



# An Assessment of the Development at the Turkish Pharmacy Faculties

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## Research Article

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## Abstract

**Objective:** Pharmacy education first began in the Ottoman Empire with the *Pharmacy Class* at *Mekteb-i Tıbbiye-i Adliye-i Şâhâne*, which was founded in 1839, and then continued at different schools as *Mekteb-i Tıbbiye-i Şâhâne* (1867), *Haydarpaşa Military School of Health* (1876), *Şam Health School* (1903), and *Eczacı Mekteb-i Âlisi* (1908) to educate people for giving services in pharmacy field. At the beginning, the duration of the education at these schools was 2 years but after a while it was prolonged into 4 years. In this study, introducing the current status of Pharmacy Faculties and its academically improvement between the academic years of 2007-2008 and 2011-2012 are aimed.

**Methods:** In this study, by reviewing literature on Turkish Pharmacy Education, required information was inspected and by corresponding with the Pharmacy Faculties data about these schools were put forth.

**Results:** Today, pharmacy education in Turkey continues at the different Pharmacy Faculties. With the last regulations, the duration of education was prolonged into 5 years since 2005. The number of Pharmacy Faculties in Turkey is gradually increasing year by year and 24 of them provide pharmacy education. The education in these faculties is within international standards and besides many other scientific researches is on-going.

**Conclusion:** The high number of pharmacy faculties is the most important obstacle in front of the quality pharmacy education for making current situation even better, the importance of the balance between the employment of academic staff and student recruitment should not be ignored.

**Keywords:** Pharmacy education, Post-secondary education, Academic activity, Academician, Pharmacy faculty

## Introduction

Pharmacy education first began in the Ottoman Empire with the Pharmacy Class at *Mekteb-i Tıbbiye-i Adliye-i Şâhâne* that was founded in 1839. The first civilian pharmacy school *Mekteb-i Tıbbiye-i Mülkiye-i Şâhâne* opened in 1 March 1867 and the education continued at different schools such as *Haydarpaşa Military School of Health* (1876), *Şam Health School* (1903) and *Eczacı Mekteb-i Âlisi* (1908) to educate people for giving services in pharmacy field <sup>(1-8)</sup>.

At the beginning, the duration of the education at these schools was 2 years but after a while it was prolonged into 3 years in 1850s. After the proclamation of The Turkish Republic, the duration of the formal pharmacy education increased to 4 years in 1938. Between 1933 and 1944, the Pharmacy School was affiliated with the Faculty of Science. The school served between 1933 and 1944 under the Faculty of Medicine <sup>(1-8)</sup>. In case of today's conditions, keeping up with the international systems has an important place. Therefore the duration of pharmacy education was prolonged into 5 years in Turkey since 2005.

Today in the Turkish Republic, pharmacy education continues in the several faculties of pharmacies. There are 3 faculties in Ankara, 8 in İstanbul, and 1 in Ağrı, Diyarbakır, Edirne, Eskişehir, Erzincan, Erzurum, İzmir, Mersin, Malatya, Kayseri, Sivas, Trabzon and Van. Of these all faculties 24 of them provide pharmacy education <sup>(9)</sup>. Seven of these faculties underlie Turkish Pharmacy Education. Their brief histories are explained below:

**Ankara University Faculty of Pharmacy:** The faculty was founded in 1960 as the first pharmacy faculty in Turkey. Its first students were graduated in 1964-1965. First dean of the faculty was Prof. Dr. Nurettin Mazhar Öktek <sup>(3,4,7)</sup>.

**İstanbul University Faculty of Pharmacy:** This faculty is a continuation of Pharmacy Class in *Mekteb-i Tıbbiye-i Adliye-i Şâhâne*, which was founded in 1839. It took its current name in 1962. First dean of the faculty was Prof. Dr. Turhan Baytop <sup>(3,4,7)</sup>.

**Hacettepe University Faculty of Pharmacy:** The faculty was established within the Hacettepe University Faculty of Medicine as a department



and it took the current name in 1971. First dean of the faculty was Prof. Dr. Oğuz Kayaalp <sup>(7)</sup>.

**Ege University Faculty of Pharmacy:** The three private pharmacy schools in Izmir (Yakındoğu Private School of Pharmacy, Çankaya Private School of Pharmacy and Karataş Private School of Pharmacy) were combined in 1971 and then in 1974 Ege University Faculty of Pharmacy was established. First dean of the faculty was Prof. Dr. Dündar Berkan <sup>(7)</sup>.

