed to the competitive model. The policy makers in this area can use this characteristic as a leverage to improve efficiency, fairness, revenue and health indices.
Keywords: Drug, Pharmaceutical Market, Concentration, Index, Iran

1. Introduction

Nowadays, the pharmaceutical industry is gradually gaining the number one position among the different industries throughout the world (1). Products of the modern pharmaceutical industry have improved the outlook for patients with many different disorders. Pharmaceutical companies have been successful in drug manufacturing based on scientific explorations. Despite these successes, pharmaceutical companies have been increasingly publicly criticized (2, 3). Despite lower prices of drugs in international markets, accessing some of the essential medicines is difficult (4). Many patients in poor countries cannot get access to the drugs required for their treatments because of the high prices of the medicines. The prices are set by producers who benefit from an exclusive opportunity (5). The competition is therefore influenced by market concentration and this issue is a key concern of agencies, policy makers and legislators (6). Furthermore, the investigation of impacts of policies focusing on improving equity and equality in access to required medicines, is a matter of great importance to efficiency in the pharmaceutical industry (1). The pharmaceutical market size in Iran has increased 6.8 % in terms of volume and 18.5 % in terms of value since 2001 (7). The growth rate of this market has been considerable in Asia. The reasons for increased dependence

on pharmaceutical products, and the growth of this market in the region include population changes, increased life expectancy, increased health care costs spent by governments, increased health awareness among consumers and chronic diseases along with changes in lifestyle (8). The expansion of this market has been due to companies which have investigated production, research, and capacity development of the pharmaceutical sector in Iran. This capacity is such that domestic firms have more than 95% of the drug production share (7). In economic studies, the Herfindahl -Hirschman index is a measure calculating the rate of concentration while giving more weight to large corporations; i.e. an industry or market exclusivity or concentration is measured based on the existence of companies having the most share of the market or industry (9). This index is a measure of market concentration in regions which are served by service providers; the mentioned measure is based on the market share of all providers in a certain market (10). This index uses the information of all industry agencies. To obtain this index, the sum of squares of size share (production, sales, assets, labor and etc.) of all agencies in the industry or market is calculated (11). Concentration ratio is also an index which is calculated through total share of sales in large industrial agencies. Concentration ratio index investigates only large industrial agencies (12). Regarding the importance of the competition and performance in the pharmaceutical market in Iran and their impacts, this study aims to investigate the current situation of the pharmaceutical market using indices of Herfindahl-Hirschman and market concentration ratio.

2. Material and Methods
This descriptive cross-sectional study aimed to investigate the structure of the pharmaceutical market in Iran by calculating Herfindahl-Hirschman indices and the concentration ratio in 2012. In this study, the research sample included 91 companies active in manufacturing and medicines in Iran. Given the limitation of the population, census sampling method was used to select samples. The data were gathered from the Food and Drug Administration in the form of Microsoft Office Excel spread sheets. Statistical analysis was performed using IBM© SPSS© Statistics version 20 (IBM© Corp., Armonk, NY, USA) and Microsoft Office Excel were used in order to analyze the data, and the findings were demonstrated in the forms of tables and diagrams. Finally, the pharmaceutical market in Iran was analyzed through calculations of indices of Herfindahl-Hirschman and concentration ratio for 4 companies. The concentration ratio index shows the percentage of total sales in the industry which is built by its agencies. Commonly, the concentration ratio of 4 companies is used in economic studies (13); in this study, the same ratio is calculated. In order to calculate the Herfindahl-Hirschman index, weights are given to each agency based on its share value in the market. This index ranges from 0 to 10000 points ($0 < H < 10000$) (11). The following steps were taken in order to calculate this index: First, the percentage share of each company was calculated. After calculating the square of each company's share volume, the sum of squared percentage shares shows the Herfindahl-Hirschman index.

3. Results
Based on the descriptive analysis of the data, while the largest share of the industry was 5.57%, the smallest share was 0.01%. Also, the average share of the industry was 1.09%. The range of shares in the industry was 5.56%. Concentration-distribution indices show that the shares of the companies in the industry are almost symmetrically distributed. Sales Percentage Share of four Pharmaceutical Corporations and Concentration Ratio was 4.1522, 4.2903, 4.3712 and 5.5734 respectively, and total sum of them was 18.3871 (CR4=18.3871). The Herfindahl-Hirschman index was determined to be 248.5. It shows the low concentration of the market in Iran. Also, according to the obtained value for the concentration ratio of 4 large corporations (18.39%), it can be concluded that the pharmaceutical market in Iran is nearly a competitive market.

