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The history of haemodialysis in Turkey

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ΑΡΧΕΙΑ ΕΛΛΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ 2020, 37(Συμπλ 2):231–236

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Η ιστορία της αιμοκάθαρσης στην Τουρκία

Περίληψη στο τέλος του άρθρου

The review of the historical process of haemodialysis (HD) application in Turkey from the beginning to the present. It can easily be seen that the founders on Nephrology made great sacrifices that these days have not been easily reached. The establishment of dialysis centres was also time- consuming and difficult. The first application was made in 1962 at the Ankara University Faculty of Medicine. This was followed in 1965 by the Cerrahpaşa Medical Faculty. Dialysis recording systems started in 1989. Today, there are about 884 HD centres in Turkey, two-thirds of which are private and one-third public. The fees of these patients are covered by the government and no extra payment is required. These centres are spread all over Turkey and there is no patient who has died due to lack of HD treatment. Patients are taken from and to their homes free and meals are provided by HD centres. Procedures and regulations related to HD are thoroughly arranged. All centres are supervised twice a year. A certificate program has been implemented since 2000 and authorised staff has been trained and given five-year certificates. Recent data shows that in Turkey there are about 63,349 patients and 17,322 devices. The annual mortality rate is 15%. The number of patients who use home HD has exceeded 800, placing Turkey in third position in Europe.

Key words

History of haemodialysis Turkey
Home dialysis Turkey
Renal Registry Turkey

1. HISTORY OF HAEMODIALYSIS IN TURKEY

The first studies and views on dialysis in the world emerged in 1854, when Thomas Graham, a Scottish chemist from Glasgow University first described dialysis. The first studies on artificial kidneys were made in 1912 by Abel, Rowtree and Turnel. In 1942, it was administered by Kolff in a patient with acute renal failure. The artificial kidney, which had not been used in chronic cases until 1960, was used in irreversible kidney failure cases with the development of the closed cannula (Scribner et al, 1965). However, the actual solution was achieved with the arteriovenous fistula performed for first time by Brescia and Cimino.[1]

Our first encounter with the term haemodialysis (HD) was when a plane crashed at Ankara Ulus Square in 1963. The lack of dialysis was then realised and the term "acute renal failure" first appeared on the agenda. Nephrology was not a separate discipline yet and kidney diseases were treated in the context of Internal Medicine. Due to the accident, the media focused on dialysis and the World Health Organization donated three haemodialysis machines for the treatment of those injured.[1]

Turkish Nephrology took a great leap in 2000. Progress started in the 1950s, increased in the 1960s and gained momentum in the 1970s. In the beginning, it developed slowly with the efforts of individualists, progressed with the establishment of haemodialysis centres in the 1980s, and reached world standards in the 1990s. Its course is parallel to the historical scientific developments occurring throughout the world, but it faces difficulties in dialysis practice such as the necessity of providing most materials and tools from abroad and the inadequacy of dialysis for society. The lack of trained personnel caused delays in these practices.[1–4] The history of Turkish Nephrology started in the 1950s, with the book "Internal Renal Diseases" by C. Sökmen, Professor of Ankara University Faculty of Medicine, which saw a second edition in 1961.[5,6] Following this book, peritoneal lavage was performed in 1958 at Cebeci Hospital of the Ankara University Faculty of Medicine,[7] acute haemodialysis with Kolff's artificial kidney device in 1962, acute peritoneal dialysis in 1963 and a percutaneous renal biopsy in 1964.[8]

According to Professor E. Ertuğ, at the end of 1961, a closed system (tank type), positive pressure HD device developed by Kolff and manufactured by Travenol was imported by the Ankara Medical Faculty and applied to a patient for the first time in June 1962.[1]

Following this, it is understood from "Internal Renal Diseases" by C. Sökmen, that the next HD studies were

performed at the Istanbul University Cerrahpaşa Faculty of Medicine. Professor K. Önen was introduced to the HD machine in 1956, when it was shown to him by the renowned nephrologist and thinker Professor J. Hamburger at the Necker Hospital in Paris. In 1962, at Los Angeles County General Hospital, he learned to use the oldest Travenol-type machine in the renal unit and its application in patients. He states that there was a total of 7–8 HD machines in Los Angeles, all used for the treatment of acute renal failure. When Professor Kemal Önen returned to the Istanbul University Faculty of Medicine "Treatment Clinic and Pharmacology" chair in 1964, he started HD in patients with acute renal failure for the first time in 1965 by purchasing a Travenol 100l tank and a Sigmamotor pumped HD device. Since 1966, this practice has continued as needed[1,3] (fig. 1). A positive pressure HD device was used for the first time in June 1962 at Ankara University School of Medicine.[1,2] Research shows that at the end of 1961, a tank-type HD machine was imported and first used in the treatment of a patient at the Ankara University Faculty of Medicine in June 1962. There were no posts, nor professional staff allocated to conduct dialysis at that time.[1,10,11]