**Gazi University Faculty of Pharmacy:** This faculty was established in 1968 as Anadolu School of Pharmacy. It was combined with Ankara Private School of Pharmacy and they were incorporated in Ankara Academy of Economics and Commercial Sciences. The faculty took its current name in 1982. First dean of the faculty was Prof. Dr. Fethi Aktan <sup>(7)</sup>.

**Anadolu University Faculty of Pharmacy:** The faculty was opened in 1968 as "HASTAŞ Private School of Pharmacy" Then, in 1971, it was get involved in Eskişehir Academy of Economics and Commercial Sciences and named as Anadolu University Faculty of Pharmacy in 1982. First dean of the faculty was Prof. Dr. İhsan Sarıkardaşoğlu <sup>(7)</sup>.

**Marmara University Faculty of Pharmacy:** İstanbul Private School of Pharmacy was founded in 1962. After the involvement into İstanbul Academy of Economics and Commercial Sciences in 1979, it took its name in 1982. First dean of the faculty was Prof. Dr. K. Turgay Yardımcı <sup>(7)</sup>.

Pharmacy faculties those are founded after 1990 are presented in Table 1.

**Table 1.** After 1990 opened and pharmacy education providing faculties in Turkey

The Name of the School	Year of Opening	Location
Atatürk University Faculty of Pharmacy	1997	Erzurum
Mersin University Faculty of Pharmacy	2000	Mersin
İnönü University Faculty of Pharmacy	2001	Malatya
Yeditepe University Faculty of Pharmacy	2001	İstanbul
Erciyes University Faculty of Pharmacy	2003	Kayseri
Karadeniz Teknik University Faculty of Pharmacy	2003	Trabzon
İstanbul Medipol University Faculty of Pharmacy	2010	İstanbul
Yeni Yüzyıl University Faculty of Pharmacy	2010	İstanbul
Bezmialem Vakıf University Faculty of Pharmacy	2010	İstanbul
Kemerburgaz University Faculty of Pharmacy	2012	İstanbul
Ağrı İbrahim Çeçen University Faculty of Pharmacy	2013	Ağrı
Cumhuriyet University Faculty of Pharmacy	2013	Sivas
Dicle University Faculty of Pharmacy	2013	Diyarbakır
Erzincan University Faculty of Pharmacy	2013	Erzincan
Trakya University Faculty of Pharmacy	2013	Edirne
Yüzüncü Yıl University Faculty of Pharmacy	2013	Van
Biruni University Faculty of Pharmacy	2014	İstanbul

It is thought that the number of pharmacy faculties increased to 50 with the planned faculties in different cities of Turkey. There are also 12 Pharmacy Services School in Vocational School of Health Services for educating pharmacy technicians and 13 Medical Presentation and Marketing School in Vocational Schools which are closely related with pharmacy services <sup>(9)</sup>.

Pharmacy as an interdisciplinary field of science contain many different areas like drug discovery, manufacturing, distribution, marketing and patient care <sup>(10)</sup>. In pharmacy faculties there are several divisions and departments to do scientific studies on these areas. Also, the education in the pharmacy faculties at the Division Head of Pharmaceutical Professional Sciences, Division Head of Pharmaceutical Technology and Division of Pharmaceutical Basic Sciences is within international standards in these faculties, too <sup>(11)</sup>. In this study, by reviewing literature on Turkish Pharmacy Education, required information was inspected and by corresponding with the Pharmacy Faculties data about these schools were put forth. Thus, introducing the current status of Pharmacy Faculties and its academical improvement among the academic years of 2007-2008 and 2011-2012 are aimed.

## Material and Method

In this study, the literature review on pharmacy education was made and related documents such as books, articles and reports were reviewed. Besides the history of pharmacy faculties in Turkey was examined. Also, some information like the number of students and academicians, academic studies among the academic years 2007-2008 and 2011-2012 were requested from faculties.

## Results

For the purpose of examining the Status of the Pharmacy Faculties among the years of 2007-2012, in the first place number of academicians at Pharmacy Faculties was investigated. The numbers of academicians per department at faculties among the academic years 2007-2008 and 2011-2012 are provided in Table 2.

As seen in the Table 2, there is not a significant change in total academician number at faculties. In addition, the number of students newly enrolled to faculties of pharmacy, total number of current students at faculty of pharmacy and number of graduates from the faculty of pharmacy also examined and these data are presented in Table 3.

A significant increase in the number of pharmacy students in recent especially years is observed in Table 3.