4. Discussion
Ensuring access to medicines and appropriate use of affordable, effective and healthy drugs are two most important functions of an effective health system (14). In addition, most of the countries adopt policies for price setting in order to deal with the exploitation of price in the market (15). The pharmaceutical market size in Iran has increased 6.8 % in terms of volume and 18.5 % in terms of value since 2001 (7). According to the findings of this study, the share of 4 pharmaceutical corporations in the industry was almost 1/5 of the total industry. It means that these 4 corporations could not seize a large portion of the market. Therefore, the market share of each corporation was not concentrated in the hands of some certain agencies and the market is not governed by exclusivity power. Hence, we can mention that the pharmaceutical market in Iran is not exclusive. Exclusivity can have negative effects on the welfare of the society. Market concentration makes it difficult for new products to easily get into the market and thus it decreases the accessibility (16). The lack of exclusivity in the pharmaceutical market in Iran can be considered as a strong point to improve the efficiencies of this section. The government can use this potential in

order to build a competitive market of medicines based on generic names, and this can bring many achievements for the health system. In a study conducted by Cameron and Laing, they stated that shifting the style of medicine purchase from original brands to generic names can contribute to cost saving in the health system (17). Based on the analysis of available data, the Herfindahl-Hirschman index for the pharmaceutical industry in Iran was determined to be 248.5. This value is small and shows that the concentration in Iran's pharmaceutical industry is low. Therefore, this industry is not considered to be exclusive. However, some features of a competitive industry may be also true for this industry. Hinkonen and Tamminen do not confirm such a conclusion for the twelve-branched group of medicines in Finland (18). Torres and Gutierrez conducted a study investigating the Mexican pharmaceutical industry. In this study the authors stated that the pharmaceutical market of this country has a multilateral exclusivity (19). The pharmaceutical industry in Iran has had an increase in efficiency and competition. The cause of these changes might be the special modifications which have been recently imposed on this industry. Some of these changes included removal of regulations and performance facilitation in domestic pharmaceutical companies, allowing market entry and investment for the private sector and the establishment of private pharmaceutical companies, increasing the production of medicines by companies and executing motivation policies (1). According to the classic theories of microeconomics, the existence of exclusivity in an industry causes some of the production agencies to have market forces and influence on prices, through decreasing production supplies (13). The pharmaceutical market is just like other markets and the market forces always influence the rational prescription and consumption of the medicines (7). In this market as well, the concentration or exclusivity can have negative effects on the welfare of the society due to unreal prices. Realization and rationalization of the prices play key roles in consuming medicines. The price, as the most effective tool, can have a very powerful impact on maintaining and improving the quality of drugs. It can also help in controlling and balancing the irrational consumption of drugs (20). Chen and Schweitzer considered price setting as a fundamental principle in controlling the costs of medicines (21). Increasing the competition in the pharmaceutical industry is followed by the improvement of efficiency. Competition can change the exclusivity of the industry into the exclusive competition and can supply alternative productions. It may cause a reduction in exclusive and exploitative prices. According to the theories of microeconomics, competition causes clarity and stability of prices in markets (13). The structure of market in the health sector and consequently in the pharmaceutical section has great impact on population health level (22). For instance, Parikh et al., in their study, have shown that financial barriers are associated with insufficient access to services, low quality of services and bad clinical consequence in patients with diabetes (23). A study conducted by Roll showed that there is a negative linear relation between physicians' density and the possibility of prompt diagnosis of Marfan syndrome (24).

5. Conclusions
The Herfindahl-Hirschman index was determined to be 248.5. It shows the low concentration of the market in Iran. It can be concluded that through anti-exclusivity policies, the possibility of fair competition, price clarity, quality improvement, and an increase in satisfaction and responsibility can be achieved. Also, we should consider some advantages derived from the economies of scale and scope in some areas of the health sector. According to the findings of this study, at the low level of concentration indices in the pharmaceutical market in Iran, and the similarity of this market to the competitive model, the following policies are suggested to be considered: identification of bottlenecks in this section in order to perform modifications and improve the efficiency, benefiting from the competitiveness of pharmaceutical section and creating competition over generic products in order to increase the production of these products, and using competitive potentials of this section to design and execute policies of price setting. It is recommended that further studies be conducted in the field of the Pharmaceutical Market.

Conflict of Interest:
There is no conflict of interest to be declared.

Authors' contributions:
All authors contributed to this project and article equally. All authors read and approved the final manuscript.

References:

1) Ebadi J, Ghavam MH. Allocation of Pharma Subsidies with Respect to Efficiency and Equality. Tahghighate Eghtesadi. 2009; 44(86): 131-62.