Later applications in Turkey were made at Istanbul University Cerrahpaşa Faculty of Medicine by Kemal Önen (1965), Istanbul University Çapa Faculty of Medicine by Muhsin Özen (1969), Sağlık Bilimleri University Gülhane Faculty of Medicine by Müştak Özüer (1972), Hacettepe University Faculty of Medicine Paediatrics by Ümit Saatçi (1974), Atatürk University by Ayla San (18.07.1975) and Uludağ University by Aydoğan Öbek and Mustafa Yurtkuran (28.11.1975)[12] (fig. 2, tab. 1).

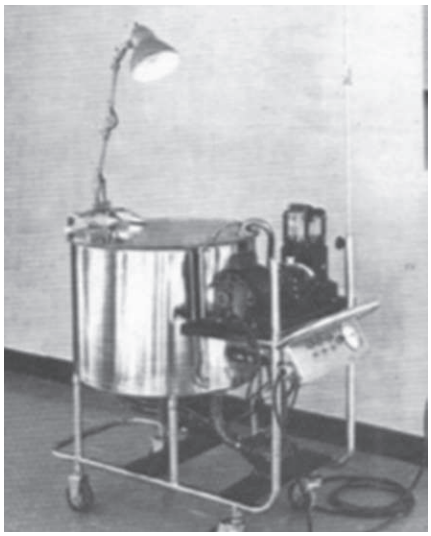


Figure 1. First used haemodialysis (HD) machine, 1962 (device).[9]

2. FIRST APPLICATIONS OF HAEMODIALYSIS

- 1962 Ankara University Faculty of Medicine (E. Ertuğrul and his team)
- 1965 Istanbul University Cerrahpaşa Faculty of Medicine (K. Önen)
- 1969 Istanbul University Çapa Faculty of Medicine (M. Özen)
- 1970s Ege University Faculty of Medicine (S. Yeğinboy, A. Cura)
- 1970 The first company in the field of haemodialysis, Tibsan A.Ş. (Ş. Soyuyüce)
- 1972 Gülhane Military Medical Faculty (M. Özüer)
- 1974 Hacettepe University Faculty of Medicine (Ü. Saatçi, A. Gürçay, Ş. Çağlar)

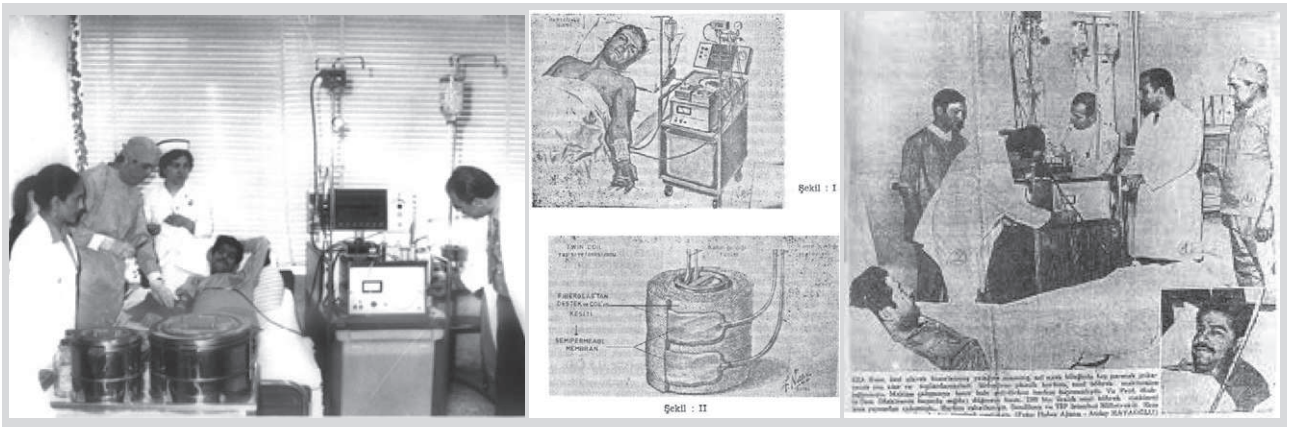


Figure 2. The first dialysis device and coil dialyser.[10]