**Table 2.** Academicians per departments among the academic years 2007-2008 and 2011-2012

Departments	Professor					Associate Professor					Assistant Professor					Teaching Assistant					Research Assistant				
	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Pharmaceutical chemistry	48	46	51	53	52	16	16	12	13	15	14	16	16	15	14	2	2	2	2	2	41	31	28	29	32
Pharmacology	23	23	24	24	25	7	9	8	6	5	17	18	21	22	26	2	1	1	1	-	28	28	24	24	28
Pharmaceutical botany	4	4	4	5	5	2	2	6	5	6	7	8	6	6	6	-	1	-	-	1	12	9	10	11	14
Pharmacognosy	27	27	28	30	37	14	17	17	16	10	14	11	9	10	16	1	1	1	-	-	35	25	23	29	28
Pharmaceutical toxicology	20	21	22	22	21	7	8	7	7	7	6	7	10	10	10	2	1	2	2	2	30	27	20	20	21
Pharmacy management	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	2	3	3	3	4
Pharmaceutical technology	28	27	28	29	32	12	14	16	13	13	18	18	19	21	17	2	3	3	2	2	54	47	40	38	48
Radiopharmacy	2	1	2	2	2	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	7	3	3	3	3
Pharmaceutical biotechnology	2	2	3	3	3	1	3	2	2	2	3	3	4	3	3	-	-	-	-	-	7	5	5	5	5
Analytical chemistry	15	18	20	22	28	14	15	13	12	9	13	13	12	13	18	4	4	5	4	1	30	23	22	23	25
Biochemistry	14	14	13	13	14	3	6	9	9	7	12	12	10	14	17	1	1	2	2	1	35	23	18	17	15
Basic pharmaceutical sciences	6	4	4	5	7	5	4	5	7	4	4	2	2	2	6	-	-	1	1	1	15	12	9	9	7
Microbiology	7	7	9	7	7	2	3	2	3	4	8	7	7	6	6	-	-	-	-	-	8	8	8	8	9
<b>Total</b>	199	197	211	218	236	84	98	98	94	83	117	116	116	122	139	15	15	18	15	11	304	244	213	219	239

**Table 3.** Number of students among the academic years 2007-2008 and 2011-2012

	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
<b>Number of new enrollments</b>	1020	1195	1265	1421	1483
<b>Total number of current students</b>	4666	4896	5821	6368	7069
<b>Number of graduates</b>	966	374	815	988	1016

The number of national and international publications, papers, projects and books of academicians at pharmacy faculties are determined for finding out the scientific activities. In this step of the study, the data are collected from Anadolu, Ankara, Atatürk, Erciyes, Hacettepe, İnönü, İstanbul, Karadeniz Technical and Mersin Universities' Pharmacy Faculties. Other faculties are excluded as their being at the foundation stage and have not completed their academic staff and departments.

At Table 4, 5, 6 and 7, respectively the number of publications, presentations, projects and books at Pharmacy Faculties based on departments among the academic years 2007-2008 and 2011-2012 are given.

When examining the information presented in Table 4, the number of international publications seems to be greater than the number of national publications in almost all the departments in the Faculties of Pharmacy.

When examining the information presented in Table 5, like as the number of publications, the number of presentations at international congresses seem to be greater than the number of presentations at national congresses in the Faculties of Pharmacy.

From Table 6, it is observed that there is an increase in the both the number of projects carried out and the total number of the projects over the years in several departments in the Faculty of Pharmacy.

As the number of projects, it can easily be seen from Table 7 that the number of written books in the Faculties of Pharmacy is lower than other scientific activities.

### Discussion & Conclusion

Training pharmacists who have extensive knowledge about drugs and an important role on drug delivery is significant in terms of public health and professional development<sup>(12,13)</sup>. On the other hand, it is a must to follow quality criteria for an efficient education<sup>(14)</sup>. Therefore, academicians have a great role in this term.