2) Gellman B. A Turning Point That Left Millions Behind: Drug Discounts Benefit Few While Protecting Pharmaceutical Companies' Profits Series: DEATH WATCH: AIDS, Drugs and Africa; 2/3. Washington Post: 2000.

3) Boseley S. Third World Dying for New Medicines. The Guardian. 2001.

4) WHO. WHO Medicines Strategy: Framework for Action in Essential Drugs and Medicines Policy. 2000-2003. Available From: http://apps.who.int/medicinedocs/pdf/whozip16e/whozip16e.pdf.

5) Cecilia Oh. TRIPS, Drugs and Public Health: Issues and Proposals. Malaysia: Third World Network; 2001.

6) Zhang JX, Tao J. DE1 Market Concentration and ITS Cross-Linkage With The Consumption of ACE Inhibitors and Arbs. Value in Health. 2009; 12(7): A342. doi: 10.1016/S1098-3015(10)74683-0.

7) Dinarvand R. New National Drug Policy in Iran leading to Expanded Pharmaceutical Market and Extended Access of Public to Medicines. Iranian J Publ Health. 2009; 38(Suppl 1): 158-61.

8) Economist Intelligence Unit. Asia Competition Barometer Pharmaceuticals. Singapore's Economic Development Board; 2012.

9) Curry B, George KD. Industrial concentration: A survey. The Journal of Industrial Economics. 1983; 31(3): 203-55. doi: 10.2307/2097885.

10) Ebadifard Azar F, Rezapour A. Health Care Economics. Tehran: Ebadifard Publication; 2012; 107.

11) Rezaei F, Nasiri N, Haqiq H. An Empirical Analysis of Industry Concentration Efficacy in the Prediction of Manufacturing Industries' Stock Returns. Journal of Management Studies in Development & Evolution. 2010; 20(62): 61-89.

12) Mcpake B, Normand C. Health Economics. 2 ed. New York: Routledge; 2005; 143.

13) Santerre R, Neun S. Health Economics: Theories, Insights, and Industry Studies. Mason, OH: South-Western Cengage Learning; 2010.

14) Roberts MJ, Reich MR. Pharmaceutical Reform: A Guide to Improving Performance and Equity. Washington, DC: World Bank; 2011. doi: 10.1596/978-0-8213-8760-3.

15) Zweifel P, Breyer F, Kifmann M. Health Economics. Springer; 2009.

16) Tsai YW, Wen YW, Huang WF, Kuo KN, Chen PF, Shih HW, et al. Pharmaceutical penetration of new drug and pharmaceutical market structure in Taiwan: hospital-level prescription of thiazolidinediones for diabetes. Eur J Health Econ. 2010; 11(3): 279-90. doi: 10.1007/s10198-009-0174-1. PMID: 19649666.

17) Cameron A, Laing R. Cost savings of switching private sector consumption from originator brand medicines to generic equivalents. Geneva: World health report; 2010.

18) Heikkonen T, Tamminen N. The Concentration of Pharmaceutical Market in Some Medicine Groups in Finland. Value in Health. 2009; 12(7): 244-5. doi: 10.1016/S1098-3015(10)74195-4.

19) Torres Guerra S, Gutiérrez JP. [The pharmaceutical market in Mexico: size, value, and concentration]. Rev Panam Salud Publica. 2009; 26(1): 46-50. doi: 10.1590/S1020-49892009000700007. PMID: 19814881.

20) Tahsiry A. Reform of Drug Pricing is important. Donyaye eqhtesad. 2012.

21) Chen Y, Schweitzer SO. Issues in Drug Pricing, Reimbursement, and Access in China with References to Other Asia-Pacific Region. Value Health. 2008; 11 Suppl 1: S124-9. doi: 10.1111/j.1524-4733.2008.00376.x. PMID: 18387056.

22) Bissonnette L, Wilson K, Bell S, Shah TI. Neighbourhoods and potential access to health care: The role of spatial and aspatial factors. Health Place. 2012; 18(4): 841-53. doi: 10.1016/j.healthplace.2012.03.007. PMID: 22503565.

23) Parikh P, Leigh S, Parikh R, Meng H, Sakellarios N, Brown D. Association of Financial Barriers to Health Care With Access to Care, Quality of Care and Outcomes in Diabetics With Coronary Artery Disease. J Am Coll Cardiol. 2012; 59(13): 1842. doi: 10.1016/S0735-1097(12)61843-9.

24) Roll K. The influence of regional health care structures on delay in diagnosis of rare diseases: The case of Marfan Syndrome. Health Policy. 2012; 105(2-3): 119-27. doi: 10.1016/j.healthpol.2012.02.003. PMID: 22420917.