Table 1. Haemodialysis centres and device types available in 1980 in Turkey.[11]

	Travenol		Fresenius Canister	Rhoidal 75	Gambro	Seatle
	RSP	Clear				
Adana						
Medical Faculty	5	–	–	–	–	–
Ankara						
A.Ü. Medical Faculty	3	4	–	1	2	1
Gülhane Medical Faculty	4	–	–	–	–	–
Güven Hospital	3	–	2	–	–	–
Hacettepe Medical Faculty	13	–	–	–	–	–
Trafik Hospital	3	–	–	–	–	–
Yüksek İhtisas Hospital	5	–	–	–	–	–
Bursa						
Medical Faculty	7	–	–	–	–	–
Erzurum						
Medical Faculty	1	–	–	–	–	–
Istanbul						
Beyoğlu First Aid Hospital	–	–	1	–	–	–
İ.Ü. Çapa Medical Faculty	6	2	–	–	–	–
İ.Ü. Cerrahpaşa Medical Faculty	4	–	–	–	–	–
Haydarpaşa Numune Hospital	5	–	–	–	–	–
Samatya SSK Hospital	9	–	–	–	–	–
İzmir						
Ege Medical Faculty	5	–	–	–	–	–
Tepecik SSK Medical Faculty	5	–	–	–	–	–
Trafik Hospital	–	–	–	2	–	–
Kayseri						
Gevher Nesibe Medical Faculty	3	–	–	–	–	–
Home Dialysis in Develi	1	–	–	–	–	–
Samsun						
Medical Faculty	1	–	–	–	–	–
Total	83	6	3	3	2	1

- 1974 Haemodialysis in infant patients first applied at Hacettepe (Ü. Saatçi)
- 1975 Atatürk University Faculty of Medicine (A. San)
- 1975 Uludağ University Faculty of Medicine. (A. Öbek, M. Yurtkuran)
- 1975 Yüksek İhtisas Hst. [The Turkish High Specializing Hospital] (S. Çetin and his team)
- 1976 First private dialysis centre (M. Özüer)
- 1976 Çukurova University (C. Kobal)
- 1978 Istanbul Training Hospital [SSK] (M. Erman, F. Karakullukçu, F. Kutlar)
- 1979 Ankara Training Hospital [SSK] (S. Şen)
- 1980 Dr Behçet Uz Children's Hospital, is the first haemodialysis centre in Turkey to serve children among state hospitals (G. İnan, M. Bak)
- 1991 The first company to produce haemodialysis bicarbonate solution (Ren-Med)
- 1996 First Haemodialysis Material Production in Turkey (Tıpsan A.Ş., SA-SAN)

3. DIALYSIS RECORDING SYSTEMS[13]

- HD recording systems started in Istanbul in 1989 by the Society of Turkish Nephrology. From 1990 onwards, it developed to today's modern status. The Ministry's of Health comprehensive national dialysis and transplantation recording system was introduced in 1996.

The number of HD Centers in our country historical development has steadily increased. The number of centers in Turkey between 1980 and 1985 was 19. The number of patients was between 600 and 700. There were 256 centres in 1998 and 472 centres in 2003. In 2004, there were 518 centres and 29,775 patients. In 2005, there were 577 centres and 33,241 patients. In 2012, there were 48,900 haemodialysis patients (including paediatric cases). Regarding the number of devices, the Ministry of Health had 4,483, the private sector 9,877 and universities 1,276.[18]

4. CURRENT STATUS OF HAEMODIALYSIS IN TURKEY

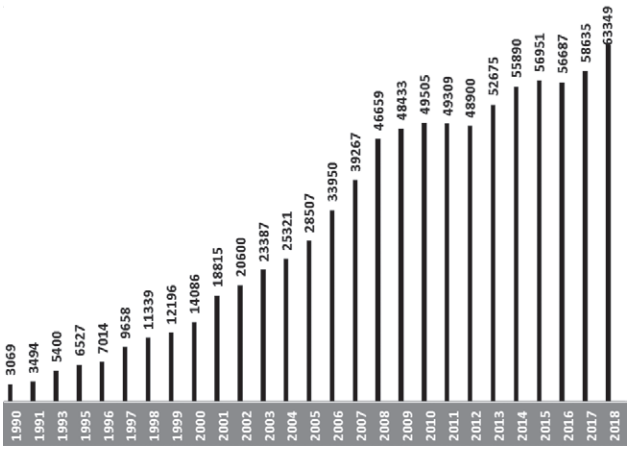
Recent data show that there are about 63,349 patients in Turkey and 17,322 devices. The annual mortality rate is 15%; there were about 882 HD centres in 2018,[14] two-thirds of which private and one-third public. The fees of these patients are covered by the government and no extra payment is required. These centres are spread all over Turkey.[15] Patients are taken from and to their homes free and meals are provided by HD centres.[16]

However, inadequate numbers of trained personnel reduce the quality of the dialysis process. The focus should be not on opening dialysis centres but on providing better health services to our patients by quality dialysis while safeguarding the national economy against unnecessary expenses.