**Table 4.** Number of published articles among the academic years 2007-2008 and 2011-2012 in pharmacy faculties

Department		Number of published articles				
		2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Pharmaceutical chemistry	IN	56	98	115	105	80
	N	4	8	8	8	10
Pharmacology	IN	54	59	104	114	101
	N	11	21	21	33	32
Pharmaceutical botany	IN	26	30	26	25	23
	N	18	19	20	27	11
Pharmacognosy	IN	102	142	148	161	136
	N	43	36	19	46	35
Pharmaceutical toxicology	IN	35	62	92	71	73
	N	17	34	9	15	16
Pharmacy management	IN	3	-	-	2	5
	N	2	8	5	12	9
Clinical pharmacy	IN	2	4	1	7	4
	N	2	1	3	7	3
Pharmaceutical technology	IN	41	67	76	102	77
	N	12	16	23	32	16
Radiopharmacy	IN	10	5	4	2	3
	N	-	-	-	-	-
Pharmaceutical biotechnology	IN	19	16	13	22	19
	N	-	1	1	4	1
Analytical chemistry	IN	51	98	122	138	139
	N	12	12	17	21	8
Biochemistry	IN	43	43	56	71	77
	N	8	17	10	14	16
Basic pharmaceutical sciences	IN	13	10	9	7	15
	N	3	1	1	3	-
Pharmaceutical microbiology	IN	21	42	45	36	49
	N	7	9	18	9	15
<b>Total</b>		615	540	966	1094	973

(IN: International, N: National)

As seen in the Table 2 and 3, there are differences in the number of academicians and students at faculties. This situation also affects the scientific activities conducted in the department and these activities show some variations according to years. There were 719 academicians in pharmacy faculties between 2007 and 2008, 708 between 2011 and 2012. The number of academicians changes in each year. Furthermore, according to the Student Selection and Placement Center's data, 1.1% of the all academicians in Turkey were employed in pharmacy faculties in 2007. This ratio decreased to 0.72% in 2012 <sup>(11)</sup>. In addition, reasons like majority of the number of examinations and the desired conditions for being academician caused a reduction at the number of research assistants in the Faculties of Pharmacy.

In the light of data from pharmacy faculties and the Evaluation, Selection and Placement Center, the total number of enrolled students in pharmacy faculties

**Table 5.** Number of presentations among the academic years 2007-2008 and 2011-2012 in pharmacy faculties

Department		Number of presentations (both oral and poster)				
		2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Pharmaceutical chemistry	IN	53	93	153	123	100
	N	35	16	25	47	35
Pharmacology	IN	53	57	64	59	90
	N	41	27	39	48	44
Pharmaceutical botany	IN	16	30	29	32	38
	N	20	50	35	34	19
Pharmacognosy	IN	84	152	56	56	57
	N	54	82	70	89	60
Pharmaceutical toxicology	IN	53	66	82	76	77
	N	69	45	36	47	45
Pharmacy management	IN	1	2	5	10	22
	N	4	11	4	11	12
Clinical pharmacy	IN	8	4	16	22	10
	N	3	2	2	4	4
Pharmaceutical technology	IN	89	120	105	113	108
	N	29	49	22	39	39
Radiopharmacy	IN	6	7	9	2	7
	N	4	-	2	4	6
Pharmaceutical biotechnology	IN	27	25	20	20	38
	N	12	23	13	9	7
Analytical chemistry	IN	40	94	77	100	96
	N	21	60	61	34	79
Biochemistry	IN	51	51	40	51	35
	N	33	25	37	55	26
Basic pharmaceutical sciences	IN	14	4	24	19	17
	N	9	4	10	5	10
Pharmaceutical microbiology	IN	14	30	24	42	39
	N	27	19	11	15	18
<b>Total</b>		870	1148	1071	1166	1138

(IN: International, N: National)

increased. It is thought that the working areas of pharmacy profession affect the students' choice on choosing their career <sup>(15,16)</sup>. Faculties of Pharmacy opened in recent years have also played a role in the increase of this number. The decrease in the number of the students graduated from the faculty at 2008-2009 is a result of legal regulation that extended the training period to 5 years is evaluated.

Considering all these data, the imbalance between the number of students and academic staff in the faculties is thought to cause various problems. In the sources of the early 2000s, although the number of the Faculty of Pharmacy was reported to be sufficient and even more, the increasing number of faculty is a remarkable case. According to Çiftçi, the inequality in the number of students per academicians is the reason of losing social benefit <sup>(12)</sup>. In this perspective, by interactive training in theoretical courses could be provided