According to the Ministry of Health, as of 2019, there are 884 HD centres in Turkey. All dialysis centres are inspected twice a year by the health directorates. Since 2000, a dialysis certificate program has been implemented and physicians and nurses other than nephrologists who will work in dialysis have been trained in dialysis training centres and certified, with certificates subject to recertification after 5 years.[16]

In the last 10 years, approximately 30 dialysis technician schools have been established in vocational colleges within universities and so far 13,500 technicians have graduated. 3,500 new dialysis technicians graduate each year[17] (tab. 2).

Table 2. Number of haemodialysis patients in Turkey.[18]



5. MINISTRY OF HEALTH HAEMODIALYSIS DATA 2018 IN TURKEY

See table 3.

6. DISTRIBUTION OF HD PATIENTS ACCORDING TO HD TYPE AS OF THE END OF 2018

Standard HD in centre; n (57.649), % (95.06), haemodiafiltration; n (1.733), % (2.86), home HD; n (555), % (0.92), haemofiltration; n (15), % (0.02), unknown type; n (691), % (1.14), total; n (60.643), % (100.00).[19]

6.1. Home haemodialysis

Home haemodialysis (HD) for the treatment of end-stage renal disease was first developed in the early 1960.[20] In Turkey, home HD started for the first time in 2006, with 4 patients in İzmir. After four years of trouble-free treatment of these patients, home HD was defined in Dialysis Centres Regulation 18, published in the Official Gazette of 18.06.2010 under number 27615, and has since been

Table 3. Ministry of Health. Haemodialysis data 2018 for Turkey.[19]

Type of institution	Number of institutions	Number of patients	Number of machines
Ministry of Health	502	19.858	5.953
University	55	4.584	1.162
Private	325	38.907	10.207
Total	882	63.349	17.322

reimbursed by the Social Security Institution. In the following years, haemodialysis at home became widespread throughout Turkey. In early April 2018, there were approximately 380 private and 75 public sector home HD patients in Turkey. In the end of 2016, in terms of the number of home haemodialysis patients, Turkey, third in Europe after the UK and Germany,[16] rose to eighth in the world. Planning and financing a healthy home haemodialysis program is possible through close cooperation between clinicians, health authorities, the social security institution and the private sector. In order to spread home HD, which seems profitable for all stakeholders, its awareness should be increased, service should be made available in all cities, red tape should be minimised and procedures should be reduced.[15]

7. CONCLUSIONS

Turkish Nephrology has witnessed great developments since its beginnings. Major steps have been taken in HD and nowadays, all types of HD are used, including all the latest scientific developments. Home HD has also gained ground. As of 1 March 2019, the Dialysis Centres Regulation was renewed.

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ΠΕΡΙΛΗΨΗ

Η ιστορία της αιμοκάθαρσης στην Τουρκία

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Αρχεία Ελληνικής Ιατρικής 2020, 37(Συμπλ 2):231–236