**Table 6.** Number of projects among the academic years 2007-2008 and 2011-2012 in pharmacy faculties

Departments		Number of projects				
		2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Pharmaceutical chemistry	IN	-	-	-	-	1
	N	36	42	58	61	46
Pharmacology	IN	4	2	3	4	8
	N	13	27	32	34	40
Pharmaceutical botany	IN	8	8	-	1	-
	N	7	22	20	16	20
Pharmacognosy	IN	1	-	-	2	2
	N	20	28	31	25	19
Pharmaceutical toxicology	IN	-	1	-	1	1
	N	21	25	30	16	36
Pharmacy management	IN	1	-	-	1	-
	N	-	-	-	-	-
Clinical pharmacy	IN	-	-	-	-	-
	N	-	-	1	1	1
Pharmaceutical technology	IN	5	-	2	1	2
	N	23	39	42	28	36
Radiopharmacy	IN	-	-	-	-	-
	N	1	1	-	2	1
Pharmaceutical biotechnology	IN	-	1	-	-	-
	N	4	4	5	5	12
Analytical chemistry	IN	7	1	-	-	2
	N	23	34	33	37	17
Biochemistry	IN	2	1	9	-	-
	N	18	25	22	35	44
Basic pharmaceutical sciences	IN	-	-	1	-	-
	N	7	6	5	5	6
Pharmaceutical microbiology	IN	-	-	-	-	-
	N	13	11	25	20	27
<b>Total</b>		214	278	319	295	321

(IN: International, N: National)

in order to reduce the number of students per faculty member as demonstrated in a variety of studies, so the quality of pharmacy education and the quality of pharmacy profession have reached to a certain level.

Analyzing the data received from the faculties, changes in the number of academicians work in faculties seem to affect the number of scientific studies. In addition to that, the high number of articles that assessed as scientific activities is thought to be a result of the academic promotion criteria.

Differences in the number of publications, presentations, projects and books at departments those are carrying out their scientific studies in faculties seem to be closely related to the area of the department in which they study and also the number of academic staff in the department. Within the departments' study area, the number of scientific journals they can make publications and congresses they can participate can vary greatly according to the study area. Again the numbers of projects prepared by the departments are significantly affected by the factors mentioned above as well as cooperation opportunities in faculty. Therefore, the departments cannot be properly compared with each other, instead, it would be

**Table 7.** Number of published books among the academic years 2007-2008 and 2011-2012 in pharmacy faculties

Departments		Number of published books				
		2007-2008	2008-2009	2009-2010	2010-2011	2011-2012
Pharmaceutical chemistry	IN	2	-	-	1	-
	N	2	1	6	5	-
Pharmacology	IN	2	2	1	-	10
	N	3	2	11	3	3
Pharmaceutical botany	IN	-	1	-	2	1
	N	3	5	3	5	3
Pharmacognosy	IN	3	2	1	2	1
	N	2	1	2	2	5
Pharmaceutical toxicology	IN	-	3	1	-	2
	N	1	-	2	1	1
Pharmacy management	IN	-	-	-	-	1
	N	-	1	4	3	1
Clinical pharmacy	IN	-	-	2	2	3
	N	-	-	-	1	3
Pharmaceutical technology	IN	4	1	-	1	-
	N	4	2	6	3	5
Radiopharmacy	IN	-	-	1	1	-
	N	1	1	-	-	-
Pharmaceutical biotechnology	IN	1	-	-	-	-
	N	-	-	-	-	-
Analytical chemistry	IN	1	-	-	-	-
	N	-	-	4	7	-
Biochemistry	IN	-	-	-	-	-
	N	6	6	1	1	1
Basic pharmaceutical sciences	IN	-	-	-	-	-
	N	2	-	2	-	1
Pharmaceutical microbiology	IN	-	-	-	-	-
	N	-	1	1	1	7
<b>Total</b>		37	29	48	41	48

(IN: International, N: National)

appropriate to make the necessary evaluations by taking into account the opportunities of the related scientific field are considered.

The high number of pharmacy faculties is the most important obstacle in front of the quality pharmacy education. 85% of pharmacy graduates prefer to serve in community pharmacy<sup>(13)</sup>. Of this ratio, a decrease is expected after the change on the "Law on Pharmacy and Pharmacists" in 2012, which restricts the rules for opening community pharmacy easily<sup>(17)</sup>. On the other hand, the pharmacists' employment opportunities should be increased in order not to encounter with unemployment problem in the future. To ensure continuity of quality of the pharmaceutical sector in our country, the employment of academics who provide education in faculties of pharmacy must also be provided quickly. For this, as well as making various presentations that lead graduates from Faculty of Pharmacy to be an academicians, submission of financial and spiritual incentives will also provide benefits. Furthermore,



the Higher Education Council should increase the number of the research assistants and Academician Education Program cadres at Pharmacy Faculties for the purpose of directing new graduate pharmacists to universities in order to close the teaching staff deficit in the pharmacy field.

In accordance with all these data, for making current situation even better, the importance of the balance between the employment of academic staff and student recruitment should not be ignored.

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## AUTHORS' CONTRIBUTIONS

Authors contributed equally to all aspects of the study.

## PEER REVIEW

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## CONFLICTS OF INTEREST

The authors declare that they have no competing interests.