Η ανασκόπηση της ιστορικής διαδικασίας εφαρμογής της αιμοκάθαρσης (HD) στην Τουρκία από την αρχή μέχρι σήμερα. Μπορεί εύκολα να φανεί ότι οι ιδρυτές της Νεφρολογίας έκαναν μεγάλες θυσίες που δεν επιτυγχάνονται εύκολα σήμερα. Η ίδρυση κέντρων αιμοκάθαρσης ήταν επίσης χρονοβόρα και δύσκολη. Η πρώτη εφαρμογή έγινε το 1962 στην Ιατρική Σχολή του Πανεπιστημίου της Άγκυρας. Αυτή ακολούθησε το 1965 η Ιατρική Σχολή του Πανεπιστημίου Cerrahpaşa. Τα συστήματα καταγραφής αιμοκάθαρσης ξεκίνησαν το 1989. Σήμερα, υπάρχουν περίπου 884 κέντρα αιμοκάθαρσης στην Τουρκία, τα δύο τρίτα των οποίων είναι ιδιωτικά και το ένα τρίτο δημόσια. Το κόστος νοσηλείας αυτών των ασθενών καλύπτεται από την κυβέρνηση και δεν απαιτείται επί πλέον πληρωμή. Τα κέντρα αυτά είναι διεσπαρμένα σε ολόκληρη την Τουρκία και δεν υπάρχει ασθενής που πέθανε εξ αιτίας της δυνατότητας για αιμοκάθαρση. Οι ασθενείς μεταφέρονται από και προς τα σπίτια τους δωρεάν και παρέχονται γεύματα από τα κέντρα αιμοκάθαρσης. Οι διαδικασίες και οι κανονισμοί που σχετίζονται με την αιμοκάθαρση είναι καλά οργανωμένοι. Όλα τα κέντρα εποπτεύονται δύο φορές τον χρόνο. Από το 2000 εφαρμόστηκε πρόγραμμα πιστοποιητικών και το εξουσιοδοτημένο προσωπικό έχει εκπαιδευτεί και έχει λάβει πιστοποιητικά πενταετούς διάρκειας. Πρόσφατα στοιχεία δείχνουν ότι στην Τουρκία υπάρχουν περίπου 63.349 ασθενείς και 17.322 συσκευές. Το ετήσιο ποσοστό θνησιμότητας είναι 15%. Ο αριθμός των ασθενών που κάνουν κατ' οίκον αιμοκάθαρση ξεπέρασε τους 800, τοποθετώντας την Τουρκία στην τρίτη θέση στην Ευρώπη.

Λέξεις ευρετηρίου: Ιστορία της αιμοκάθαρσης Τουρκία, Κατ' οίκον αιμοκάθαρση Τουρκία, Νεφρολογικό αρχείο

References

1. SAN A. History of hemodialysis in our country. In: Akpolat T, Utaş C (eds) *Hemodialysis physician manual.* 2nd ed. Anatolia Publishing, Kayseri, 2001:350–359
2. EGE R. *On the 50th anniversary of the Republic: AÜ Development of the Faculty of Medicine.* Ankara University Scholl of Medicine, Ankara, 1974:681–683
3. ÖNEN K, UNAT EK. *After 1850 in the world and Turkey's history of progress in medicine.* Cerrahpaşa Medical School Foundation, İstanbul, 1988:310–316
4. BLACK SD. *Renal disease.* 3rd ed. Blackwell Scientific Publications, Oxford, 1972
5. SÖKMEN C. What we lost from the first mortar in nephrology.

Renaliz Newspaper 1999, 1:2
6. SÖKMEN C. *Internal renal diseases.* Ankara University Faculty of Medicine Publications, Ankara, 1951
7. SIPAHI N. Memories of first steps in peritoneal dialysis. *Renaliz Newspaper* 2002, 10:3
8. Contributed to nephrology, Selahattin Koloğlu, our distinguished Professor who performed the first renal biopsy intervention. *Renaliz Newspaper* 2002, 9:3
9. SAN A. *Dialysis in Turkey from past to present.* Anatolia Kidney Foundation Publications, Ankara, 1998
10. SAN A. Recent opinions in hemodialysis. *Atatürk University Medical Bulletin* 1976, 1:113–128
11. ERTUĞ E, ERBAY B. Problems experienced in the dialysis methods used for the treatment of patients with renal failure. *Ankara Medical Journal* 1980, 33:386
12. SAN A. *Turkish history of nephrology.* Anatolia Kidney Foundation Publications, Ankara, 2002
13. SAN A. *Turkish history of nephrology: A summary.* Anatolia Kidney Foundation Publications, Ankara, 2003
14. MINISTRY OF HEALTH OF TURKEY. Annual report 2018
15. DEMIRCI C, OK E. Home hemodialysis. *Journal of Patient Safety and Health Finance* 2018, 1:6–15
16. ARSLAN H. *Problems in dialysis.* Dialysis Physicians Association Presentation, National Congress of Nephrology, Hypertension, Dialysis and Transplantation. Antalya, 2017
17. Regulation on dialysis centres. Official newspaper, 1.3.2019
18. TURKISH SOCIETY OF NEPHROLOGY AND TRANSPLANTATION. Registry 1996–2019
19. SÜLEYMANLAR G, ATEŞ K, SEYHANI N (eds). *In Turkey Nephrology Dialysis and Transplant Registry 2018.* T.C. Ministry of Health and Turkish Nephrology Association Joint Report. Turkish Society of Nephrology Publications, Ankara, 2019
20. BLAGG CR, DALY SM, ROSENQUIST BJ, JENSEN WM, ESCHBACH JM. The importance of patient training in home hemodialysis. *Ann İntern Med* 1970, 73:841–847

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